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Transcript Exhibit(s)

Docket #(s): T-00000A-00-0194

Exhibit # : See attached Exhibit List for the Status of each Exhibit.

ACRA
Arizona Court Reporters Association

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Court Reporting & Realtime Specialists

e-mail: azrs@az-reporting.com
www.az-reporting.com

NCRA MEMBER Guardians of the Record

Marta T. Hetzer
Administrator/Owner

Suite Three
2627 North Third Street
Phoenix, AZ 85004-1103
(602) 274-9944
FAX: (602) 277-4264

TO: Ms. Lyn Farmer, Chief Administrative Law Judge
Ms. Nancy Cole – Docket Control

RE: Qwest / Cost Docket Phase IIA
T-00000A-00-0194
11-07-2001 Volume I
11-08-2001 Volume II

DATE: Friday, November 16, 2001

FROM: Marta T. Hetzer

The original exhibits in this matter have been filed today, as follows:

Docket Control

AT&T Exhibits	AT&T 1, 2, and 7 through 10
Staff Exhibits	S-1 to 5 and 7 through 9 Note: S-8 has been deemed public by Mr. Devaney, see Page 435, Line 24
Qwest Exhibits	Qwest 1 through 11
WorldCom Exhibits	WorldCom 1 through 6

CALJ Farmer Confidential Exhibits

AT&T Exhibits	AT&T 3 through 6
Staff Exhibit	S-6

Thank you very much.

Arizona
Docket No. T-00000A-00-0194
AT&T 011-217

INTERVENOR: AT&T Communications of the Mountain States, Inc.

REQUEST NO: 217

Summarize the purpose of each of the files, including databases, executables, and any other files, that constitute the SCM.

RESPONSE:

For your convenience we are providing the Attachments A, B, C, D and E. Attachments A, B, and C are the "Help" files found within the Models. Attachment D, is the Technical Description for the Switching Cost Model(SCM) and Attachment E is the Computing Unit Investments document.

Respondent: Jennifer Peppers, Sr. Cost Accountant, Qwest

tabbies EXHIBIT Admitted ATT 1

ATTACHMENT A

Table of Contents

Overview of Switching Core Module

The Switching Core Module has three functions: (1) calculate unit investments for each single office and report those values; (2) weight single office values s together into one or more multiple office studies that are used by the Switching Features Module; (3) develop investments by call type for each office; these values are used by the Switching Usage Module.

The first function of Core is to calculate data (unit investments) for single offices (CLLI codes). These calculated office records are then weighted to create state and company-wide studies that are used as input to the Switching Features Module. The same single office records are used to create investments for various services and call types for each office. These call type investments are used as input to the Switching Usage Module.

Input data items for offices of one switch type are stored in a Microsoft ACCESS 97 based file. Unit investments for each office are saved in the same file.

Computing Unit Investments: Opening Investment and Office Data Files

The process of calculating single office data utilizes two types of files: an investment **Database** file and a single **Office Data** file. For each sort of switch type, there is a database file and an office data file. Therefore, since the Switching group has modeled four switch types, there are 8 files (4 Database and 4 Office Data).

The Database file for each switch type contains equipment definitions and prices, calculation definitions, quantities, capacities, and other data that is not related to any specific office. The Office Data file contains specific office data, e.g. lines, trunks, traffic data (*Inputs*), as well as items constant to all offices, e.g. discounts, study periods (*Parameters*).

Both files are Microsoft ACCESS 97 based files. Data in these files is maintained using ACCESS. However, a user does not need to have a copy of the ACCESS data base program to be able to run the Switching Core Module. It should also be noted that the Switching Core Module does not create Database or Office Data files. The provided files, or copies, must be used.

When the Switching Core Module is started, it prompts the user for a Database file. The structure of the filename for this type of file is **IxxxYYan** where **I** (or **i**) designates Investment database file. **xxx** is a three character reference to switch type (e.g., SW1). The **YY** is a year designation, such as 99, which represents the year in which the data was last current. The **a** and **n** represent a combination of letters and numbers. This combination is not significant --- it is varied during model development for archival purposes.

When the user has selected an investment Database from the "OPEN SWITCHING DATABASE FILE" window, the Switching Core progr m immediately presents the user with the "OPEN SWITCHING OFFICE FILE" window.

The user then should select an Office Data file. The structure of the filename for this type of file is **OxxxYYan**. The **O** (or **o**) designates an Office file and **xxx** is the switch type as in the Database filename. (The switch type must match in the Database and Office Data filenames.) The **YY** is a year designation, such as 99, which usually designates the year in which the data has been calculated. The **an** represents a combination of letters and numbers. This combination is not significant --- it is varied during model development for archival purposes. This combination and the one referenced in the Database filename are of no significance and need not match each other.

If the user ever wants to change switch types, use the File command on the menu bar and open a new Database, then a matching Office Data file. *The order is important.*

Computing Unit Investments: Calculating a Single Office

Once the two file types have been opened, office data can be calculated one of two ways. A single office can be highlighted in the centered (Offices for Calculating) list box (blue), then the 'Calculate and Save Office' button "pressed."

Note: If desired, the user should enter selections in the Options area (green) before pressing the Calculate and Save Office button. See Computing Unit Investments: Obtaining detailed calculation information for an office *for more information.*

OPTIONS:
The offices may also be calculated in a group (batch mode). If the 'ALL' option under 'Batch Processing: Offices' is selected, then the 'Calculate and Save ALL Offices' button "pressed," all offices in the Office Data file will be calculated.

If the 'STATE' option is selected, a state abbreviation entered in the text box below the Two character State code label, then the 'Calculate and Save STATE Offices' button "pressed," all offices in the Office Data file in the indicated state will be calculated.

If an office has remotes, those remotes are calculated at the same time as the host. Remotes and hosts require input data relating to the Host/Remote cluster to calculate unit investments for each office within the cluster. Therefore, a remote cannot be calculated separately from its host.

The menu bar includes a choice named Break Point. One of four break points (transition points between analog and digital lines) can be chosen. The 12 kilofeet selection is the default value.

Under the title Methodology for Calculating Office Inputs are two options: Standard and Building Blocks. The Building Blocks option is to be chosen when calculating data for Oregon only.

Computing Unit Investments: Obtaining detailed calculation information for an office

For informational purposes only, the Core program provides a method for viewing how detailed calculations are performed for an office. The process described below describes how to create a comma delimited file containing calculations. This file can be opened using EXCEL to view the calculations.

To create a file containing those computations, the user would (before calculating an office) select the 'Yes' option under the 'Save Detailed Calculations for Office in a File?' label. The Host check box and/or the Remote check box should then be selected. If both are checked, calculations for a host and all of its remotes would be included.

Then check either ALL, WORKSHEET or CATEGORY. Choosing 'ALL' will result in all worksheets/categories being output. Selection of WORKSHEET will cause the list box to be filled with Worksheet designations. A Worksheet can either be selected or typed into the combo box. Picking CATEGORY will list functional categories, and a category can then be chosen or typed into the combo box. *Note: Specific worksheets and category numbers can be found in the Database file using the ACCESS 97 system.*

Then the 'Calculate and Save Office' button should be "pressed." The Core program will prompt for an output filename in which to store the detailed calculations. The resulting comma delimited file can be opened and viewed using EXCEL.

Computing Unit Investments: Single office reports

For informational purposes only, the Core program provides a method for printing the input and output values for any calculated office.

The user should select offices to be reported in the right hand (Office for Reporting) list box (black with red labels) using standard Windows techniques. More than one office can be selected. Remotes are not automatically reported with their host --- they must be specifically selected in either the Offices For Reporting or the Remotes list boxes.

Option buttons above the list box allow a user to select Inputs, Parameters, and/or Outputs to be reported. Inputs are office specific data items, such as lines, CCS, trunks, etc. Parameters are inputs that apply to all offices of the same switch type. Outputs are functional category unit investments.

An output report may be sent to a printer or file as indicated by the 'File or Printer?' option box above the office list. To obtain the report, "press" the 'Output Office Report(s)' button. If the file option button was selected, the Core program will prompt the user for a filename.

Using Core to create Usage data

Calculating data to be utilized by the Usage program requires use of the Offices for Reporting List box (black lettering with red labels).

Offices are selected as indicated in the previous discussion of single office reports. [Note: the Batch Processing: Offices options apply if used.] However, the 'Output Office Report(s)' button on the Switching Core screen is **not** utilized. Instead, selection of the Calls command from the menu bar causes a Switching Calls box to appear. Two options are available: a reporting function and a method for calculating and outputting Usage data.

For informational purposes only, call investments for selected offices can be directed to a printer by “pressing” the 'Output Calls Report to Printer' button.

If the 'Output Data to Usage File' button is pressed, the user will be prompted for the name of the usage file. The current usage files' names follow the naming structure of **UxxxYYan** where U (or u) designates Usage and have extensions of .mdb (an ACCESS 97 file). The xxxYYan portion of the filenames match that of the investment and office file names described in the <u>Computing Unit Investments: Obtaining detailed calculation information for an office</u> section.

Once an existing Usage file has been chosen, data for selected offices is calculated and output to that file.

The Switching Core Module will not create a new Usage file. Either the current Usage data base file, or a copy, must be used.

Using Core to create Features data

The current release of Switching Features requires files containing multiple office studies. These studies contain weighted averages of selected offices. So, before data can be passed onto Features, studies must be calculated and saved.

To create studies and study files from Core, select the Studies command on the menu bar. A new screen, Switching Core Studies, will appear.

The following will describe two ways in which studies can be created for a Qwest wide study.

#1:

) Select 'Open Study File' from the menu bar. This allows the creation of a new file, or the opening of an existing file. (Switching Core study files are ACCESS 97 based.) Study files usually are named using the structure **SxxxYYan**. The **S** (or **s**) designates a Study file and **xxx** is the switch type as in the Database filename. The **YY** is a year designation, such as 99, which usually designates the year in which the study file has been created. The **an** represents a combination of letters and numbers. This combination is not significant --- it is varied during model development for archival purposes. This combination and the ones referenced in the Database filename and Office Data filename are of no significance and need not match each other.

) Enter a study name in the Study Name text box. A study name should be a description of the data being calculated and saved (e.g., Qwest 1999). Note that spaces are allowed within the study name. A study name may not exceed 18 characters, including spaces.

) Offices weighted in a study can be selected or deselected using a combination of techniques. All offices in the Office Data file can be selected by pressing the 'Select ALL' button above the list of CLLI codes. Or all offices can be deselected by pressing the 'Clear ALL' button. Individual CLLI codes can be individually selected or deselected by using standard Windows techniques in the list box.

) Also, the Core program will select offices based upon input criteria: To select offices for a Qwest study, "press" the 'Select ALL' button. Pick the 'Select Offices by Criteria' command on the menu bar. A drop down list will offer one or more choices. Choose 'Select Criteria for HOST INPUTS'. A 'Set Criteria' screen will appear.

) Down near the end of the 'Input Description' list, highlight 'Include in Feature Studies and Files (Y or N),' then type "Y" (upper case) in both the LOW and HIGH text boxes and "press" the 'SAVE' button. Some offices are inappropriate for Features Studies, e.g. lineless hosts, and such are flagged with an 'N.'

) " Press" the 'DONE' button. The criteria screen closes, and the Switching Core Studies screen is shown. All host offices with the flag of Y are highlighted in the list box. All remotes will also be highlighted.

) At the bottom left of the screen, is an area labeled Special Options. Three choices are available: Analog + Digital > 0, BRI > 0 and PRI > 0. These three options concerning line values add further criteria to the offices used in a study.

) The Switching Features Modules can utilize studies with either ISDN or non-ISDN offices. For the latter, a study would need offices that have analog and digital lines (including forecasted growth). Therefore, for a non-ISDN study, the Analog + Digital > 0 in the Special Options box would be checked.

[Note: ISDN features can be PRI or BRI based, so ISDN studies would require offices which have current and growth values greater than zero. Therefore, for an ISDN study, the BRI >0 and/or the PRI > 0 in the Special Options box would be checked. Also, in step 1e above, Include in ISDN Studies and Files (Y or N) would be used.]

If no selections are checked in the Special Options box, the Analog + Digital > 0 option is used.

) Once a Special Option has been selected, "press" the 'Calculate and Save Study' button on the right side of the screen. This process calculates and saves a study in the designated study file.

[Note: If a user wished to similarly calculate a study for a State, the same process would be followed, except that after the 'Include in Feature Studies and Files (Y or N)' low and high criteria have been set to "Y," the state could be selected. In the 'Input Description' list box, select 'State,' then type the **two** letter state designation in both the LOW and HIGH text boxes. "Press" the 'SAVE' button, then 'DONE.' This will select only offices for the State.]

#2:

Studies may also be created by using a batch process. As discussed above, open a study file and enter a name in the Study Name box. Enter a generic study name, such as 1999.

Select YES in the Batch Processing: Studies box and select one of the choices in the Special Options box. "Press" the 'Calculate and Save Study' button.

The program will create studies for each state within the Qwest region and a company wide study. The studies will be named with combinations of state abbreviations and the entered Study Name. For example, if '1999' was entered as the Study Name, the program would save studies as 'AZ 1999', 'CO 1999', 'QC 1999', etc.

The rest of the Switching Core Studies screen

It should be noted that other options are available on the Switching Core Studies screen. Studies can be calculated without opening a study file and/or naming the study ('Calculate and Print Study'). Studies already calculated and saved in a file can be reported ('Print Existing Study'), and a new study can be calculated, saved and printed ('Calculate, Save and Print Study').

For informational purposes, reports can be sent to a printer or file, and can include weighted outputs and/or the names of offices included in the study. Make those selections in the box above the list of office CLLI codes.

When studies are saved, the program allows the user an opportunity to create a backup of the Office Data file for archival purposes.

ATTACHMENT B

Table of Contents

Overview of the Switching Usage Module

The Switching Usage Module is designed to provide Switching Usage values for selected states and/or CLLI codes.

The Switching Usage Module reads call type investments for selected offices from a database, then calculates unit investments. These values are output to the EXCEL workbook, along with, for documentation, other parameters used for the run.

Some features of the Switching Usage Module are available to a user, but are not essential. These include the ability to read runtime parameters from a project sheet in an EXCEL file.

The most common method of running the Module is to follow these steps:

Select one or more states using the 'STATES' check boxes.
Select **Get Data** from the Menu Bar.
Select **EXCEL Output** from the Menu Bar.
Select **Regular Report**.

This procedure would result in the following steps being followed:

Usage values for the end offices and tandems in the state(s) are output to the EXCEL workbook. Runtime parameters are save in a worksheet named Project Sheet - S in the same workbook.

The user would then be responsible, if desired, for printing, and/or naming and saving the workbook using EXCEL techniques. This EXCEL Project file then can be used at a later time to identify the parameters used for the session. Or the Project File could be modified for other runs.

Some alternatives to the above procedure would include specifying ranges of input values to be used in selecting offices for calculating Usage values. See <u>Criteria Selection</u> for more information.

Also, once the **Get Data** menu selection has been chosen, the Switching Usage Module displays a list box of all of the offices that meet the State and Criteria parameters. All offices are highlighted. The user can then deselect specific offices by 'clicking' them with a mouse and the deselected offices are unhighlighted. They can be reselected (highlighted) by again using the mouse.

A list box of all of the tandems that meet the State parameters is also displayed. All tandems are highlighted. The user can then deselect or select specific tandems as described above.

Different EXCEL project workbooks can be used. Times of day can be varied in number and definition.

The Menu Bar

The Menu Bar consists of five commands:

Open EXCEL Project File
Clear
Get Data
EXCEL Output
Help

Open EXCEL Project File

A project file is used to store parameters for a run and output from a Usage session. The parameters include the states, criteria (See Criteria Selection), offices and tandems used, etc. This project file can be stored on the LAN, a user's hard disk, or a floppy disk.

A project file does not need to exist before you save it. Once a project file is saved, it can be opened and read later to indicate parameters to the Switching Usage Module. Parameters can then be changed, if desired, before an EXCEL report is generated.

A project file can be read at any time while the Usage screen is the active window. It is up to the user to name and save the EXCEL project file.

Choosing **Clear** provides three options:

Clear All Offices and Criteria
Clear Only Criteria
Clear Only Offices

Any of the Clear commands may be used any time before EXCEL output is selected.

Once offices have been selected based upon a state and ranges of criteria, the user may decide not to calculate Usage values using those offices. Clearing offices removes all offices from the list box. Clearing criteria replaces any entered criteria with the value '[none]'. The user, having cleared the selected offices and/or criteria, would select new offices and/or states, and repeat the Get Data command. See State Selection and Criteria Selection for more information.

Choosing **Get Data** causes the Switching Usage Module to find all offices in the selected states and having inputs that match any indicated criteria ranges. The selected offices appear in a list box. The user can then deselect offices from that list, if desired, by 'clicking' (unhighlighting) them with a mouse. An office can also be reselected by again using the mouse to highlight it. See State Selection and Criteria Selection for more information. A list box containing tandems which meet State Selection parameters is also displayed for selection/deselection.

The **EXCEL Output** command on the Menu Bar causes the Switching Usage Module to output parameters for the run to a worksheet named Project Sheet - S, calculate usage values for the selected offices and tandems and output them to other sheets within the EXCEL Project file. This workbook will be the EXCEL Project file selected using the menu selection Open EXCEL Project File. If no project workbook has been selected, the Switching Usage Module uses a default file.

EXCEL becomes the active program with a sheet named UNIT INVESTMENTS - Offices becoming the active sheet. Several sheets are contained in the workbook. Some contain a report of calculated usage values. A project sheet is also included. The user is responsible for printing, and/or naming and saving the workbook, if desired, using EXCEL techniques.

The **EXCEL Output** menu selection has two choices: **Regular Report** and **Include IEO Orig & Term**. The **Regular Report** includes unit investments for intraoffice, interoffice, measurement, and tandem call setup and conversation minute. Also included are NTS-COE and miscellaneous values. The CLLI codes for included offices and tandems are also displayed.

Selection of **Include IEO Orig & Term** causes the output of an additional sheet for interoffice originating and terminating unit investments.

Selection of **Help** causes the Table of Contents for the Help system to be displayed. Pressing the F1 key while the cursor is in the desired area can also access help for any part of the screen.

State Selection

At least one State must be chosen from the 'STATES' check boxes. When the Get Data command is selected, the Switching Usage Module determines which offices (using the state code imbedded within the CLLI code) match the selected state. If ranges of criteria have been indicated, the Module will choose offices within the state that match the criteria. See Criteria Selection for more information. A list box containing the indicated states' tandems is also displayed.

Pressing the 'All' button selects all of the states. Pressing 'None' deselects all offices and tandems in all states. These two choices aid in speeding up selection of states. For example, to select only one state, click the 'None' button, then click the desired state.

Criteria Selection

On the right side of the Switching Usage Module screen is a section titled Selection Criteria that contains three columns. The first, or left, column displays descriptions of some of the input values for all offices used by the Module. The second, or middle, column has a title of LOW [>=] and the third, or rightmost, column is titled HIGH [<=].

If these columns are overlaid with the lists of end offices and tandems, use the Clear|Clear Offices command on the menu bar.

The low and high columns have input boxes aligned with the descriptions on the left. These boxes are available to the user for setting low and high ranges for the inputs.

For example, a user may want to use only host offices for one switch type in a state. After selecting the appropriate state, the user might then enter SW1H in both the low and high boxes next to the Switch Type label. Or one could select offices having Total Lines between 5,000 and 10,000 inclusive by putting 5000 in the low box and 10000 in the high box for that input.

Combinations of selection criteria are valid. For example, putting SW1H in the low and high boxes for Switch Type, and 5000 and 10000 in the low and high boxes, respectively, for Total Lines, would result in the selection of SW1 host offices with total lines between 5,000 and 10,000.

All of the input boxes are initialized with the value of [none]. The [none] indicates that no criterion has been set. When indicating criteria, the user does not need to set both low and high values. The [none] value is ignored. For example, if a user enters 5000 in the low box for Total Lines and leaves [none] in the high box, the Switching Usage Module selects offices with total lines of 5,000 or more.

The user can reset any criterion's box to the [none] parameter by double clicking the box with a mouse.

Valid entries for some inputs should be obvious: Total Lines, BH, CCS, and IAOPCT require numeric values. (IAOPCT is not a percentage but a ratio in decimal format. These values should be entered as numbers less than or equal to 1.)

CLLI Code is an alphanumeric field and the low and high values are interpreted alphabetically. If the low value for this field is 'C' and the high value is 'D', only CLLI codes beginning with C would be selected, since all CLLI codes beginning with D have 11 characters and are less than a single D.

Switch Type is also an alphanumeric field using codes for offices. The following codes, listed alphabetically, indicate switch type: SW1, SW2, SW3 and SW4. Combining one of these with H indicates a host, whereas R indicates a remote. SW4R is a switch 4 remote.

The distinction is important. For example, to select only SW2 hosts, SW2H should be entered in both low and high Switch Type boxes. To select all SW2 switches, the low value would be SW2H and the high SW2R. To select SW2 and SW3 offices, the low would be SW2H and the high would be SW3R.

Multiple selections can also be done. For example, the user wants only to get usage values for non-remote offices. To do this, the user would follow this procedure:

Enter SW1H in both the low and high boxes for Switch Type, then use the Get Data command on the Menu Bar. SW1 hosts in the selected state will populate the list box.

Repeat the above step with SW2H in both boxes. Repeat with SW3H then repeat with SW4H.

The MSA Code is a number between 1 and 3.

Inclusion or Exclusion of SS7 Investments

A check box is located on the SCM Usage screen which is labeled 'Include SS7 Investments.' If the box is checked, SS7 investments are included in the Usage module outputs. If the box is unchecked, outputs do not include SS7 investments.

ATTACHMENT C

Table of Contents

How to Use the Switching Features Module

The Switching Features Module is a Windows-based system that calculates values for selected switching features. These values can be output to a text-based file or an EXCEL workbook.

There are five parts to the Switching Features screen:

The Menu Bar
Type of Data and Features Definition Files
Report Parameters
Data Files and Studies
Features Selection

Simply described, use of the Switching Features Module entails the following steps:

A Type of Data is selected; Report Parameters are chosen, Switch Data Files, a Features Definition File and Studies are selected; Features with inputs are picked. A Report File or EXCEL Output is created and, if desired, printed.

VERSION 7.0 and later:
A Project File is no longer required. Parameters for a session may be entered, then either a Report File or EXCEL Output file may be created.

A Report File is no longer required. An EXCEL Output file may be accessed without first creating a Report File.

See also:

Type of Data
Report Parameters
Data Files and Studies
Features Selection
The Menu Bar

The Menu Bar

The menu bar consists of the following commands:

Clear
Open EXCEL Project File
Select Investment Types
Show Formulas?
EXCEL Output
Report File
Help

Choosing **Clear** provides three choices: **Clear All, Clear all Features**, and **Clear all Studies**. **Clear All** erases, or resets to defaults, all Report Parameters, Study selections and Feature choices. Selection of **Clear all Features** deletes all of the selected Features and **Clear all Studies** deletes all of the selected studies.

Open EXCEL Project File opens an EXCEL file that was created previously using the Switching Features Module. Project parameters which created the output in the EXCEL file are read from its 'Project Sheet - F' sheet.

Choosing **Select Investment Types** causes a list box to appear. In the list box are all of the current classifications for the types of investments utilized by the Features module. A user may choose **ALL** types or individually select the investment types to be used in developing the feature investment outputs.

The **Show Formulas?** option on the Menu Bar gives the user two choices: **Do Not Show Formulas** and **Show Formulas.** If Show Formulas is selected, the EXCEL workbook (see next topic) will include worksheets, which show data and formulas that illustrate the Features calculations.

EXCEL Output writes the results of a Cost Study Report to several sheets in EXCEL. It also makes EXCEL the active application with the Features data displayed.

Choosing **Report File** provides two choices: **Save Output Report File** and **Print Output Report File**. A user can open a new file or an existing report file. **Save Output Report File** saves the output in the Report File. It either creates and saves a new output file, or replaces an existing output file. **Print Output Report File** utilizes Print Manager to print whatever file is listed as the current report file.

Selection of **Help** causes the Table of Contents for the Help system to be displayed. Pressing the F1 key while in the desired area can also access help for any part of the screen.

See also:
Using the Menu Bar

Type of Data

Various types of data are available for running features reports. Only one type of data may be used in a single run. The **Type of Data** list box contains directory names. These directories contain data files for use with the Features module. A directory name in the **Type of Data** list box may indicate its type and date of creation.

The **Features Definition Files** list box will contain one or more filenames. These files contain information for calculation of feature outputs. By placing the mouse cursor over the file list, the tool tip will indicated which file is the most current. Other files, if listed, are for archival and output recreation purposes only.

See also:
Changing Studies

Report Parameters

Required Parameters:

One of the desired **Types of Data** should be selected.

At least one of the **Investment Outputs** must be chosen.

Optional Parameters:

The **Office Names** and/or the **Project Inputs** selection in the **Print Input Values** list box may be chosen.

Yes or No should be appropriately selected for the **Keep States Separate** and **Weight Host & Remotes Together** options.

See also:
Changing Report Parameters

Data Files and Studies

Once one of the directories in the **Types of Data** list box has been selected, the **Switch Data Files** window displays names of files containing studies that apply. Selection of one of the files causes the study names in that file to appear in the window above the **Update Studies in Project** button.

Multiple study names in the window can be chosen. To add highlighted study names to the project, the Update Studies in Project button should be "pressed."

To delete study names from the project, proceed as described above except unhighlight the selections to be deleted, then "press" the Update button.

While only one **Type of Data** may be used in a session, multiple data files with their respective studies may be included in a run.

To the left of the button labeled Update Studies in Project, is one informational box which indicates the number of studies that are selected for the current run.

See also:

Changing Studies
Type of Data

Features Selection

A **Feature Group** must be highlighted. Then one of the selected group's features can be chosen from the **Feature Name** window. **Feature Inputs** and values for the chosen Feature will appear in the Feature Inputs window. Selection (highlighting) of an input will cause an input box to appear where the input value can be changed.

At any time, the currently considered Feature Group and Feature Name will appear in the boxes at the top of the Features area (above Feature Group list and the Add/Modify and Delete buttons).

To add the selected Feature to the project, "press" the Add or Modify Feature to Project button.

To modify the inputs of a Feature already in the project, select the Feature as described above and change the inputs. Making sure the Feature is highlighted, "press" the Add or Modify Feature to Project button.

When the the Add or Modify Feature to Project button is pressed, the label shown in the **Label Used on Outputs** box will be used in conjunction with the selected feature. This label can be selected by the user from the items in the list box, or entered in the box by a user. If the **per Use** label is selected, investments will be calculated on a *per Completed Call* basis. **Per Line** is the default.

To delete a Feature, unhighlight it in the Feature Name window, then "press" the Delete Feature from Project button.

To see a description of the currently selected feature, "press" the Show Feature Description button.

Between the lists labeled **Feature Group** and **Feature Name** are four informational boxes. When a feature is highlighted, the first three boxes indicate for which switch types the feature is applicable. The fourth box indicates the number of features that are in the current run.

See also:
Changing Features Selections

Changing Report Parameters

Report Parameters consist of **Investment Outputs, Print Input Values, Keep States Separate,** and **Weight Host & Remotes Together**.

One or both of the **Investment Outputs** may be selected, and at least one must be checked on the screen.

Print Input Values are optional and apply only to Report Files. None, one or both of the options may be chosen. **Office Names** causes the output report to include the CLLI codes of offices in the study. **Project Inputs** causes the output report to include input values for each Feature being reported. **Print Input Values** are selected by highlighting, and deselected by dehighlighting.

The **Keep States Separate** option works as follows:

Selecting Yes weights values for selected features across switch types by state. Selecting No weights the features regardless of state (all states are weighted together).

The **Weight Host & Remote Together** option works as follows:

Selecting Yes weights selected Host feature values with those selected Remote feature outputs. Selecting No keeps Host and Remote weighting separate.

Using these two yes or no options can result in four types of weightings of selected features:

1) States separate/Hosts and Remotes weighted together
2) States separate/Hosts and Remotes separate
3) States weighted together/ Hosts and Remotes weighted together
4) States weighted together/ Hosts and Remotes separate

See also:
Report Parameters

Changing Studies

To select Studies to be included in the session and/or Project File, a switch data file must be chosen.

To add Studies to the project: Select a switch data file, then, in the Study Names window, highlight the desired studies and “press” the Update Studies in Project button.

To delete Studies: Proceed as if adding Studies, except in the Study Names window, unhighlight the desired studies and “press” the Update Studies in Project button.

See also:
Type of Data
Data Files and Studies

Changing Features Selection

To add a Feature to the project: Select a **Feature Group**, then select a **Feature Name**. Highlight a **Feature Input** whose value should be changed. Change the value in the pop up window. When all inputs have been updated for the current Feature as desired, “press” the Add or Modify Feature to Project button.

To update any inputs for a Feature already in the project: Select a **Feature Group**, then select the desired **Feature Name**. Highlight a **Feature Input** whose value should be changed. Change the value in the pop up window. When all inputs for the current Feature have been updated as desired, “press” the Add or Modify Feature to Project button.

A single feature may occur only once in a project.

To delete a Feature from the project: Select a **Feature Group**, then unhighlight the **Feature Name** to be deleted and “press” the Delete Feature from Project button.

See also:
Features Selection

Using the Menu Bar

These commands are on the Menu bar: **Clear**, **Open EXCEL Project File**, **Select Investment Types**, **Show Formulas?, EXCEL Output**, **Report File** and **Help**.

Choosing **Clear** provides three choices: **Clear All**, **Clear all Features**, and **Clear all Studies**.

Clear All clears, or restores defaults for, all Report Parameters, Study selections and Feature choices.

Clear all Features clears all of the selected Features. **Clear all Studies** removes all of the selected studies in the Switch Data Files list box from the project.

Open EXCEL Project file allows a user to open a previously created EXCEL Output file. When opened, the Switching Features Module reads a sheet named Project Sheet - F to retrieve parameters used in the development of that EXCEL sheet. An EXCEL Project file is not required. The Switching Features Module will use a default workbook that contains template information that a user can modify.

Choosing **Select Investment Types** causes a list box to appear. In the list box are all of the current classifications for the types of investments utilized by the Features module. A user may choose **ALL** types or individually select the investment types to be used in developing the feature investment outputs.

The **Show Formulas?** option on the Menu Bar gives the user two choices: **Do Not Show Formulas** and **Show Formulas.** If Show Formulas is selected, the EXCEL workbook (see next topic) will include worksheets which show data and formulas that illustrate the Features calculations.

EXCEL Output writes the results of a Features run to a number of sheets in EXCEL. EXCEL becomes the active application and several worksheets are created. For every study requested, one sheet contains a report that displays all feature results for individual studies as well as the weighted value. Also, a detailed report containing all feature results for individual studies as well as the value used for weighting is created. These sheets are named with the study name.

A sheet named CALCULATIONS contains all of the selected features with the values for each study used. It also contains a section which shows the formulas for the weightings to create a worksheet named WINPC3 Investments - F. A sheet named INPUTS contains all input values for the selected features.

A new sheet named Project Sheet - F contains all the parameters associated with the creation of the EXCEL output workbook. If the EXCEL workbook is saved, this sheet can be used to provide parameters to the Switching Features program during a later session.

Report File has two options. **Save Output Report File** displays a open file dialog box through which a user may designate a new or an existing report file. An output report file contains detailed calculations that show how feature output values are computed. It is intended to be for informational purposes only. The **Save Output Report File** saves the calculated output to the

Report File that has an extension of .RPT.

Print Output Report File utilizes Windows to print whatever file is listed as the Current Output Report File.

Help on the Features Menu bar gives the user access to the Help system. To get help for a screen input, move the cursor to that input area and press the F1 key.

See also:
The Menu Bar

ATTACHMENT D

USWEST COMMUNICATIONS

Switching Cost Model (SCM) Users Manual

(Switching Module)

February 1998

Market Services & Economic Analysis

MSEA

Market Services And Economic Analysis Organization

USWEST COMMUNICATIONS

Switching Cost Model
February 1998

Table of Contents

Note: The model described in this document is referred to as SCM – Switching Cost Model. This same model is referred to as SM - Switching Module in other documentation.

Table of Contents

SCM User Manual

Overview of SCM Core

Switching Cost Model (SCM) is a set of menu driven PC based engineering cost models developed by U S WEST Communications.

SCM Core has three functions:

- calculate and report unit investments for individual CLLI codes (single office)
- weight single offices together into one or more multiple office studies for use by the SCM Features program
- develop investments by call type for each single office for use by the SCM Usage program.

Hardware and Software minimum requirements

- 486 processor
- 16MB of RAM
- Windows 3.1.

SCM Files Directory Structure

The SCM files must be in the following directory structure:

\SCM\DATA

Any main directory name is acceptable but SCM is used in this document. The subdirectory must be named DATA

All *.DAT, *.EQU files and SCMFEAT7.XLT should be in \SCM\DATA.

All *.DLL, *.VBX and *.LIB files should be in \WINDOWS\SYSTEM.

All other files reside in the SCM main directory.

Windows Command Lines:

Once the SCM files have been installed, Command lines (Windows 3.1+) or Shortcut Target lines (Windows 95) should be built.

Command/Shortcut lines for:
SCM Core: C:\SCM\SCMCORE2.EXE

SCM Features:	C:\SCM\SCMFEAT7.EXE
SCM Usage:	C:\SCM\SCMUSAG6.EXE
SCM Start	C:\SCM\SCMSTART.EXE

Investment Database and Office Data Files

SCM Core utilizes two files for each switch type: an **Investment Database** file and an **Office Data** file. Both files are Microsoft ACCESS 2.0 based files. Data in these files is maintained using Microsoft ACCESS; however, a user does not need to have a copy of the ACCESS data base program to be able to run SCM Core. It should also be noted that the SCM Core program does not create Investment Database or Office Data files. The files provided by SCM, or copies, must be used.

The current **Investment Database** filenames are:

Isw197ao.mdb
Isw297ao.mdb
Isw397ao.mdb
Isw497ao.mdb

The Investment Database filename structure is **IxxxYYao** where:

•**I** (or **i**) designates that the file is an SCM Investment Database
•**xxx** is a three character code referring to a switch type:
SW1 = 5ESS
SW2 = DMS-100
SW3 = DMS-10
SW4 = AXE10
•**YY** is the year for which the prices were last current
•**ao** insignificant to the user, this combination is only significant to the model developer.

The Investment Database file contains:

- hardware and software quantities
- hardware and software prices
- calculation definitions
- equipment capacities
- miscellaneous data that is not related to a specific CLLI code.

The current **Office Data** file names are:

Osw197ao.mdb
Osw297ao.mdb
Osw397ao.mdb
Osw497ao.mdb

The Office Data filename structure is **OxxxYYao** where:

- **O** (or **o**) designates that the file is an SCM **O**ffice Data file
- **xxx** is a three character code referring to a switch type:
(The switch type selected in the Investment Database filename must match the switch type in the Office Data file name i.e.: I**sw1**97ao = O**sw1**97ao.
- **YY** is the year for which the prices were last current.
- **ao** This combination is only significant to the model developer and does not need to match the Investment Database filename.

The Office Data file contains inputs and parameters:
Inputs are CLLI code specific, e.g.:

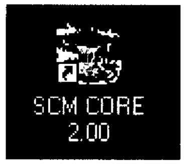
- number of lines
- number of trunks
- BH CCS per trunk.

Parameters are common to all CLLI codes, e.g.:

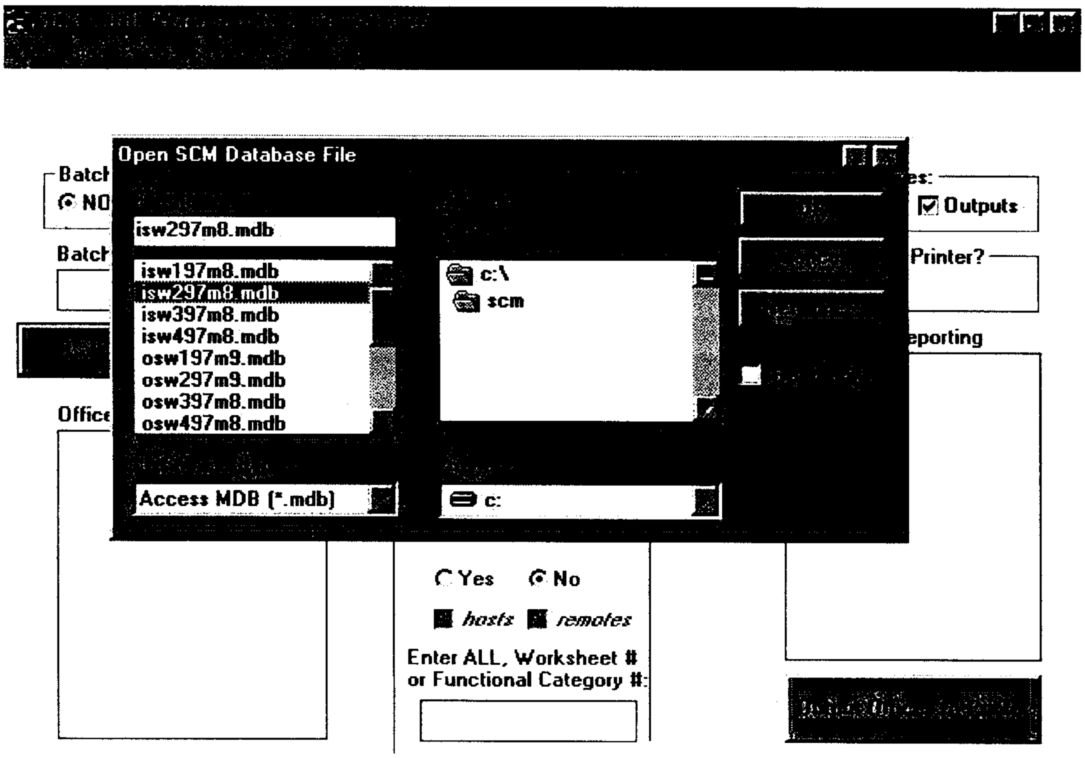
- vendor discounts
- study periods.

Starting SCM Core

Click on the SCM CORE 2.00 ICON:

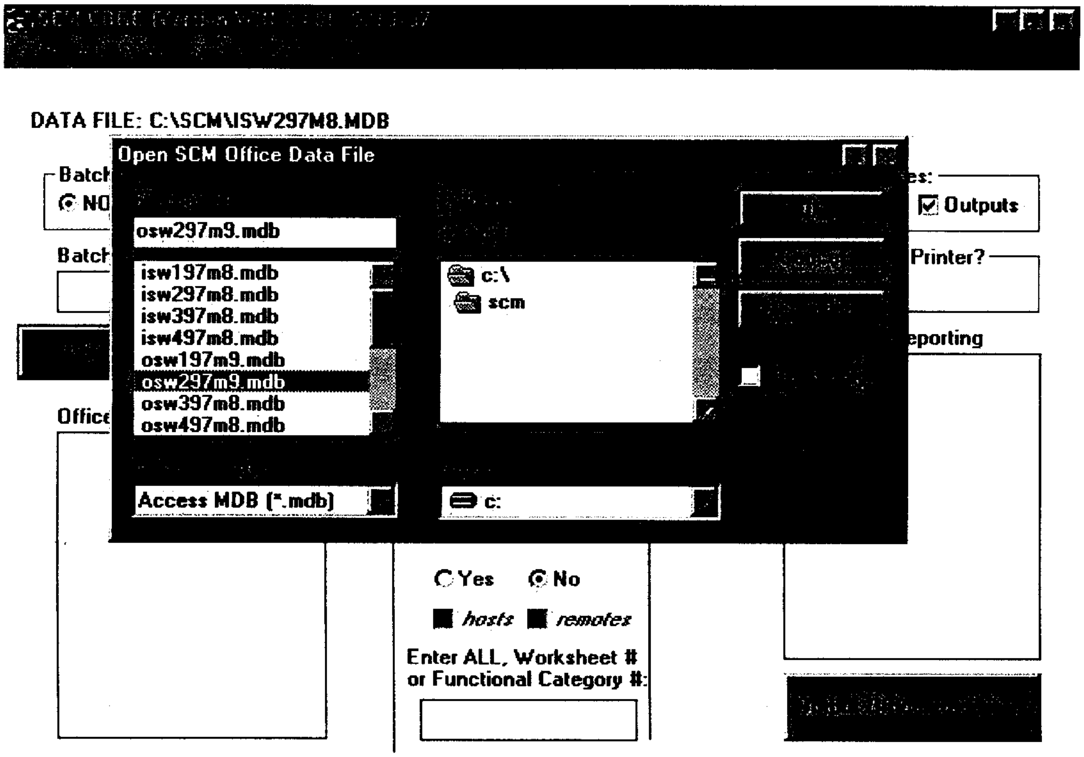


The first window to appear is the "OPEN SCM DATABASE FILE" screen. Select an SCM Investment Database file by double clicking the file name or highlighting the file name and clicking OK.



In this example, the Investment Database isw297m8.mdb is selected.

After the Investment Database is selected, a second window appears "OPEN SCM OFFICE FILE". Select an SCM Office Data file by double clicking the file name or highlighting the file name and clicking OK.



In this example, the Office Data file osw297m9.mdb is selected.

If the user ever wants to change switch types, use the File command on the menu bar and open a new Investment Database first, then a matching Office Data file. The order is important.

Once and Investment Database file and Office Data file have been selected, Core is ready to perform a variety of functions.

How to Generate Single Office Reports

After an Investment Database and Office Data file have been opened, SCM Core can generate reports. Follow these steps to generate a single office report:

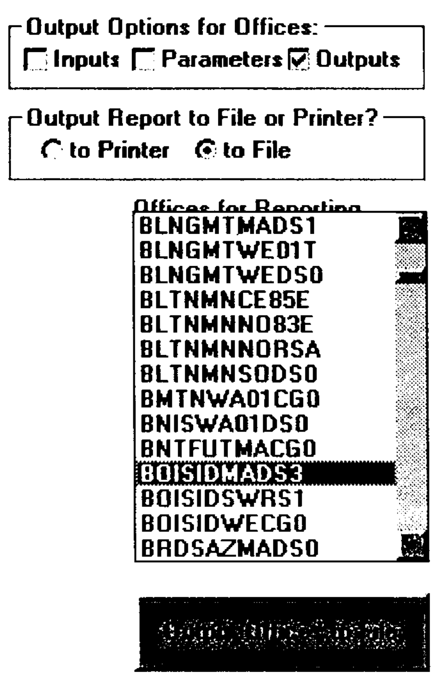
1. Select the CLLI code for the desired office from the 'Offices for Reporting' list box on the right side of the screen.

2. Select the desired output options from the 'Output Options for Offices' list box

   - Inputs will display all CLLI code specific data items such as number of lines, CCS, trunks, etc.
   - Parameters are inputs which apply to all offices of the same switch type such as discount percent, length of study period, etc.
   - Outputs are functional category unit investments (FCATS).

3. Select where the report should be sent in the 'Output Report to File or Printer?' Option box. If the file option button is selected, the Core program will prompt the user for a filename. Enter a DOS acceptable file name and note the directory where the file will be saved for future use. If the printer option button is selected, Windows will display the 'Print Setup' box before printing the report

In this example, the outputs for BOISIDMADS3 will be sent to a file.



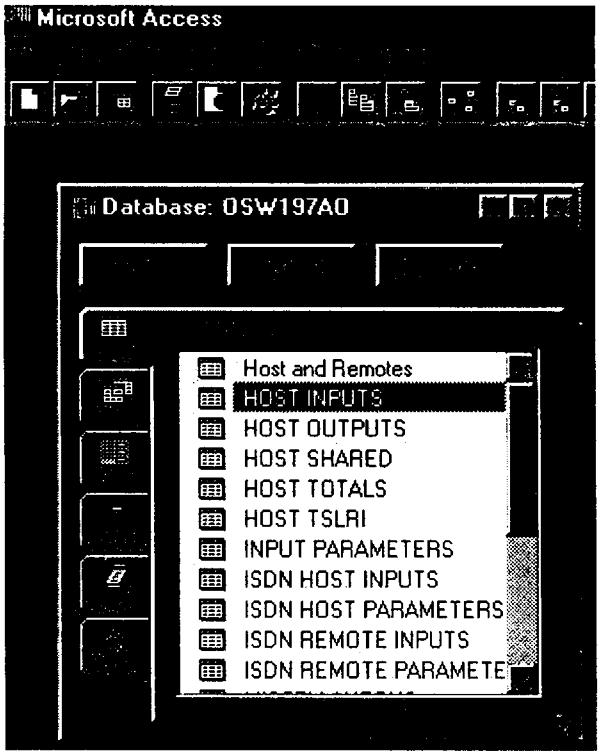
How to change Core Inputs

An occasion may arise where an input or parameter for a CLLI code needs to be changed. This is accomplished by editing the input database and recalculating the office. All inputs and parameters are stored in Microsoft Access 2.0 tables.

To change an input follow these steps:

1. Open the desired SCM Office data file using Microsoft Access 2.0.

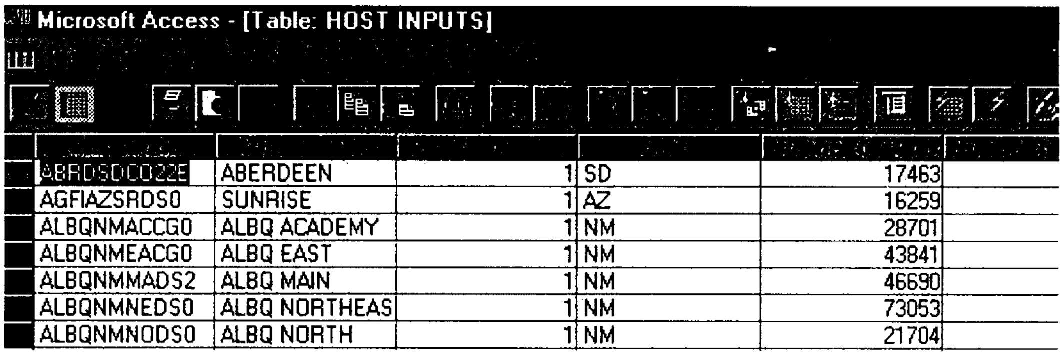
2. Open the appropriate table. For this example the HOST INPUTS table is selected.



When the table opens it will resemble the picture below. Input titles will be across the top row and CLLI codes for the individual switches will be in the first column.

3. Locate the input to be changed, change it, and close the table.

This only changes the input value in the Microsoft Access database. The office will still have to be recalculated in SCM Core before the results of the change can be viewed. Recalculate the office following the steps detailed in "How to Calculate Single Office Files".



ABRDSDCO22E	ABERDEEN	1	SD	17463
AGFIAZSRDS0	SUNRISE	1	AZ	16259
ALBQNMACCG0	ALBQ ACADEMY	1	NM	28701
ALBQNMEACG0	ALBQ EAST	1	NM	43841
ALBQNMMADS2	ALBQ MAIN	1	NM	46690
ALBQNMNEDS0	ALBQ NORTHEAS	1	NM	73053
ALBQNMNODS0	ALBQ NORTH	1	NM	21704

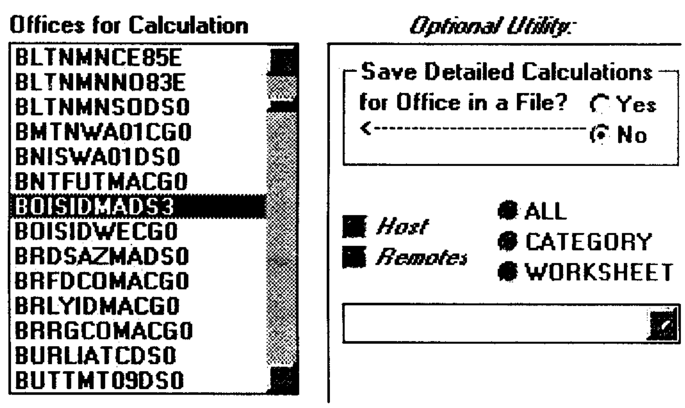
How to Calculate a Single Office

All the offices in the Core Office Data files are already calculated and the functional category values, inputs and parameters saved. The only time an office would need to be recalculated is if an input is changed.

Follow these steps to calculate single office outputs:

1. Select an individual CLLI code from the list box 'Offices for Calculation' on the left hand side of the window.

2. Click the 'Calculate and Save Office' button.



In this example, the Boise, Idaho, Main - digital switch number 3 has been selected. When calculations are complete, Core will display the following message.

Once the office has been recalculated the results may be reported. See 'How to Generate Single Office Reports'.

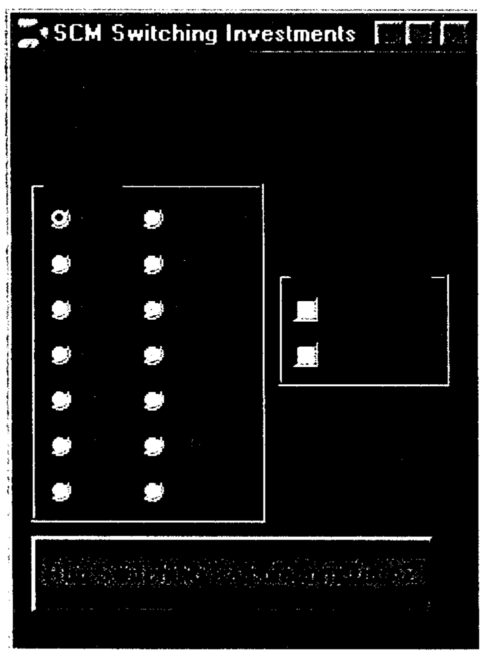
SCM START

The simplest way to generate Core outputs for the SCM Usage and SCM Features models is by running SCM Start. SCM Start allows the user to select a state and the type of investments desired and recalculate all the CLLI codes within the selected state. SCM Start would typically be run after a parameter has been changed that would affect the FCAT values of all the CLLI codes within an Office Data file, e.g. changing the vendor discount rate.

Follow these steps to run SCM Start

1. Click on the SCM Start ICON:

2. The following screen appears:



3. Select the state desired in the 'States' selection box

4. Select the investment type in the 'investments' selection box – usage, features or both may be selected.

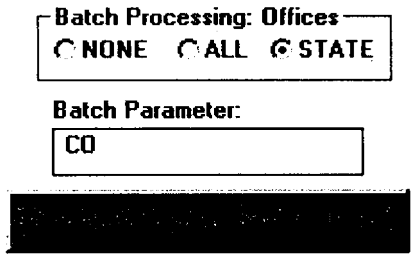
5. Click 'Run Switching Calculations for' box.

All the CLLI codes in the state selected will be recalculated using the changed inputs/parameter.

How to Calculate Offices in a Batch Mode

Offices may also be calculated in a group (batch mode). If the 'ALL' option button under 'Batch Processing: Offices' is selected, then the 'Calculate and Save ALL Offices' button "pressed," all CLLI codes in the Office Data file will be calculated.

If the 'STATE' option button is selected, a state abbreviation entered in the text box below the Batch Parameter label, then the 'Calculate and Save STATE Offices' button "pressed," all offices in the Office Data file in the indicated state will be calculated.



If an office has remotes, those remotes are calculated at the same time as the host. Remotes and hosts require input data relating to the Host/Remote cluster to calculate unit investments for each office within the cluster. Therefore, a remote cannot be calculated separately from its host.

The menu bar includes a choice name Break Point. One of four break points (transition points between analog and digital lines) can be chosen. The 12 kilofeet selection is the default value.

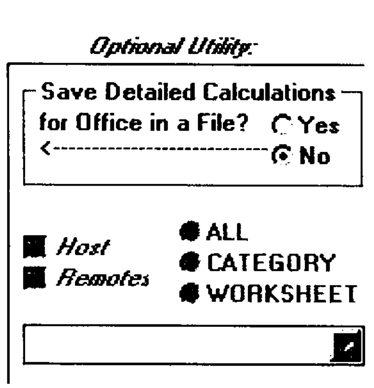
Under the title Methodology for Calculating Office Inputs are two options: Standard and Building Blocks. The Building Blocks option is to be chosen when calculating data for Oregon only.

Obtaining Detailed Calculation Information for an Office.

The SCM Core program provides a method for viewing how detailed calculations are performed for a CLLI code.

To create a file containing those computations, the user would (before calculating an office)

1. select the 'Yes' option under the 'Save Detailed Calculations for Office in a File?' label.
2. select the Host check box and/or the Remote check box. If both are checked, calculations for a host and all of its remotes would be included.
3. select either ALL, WORKSHEET or CATEGORY. Selection of WORKSHEET will cause the list box to be filled with worksheet designations. A Worksheet can either be selected or typed into the combo box. Picking CATEGORY will list functional categories, and a category can then be chosen or typed into the combo box. Note: specific worksheets and category numbers can be found in the Database file using the ACCESS 2.0 system.
4. press the 'Calculate and Save Office' button. The Core program will prompt for an output filename in which to store the detailed calculations.

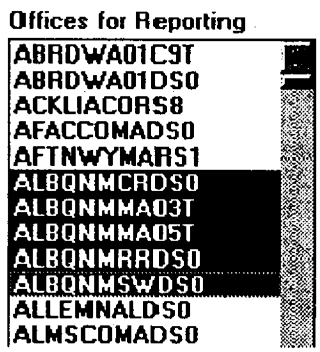


How to Create Usage Data

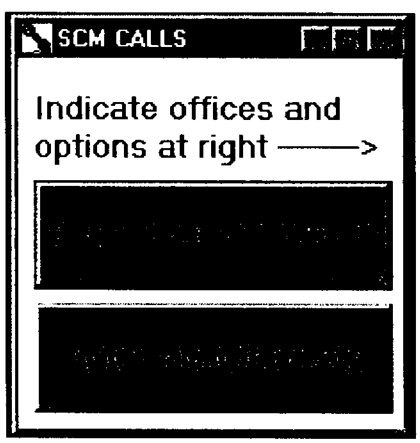
Follow these steps to create input for the SCM Usage model:

1. Open the desired Investment database and Office data files as described earlier.

2. Select the CLLI codes to be included using the 'Offices for Reporting' List box. In this example, five Albuquerque, New Mexico CLLI codes are selected.

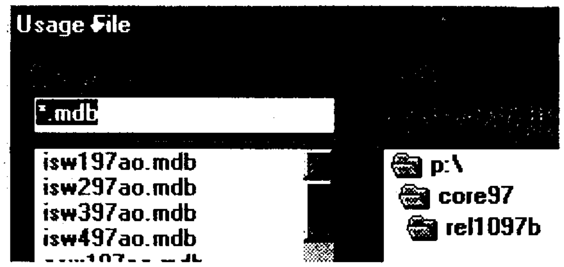


3. Click the **Calls** command on the menu bar. The program displays this box.



4. Click the "Output Data to Usage File" button. There may be a delay while Core loads the selected CLLI codes into the Usage file.

5. Name the file "USAGE6.mdb" and save it as an ACCESS 2.0 file.
   Note: The usage file may be named anything the user would like at the time the data is saved; however, the Usage program will only accept files with the USAGE6.mdb name. So if the user names the Usage file anything other than USAGE6.mdb it will have to be copied or renamed to USAGE6.mdb before it is read into the Usage model.



When complete, this message will display.

How to Create Files Used in SCM Features

SCM provides the input files required to run SCM features and generate feature reports on a state specific or region wide basis. These study files are named: SSW197AO.mdb, SSW2197AO.mdb and SSW397AO.mdb where:

- **S** designates an SCM Study file
- **SW1, SW2 and SW3** represent 5ESS, DMS-100 and DMS-10 switch types respectively
- **97** is a year designation, which usually designates the year in which the study file has been created
- **AO** are letters used during model development for archival purposes and are not significant to the user. Unlike the Database filename and Office Data file name which need to match each other, these letters do not need to match either file.

Within each of these study files are state specific and region wide files for the switch type. These are the standard files to be used in SCM Features. The study names are:

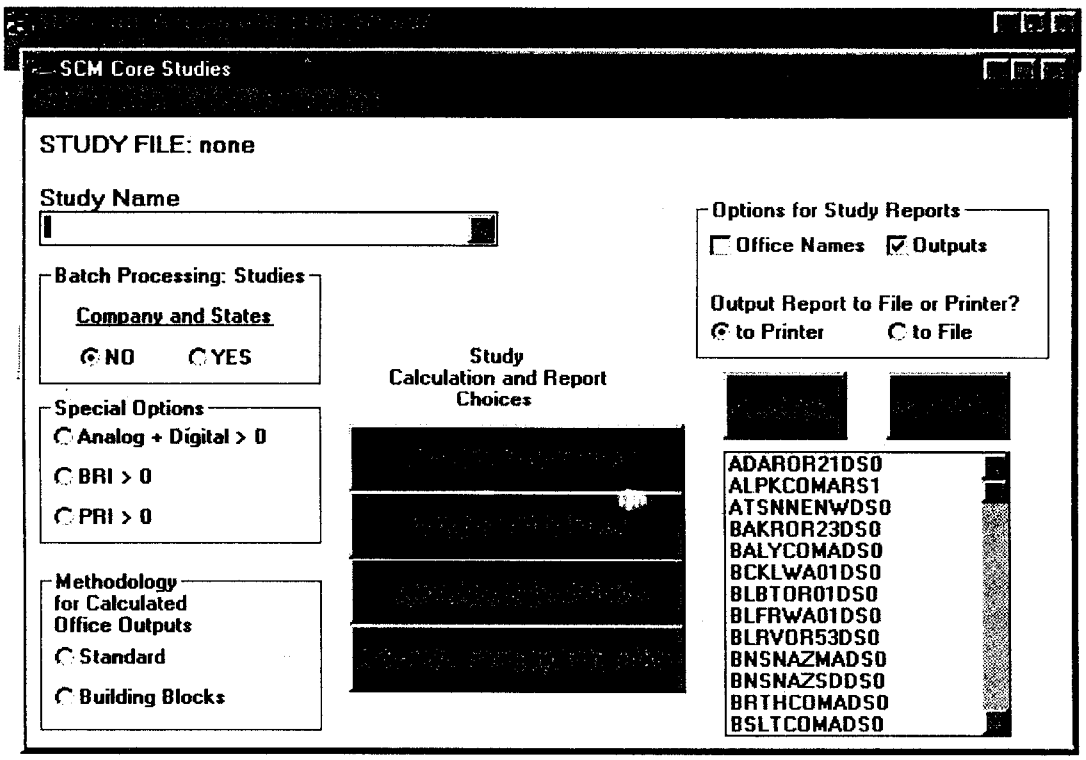
AZ 97 BRI STD	AZ 97 POTS STD	AZ 97 PRI STD
CO 97 BRI STD	CO 97 POTS STD	CO 97 PRI STD
IA 97 BRI STD	IA 97 POTS STD	IA 97 PRI STD
ID 97 BRI STD	ID 97 POTS STD	ID 97 PRI STD
MN 97 BRI STD	MN 97 POTS STD	MN 97 PRI STD
MT 97 BRI STD	MT 97 POTS STD	MT 97 PRI STD
NE 97 BRI STD	NE 97 POTS STD	NE 97 PRI STD
NM 97 BRI STD	NM 97 POTS STD	NM 97 PRI STD
ND 97 BRI STD	ND 97 POTS STD	ND 97 PRI STD
OR 97 BRI BBLK	OR 97 POTS BBLK	OR 97 PRI BBLK
OR 97 BRI STD	OR 97 POTS STD	OR 97 PRI STD
SD 97 BRI STD	SD 97 POTS STD	SD 97 PRI STD
USW 97 BRI BBLK	USW 97 POTS STD	USW 97 PRI BBLK
USW 97 PRI STD	USW 97 POTS BBLK	USW 97 PRI STD
UT 97 BRI STD	UT 97 POTS STD	UT 97 PRI STD
WA 97 BRI STD	WA 97 POTS STD	WA 97 PRI STD
WY 97 BRI STD	WY 97 POTS STD	WY 97 PRI STD

The naming convention is simple: the two digit state abbreviation is followed by the year of the study. Next is the type of CLLI codes included in the study – Basic Rate Interface ISDN (BRI), Primary Rate Interface ISDN (PRI) and typical analog/digital offices (POTS). Most files conclude with STD meaning standard outputs - BBLK stands for Building Block outputs and only apply to Oregon or region wide studies including Oregon. These studies contain weighted average functional category values used by the SCM Features model.

Batch processing is another method of creating files for use in SCM Features. Studies may be created using criteria selection which will pick CLLI codes that match defined criteria and batch processing which will pick CLLI codes using pre-programmed options.

Follow these steps to create a study using criteria selection:

1. Open the desired Investment database and Office data files as described on pages 9 and 10.
2. Click 'studies' on the menu bar. The following screen appears.

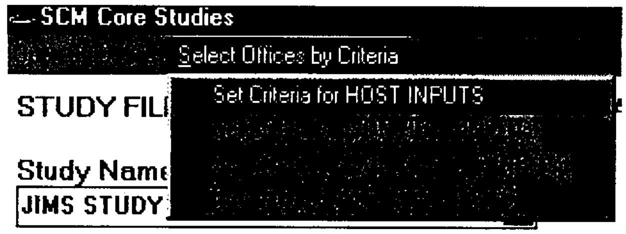


3. Enter a study name in the Study Name text box. A study name should be a description of the data being calculated and saved (e.g., US WEST 1997). Note that spaces are allowed within the study name. A study name may not exceed 18 characters, including spaces.

4. To select offices for a U S WEST study, "click" the 'Select ALL' button. All the CLLI codes in the Office data file will be highlighted.

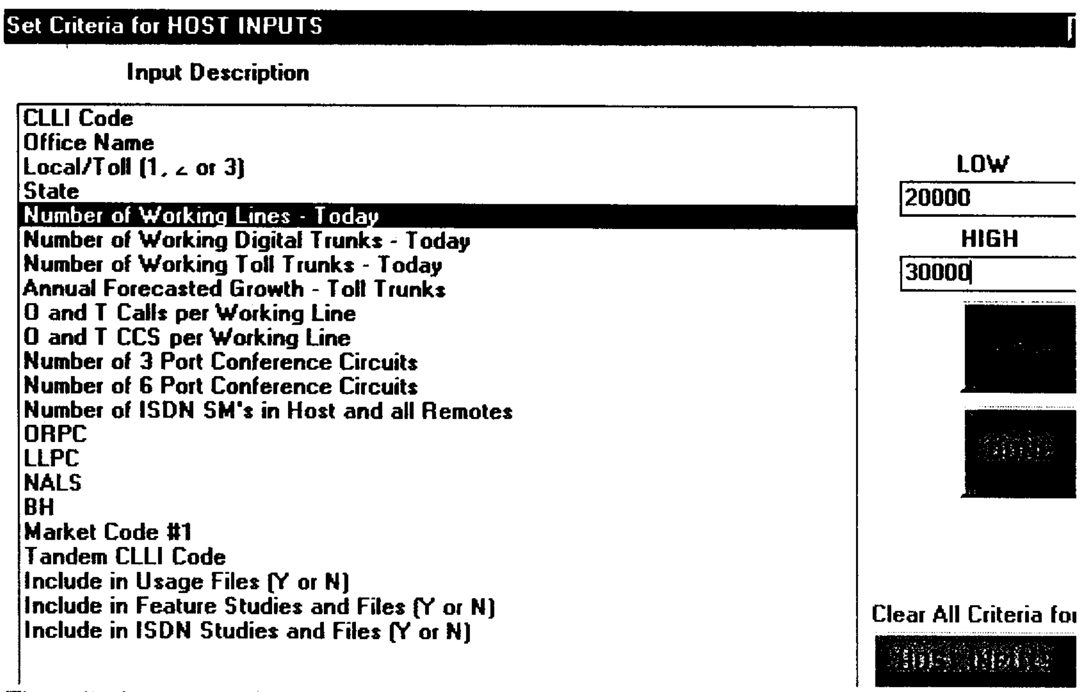
5. Click the 'Select Offices by Criteria' command on the menu bar. A drop down list will offer one or more choices.

6. Click 'Select Criteria for HOST INPUTS'.

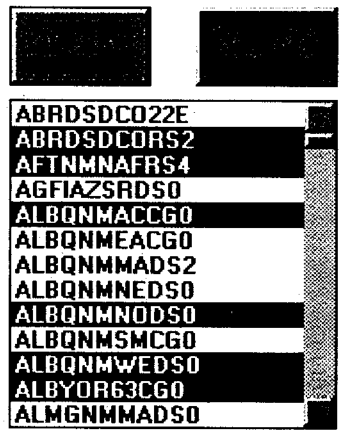


The following screen appears. In this example we want to select CLLI codes with between 20,000 and 30,000 working lines today.

- Highlight the input "Number of Working Lines – Today" and press the TAB key
- Enter 20000 in the LOW box and press TAB
- Enter 30000 in the HIGH box and press TAB
- Click on SAVE
- Highlight 'Include in Feature Studies and Files (Y or N),' and press TAB
- Type "Y" (upper case) in both the LOW and HIGH text boxes
- Click on SAVE
- Click on DONE



The criteria screen closes, and the SCM Core Studies screen is shown. All host CLLI codes that match the criteria are highlighted in the list box. All remotes associated with those hosts will also be highlighted.



7. At the bottom left of the screen, is an area labeled Special Options. SCM Features can utilize studies with either ISDN or non-ISDN offices. Three choices are available: Analog + Digital > 0, BRI > 0 and PRI > 0. Select one of the following:

- For non-ISDN offices select Analog + Digital > 0
- for BRI features select BRI > 0
- for PRI features select PRI > 0. Note: to match any of these three options, a CLLI code will have to have both lines today and growth values greater than 0 for the option selected.
- Also, in criteria selection, Include in ISDN Studies and Files (Y or N) would be used.]

If no selections are checked in the Special Options box, the Analog + Digital > 0 option is used.

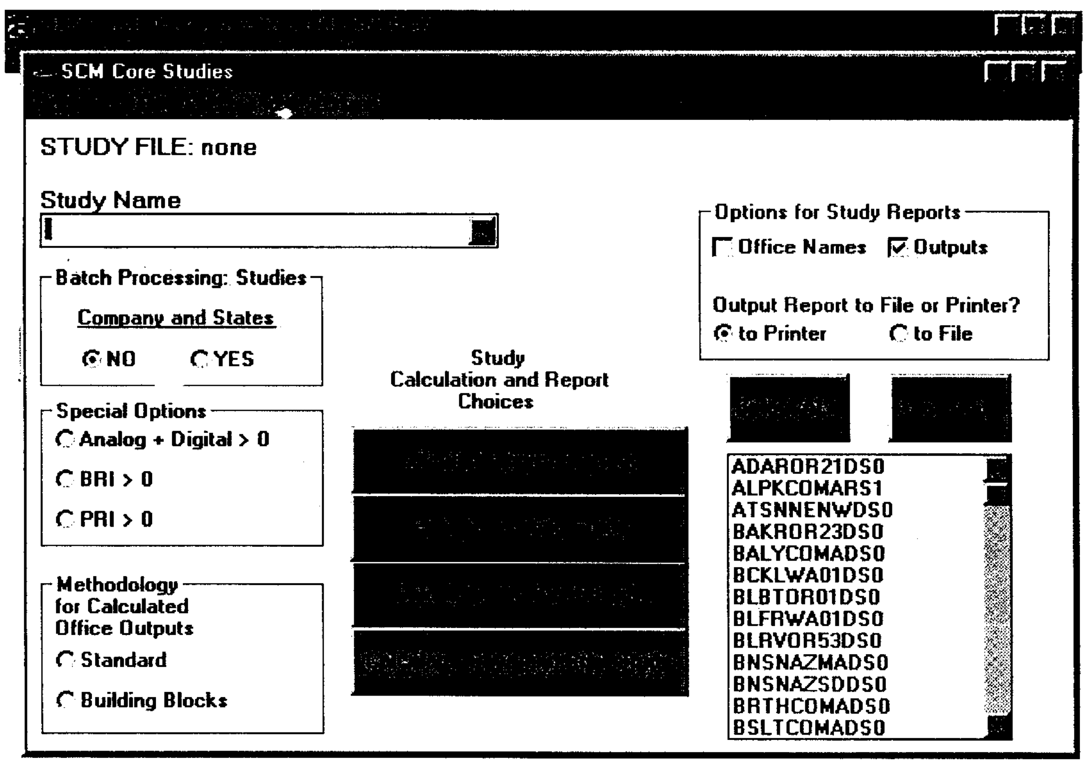
Once a Special Option has been selected, "press" the 'Calculate and Save Study' button on the right side of the screen. This process calculates and saves a study in the designated study file.

[Note: If a user wished to similarly calculate a study for a State, the same process would be followed, except that after the 'Include in Feature Studies and Files (Y or N)' low and high criteria have been set to "Y," the state could be selected. In the 'Input Description' list box, select 'State,' then type the **two** letter state designation in both the LOW and HIGH text boxes. "Press" the 'SAVE' button, then 'DONE.' This will select only offices for the State.]

Using Batch File Processing to Create SCM Features Files

Batch file processing will recalculate all the files for use in SCM Features. This function should only be used if a change has been made to an input or parameter that will affect the output values of all the CLLI codes in an Office Data base. If an input or parameter change has been made that will affect values for a specific state, SCM Start is a better way to recalculate those offices. Follow these steps to create a study using batch processing:

1. Open the desired Investment database and Office data files as described on pages 9 and 10.
2. Click 'studies' on the menu bar. The following screen appears.



3. Enter a generic study name, such as 1997.
4. Select YES in the Batch Processing: Studies box and select one of the choices in the Special Options box. "Press" the 'Calculate and Save Study' button.

The program will create studies for each state within the U S West region and a company wide study. The studies will be named with combinations of state abbreviations and the entered Study Name. For example, if '1997' was entered as the Study Name, the program would save studies as 'AZ 1997', 'CO 1997', 'USW 1997', etc.

The rest of the SCM Core Studies screen

It should be noted that other options are available on the SCM Core Studies screen. Studies can be calculated without opening a study file and/or naming the study ('Calculate and Print Study'). Studies already calculated and saved in a file can be reported ('Print Existing Study'), and a new study can be calculated, saved and printed ('Calculate, Save and Print Study').

For informational purposes, reports can be sent to a printer or file, and can include weighted outputs and/or the names of offices included in the study. Make those selections in the box above the list of office CLLI codes.

When studies are saved, the program allows the user an opportunity to create a backup of the Office Data file for archival purposes.

APPENDIX A - TECHNICAL DESCRIPTION

Introduction

The Switching Cost Model (SCM) is a set of menu driven PC engineering cost models developed by U S WEST Communications. SCM provides unit investments for the DMS-10, DMS-100, 200, 100/200, Ericsson AXE and 5ESS switching equipment for various services and features. These models have three major parts:

- Core - provides unit investments by switch functional category (FCAT)
- Calls - provides unit investments for call setup and conversation CCS which are used in the SCM Usage model
- Features - provides unit investments for features (e.g. Custom Calling)

These SCM models include remotes and are compatible with SS7. Other SCM models provide investments for SS7.

History

Before divestiture, switching costs were provided by an AT&T system called Switching Cost Information System (SCIS). At divestiture this project was transferred to Bell Communications Research (BCR). The Switching Cost Modeling district was created in U S WEST in 1985 as part of a strategic plan to independently provide all costing and pricing expertise. This was also seen as an opportunity to address the region's unique needs which were not always met by a centralized system. SCM has been used in U S WEST cost studies since 1989.

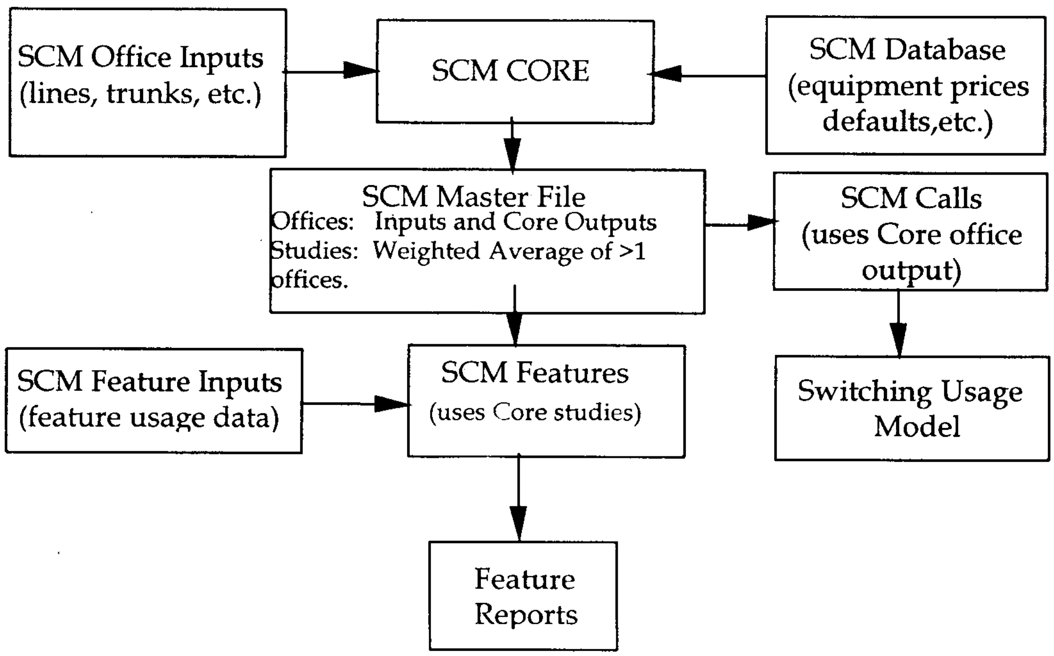
USES OF SCM AND THE SCM PROCESS

SCM Uses

SCM results are used to support state and federal regulatory filings and proceedings. SCM results are also used by product management for both regulated and competitive products.

SCM Process

The following flowchart illustrates the process of SCM. The SCM Core program outputs feed both the Calls and Features programs. Calls supplies inputs for the Switching Usage Model which provides LRIC (Long Run Incremental Cost) support for the setup and conversation portions of basic calls made using U S WEST Communications' network.



SCM CORE

Overview

SCM Core is the first of three major processes in the SCM Model. SCM Core calculates the Average Busy Season Busy Hour (ABSBH) unit investments by functional category which are then used by other models, e.g. Calls and Features. Unit investments are output for each switch or CLLI code. The Calls process calculates investments for ABSBH call setup and conversation CCS and the Features process calculates unit investments for central office features.

Partitioning and Functional Categories

In order to develop capacity unit costs, the switch must be analyzed and partitioned into functional components. Partitioning is the placement of equipment into functional categories depending on the function or use of the equipment. These functional categories should be recognizable and easily understood by cost analysts.

Any significant or readily identifiable investment that is incurred to provide a switching function should be recovered by services using that function. Therefore, the investment should be partitioned to that provided function and a unit investment developed by dividing that equipment's investment by its capacity, properly adjusted for standby capacity.

If the function were not required, there would be no cost incurred. In general, if demand for the function is sufficiently increased, eventually the equipment will exhaust and either more equipment will be purchased or the vendor will have to redesign the equipment with more capacity. Functional costs send the correct cost signals as use of existing capacity will eventually require more equipment to be purchased.

The partitioning process is carried out for every significant piece of equipment in the switch. Most equipment items have one function and the entire investment is partitioned to that functional category. Multicapacity equipment provides more than one function and has more than one capacity. For example, equipment which performs the line concentration function typically has both a line capacity and a CCS capacity. For this equipment the investment associated with each function is identified.

There are, however, some multicapacity equipment cases where demand for one function will never increase sufficiently to cause additional equipment to be purchased. In these cases, the equipment that provides the one function also provides a second function as well. If the second function's capacity limit will always be reached before the first function's capacity limit is reached, the entire investment in the multicapacity equipment is partitioned to the second function. This is because increased demand for the second function causes the purchase of the entire package of multicapacity equipment.

Standby Capacity

The issue of standby equipment capacity installed but not immediately used has been with the communications industry from its beginning.

Once a switch is economically engineered and installed, standby capacity in the equipment can arise for a variety of reasons as listed below.

- Standby capacity required for administration
- Standby capacity due to multicapacity equipment
- Standby capacity due to growth engineering
- Standby capacity due to modularity

Administrative Standby

Standby capacity is maintained for some items in the switch due to administrative needs such as testing, rearrangements, unanticipated growth or unavoidable delays in office additions. These costs are handled with an administrative standby fill factor for the items of equipment affected. For example, the investment per line card would be divided by this fill factor. In this manner, the investment per line card has included in it an amount to recover the investment in unused line cards which are required for the afore mentioned administrative needs, but are not normally used for providing service to customers.

Multicapacity Standby

Standby capacity due to multicapacity equipment occurs when the capacity of one function of a multifunction piece of equipment exhausts before capacity of the other function(s) exhausts. This is the standard situation for multicapacity equipment because it is highly unlikely that all capacities will exhaust simultaneously. For the non-exhausted function of the multicapacity equipment, the fill factor is equal to the ratio of used capacity to total capacity available. This will account for the unused capacity of the multicapacity equipment caused by its joint production capability.

Example

Assume a line unit has two capabilities:

500 lines and 1700 line CCS

Assume the average line CCS per line is 3.0. When the line unit is fully equipped with 500 lines (assuming 100% administrative fill), then only 1500 line CCS will be utilized.

Line CCS utilized = (3.0 * 500) = 1500
Line CCS standby capacity = (1700 - 1500) = 200
Fill Factor = 1500/1700

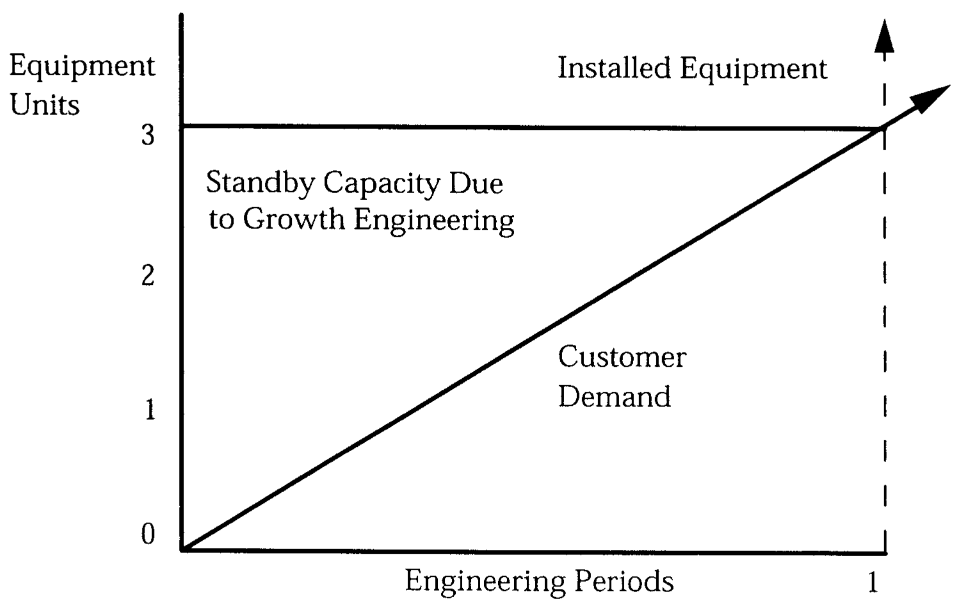
The remaining standby capacity, 200 CCS, cannot be utilized without changing the average CCS per line. The 200 CCS is standby capacity due to multicapacity equipment.

During the partitioning of the switch, the investment in the line unit was partitioned to the two functions, lines and line CCS, based on a technical understanding of the equipment. The unit investments for the two functions, lines and line CCS, are then determined by dividing partitioned line unit investments by the usable capacities, in this case 500 lines and 1500 CCS. Thus, the investment in the standby line CCS capacity (200 CCS) is born by the line CCS unit investment.

Growth Engineering Standby

Standby capacity due to growth engineering is the amount of capacity periodically engineered into some switch components to assure that there is capacity available to provide service to users over a specified engineering period. This type of capacity occurs when the anticipated growth in customer demand necessitates installation of more than one piece of equipment (three, in the example below) per engineering period.

This is done primarily to minimize costs. If a switch is installed and capacity is added one unit at a time, only as demand occurs, the continual engineering and installation would create a great expense. Similarly, if switches are installed fully equipped to meet their maximum capacity, there initially may be enough standby capacity to last ten years. This would create a great initial expense.



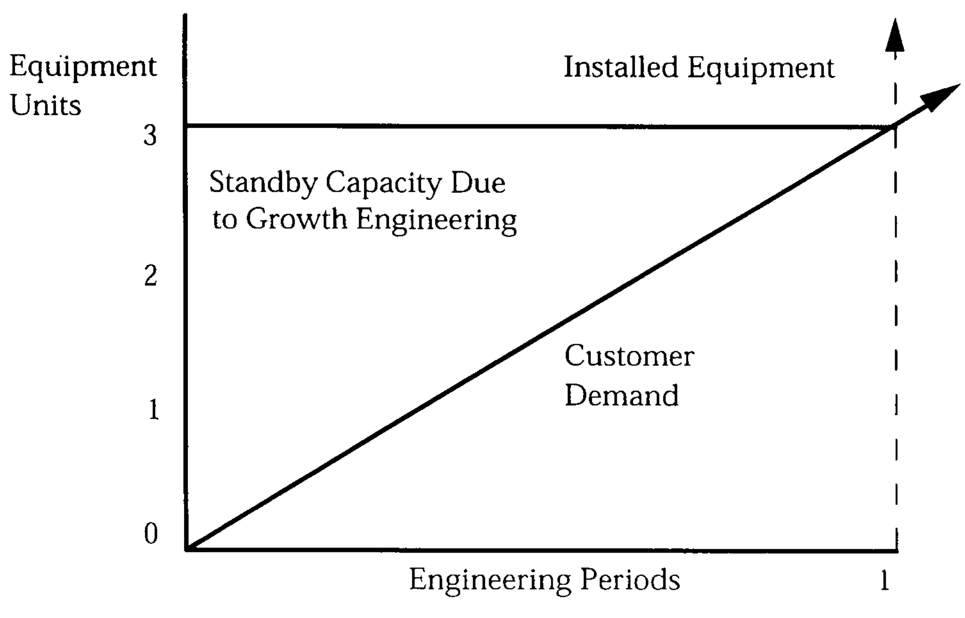
Standby capacity due to growth engineering is handled on an average basis by the Utilization Factor (UF) which will be discussed later.

Modularity Standby

Standby capacity due to modularity is the amount of standby capacity in some switch components due to one unit of equipment being installed with more capacity than can be used during one engineering period. This is sometimes referred to as "lumpiness" of investment and is a situation that occurs with switching equipment that is purchased in modules with large capacities.

<u>Standby capacity due to modularity differs from standby capacity due to growth engineering in the number of units installed and the number of engineering periods.</u> Modularity spare occurs when one unit, installed at the beginning of an engineering period, has more capacity than can be used during the engineering period. Standby capacity due to growth engineering is a result of <u>more than one</u> piece of equipment being installed at the beginning of an engineering period because one piece of equipment does not have enough capacity to last the entire period.

To see this difference visually, compare the graph showing Growth Standby to the graph below showing Modularity Standby.



Standby capacity due to modularity is also handled on an average basis by the Utilization Factor (UF) which will be discussed next.

Utilization Factor

A utilization factor is a ratio of utilized capacity to available capacity. It may be expressed at a point in time, or represented as some weighted average over a study period. The Utilization Factor (UF) used in SCM handles average standby capacity due to growth engineering and modularity and is a time weighted average over a study period.

LRIC Unit Investments

The SCM Core model computes unit investment outputs for each functional category:

The partitioning process determines the function, investment and capacity for the various components of a switch. In order to calculate the LRIC unit investment for a switch component, its investment is divided by its capacity which is adjusted for standby capacity as follows:

$$\text{LRIC} = \frac{\text{Investment in Equipment Unit}}{\text{C * AFF * MCF * UF}}$$

Where:

C	=	Capacity of Equipment Unit
AFF	=	Administrative Fill Factor
MCF	=	Multicapacity Fill Factor
UF	=	Utilization Factor

These factors are equal to 100% less the percent of capacity that is required for standby. Note, too, that for a given unit of equipment UF will either reflect the Growth Standby or Modularity Standby, but never both.

Example

To calculate the LRIC investment of the line CCS portion of a line unit, assume the following numbers:

• Investment Partitioned to CCS	=	\$20,000
• CCS Capacity of Equipment	=	1,700 CCS
• Administrative Fill Factor (AFF)	=	.97
• Multicapacity Fill Factor (MCF)	=	.96
• Utilization Factor (UF)	=	.98

Substitution into the LRIC unit investment algorithm gives:

$$\text{LRIC} = \frac{\$20{,}000}{1700\ \text{CCS} * .97 * .96 * .98} = \$12.89 \text{ per CCS}$$

SCM Core Processing

The sequence of steps which SCM Core follows to apply the concepts described in the previous pages to calculate SCM Core outputs is as follows:

Step 1: Assigns (partitions) each piece of equipment to functional categories and determines equipment capacity.

Step 2: Calculates quantities and list prices for each piece of equipment.

Step 3: Calculates vendor discounts on each piece of equipment to determine investment.

Step 4: Calculates how much standby an efficiently engineered switch will require over the study period.

Step 5: Calculates LRIC unit investment for each piece of equipment using investments from Step 3, capacities from Step 1, and the fill factors from Step 4.

Step 6: Sums unit investments for the various pieces of equipment by functional category.

Step 7: Optionally, calculates multiple office studies with weighted averages by functional category.

Step 8: Generates files and paper reports.

Output Categories

The following is a list of the functional category outputs (FCATs) which are typically generated by the Core models. These outputs may differ depending on the type of switch.

Investment/Analog Line	Investment/Analog Trunk
Investment/Analog Line CCS	Investment/Byte of Memory
Investment/Analog Line Ring CCS	Investment/3 Port Conference Circuit CCS

Investment/Digital Line	Investment/6 Port Conference Circuit CCS
Investment/Digital Line CCS	Investment/BRI
Investment/Digital Trunk	Investment/BRI CCS
Investment/Processor Millisecond	Investment/PRI
Investment/Recorded Announcement	Investment/Packet Per Second

Validation of SCM Core

SCM Core models are developed by studying engineering rules and by observing actual switches as provisioned. The models are validated by comparing the total investment from the model with actual switch orders. An analysis is done to determine the percent difference between the actual switch order and the model output. For all SCM models, this percent difference is less than 10%.

SCM CALLS

Overview

SCM Calls provides Average Busy Season Busy Hour (ABSBH) investments by type of service. SCM Calls uses Core functional category outputs to develop cost per ABSBH call attempt and cost per ABSBH conversation CCS outputs. Core outputs become the Calls inputs because Core outputs reflect what the cost is of using the switch's resources. Calls contains algorithms that determine how much of the switch resources are needed to setup and maintain basic telephone calls. The output from SCM Calls is primarily used to provide inputs into the Switching Usage Model.

Services

Calls has the ability to generate output for various call types depending on the office type described below.

TYPE OF OFFICE	END OFFICE CONFIGURATION
End Office	• Analog Lines • Digital Lines • Digital Trunks
End Office / Access Tandem	• Analog Lines • Digital Lines • Digital Trunks
Access Tandem	• Digital Trunks
Remotes	• Analog Lines • Digital Lines • Host Digital Trunks

Outputs

The following is a list of the SCM Calls outputs for the various call types. Weighted outputs are also available and are calculated by weighting similar analog and digital outputs.

Investment Per ABSBH Call Setup Analog Line to Analog Line Analog Line to Digital Line Digital Line to Digital Line Digital Line to Analog Line	Analog Line to Digital Trunk Digital Line to Digital Trunk Digital Trunk to Analog Line Digital Trunk to Digital Line Digital Trunk to Digital Trunk

Investment Per ABSBH Conversions CCS Analog Line to Analog Line Analog Line to Digital Line Digital Line to Digital Line Digital Line to Analog Line **Investment Per Analog Line** **Investment Per Digital Line** **Weighted Investment per Line**	Analog Line to Digital Trunk Digital Line to Digital Trunk Digital Trunk to Analog Line Digital Trunk to Digital Line Digital Trunk to Digital Trunk

On a forward-looking basis, analog trunks are not used for interoffice trunking. Therefore, calls to and from trunks use 100% digital trunks.

SCM Calls Processing

SCM Calls is basically a set of algorithm matrices for the various switch types and call types. The cells in the matrix contain algorithms for calculating how much of each SCM Core functional category is required for a Call Setup and a Conversation CCS for the various call types (e.g., Analog Line to Analog Line).

Calculating 5ESS Calls Outputs

The following steps describe the procedure for calculating SCM Calls outputs.

Step 1: Calculate the value for each cell or multiplier in the algorithm matrix.

Step 2: Multiply each Core functional category output by the appropriate multiplier in the algorithm matrix.

Step 3: For each call type (e.g., Analog Line to Analog Line Call Setup), sum the products from Step 2. Each sum constitutes a Calls output.

Example

Calculate the LRIC unit investment of the Analog Line to Analog Line Call Setup output.

STEP 1 Calculate the multipliers for each functional category in the Analog Line to Analog Line Call Setup column in the matrix.

From Algorithm Matrix		
Core FCAT Investment Per	AL to AL Call Setup Multiplier Algorithm	AL to AL Multiplier
Analog Line CCS	ADT + (2*ART)	.291 CCS
Analog Ring CCS	ART	.106 CCS
Digital Line CCS	-	0
Digital Trunk	-	0
SMP Ms	Ms per Ln to Ln Call	177 Ms
Network CCS	2*ART	.212 CCS

Where:

ART is the Average Ring Time for the service = .106
ADT is the Average Dial Time for the service = .079

STEP 2 Multiply the appropriate SCM Core functional category outputs by the calculated multipliers.

	A	B	C
Investment per	Functional Category Output	AL to AL Multiplier	A*B
Analog Line CCS	$11.26/CCS	.291 CCS	$3.28
Analog Ring CCS	$25.89/CCS	.106 CCS	$2.74
Digital Line CCS	-	NA	-
Digital Trunk	-	NA	-
SMP Ms	$.0220/Ms	177 Ms	$3.89
Network CCS	$2.73/CCS	.212 CCS	$0.58

STEP 3 Sum the values in column C. The final output is $10.49 per Analog Line to Analog Line Call Setup.

These steps are repeated for each call type.

SCM FEATURES

Overview

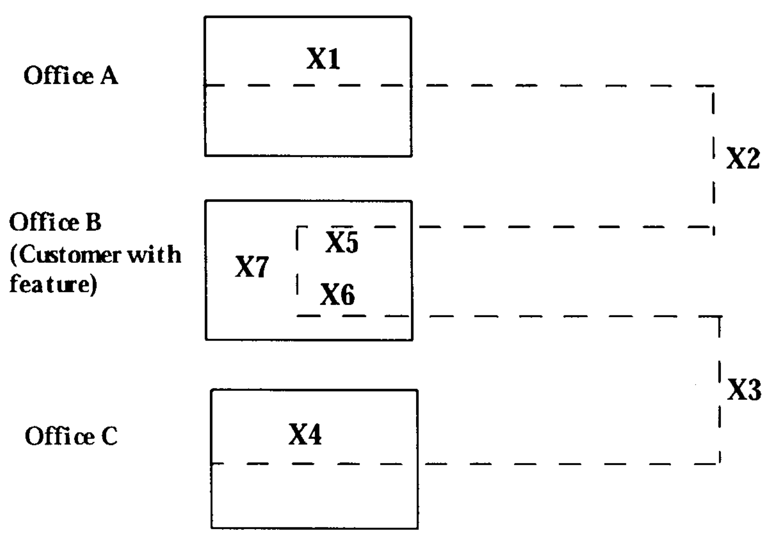
SCM Features is one of three major parts of the SCM system. It uses the functional category unit investments created in Core along with inputs provided by the SCM Features user to develop investments for features. The investments are reported for each phase of the feature - i.e., activation, deactivation, call set up and conversation.

Philosophy

SCM Features determines investment associated with a feature by partitioning the feature into its components and determining which components are not recovered by other rate elements and, therefore, need to be recovered by the feature rate. The investments required are driven by the busy hour use of the feature by the subscriber. Most feature costs are displayed as an investment per line, consistent with the rate plans for the features.

<u>**Example**</u>

Three Way Calling (3WC)



Assume a subscriber in Office A calls a subscriber in Office B who then adds on a subscriber in Office C. Note that the three subscribers are shown in this example to be in different offices. This does not have to be the case, as all can be in the same office.

The components of the actual three way calling feature call are partitioned as follows:

X1: Switching costs in Office A are recovered by Subscriber A's basic service.

X2: Transport costs between Office A and Office B are recovered by Subscriber A's basic service.

X3: Transport costs between Office B and Office C are recovered by the basic service of the feature customer - i.e., Subscriber B.

X4: Switching costs in Office C are recovered by the feature customer's basic service.

X5: Incoming call in Office B is recovered by Subscriber A basic service.

X6: Outgoing call in Office B is recovered by the feature customer's basic service.

X7: The connecting of all three subscribers to a three port conference circuit in Office B is not recovered by other rate elements and, therefore, needs to be recovered by the feature.

More specifically, the incremental costs that need to be picked up by the SCM 3WC Feature - i.e., X7 - are (1) the use of the three port conference circuit and (2) the additional processor usage above that required to set up calls from A to B and from B to C. Assume the following:

Typical customer's busy hour 3WC usage:

• Conversation time per call	1.5 CCS
• Calls per line	2

Real time in Office B:

• Call from A to B	90 MS
• Call from B to C	100 MS
• All that actually happens in 3WC	390 MS

Unit investments from SCM Core for functions required in 3WC:

- $.02/Processor Ms
- $3.00/3 Port Conference Circuit CCS (3PCC CCS)

Based on these assumptions the program will output the following:

	Core FCAT	Per Call	Per Line
$/Processor Ms	$.02	$4.00	$ 8.00
$/3PCC CCS	$3.00	$4.50	$ 9.00
Total 3WC		$8.50	$17.00

These numbers are calculated as follows. Keep in mind that all usage is in the busy hour and that the Core outputs are busy hour unit investments.

Processor Investment per Call =
(390 Ms for 3WC - 90 Ms for A to B call - 100 Ms for B to C call) or
200 Incremental Ms per call * $.02/Ms = $4.00 per call

3 Port Conference Circuit Investment per Call =
1.5 CCS conversation time per 3WC call * $3.00/3PCC CCS = $4.50 per call

Investment per Line = Investment per Call * 2 Calls per Line

Note that this example was simplified for illustrative purposes.

Right to Use Fees (RTU)

RTU fees are incorporated into the cost studies outside of the SCM features program.

SUMMARY

In summary, the Switching Cost Models (SCM) allow U S WEST the flexibility and consistency, on a regular basis, to provide switching costs which are based on the application of long run incremental costing principles, with consideration of anticipated long run demand. This approach yields costs which are useful in pricing and managing switched services.

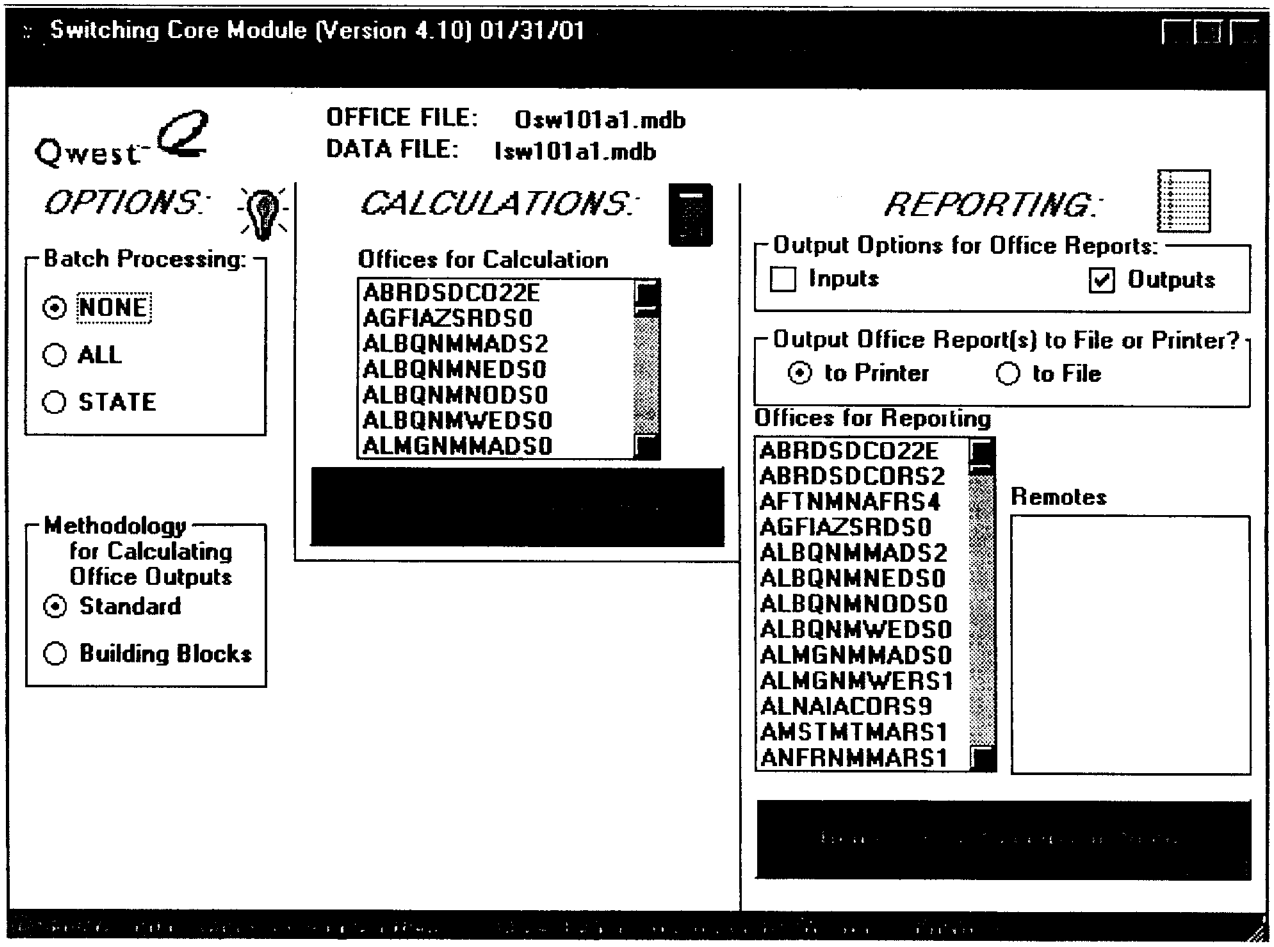
ATTACHMENT E

Qwest
Obtaining detailed calculation information in the Switching Core Module.
January 2001

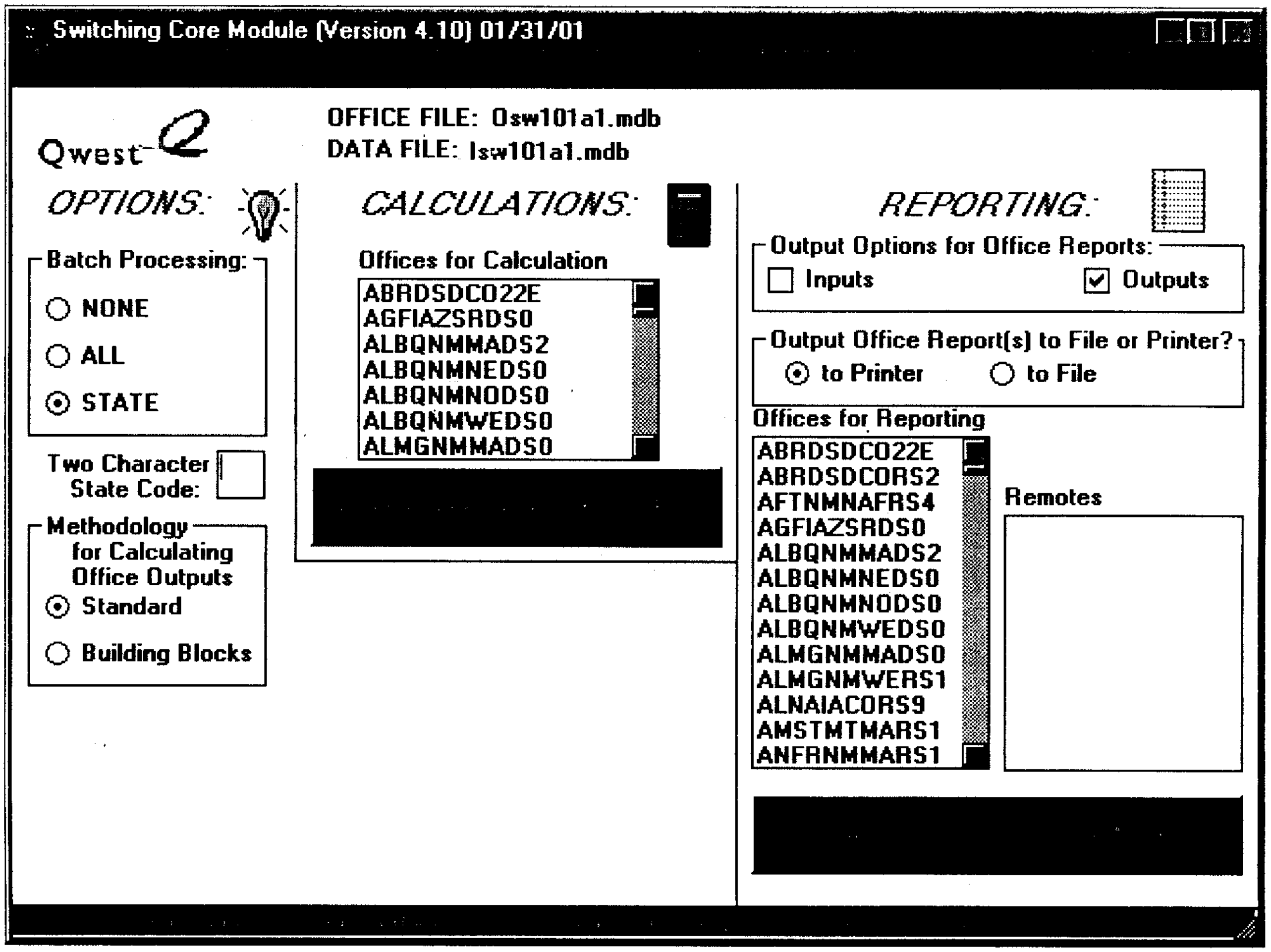
Computing Unit Investments: Obtaining detailed calculation information for an office

For informational purposes only, the Core program provides a method for viewing how detailed calculations are performed for an office. The process described below illustrates how to create a comma-delimited file containing calculations. This file can be opened using EXCEL to view the calculations.

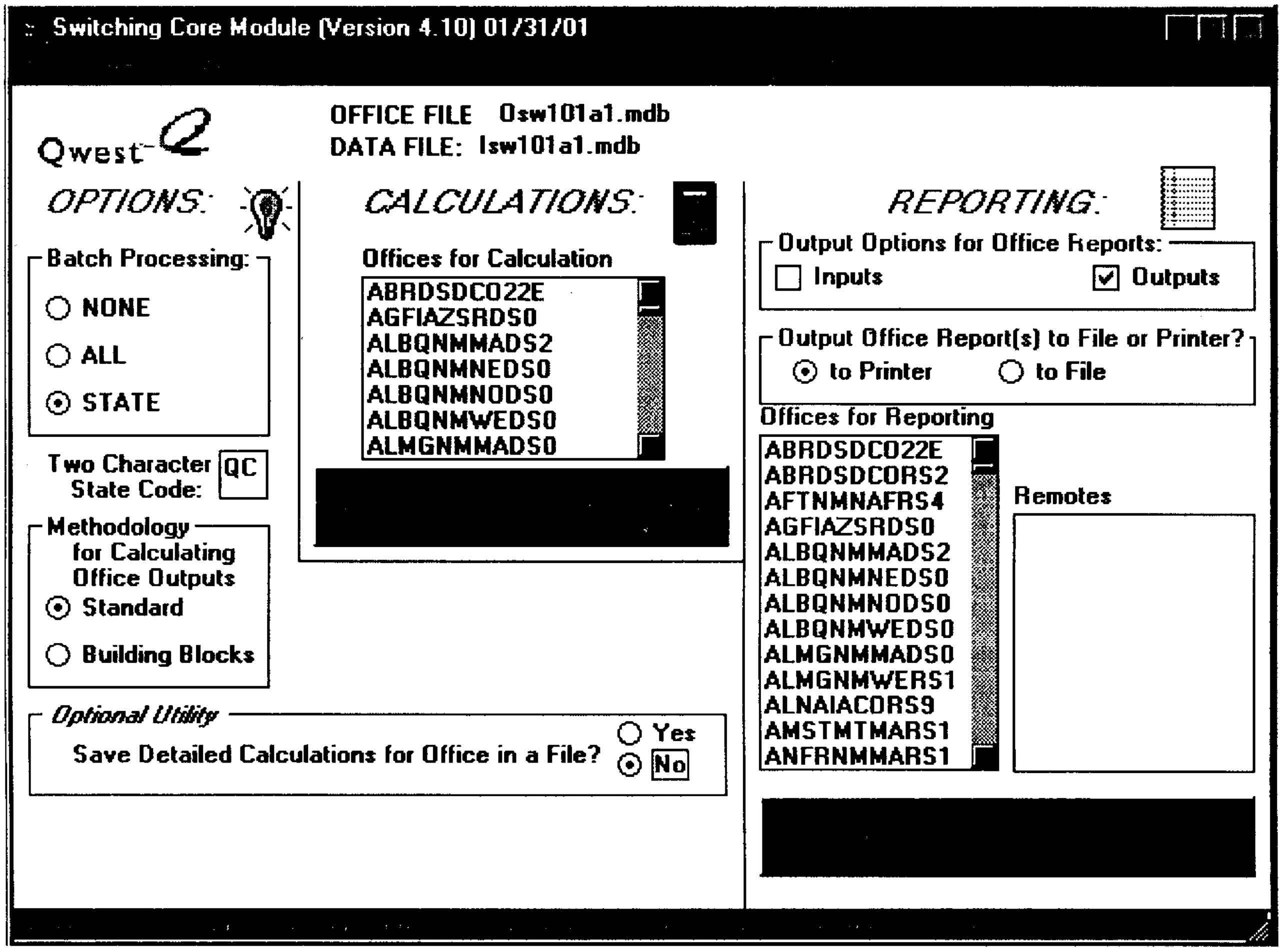
To create a file containing those computations, the user would (before calculating an office) select 'State' in the Batch Processing option box in the upper left-hand corner of the screen.



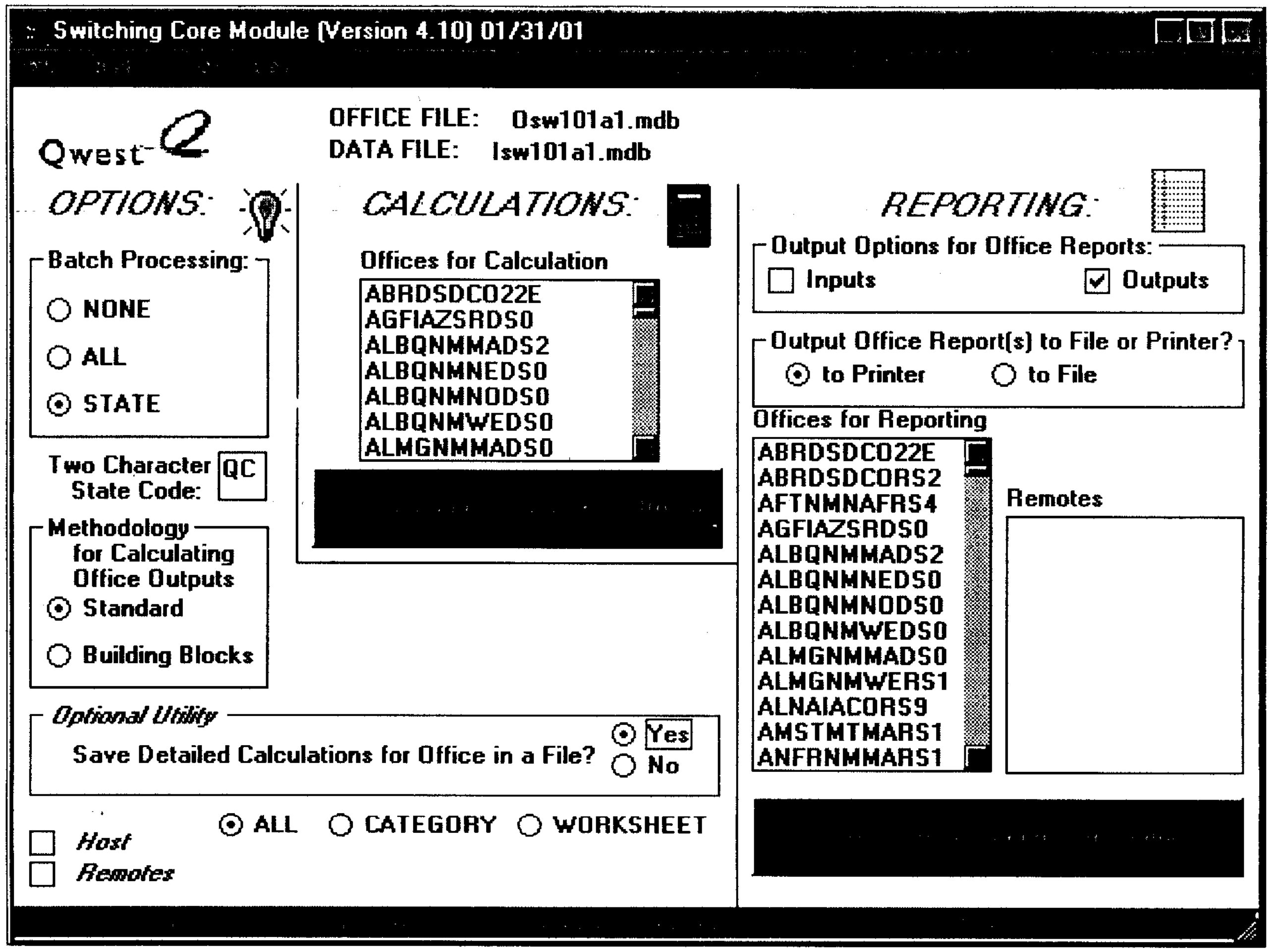
A text box labeled 'Two Character State Code' appears.



When **QC** is entered as the state code, the Optional Utility box appears in the lower left portion of the screen. To obtain the detailed report, select the 'Yes' option under the 'Save Detailed Calculations for Office in a File?' label.



Selecting 'Yes' causes more options to appear.



The Host check box and/or the Remote check box should then be selected. If both were checked, calculations for a host and all of its remotes would be included.

Then check either ALL, WORKSHEET or CATEGORY. Choosing 'ALL' will result in all worksheets/categories being output. Selection of WORKSHEET will cause the list box to be filled with Worksheet designations. A Worksheet can either be selected or typed into the combo box. Picking CATEGORY will list functional categories and a category can then be chosen or typed into the combo box. A functional category's index number (see following Note) can also be typed into the combo box. *Note: Specific worksheets and category numbers can be found in the Database file using the ACCESS 97 system.*

Then the 'Calculate and Save STATE Offices' button should be "pressed." The Core program will prompt for an output filename in which to store the detailed calculations. The resulting comma delimited file can be opened and viewed using EXCEL.

Qwest

Integrated Cost Model User Manual

Version 2.2

February 2001

Market Services & Economic Analysis

MSEA

Market Services And Economic Analysis Organization

EXHIBIT
Admitted
ATT 2

Table of Contents

Table of Contents

Table of Contents

Version 2.1:
- UDIT was added and the Transport Module was updated to Version 4.0, which includes UDIT.
- Default capital cost factors and expense factors were updated to 99V2.
- LoopMod was updated to Version 2.
- Deaveraged loop costs and loop costs by wire center were added.
- Section F - Operator Services has been removed

Version 2.2
- DS0 Direct Trunk Transport was removed
- E-UDIT was added
- Default capital cost factors and expense factors were updated to 00V2.
- Added DS0, DS1, DID/PBX Trunk Ports and ISDN BRI and PRI Line Ports.
- Updated expenses and investments to 2000 level.

Integrated Cost Model

User Manual

Purpose of ICM

The purpose of the Qwest Integrated Cost Model (ICM) is to estimate the Total Element Long Run Incremental Cost (TELRIC) of unbundled network elements. TELRICs are the costs that an efficient provider would incur if it were to replicate the necessary portions of Qwest's network to provide a network element, with the restriction that the provider would start from the same grid of network nodes used by Qwest today.

ICM estimates costs for unbundled network elements (UNE) and Local Interconnection Service (LIS) associated with the physical transmission of a call over the local exchange network. These elements fall into three segments of the local exchange network: (1) the loop facilities that connect end user locations to a central office and are used to transmit a call from the customer premise to a central office; (2) switching equipment which resides in the central office and directs a customer call to the appropriate terminating office, and (3) transport which connects central offices. In addition, ICM estimates the costs of ancillary services including Line Information Database Service (LIDB), 8XX Database Service and Signaling.

ICM Design

ICM Uses a Modular Design

ICM is comprised of five inter-related modules and an output workbook. Three of the modules – Loop, Switching and Transport – estimate the facilities investment for each element. The other two modules – Capital Cost Factors and Expense Factors – develop factors used to translate investments into monthly recurring costs and estimate recurring costs of operating the network. Figure 1 is a flow chart that depicts the ICM model design. It shows the three investment modules at the top and the two cost factors modules at the bottom. ICM takes the output of these modules as well as special studies (e.g. billing) and computes a TELRIC for each UNE. Each module is described in more detail in its own supporting documentation and user manuals. Please see Appendix D for a complete list of supporting documentation.

ICM provides input forms for each of the supported modules and other cost element specific parameters. The input forms allow users to view the default values and override those values. ICM runs the modules and inserts the results into the output workbook. The output workbook performs all calculations that are external to the supported modules. The output workbook also applies investment related factors to investments and applies expense related factors to expenses to calculate the final cost results. The user can either view the results using ICM's customized viewing feature or open the output workbook to view the results.

Qwest ICM Design

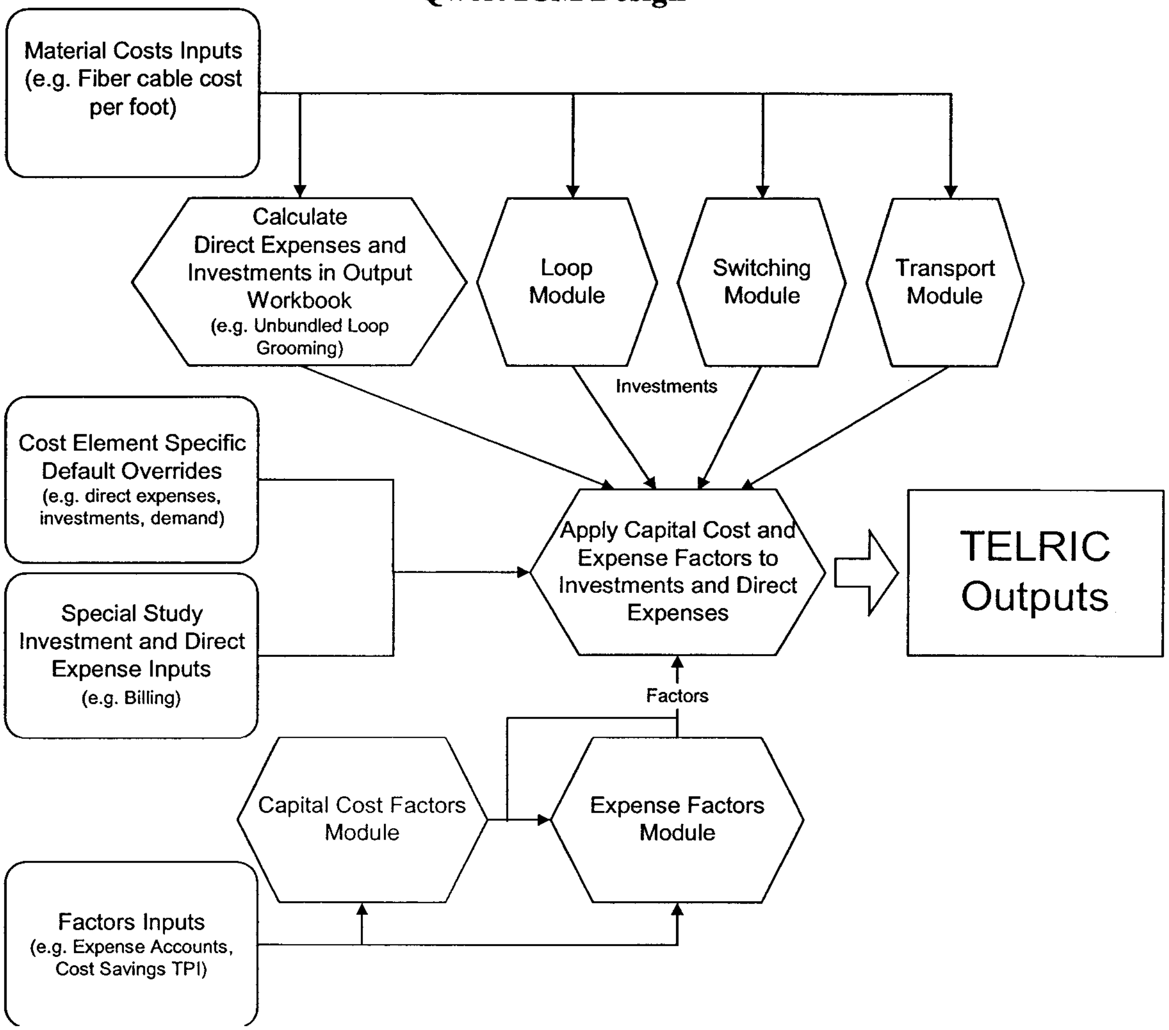


Figure 1

Hardware and Software Requirements

ICM runs best on a Pentium processor or later PC with 64 Mb or more of RAM. It requires 91 Mb of hard drive space to setup ICM. ICM may require up to an additional 48 Mb of hard drive space as a swap file depending on the amount of RAM that is installed on your system. It requires Windows 95/98 or Windows NT Workstation operating system and Microsoft Excel 97.

Getting Started

ICM consists of one CD. Follow these steps to install the program:

Remove Previous Version

(Skip this step if this is your first installation of the model)

a. Click the Windows Start Button
b. Choose Settings
c. Choose Control Panel
d. Choose Add/Remove Programs
e. Choose **QwestICM** from the program list and then hit the Add/Remove button
f. Answer the prompts to finish removal

Setup instructions

a. Shutdown any programs that are currently running
b. Insert CD marked Qwest ICM.
c. Click on the Start button of the Windows taskbar
d. Choose Settings, then Control Panel
e. Run the program associated with the icon labeled Add/Remove Programs
f. Click on the install button
g. Type D:\ICM Program\SETUP.EXE (If your CD drive has a different designation other than D then use that designation.)
h. Click the Finish button and follow the directions.

Running the Program

Start the Program

1) Click the start button
2) Choose Programs
3) Choose **QwestICM**
4) Be patient, the program takes some time to load

Home Screen

Qwest Integrated Cost Model Home Screen is shown in Figure 2. If the user plans to make any changes in any of the input parameters, the user should name the run by entering a name in the space provided under the caption labeled **Enter Run Name Below**.

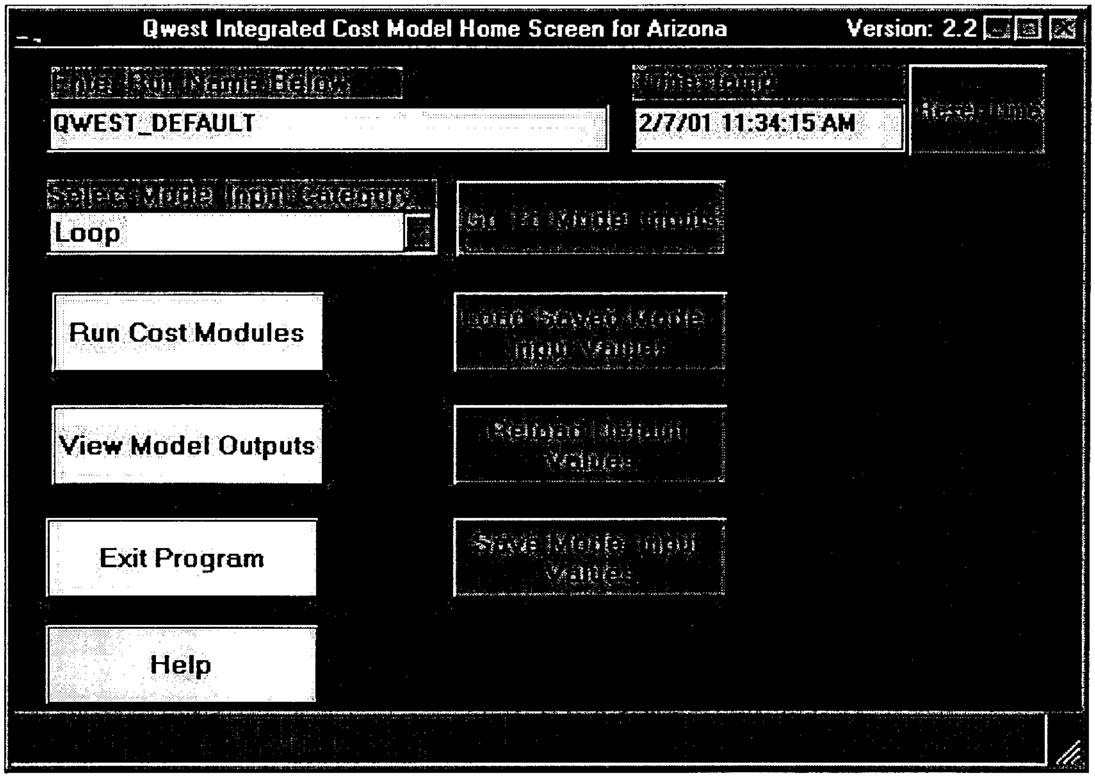


Figure 2

Input Selection

There are six input categories as follows:

- •Capital Cost—View or change the values for the cost of capital, tax rates, and/or depreciation rates
- •Expense Factors—View or change values for cost savings and inflation
- •Loop—View or change Loop Module inputs
- •Switching—View or make changes to Switching Module inputs
- •Transport— View or make changes to Transport Module (TM) inputs
- •Other—View or make changes to E-UDIT, Local Interconnection Usage inputs, DS1 and DS3 entrance facility and multiplexing, and Shared Transport inputs.

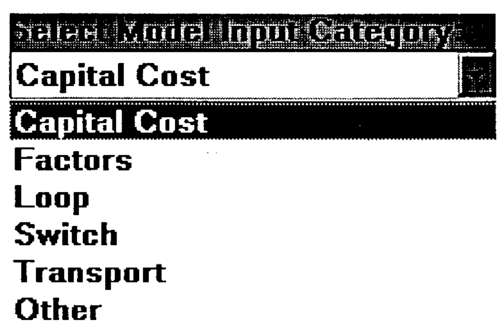


Figure 3

In order to select an input category, the user should first click on an input category using the **Select Model Input Category** drop down list shown in **Figure 3** and second the **Go To Model Inputs** button.

Saving and Loading Model Inputs

The **Main Screen** shown in Figure 2 has options to save and retrieve model inputs. Click the **Save Model Input Values** button to save the override values that have been input during the session. The **Save Current Model Input Values** form as shown in Figure 4 will open asking the user to input a name for the saved set of inputs. Click **Save Current Set of Input Values** to complete the process **Exit** to return to the **Main Screen.**

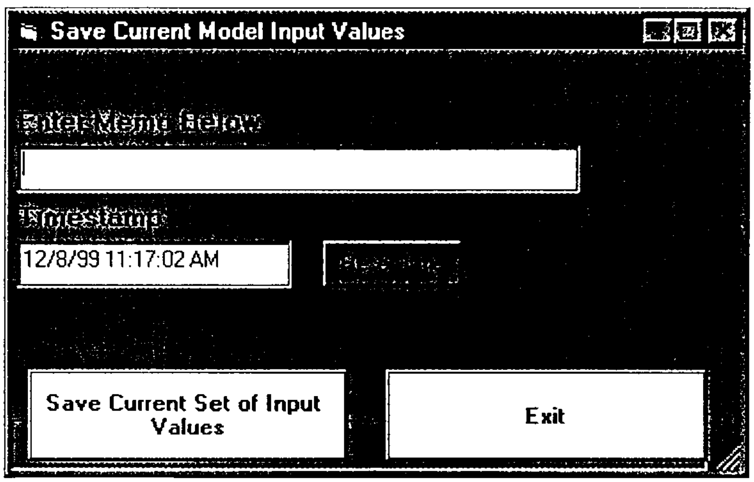


Figure 4

To load already saved input values, click **Load Saved Model Input Values** on the **Main screen** shown in Figure 2. The **Load Saved Model Input Values** form as shown in Figure 5 will open listing the previously save files. Select a file and click **Load Selected Inputs**. The model is now ready to run with the selected inputs. The user can change these inputs before running the model by going to the desired model input category as described earlier.

The model can always be reset to the default values by selecting **Reload Default Values** on the **Main Screen** shown in Figure 2.

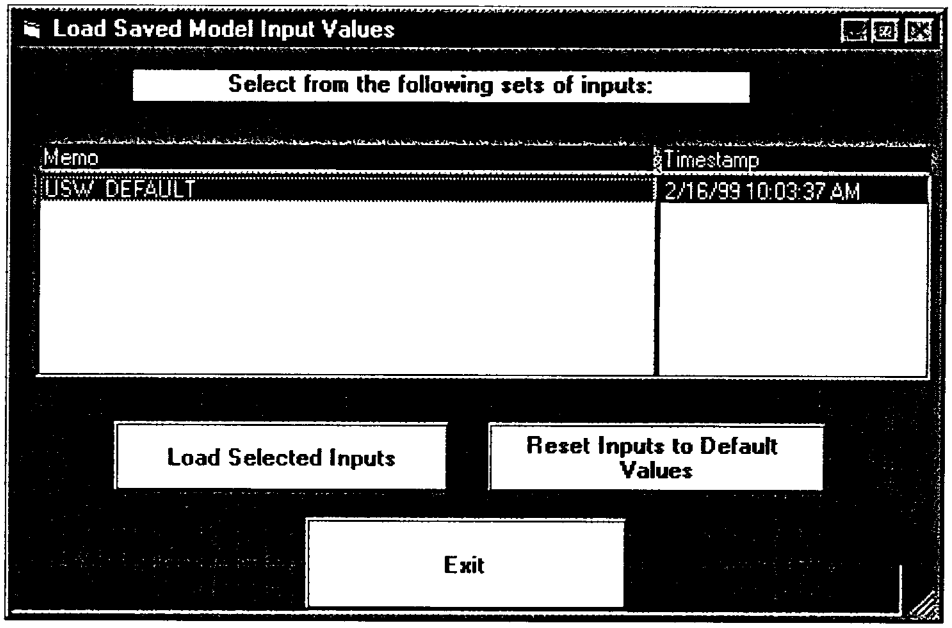

Load Saved Model Input Values
Select from the following sets of inputs:
Memo
Timestamp
USW DEFAULT
2/16/99 10:03:37 AM
Load Selected Inputs
Reset Inputs to Default Values
Exit

Figure 5

Loop Module

Description

The Loop Module is used to calculate loop investments. A detailed description of this process can be found in the Loop Module User Manual.

A loop is a physical connection from Qwest's central office to an end user's location for purposes of providing telecommunication service. Loops consist of feeder, distribution, drop wire and Network Interface Device (NID). Feeder is the main cable leaving the central office and extending to the point where distribution facilities are interconnected. Distribution is the cable that connects with the feeder and extends the loop to a termination point (i.e., pole or pedestal) near a home or workplace. A Drop wire is the aerial or buried facility that connects the distribution cable to the telecommunications terminal in the home or workplace. The NID provides electrical protection and a point of interface between the drop or building entrance cable and the customers' inside wire.

Feeder

Feeder is the main cable leaving the central office, extending to the point where distribution facilities are interconnected. LoopMod builds facilities from the most distant location in each quadrant back to central office, adding demand along the route. The data includes the line demand at the SAI (also sometimes referred to as a Feeder Distribution Interface or FDI), the sub-feeder or lateral length and the main feeder length. At each taper point the line demand is incremented to show total demand used for cable sizing. In addition the distance at each location is used in determining the technology and placement methodology that will be utilized. If the technology used is fiber based DLC, the demand is shown as number of fibers required to support the DLC remote terminals. If the technology selection is copper cable, the demand is shown as copper pairs required. The engineering fill factor is applied to this demand to determine the copper cable size or to determine the DLC size the program will utilize.

Distribution

Distribution is the cable that connects with the feeder and extends the loop to a termination point (i.e., pole or pedestal) near a home or workplace. Distribution is modeled differently than feeder. Generic distribution designs are specified for a range of neighborhoods and business districts, based on the density of access lines. The five distribution groups employed in the modeling are as follows:

Distribution Group	Includes:
DG1 - Very High	High-rise structures such as office and apartment buildings
DG2 - High	Multi-building office and industrial parks, campus environments, condominiums, apartments and town homes

DG3 - Medium	Suburban residential subdivisions
DG4 - Low	Suburban large acreage
DG5 - Very Low	Sparsely populated urban or rural areas, ranches, farms, etc.

The average investment by component for each design is multiplied by the design percents to produce a distribution investment for each kilofoot of loop length within each wire center group.

The Distribution Group designs are adjusted in LoopMod V2.0 to reflect the DA to DA density differences. Information about each DA is matched against density and building entrance terminal rules to map each DA to the appropriate DG design. The lot oriented designs (DG3, DG4 & DG5) are then adjusted based on a cable multiplier that reflects the difference between the standard design lot frontage and the frontage calculated for each individual DA.

ICM distribution costs also include the drop and Network Interface Device (NID). NID cost is also calculated separately for sell as a separate UNE when the customer does not purchase distribution.

Drop

The service wire or drop is a two to six pair facility that extends from the NID to the terminal on the distribution cable. The terminal contains a connecting block with lugs for terminating the drop wires. Where demand exceeds a certain level, entrance cables, not drops, are used and are terminated on building terminals.

Network Interface Device (NID)

The NID provides electrical protection and a point of interface between the drop or building entrance cable and the customers' inside wire. The NID may be housed in a small case on the side of residence or business, or it may be in a larger outside wall mounted building terminal for apartment buildings or small office buildings. In high density situations the NID would likely be associated with a terminal in the building basement or equipment closet.

Together, the feeder, distribution and drop designs form a data set of dollar investments for each wire center group. These dollar investments are expressed in terms of kilofeet of loop plant for application to loop length data for specific study areas. The output of the Loop Module is investments per pair by account.

Making Changes to Loop Input Parameters

ICM allows the user to view the default-input values and override those values. This document does not show the actual loop module default values. See the Loop Module Default Values document for the actual default values and justification.

The **Input Values for Loop Module** screen is the primary screen for making changes to loop input parameters. To display the **Input Values for Loop Module** screen from the **U S WEST Integrated Cost Model Home Screen,** click on **Loops** from the **Select Model Input Category** drop down list and click **Go To Model Inputs** shown in Figure 2. The **Input Values for Loop Module** screen shown in Figure 6 is displayed.

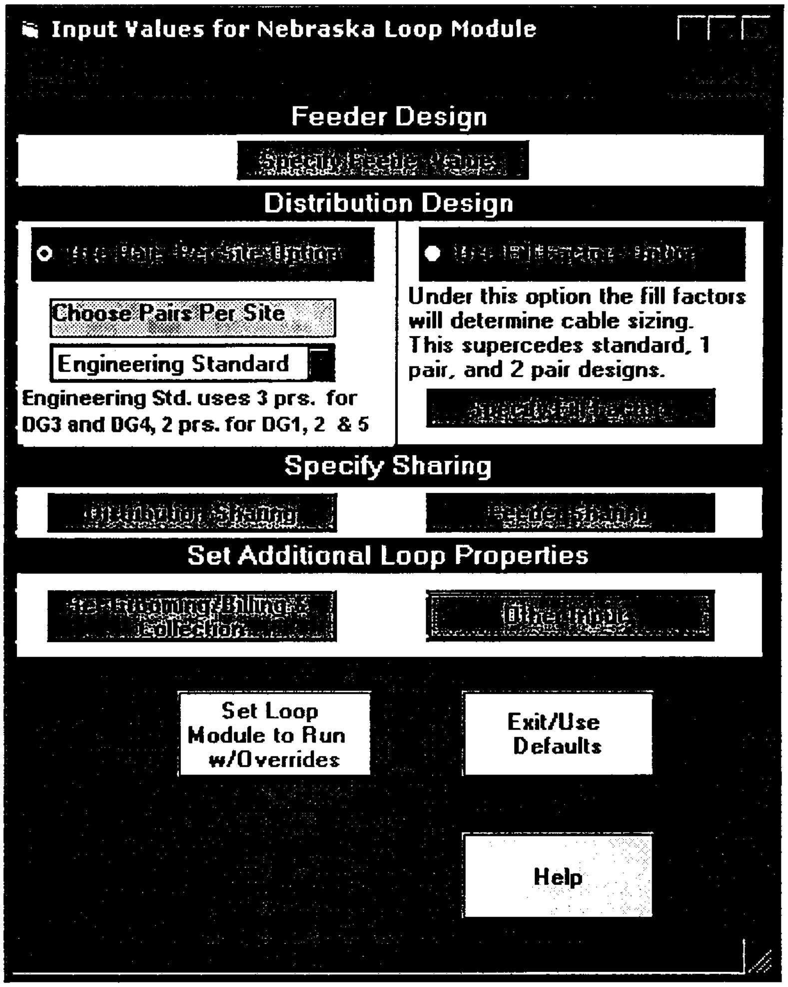


Figure 6

This input screen is divided into five areas. They are Feeder Model Crossover Point, Miscellaneous Inputs, Distribution Design, Set Feeder Fill and Set Additional Loop Properties.

Feeder Design Inputs

Feeder fill factor inputs and aerial percents are made on the **Feeder Design** form shown in Figure 7. This form is opened by clicking **Specify Feeder Values** in the Feeder Design section of the **Input Values for Loop Module** screen shown in Figure 6. The user can either accept the baseline values or change any of the values by entering a new value in the **Overrides** column for each wire center size. The default feeder fill value takes into account breakage, cost-effective long-term growth planning, and regulatory obligations (COLR, RTS) requiring stand-by capacity. Click **Use Overrides** to lock in the override values and return to the **Input Values for Loop Module** screen. Click **Exit/Use Defaults** to return to the **Input Values for Loop Module** screen without making changes.

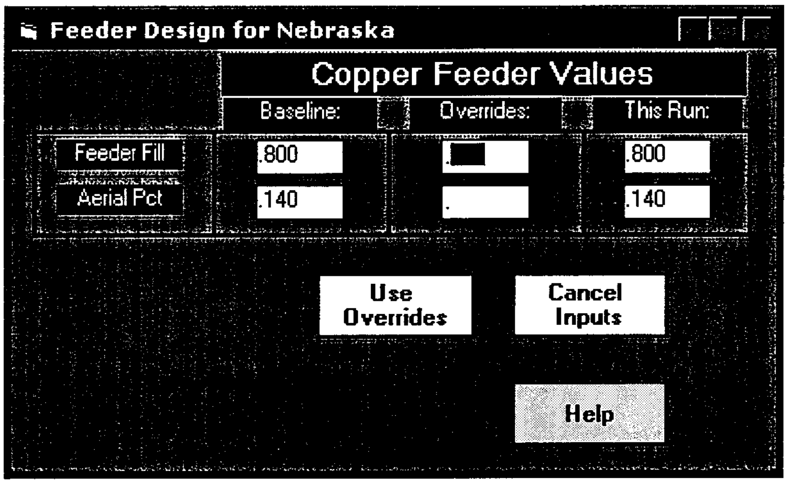


Figure 7

Distribution Design Inputs

There are two options for the distribution design. They are the Pairs Per Site Option and the Fill Factors Option. The Pairs Per Site Option calculates distribution costs based on the number of pairs per site as shown in Figure 8. The default is the Qwest engineering standard which is a mix of one, two and three pair designs depending on the distribution area. To choose the pairs per site option click the radio button labeled **Use Pairs Per Site Option**. Then select **Engineering Standard, 1 pair/site**, or **2 pairs/site** from the drop down list. Selecting **Custom** will automatically shift control to the Fill Factors Option.

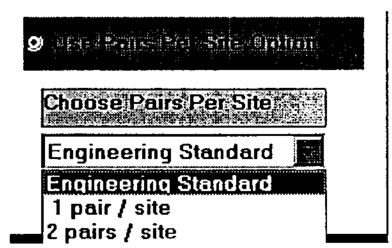


Figure 8

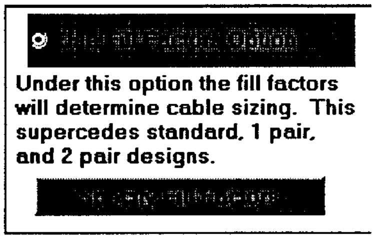


Figure 9

When the **Use Fill Factors Option** is selected by clicking on the designated radio button shown in Figure 9 and the user changes the default values for distribution fill factors, the distribution sizing is based on fill factors superceding the engineering standard of designing distribution areas based on ultimate capacity. Fill factors are a measure of the percentage of plant capacity used when the plant is installed. Fill factors allow for stand-by capacity required for administrative functions, backup and changes in demand. After selecting this option the user should click on **Specify Fill Factors** to open the **Distribution Design Using Fill Factors** form shown in Figure 10. If the user does not override at least one of the fill factors, the model will use the same Engineering Standard design as is used under the **Use Pairs Per Site Option**.

Distribution Using Fill Factors Inputs

Fill factor inputs are made on the **Distribution Design Using Fill Factors** form shown in Figure 10. This form is opened by clicking **Specify Fill Factors** in the distribution design section of the **Input Values for Loop Module** screen shown in Figure 6. The user can either accept the baseline values or change any of the values by entering a new value in the **Overrides** column for each distribution group. The default values are calculated from actual lines in service. To change the aerial percent click the **Aerial Percent** tab. Click **Use Overrides** to lock in the override values and return to the **Input Values for Loop Module** screen. Click **Cancel Inputs** to return to the **Input Values for Loop Module** screen without making changes.

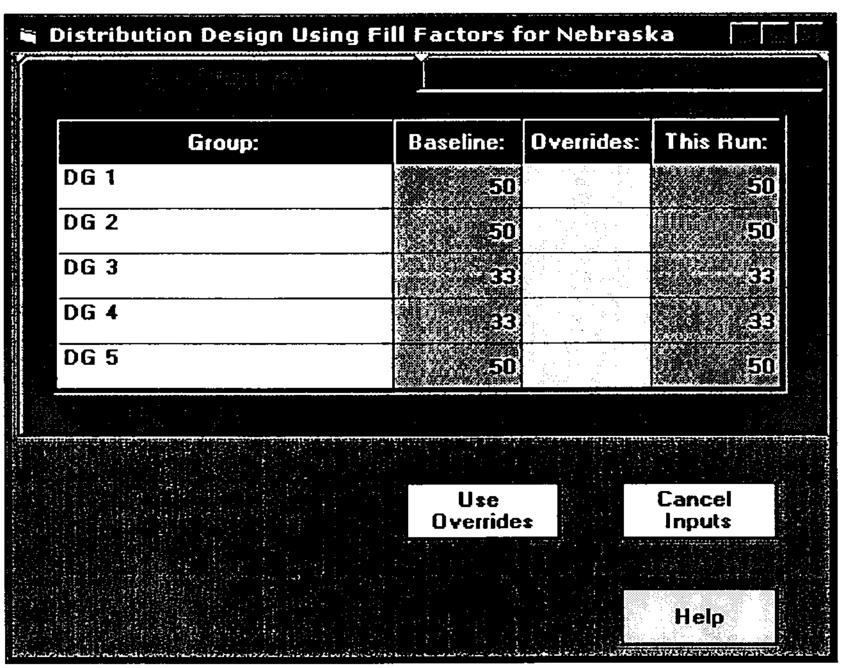


Figure 10

Placement Sharing

The Loop Module uses the percentage of sharing plant to determine the telecommunications provider's share of the cost of placing plant. It reduces the shareable portion of placement costs to reflect the opportunities that a telephone company has to reduce placement costs by sharing or avoiding placement costs. The user can input distribution sharing by type of placement activity for each distribution group. The user can input sharing for feeder by type of placement activity for urban and rural environments. See Drop Costs Inputs for inputting drop sharing.

To enter distribution placement sharing percent click **Distribution Sharing** on the **Input Values for Loop Module** screen shown in Figure 6. The **Placement Sharing by Distribution Group** form shown in Figure 11 is displayed with the default values **(Baseline)** shown. To enter Feeder placement sharing percent click **Feeder Sharing** on the **Input Values for Loop Module** screen shown in Figure 6. The **Feeder Placement Sharing** form shown in Figure 12 is displayed with the default values **(Baseline)** shown. Percent sharing can be changed from the default values by typing in the new value in the **Overrides** column. To use the overrides and return to the **Input Values for Loop Module** screen shown in Figure 6 click **Use Overrides**. To return to the **Input Values for Loop Module** screen and cancel any overrides click Exit/Use Defaults.

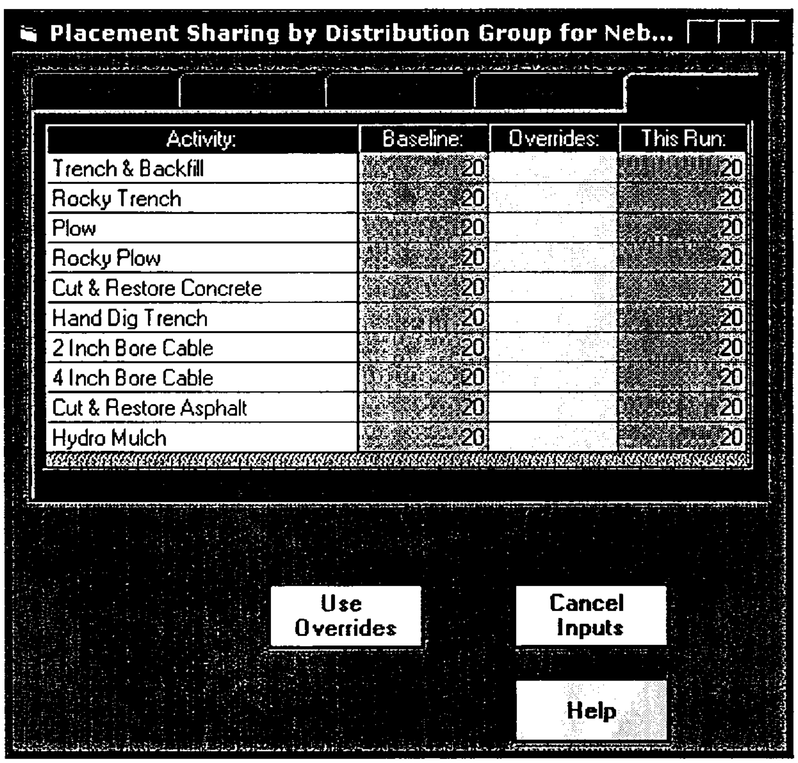


Figure 11

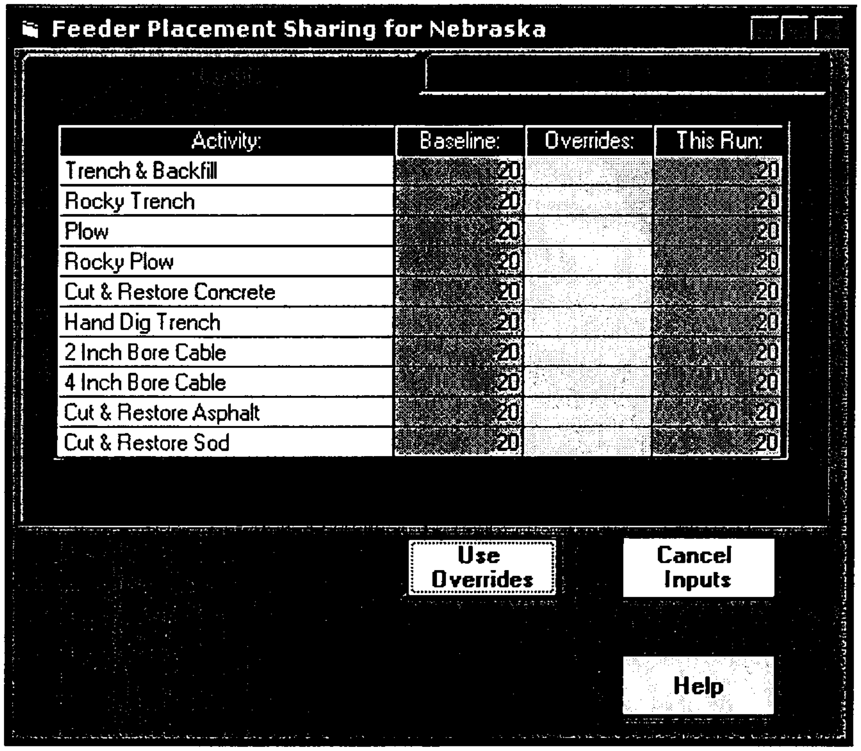


Figure 12

Unbundled Loop Grooming and Billing Inputs

To get to the **Miscellaneous Loop Inputs** form shown in Figure 13, click the **Set Grooming/Billing & Collection** button on the **Input Values for Loop Module** screen in Figure 6. Grooming is required to extract individual voice grade pairs off integrated pair gain systems before entering the switch. The Qwest default value is based on the probability that grooming will be required. To change the default value, enter an investment per 2 wire pair in the **Override** column.

Billing is the investment required in computer equipment to bill the customer per 2 wire or 4 wire loop. To change the default value, enter an investment per 2 wire/4 wire pair in the **Override** column.

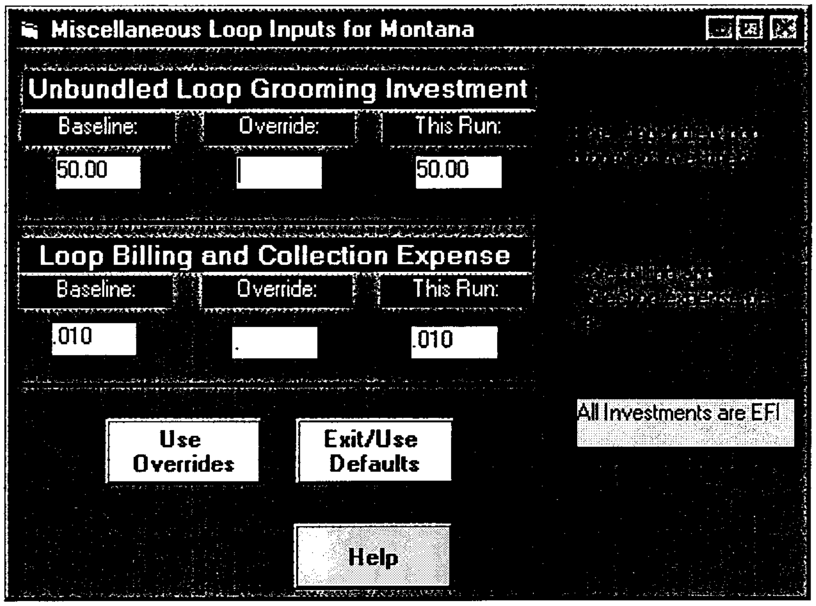


Figure 13

To use the overrides and To return to the **Input Values for Loop Module** screen shown in Figure 3 click **Use Overrides**. To return to the **Input Values for Loop Module** screen and cancel any overrides click Exit/Use Defaults.

Set Additional Loop Properties Inputs

Click the **Other Inputs** button to get access to the **Additional Inputs for the Loop Module** screen shown in Figure 14. This screen gives the user access to input forms for buried placement techniques, placement costs and material costs for feeder distribution and drop. The user can view the defaults for any category by clicking the View button. To override the defaults click Revise. Click Return to Main Loop Inputs to close this screen and return to the **Input Values for Loop Module** screen shown in Figure 6.

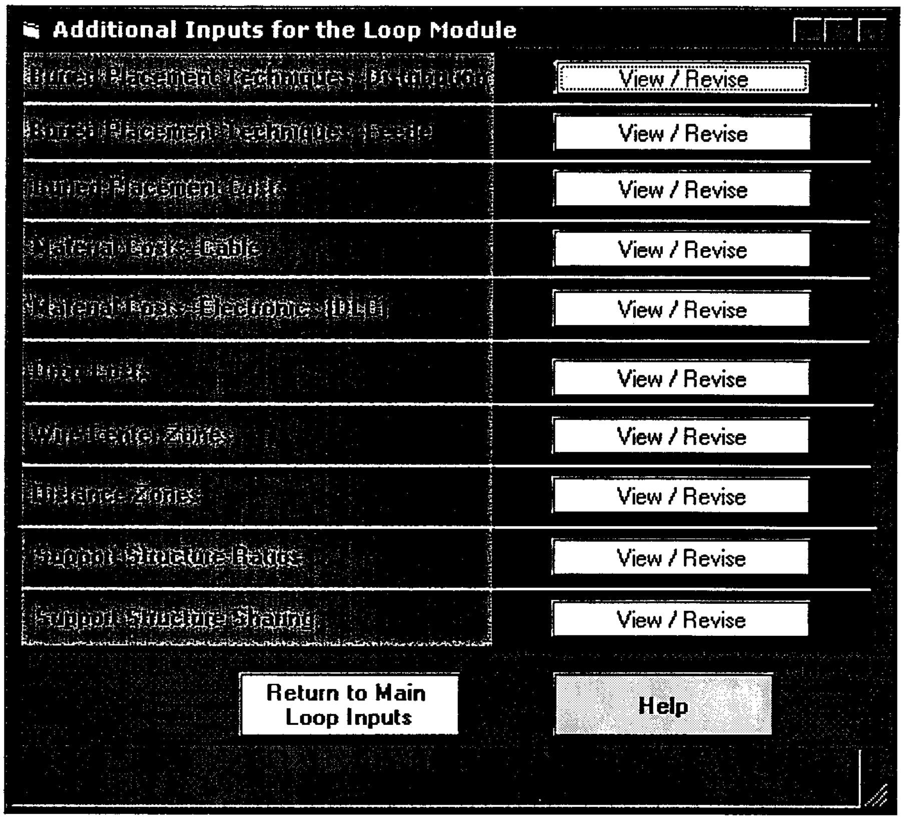


Figure 14

Buried Placement Techniques

Outside plant engineers use a variety of placement techniques to efficiently place buried feeder plant. Different field conditions require the use of specific placement techniques to place plant in a way that insures network integrity and minimizes cost. The Loop Module has separate inputs for the occurrence of nine different placement techniques for both urban and rural feeder plant. Some examples of placement techniques include: trench and backfill, plow, cut and restore concrete, and bore cable.

Buried Placement Techniques - Distribution Inputs

To change the buried placement techniques for distribution plant, click **Buried Placement Techniques - Distribution View/Revise** on the **Additional Inputs for the Loop Module** screen. The **Distribution Buried Placement Techniques by Distribution Group** form will open as shown in Figure 15. There are ten methods for placing buried plant as shown in Figure 15. The hydro mulch method is only available in DG5. The default values are based on Qwest engineering principles and confirmed by actual experience for different distribution group sizes. The user can change the default percentages by entering new values in the **Overrides** column by distribution group. The total for each distribution group must equal 100%. Use the scroll bar at the bottom of the form to access the other distribution groups.

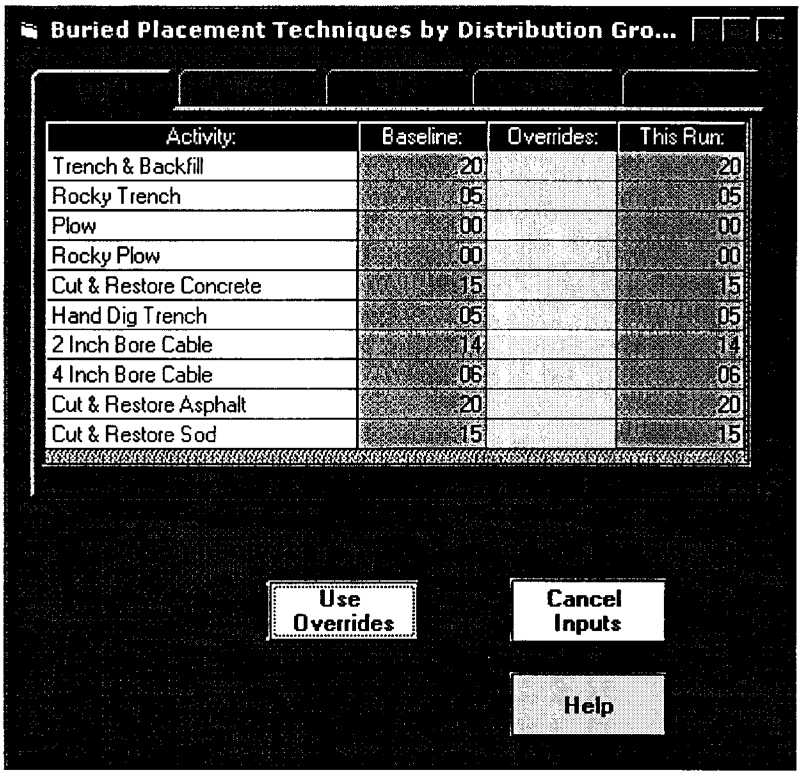
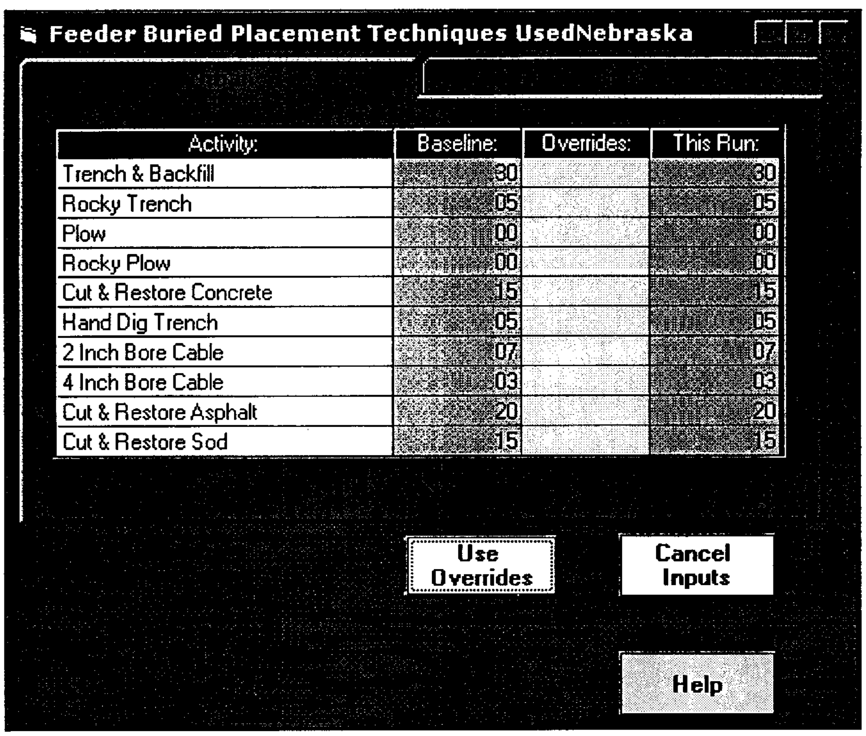


Figure 15

Buried Placement Techniques - Feeder Inputs

To change the buried placement techniques for feeder plant, click **Buried Placement Techniques - Feeder View/Revise** on the **Additional Inputs for the Loop Module** screen. The **Feeder Buried Placement Techniques** form will open as shown in Figure 16. There are ten methods for placing buried plant as shown in Figure 16. The cut and restore sod method is only available in the urban environment. The hydro mulch method is only available in the rural environment. The Loop Module uses different percentages for urban and rural placements to account for the lower density and fewer obstacles at longer distances from switching offices. The default values are based on Qwest engineering principles and confirmed by actual experience. The user can change the default percentages by entering new values in the **Overrides** column by environment. The total for each environment must equal 100%. Use the scroll bar at the bottom of the form to access the other environments.



Activity:	Baseline:	Overrides:	This Run:
Trench & Backfill	30		30
Rocky Trench	05		05
Plow	00		00
Rocky Plow	00		00
Cut & Restore Concrete	15		15
Hand Dig Trench	05		05
2 Inch Bore Cable	07		07
4 Inch Bore Cable	03		03
Cut & Restore Asphalt	20		20
Cut & Restore Sod	15		15

Figure 16

Buried Placement Costs Inputs

There are 14 cost inputs for placing. They are as follows:

Bore 2"	Plow cable - rocky	Cut & Restore concrete
Bore 4"	Restore sod/gravel Missile	Trench cable-hand
Cut & restore asphalt	Fiber Trench	Trench cable-rocky
Lay cable	Future (This is for future use)	Trench cable-standard
Plow cable	Hydro Mulch	

To change the buried placement costs for outside plant, click **Buried Placement Costs View/Revise** on the **Additional Inputs for the Loop Module** screen. The **Placement Costs** form will open as shown in Figure 17. The user can change the placement cost per foot of cable by entering new values in the **Overrides** column by distribution group. Clicking **Use Overrides** accepts the override values and returns the user to the **Additional Inputs for the Loop Module** screen.

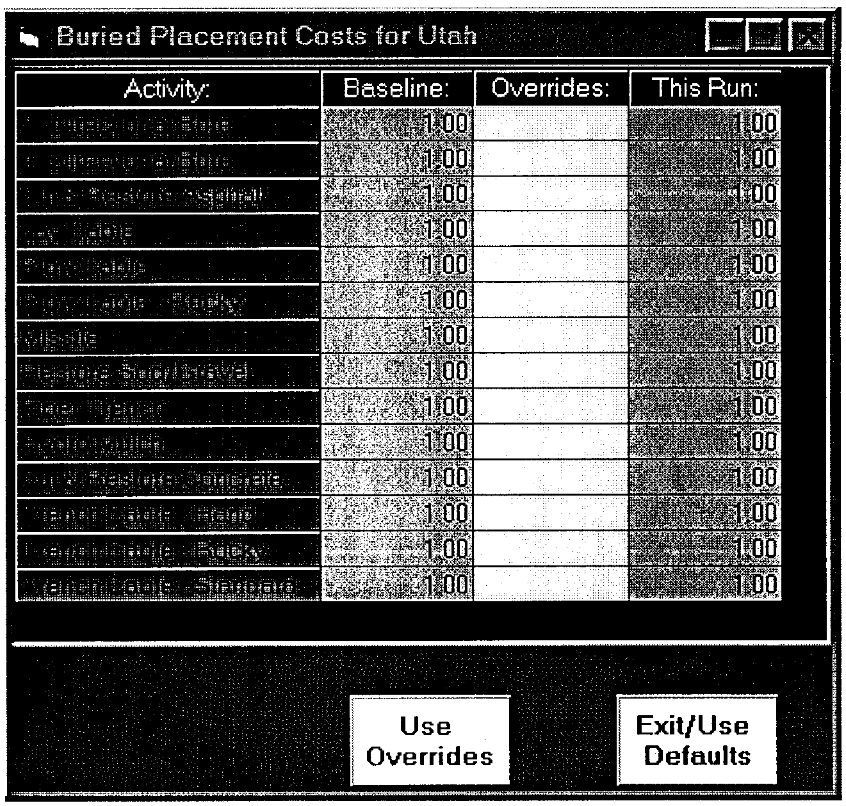


Figure 17

Material Costs Inputs

There are three forms available for inputting material costs. They are **Cable Cost** (Figure 18), **Electronics Cost** (Figure 19), and **Drop Costs** (Figure 20). Clicking the appropriate Revise button on the Additional Inputs for the Loop Module screen can access them. Cable costs are per foot of cable. Electronics costs are per unit. Drop input data is divided into four groups Aerial, 2 pair buried, 3 pair buried and drop lengths. The units are as follows:

Aerial Drop - placement per foot of wire
Labor - per hour
Material - each
Buried drop up to 100 feet and over 100 feet - per foot
Mobilization - per hour
Aerial and buried drop length - feet

Cable Costs Input

Cable Cost for Utah

Desc:	Type/Size:	Baseline:	Overrides:	This Run:
Rural Wire	1 Pair C - Rural Wire	1.00		1.00
Buried Cable - Trenched	25 Pair - 22 Gauge	1.00		1.00
Buried Cable - Trenched	50 Pair - 22 Gauge	1.00		1.00
Buried Cable - Trenched	100 Pair - 22 Gauge	1.00		1.00
Buried Cable - Trenched	200 Pair - 22 Gauge	11.00		11.00
Buried Cable - Trenched	300 Pair - 22 Gauge	11.00		11.00
Buried Cable - Trenched	400 Pair - 22 Gauge	1.00		1.00
Buried Cable - Trenched	600 Pair - 22 Gauge	1.00		1.00
Buried Cable - Trenched	25 Pair - 24 Gauge	1.00		1.00
Buried Cable - Trenched	50 Pair - 24 Gauge	1.00		1.00
Buried Cable - Trenched	100 Pair - 24 Gauge	1.00		1.00
Buried Cable - Trenched	200 Pair - 24 Gauge	2.00		2.00
Buried Cable - Trenched	300 Pair - 24 Gauge	4.00		4.00
Buried Cable - Trenched	400 Pair - 24 Gauge	1.00		1.00
Buried Cable - Trenched	600 Pair - 24 Gauge	3.00		3.00
Buried Cable - Trenched	900 Pair - 24 Gauge	1.00		1.00
Buried Cable - Trenched	1200 Pair - 24 Gauge	1.00		1.00
Buried Cable - Trenched	600 Pair - 26 Gauge	1.00		1.00
Buried Cable - Trenched	900 Pair - 26 Gauge	1.00		1.00
Buried Cable - Trenched	1200 Pair - 26 Gauge	1.00		1.00
Buried Cable Stub	50 Pair - 24 Gauge	100.00		100.00
Buried Cable Stub	100 Pair - 24 Gauge	1000.00		1000.00

Use Overrides | Cancel Inputs

Figure 18

Equipment Material Costs Inputs

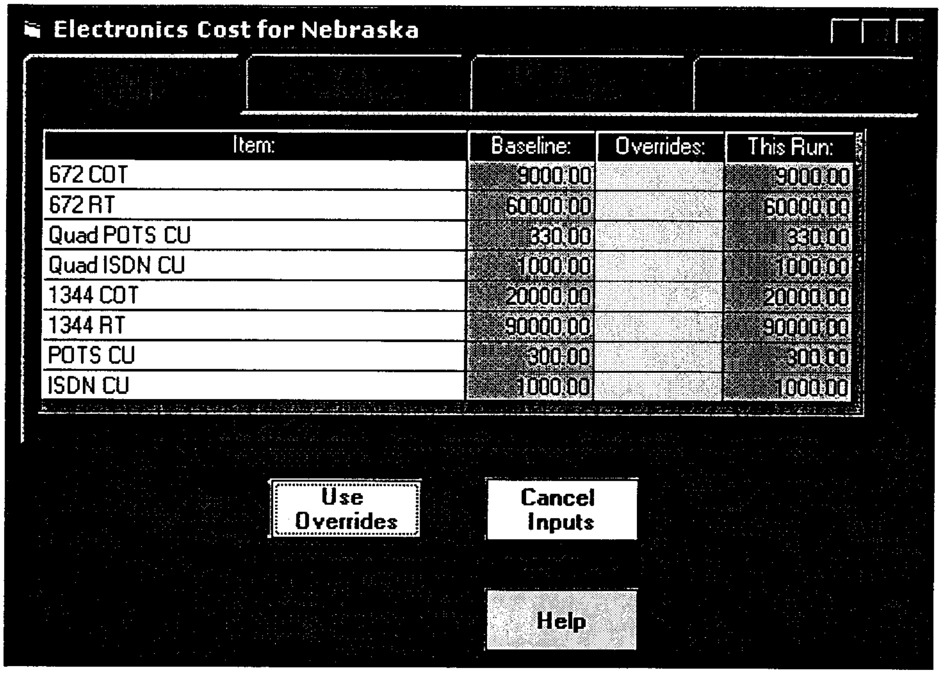


Figure 19

Drop Costs Inputs

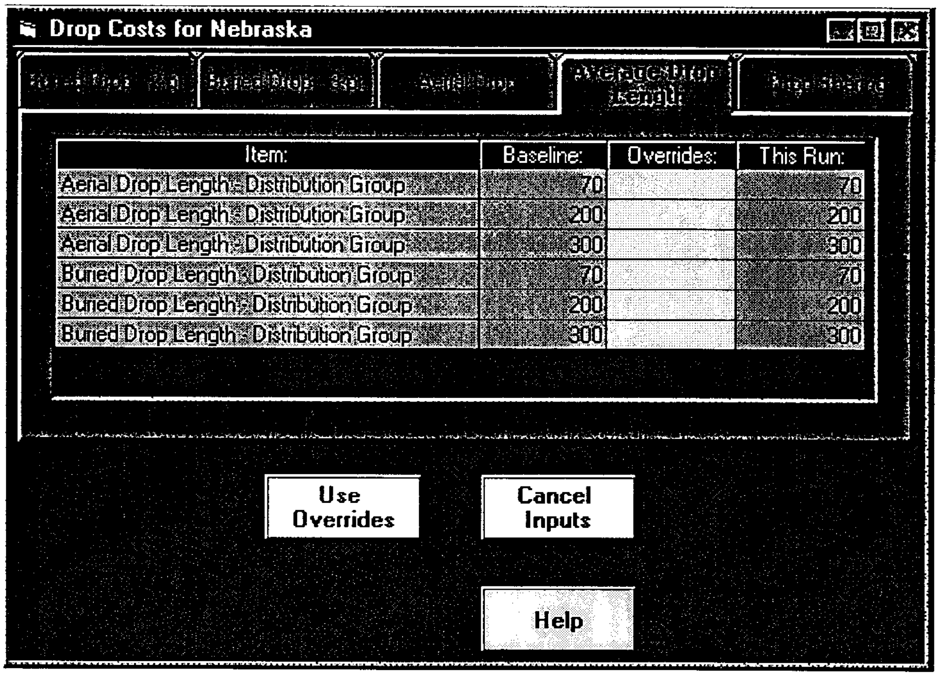
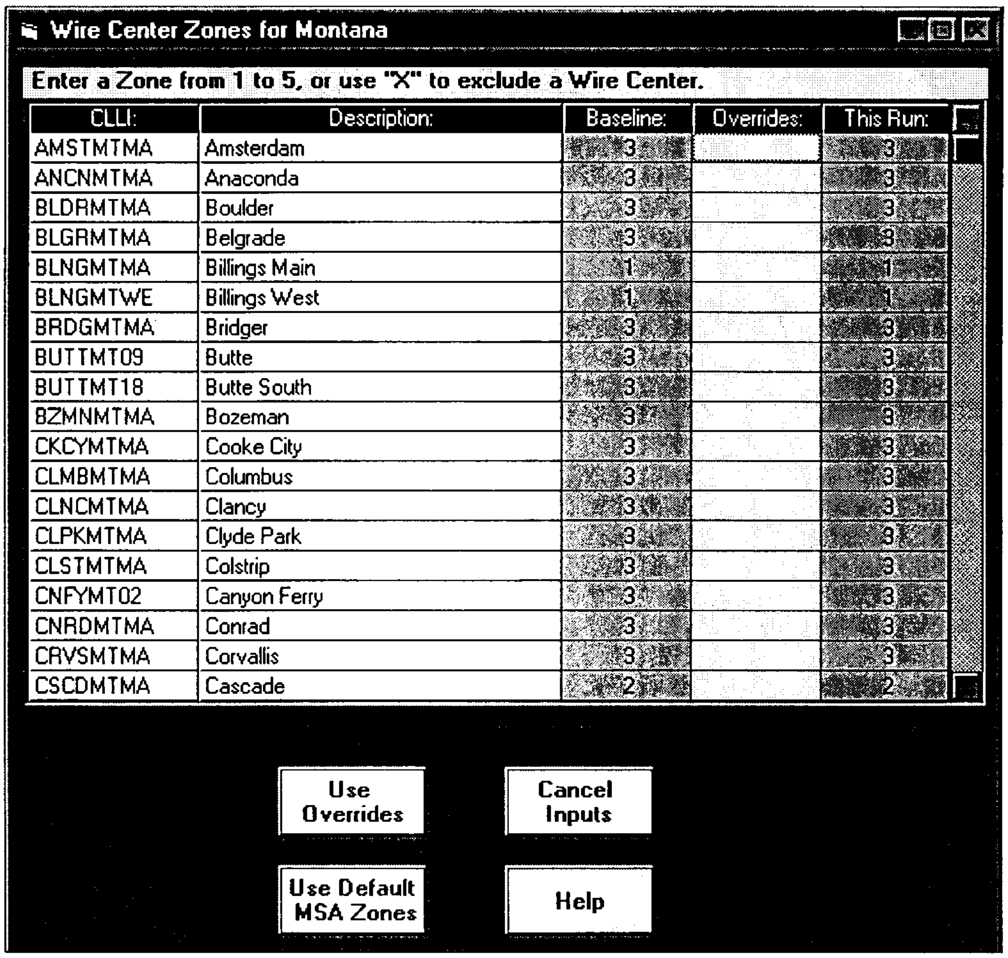


Figure 20

In addition to material cost inputs the **Drop Costs** input form provides for inputting drop lengths and drop sharing. Clicking on **Use Overrides** accepts the new values.

Wire Center Zones

ICM will calculate costs for up to five wire center zones or distance zones. The user should select either wire center zones or distance zones. The user can specify a zone for each wire center by using the **Wire Center Zones** form shown in Figure 21. To open the Wire Center Zones form, select **Wire Center Zones View/Revise** on the **Additional Inputs** form shown in Figure 14. Use the **Overrides** column to override the defaults (**Baseline**). Enter an "X" to exclude a wire center. To return to the default MSA Zones select **Use Default MSA Zones**. Click **Use Overrides** to accept the override values.



CLLI:	Description:	Baseline:	Overrides:	This Run:
AMSTMTMA	Amsterdam	3		3
ANCNMTMA	Anaconda	3		3
BLDRMTMA	Boulder	3		3
BLGRMTMA	Belgrade	3		3
BLNGMTMA	Billings Main	1		1
BLNGMTWE	Billings West	1		1
BRDGMTMA	Bridger	3		3
BUTTMT09	Butte	3		3
BUTTMT18	Butte South	3		3
BZMNMTMA	Bozeman	3		3
CKCYMTMA	Cooke City	3		3
CLMBMTMA	Columbus	3		3
CLNCMTMA	Clancy	3		3
CLPKMTMA	Clyde Park	3		3
CLSTMTMA	Colstrip	3		3
CNFYMT02	Canyon Ferry	3		3
CNRDMTMA	Conrad	3		3
CRVSMTMA	Corvallis	3		3
CSCDMTMA	Cascade	2		2

Figure 21

Distance Zones

ICM will calculate costs for up to five wire center zones or distance zones. The user should select either wire center zones or distance zones. The user can specify zones by distance from the switching and by wire center grouping by using the **Specify Distance Zones** form shown in Figure 22. To open the **Specify Distance Zones** form, select **Distance Zones View/Revise** on the **Additional Inputs** form shown in Figure 14. Enter the upper range values for each zone. The lower range for the next zone will be automatically calculated. ICM will not allow overlap zones or gaps. The first zone will be set to zero at the lower range and the last zone selected will automatically set to the highest possible value in the upper range. Click **Use Overrides** to accept the override values.

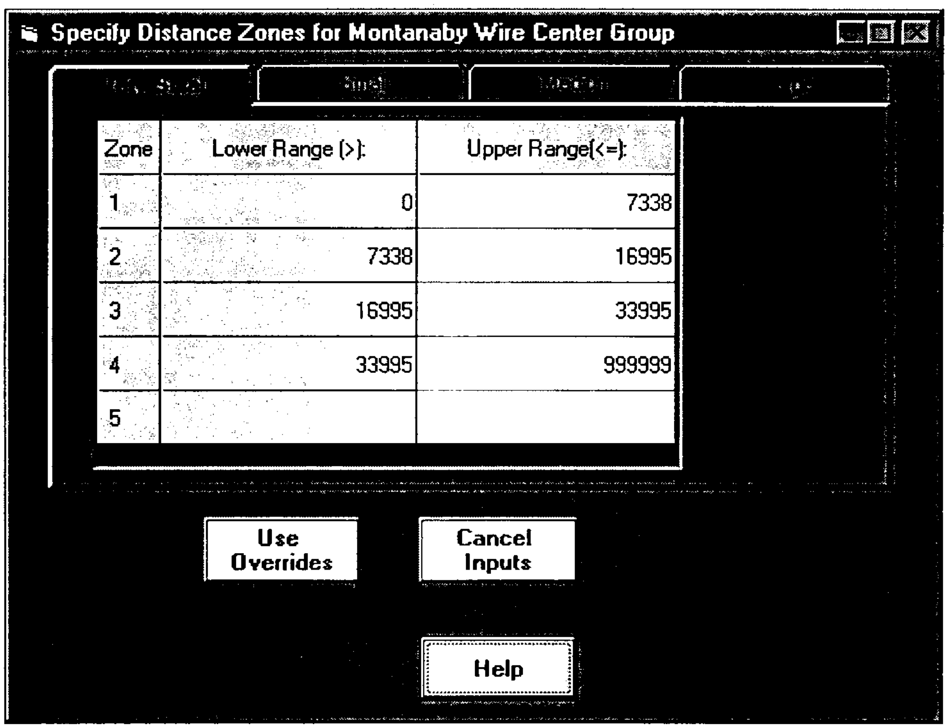


Figure 22

Support Structure Ratios

Support Structure ratios are used to calculate the investment for poles and conduit based on the investment for aerial and underground cable respectively. The ratios multiplied by either aerial or underground investment will develop the associated pole or conduit investment.

To open the **Support Structure Ratios** form click **Support Structure Ratios View/Revise** on the **Additional Inputs for Loop Module** screen shown in Figure 14. The **Support Structure Ratios** form shown in Figure 23 is displayed with the default values (**Baseline**) shown. Pole to aerial and conduit to underground ratios can be changed from the default values by typing in the new value in the **Overrides** column. To use the overrides and to return to the **Additional Inputs for Loop Module** screen, click **Use Overrides**. To return to the **Additional Inputs for Loop Module** screen and cancel any overrides click **Exit/Use Defaults**.

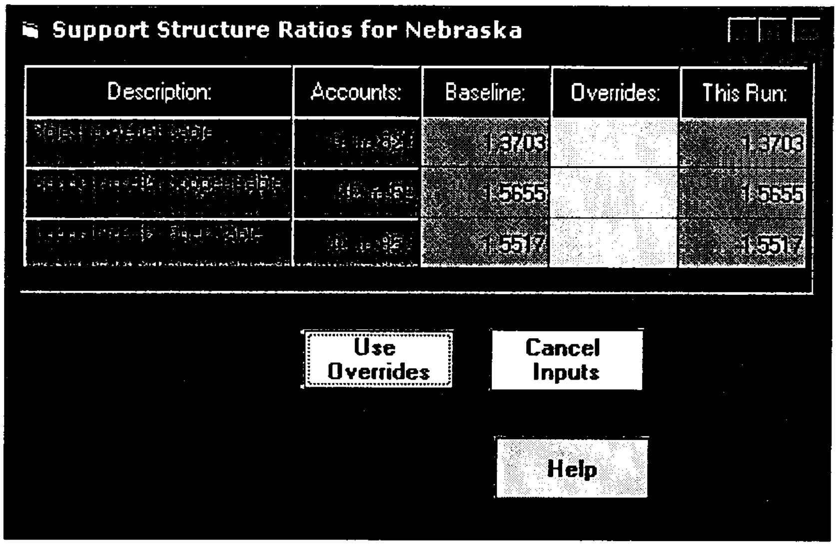


Figure 23

Support Structure Sharing

The Loop Module uses the percentage of sharing plant structures to determine the telecommunications provider's share of the cost of placing plant. It reduces the shareable portion of placement costs to reflect the opportunities that a telephone company has to reduce placement costs by sharing or avoiding placement costs. The user can input sharing for aerial and underground plant types. The baseline assumes, on a forward-looking basis, a higher percentage of poles and conduits would be leased than currently are leased.

To enter sharing percent by type of facility click **Support Structure Sharing View/Revise** on the **Additional Inputs for Loop Module** screen shown in Figure 14. The **Support structure Sharing** form shown in Figure 24 is displayed with the default values (**Baseline**) shown. Percent sharing for aerial and underground facilities can be changed from the default values by typing in the new value in the **Overrides** column. To use the overrides and to return to the **Additional Inputs for Loop Module** screen, click **Use Overrides**. To return to the **Additional Inputs for Loop Module** screen and cancel any overrides click **Exit/Use Defaults**.

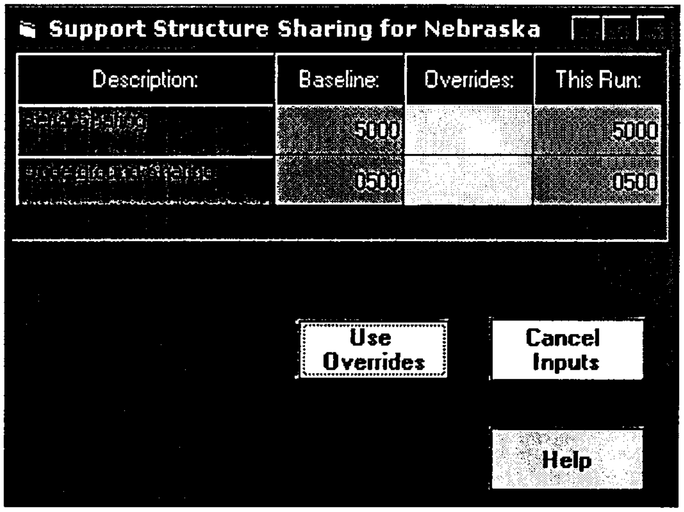


Figure 24

Viewing Loop Module Outputs

Loop Module outputs may be viewed in the output workbook described in Appendix C. From the **U S WEST Integrated Cost Model Home Screen,** click **View Model Outputs**. The **Output Selection** form is displayed as shown in Figure 50. On the **Output Selection** form, click the **View** menu item. Next click, **View Output Spreadsheet**. Excel will be launched and the output workbook will open. The user should then navigate to the spreadsheet titled, Loop Module Output.

Printing Loop Investments

Loop investment outputs of the Loop Module are located in the Loop Module Outputs spreadsheet of the ModelOut.xls workbook. This spreadsheet is printed along with the unbundled loop results.

Switching Module

Description

The Switching Module calculates investments for intraoffice and interoffice end office switching calls and minutes of use, and for interoffice tandem switching calls and minutes of use. The average cost for one point of switching is provided by rate period for the offices selected in a particular study. For example, the cost per interoffice completed call is provided for one point of switching. If the cost per interoffice local call is desired, the cost provided must be doubled since local interoffice calls are switched twice (absent any tandem involvement). An intraoffice call is switched only once, and, therefore, the cost per one point of switching alone represents the cost of the call. The Switching Module also calculates separately the cost of originating and the cost of terminating an interoffice call. The model also calculates and displays network parameters required to use the elements correctly. For example, the Switching Module provides percent of intraoffice calls completed through end office switches.

The Switching Module also calculates central office feature investments. The Switching Module Features process develops investments for features by using the functional category unit investments created in the Switching Module Core process along with inputs provided by the user. An investment is developed for each part of the feature; for example, activation, deactivation, and call attempt. The Switching Module Features process determines ABSBH investment associated with a feature by partitioning the feature into its components and determining the components not recovered by other rate elements. Cost of the feature reflects those components not included in other rate elements. The subscribers' busy hour use of the feature drives the investments required. The Switching Module displays most feature costs as an investment per line, consistent with the rate plans for the features.

Switching Module Outputs:

Intraoffice Investment per message
Intraoffice Investment per minute of use
Interoffice Originating Investment per message
Interoffice Originating per minute of use
Interoffice Terminating Investment per message
Interoffice Terminating per minute of use
Measurement Investment per message
Measurement Investment per minute of use
Tandem Interoffice Investment per message
Tandem Interoffice Investment per minute of use
Percent Intraoffice minutes of use (%)
Investment Weightings (%) 8am to 5pm (Day)
Investment Weightings (%) 5pm to 11pm (Evening)
Investment Weightings (%) 11pm to 8am (Night)
Usage Weightings (%) 8am to 5pm (Day)
Usage Weightings (%) 5pm to 11pm (Evening)

Switching Module Outputs:

Usage Weightings (%) 11pm to 8am (Night)
MDF COE investment per Pair
MDF OSP Investment per Pair
Analog Line Port
LIS Analog Port
Non Traffic Sensitive Central Office Equipment (NTS COE)
DS1 Trunk Port
Nonintegrated BRI w/o Packet
D Channel- Port Ltd. Packet Switch
D Inter Switch Packet - Port Ltd. PS
Nonintegrated Switched Packet Call Setup (SW1 Only)
Calling Number Delivery Blocking - Per Line
Analog Call Appearance
Direct Inward Dialing (Incoming) (PRI)
Direct Outward Dialing (Dial 9) Incoming (PRI)
PRI w/o Packet (23B+D)
Multiline Hunt - Circular
TRUNKSIDE Digital Facility Termination (DS0)
BASIC CENTRON Direct Inward Dialing

Making Changes to Switching Input Parameters

To get to the **Input Values for Switching Module** screen, click **Switch** from the **Select Model Input Category** drop down list and click **Go To Model Inputs** shown in Figure 2. The **Input Values for Switching Module** screen shown in Figure 25 is displayed.

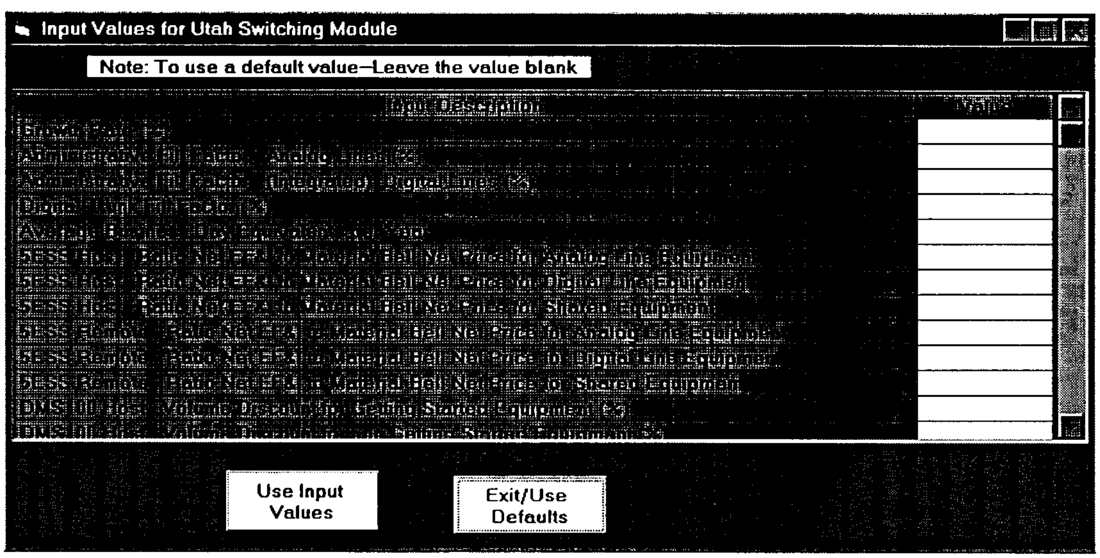


Figure 25

Qwest uses actual data and network forecasts to determine the default values. System prices and discounts are vender proprietary and therefore are not listed. The complete list of inputs is listed in the following table:

Switching Module Inputs

Switch Type	Host Or Remote	Variable Description
All	All	Growth Rate
All	All	Administrative Fill Factor - Analog Lines (%)
All	All	Administrative Fill Factor - (Integrated) Digital Lines (%)
All	All	Digital Trunk Fill Factor (%)
All	All	Average Business Day Equivalents Per Year
5ESS	Host	Ratio Net EF&I to Material Bell Net Price for Analog Line
5ESS	Host	Ratio Net EF&I to Material Bell Net Price for Digital Line
5ESS	Host	Ratio Net EF&I to Material Bell Net Price for Shared Equipment
5ESS	Remote	Ratio Net EF&I to Material Bell Net Price for Analog Line
5ESS	Remote	Ratio Net EF&I to Material Bell Net Price for Digital Line
5ESS	Remote	Ratio Net EF&I to Material Bell Net Price for Shared Equipment
DMS100	Host	Volume Discount for purchase of new switch (%)
DMS100	Host	Volume Discount for non Getting Started Equipment (%)
DMS100	Host	Integrated Business Plan Discount (%)
DMS100	Host	Line Card Discount (%)
DMS100	Remote	Volume Discount for purchase of new switch (%)
DMS100	Remote	Volume Discount for non Getting Started Equipment (%)
DMS100	Remote	Integrated Business Plan Discount (%)
DMS100	Remote	Line Card Discount (%)
DMS10	All	Volume Discount for purchase of new switch (%)
DMS10	All	Integrated Business Plan Discount (%)
DMS10	All	Line Card Discount (%)
DMS10	All	Discount for non Getting Started Equipment (%)
Ericsson	Host	Integrated Business Plan Discount (%)
Ericsson	Host	Discount for Getting Started Equipment (%)
Ericsson	Host	Discount for non Getting Started Equipment (%)
Ericsson	Host	Integrated Business Plan Two Discount (%)
Ericsson	Remote	Integrated Business Plan Discount (%)
Ericsson	Remote	Discount for Getting Started Equipment (%)
Ericsson	Remote	Discount for non Getting Started Equipment (%)
Ericsson	Remote	Integrated Business Plan Two Discount (%)

To change a value, enter the new value in the column labeled **Value** and click **Use Input Values**. Use the scroll bar to see the entire list. The data must be entered by switch type as shown in the table above.

To exit this form without making changes, click **Exit/Use Defaults**.

Viewing The Switching Module Outputs

The Switching Module outputs may be viewed in the output workbook described in Appendix C. From the **Home Screen** shown in Figure 2, click **View Model Outputs**.

The **Output Selection** form is displayed as shown in Figure 50. On the **Output Selection** form, click the **View** menu item. Next click, **View Output Spreadsheet** from the drop down list. Excel will be launched and the output workbook will open. The user should then navigate to the Switching Module output spreadsheets. The switch model output spreadsheets are labeled SM Usage Output and SM Port Feature Output.

Printing Switching Module Outputs

Switching Module outputs are printed along with the output printouts for the cost elements in which they are used. They may be printed separately from the ModelOut.xls workbook. Access to this workbook is described above in **Viewing Transport Model Outputs.**

Transport Module

Overview

The Transport Module (TM) develops investments for interoffice facilities for the Integrated Cost Model (ICM). It requires Microsoft Excel 7.0 to run. Interoffice facilities are an investment component of DS0, DS1 and DS3 unbundled network elements. The TM develops investments separately for channel terminations (CT), line haul (LH) and intermediate multiplexing (IM). CT investments are the electronics [i.e., DSX-1, DSX-3, fiber distribution panels (FDP), FLM 50/150, FLM 150, FLM 600 and FLM 2400] located in the originating and terminating central offices by account code. LH investments are the fiber and, if applicable, structures between the originating central office and terminating central office (C.O.). The IM investment components are electronics used when traversing intermediate central offices. This includes, but is not limited to, various add/drop multiplexers (ADM), FDP's and DSX panels.

Methodology

For each point pair consisting of all combinations of two wire centers, the Transport Module first calculates investment per circuit for the three components of the transport network: channel termination equipment, line haul, and intermediate multiplexing equipment. The investments associated with each point pair are next sorted into mileage bands. For each mileage band, the module reports the value for fixed and distance sensitive investments. This process is discussed in more detail in the Transport Module Technical Description document. This process is summarized below in Figure 26.

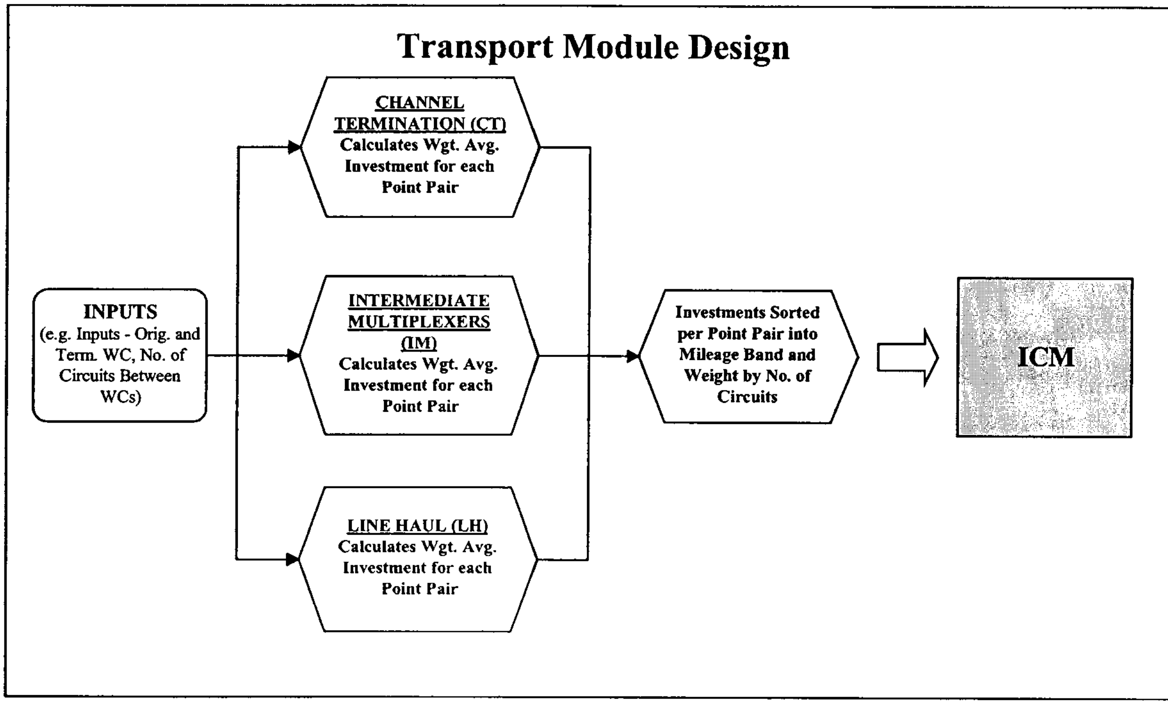


Figure 26

Investment Outputs

The investment outputs for DS0 Switched are in the following format by Plant account code:

Mileage Band	Type of cost	Fixed or Variable
OVER 0 TO 8	CONVERSATION MINUTE	FIXED
OVER 0 TO 8	CONVERSATION MINUTE	VARIABLE
OVER 0 TO 8	SETUP	FIXED
OVER 0 TO 8	SETUP	VARIABLE
OVER 8 TO 25	CONVERSATION MINUTE	FIXED
OVER 8 TO 25	CONVERSATION MINUTE	VARIABLE
OVER 8 TO 25	SETUP	FIXED
OVER 8 TO 25	SETUP	VARIABLE
OVER 25 TO 50	CONVERSATION MINUTE	FIXED
OVER 25 TO 50	CONVERSATION MINUTE	VARIABLE
OVER 25 TO 50	SETUP	FIXED
OVER 25 TO 50	SETUP	VARIABLE
OVER 50	CONVERSATION MINUTE	FIXED
OVER 50	CONVERSATION MINUTE	VARIABLE
OVER 50	SETUP	FIXED
OVER 50	SETUP	VARIABLE

The investment outputs for non switched DS0, DS1, and DS3 are in the following format by Plant account code:

Mileage Band	Fixed or Variable
OVER 0 TO 8	FIXED
OVER 0 TO 8	VARIABLE
OVER 8 TO 25	FIXED
OVER 8 TO 25	VARIABLE
OVER 25 TO 50	FIXED
OVER 25 TO 50	VARIABLE
OVER 50	FIXED
OVER 50	VARIABLE

Setup are those investments required to setup the connection and conversation minute are investments required to maintain the connection. Fixed and variable are not economic terms. Fixed refers channel termination investments which do not change in quantity of terminations based on distance. Variable refers to line haul and intermediate multiplexing investments which change in quantity of fiber and IM locations based on distance.

Making Changes To Transport Input Parameters

To get to the **Input Values for Transport Module** screen, click on **Transport** from the **Select Model Input Category** drop down list and click **Go To Model Inputs** shown in Figure 2. The **Input Values for Transport Module** screen shown in Figure 27 is displayed.

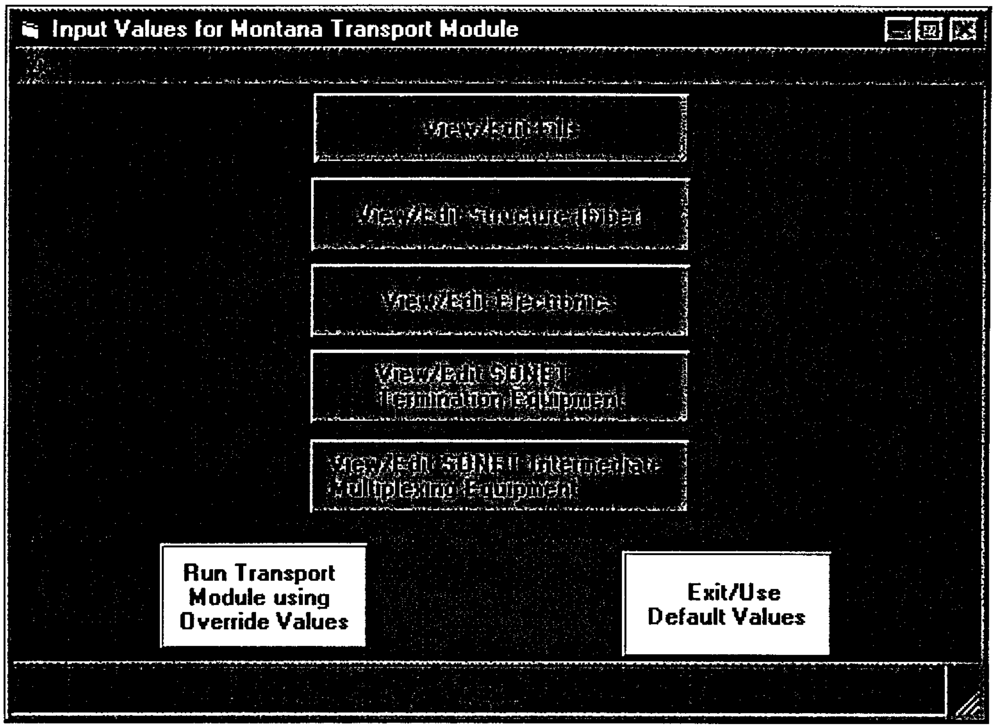
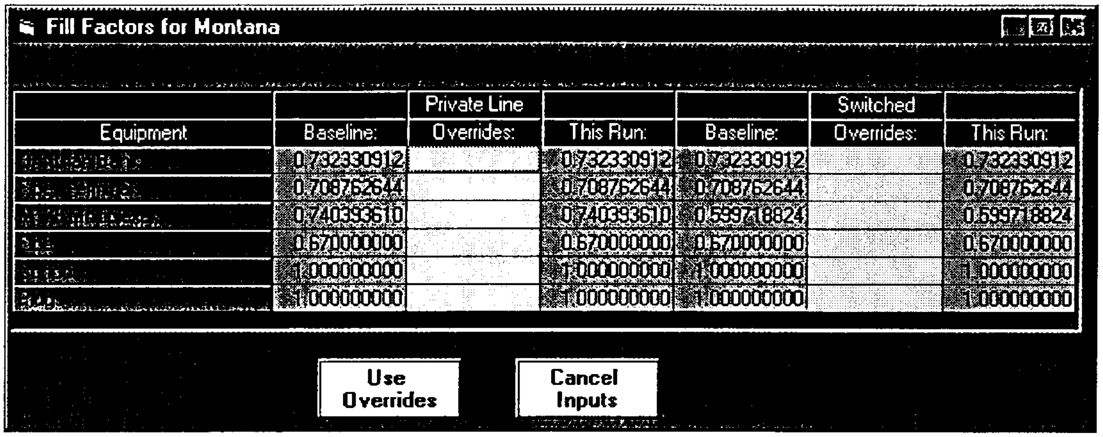


Figure 27

Fill Factor Inputs

To make changes to interoffice facility utilization factors, click **View/Edit Fills** button on the **Input Values for Transport Module** screen shown in Figure 27. The **Fill Factors** form is displayed as shown in Figure 28. To make changes to the equipment items listed, type a new value in the overrides column and click on **Use Overrides**. The user is then returned to the **Input Values for Transport Module** screen shown in Figure 27. To exit this form without making changes, click **Cancel Inputs**.

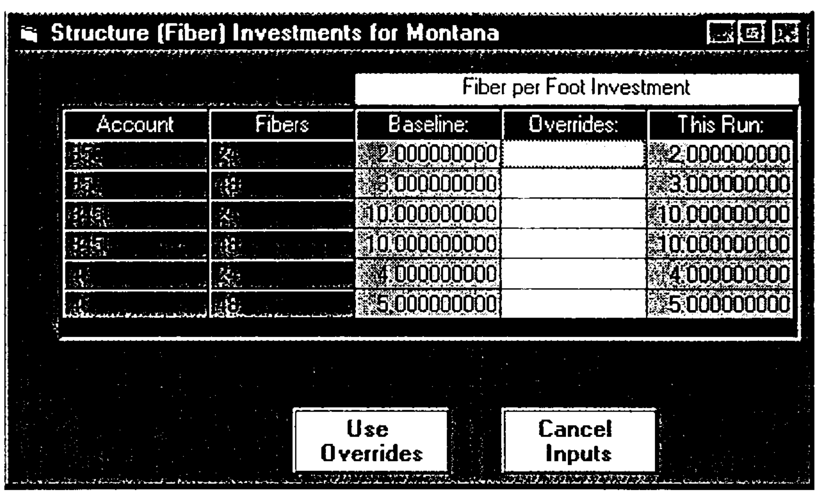


Equipment	Private Line Baseline:	Private Line Overrides:	Private Line This Run:	Switched Baseline:	Switched Overrides:	Switched This Run:
[redacted]	0.732330912		0.732330912	0.732330912		0.732330912
[redacted]	0.708762644		0.708762644	0.708762644		0.708762644
[redacted]	0.740393610		0.740393610	0.599718824		0.599718824
[redacted]	0.670000000		0.670000000	0.670000000		0.670000000
[redacted]	1.000000000		1.000000000	1.000000000		1.000000000
[redacted]	1.000000000		1.000000000	1.000000000		1.000000000

Figure 28

Fiber Structure Investments Inputs

To make changes to interoffice facility fiber investments, click the **View/Edit Structure (Fiber)** button on the **Input Values for Transport Module** screen shown in Figure 27. The **Structure (Fiber) Investments** form is displayed as shown in Figure 29. To make changes to the structure items listed type a new value in the **Overrides** column. Use the scroll bars to navigate through the list of equipment types. Click on **Use Overrides** to accept the override values and return to the **Input Values for Transport Module** screen shown in Figure 27. To exit this form without making changes click **Cancel Inputs**.



Account	Fibers	Fiber per Foot Investment Baseline:	Overrides:	This Run:
[redacted]	[redacted]	2.000000000		2.000000000
[redacted]	[redacted]	3.000000000		3.000000000
[redacted]	[redacted]	10.000000000		10.000000000
[redacted]	[redacted]	10.000000000		10.000000000
[redacted]	[redacted]	4.000000000		4.000000000
[redacted]	[redacted]	5.000000000		5.000000000

Figure 29

Electronic Equipment Inputs

To make changes to non-SONET equipment investments, click the **View/Edit Non-Electronics** button on the **Input Values for Transport Module** screen shown in Figure 27. The **Electronics** form is displayed as shown in Figure 30. To make changes to the equipment items listed, type a new value in the overrides column. Use the scroll bars to navigate through the list of equipment types, which includes mountings, cards and plug-ins. Click on **Use Overrides** to accept the override values and return to the **Input Values for Transport Module** screen shown in Figure 27. To exit this form without making changes, click **Cancel Inputs**.

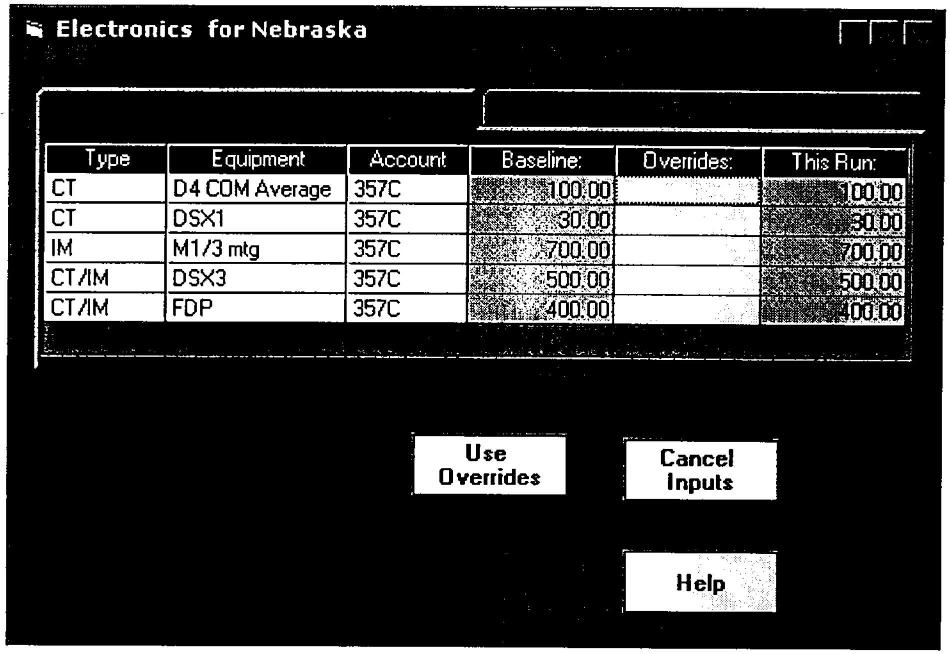
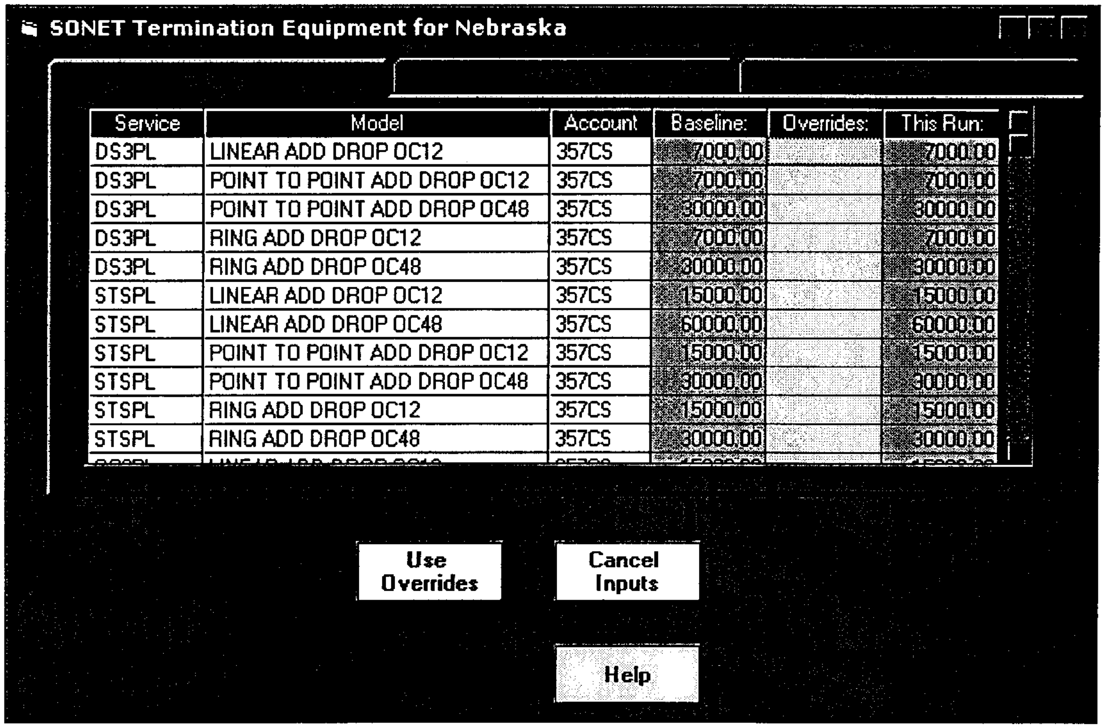


Figure 30

SONET Termination Equipment Inputs

To make changes to SONET termination equipment investments click the **View/Edit SONET Termination Equipment Investments** button on the **Input Values for Transport Module** screen shown in Figure 27. The **SONET Termination Equipment** form is displayed as shown in Figure 31. To make the changes to investments for the equipment items listed, type a new value in the overrides column. Use the scroll bars to navigate through the list of equipment types, which includes cards, mountings and plugs. Click on **Use Overrides** to accept the override values and return to the **Input Values for Transport Module** screen shown in Figure 27. To exit this form without making changes, click **Cancel Inputs**.


SONET Termination Equipment for Nebraska

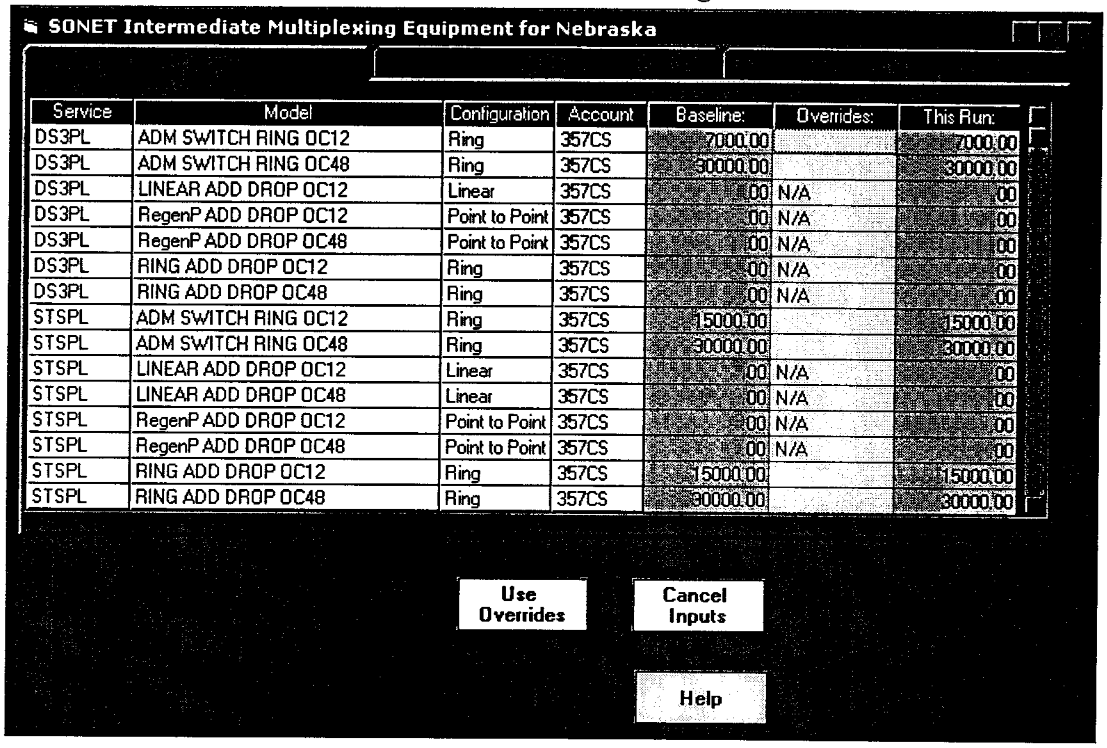
Service	Model	Account	Baseline:	Overrides:	This Run:
DS3PL	LINEAR ADD DROP OC12	357CS	7000.00		7000.00
DS3PL	POINT TO POINT ADD DROP OC12	357CS	7000.00		7000.00
DS3PL	POINT TO POINT ADD DROP OC48	357CS	30000.00		30000.00
DS3PL	RING ADD DROP OC12	357CS	7000.00		7000.00
DS3PL	RING ADD DROP OC48	357CS	30000.00		30000.00
STSPL	LINEAR ADD DROP OC12	357CS	15000.00		15000.00
STSPL	LINEAR ADD DROP OC48	357CS	60000.00		60000.00
STSPL	POINT TO POINT ADD DROP OC12	357CS	15000.00		15000.00
STSPL	POINT TO POINT ADD DROP OC48	357CS	30000.00		30000.00
STSPL	RING ADD DROP OC12	357CS	15000.00		15000.00
STSPL	RING ADD DROP OC48	357CS	30000.00		30000.00

Use Overrides
Cancel Inputs
Help

Figure 31

SONET Intermediate Multiplexing Equipment Inputs

To make changes to SONET intermediate multiplexing equipment investments, click the **View/Edit SONET Intermediate Multiplexing Equipment Investments** button on the **Input Values for Transport Module** screen shown in Figure 27. The **SONET Intermediate Multiplexing Equipment** form is displayed as shown in Figure 32. To make the changes to investments for the equipment items listed, type a new value in the overrides column. Use the scroll bars to navigate through the list of equipment types. Click on **Use Overrides** to accept the override values and return to the **Input Values for Transport Module** screen shown in Figure 27. To exit this form without making changes, click **Cancel Inputs**.


SONET Intermediate Multiplexing Equipment for Nebraska

Service	Model	Configuration	Account	Baseline:	Overrides:	This Run:
DS3PL	ADM SWITCH RING OC12	Ring	357CS	7000.00		7000.00
DS3PL	ADM SWITCH RING OC48	Ring	357CS	30000.00		30000.00
DS3PL	LINEAR ADD DROP OC12	Linear	357CS	.00	N/A	.00
DS3PL	RegenP ADD DROP OC12	Point to Point	357CS	.00	N/A	.00
DS3PL	RegenP ADD DROP OC48	Point to Point	357CS	.00	N/A	.00
DS3PL	RING ADD DROP OC12	Ring	357CS	.00	N/A	.00
DS3PL	RING ADD DROP OC48	Ring	357CS	.00	N/A	.00
STSPL	ADM SWITCH RING OC12	Ring	357CS	15000.00		15000.00
STSPL	ADM SWITCH RING OC48	Ring	357CS	30000.00		30000.00
STSPL	LINEAR ADD DROP OC12	Linear	357CS	.00	N/A	.00
STSPL	LINEAR ADD DROP OC48	Linear	357CS	.00	N/A	.00
STSPL	RegenP ADD DROP OC12	Point to Point	357CS	.00	N/A	.00
STSPL	RegenP ADD DROP OC48	Point to Point	357CS	.00	N/A	.00
STSPL	RING ADD DROP OC12	Ring	357CS	15000.00		15000.00
STSPL	RING ADD DROP OC48	Ring	357CS	30000.00		30000.00

Figure 32

Viewing Transport Module Outputs

Transport module outputs may be viewed in the output workbook described in Appendix C. From the **Home Screen** shown in Figure 2, click **View Model Outputs**. The **Output Selection** form is displayed as shown in Figure 50. On the **Output Selection** form, click the **View** menu item. Next click, **View Output Spreadsheet** from the drop down list. Excel will be launched and the output workbook will open. The user should then navigate to one of the Transport Module output spreadsheets. The Transport Module output spreadsheets are labeled DS0 Switched TM Output, DS0 Non Switched TM Output, DS1 TM Output, DS3 TM Output and ST - DS0 TM Output.

Printing Transport Module Outputs

Transport module outputs are printed along with the output printouts for the cost elements in which they are used. They may be printed separately from the ModelOut.xls workbook. Access to this workbook is described above in **Viewing Transport Module Outputs.**

Other Inputs

Each cost element has specific inputs that are not impacted by the investment modules integrated in ICM. ICM allows the user to change some of these inputs using customized forms. If the user wants to make any other changes, the user should open the output workbook and make those changes after completing the running of ICM's modules.

Making Changes to Cost Element Specific Input Parameters

To get to the **Other Input Categories** screen, click on **Other** from the **Select Model Input Category** drop down list and click **Go To Model Inputs** shown in Figure 2. The **Other Input Categories** screen shown in Figure 33 is displayed.

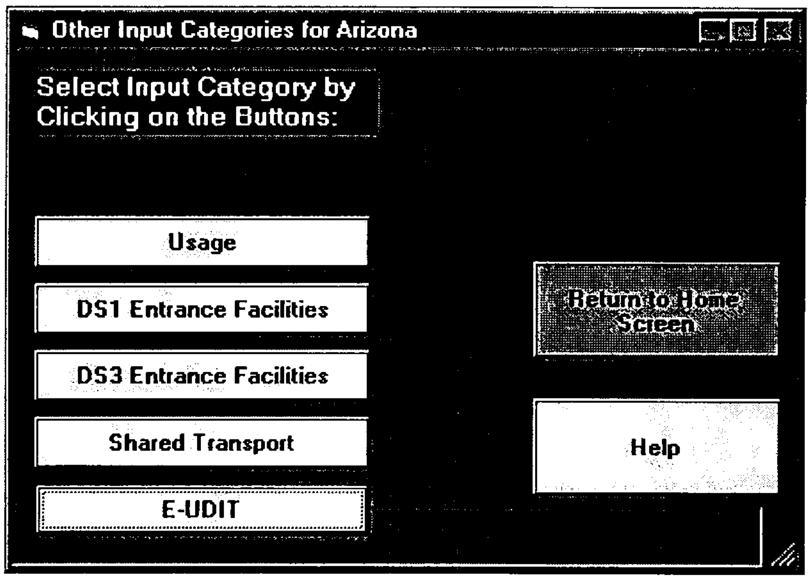


Figure 33

Line and Trunk Port Inputs

Most of the inputs to Line and Trunk Port cost calculations are outputs from the Switching Module (SM) and Transport Module (TM). For instructions on making changes to the SM and TM inputs, go to those sections of this manual.

With the exception to multiplexing, overrides to the other equipment pricing inputs must be manually inserted into the ModelOut.xls workbook using the ISDN RTU Fees Calculation, ISDN X.75 Investment Builder, ISDN Line Forecast, DS0 Trunk Investment Dev and DID PBX Investment Development tabs. To ensure proper model operation, only change the numbers in Red.

Multiplexing investments may be changing using the DS1 and DS3 Inputs.

DS1 and DS3 Entrance Facility/E-UDIT with Customer Location Electronics Inputs

DS1 and DS3 Entrance Facility/E-UDIT with Customer Location Electronics cost elements require outputs from the Transport Module (TM) for interoffice transport investments and the Network Access Channel model for entrance facility and multiplexing investments. TM is implemented in ICM. To make changes to TM inputs see Making Changes Transport Input Parameters.

To make changes to DS1 or DS3 Entrance Facility/E-UDIT with Customer Location Electronics and multiplexing inputs, click **DS1 Entrance Facilities** or **DS3 Entrance Facilities** on **Other Input Categories** screen shown in Figure 33. The form clicked will be displayed. The **Inputs for DS1 or DS3 Entrance Facility/E-UDIT with Customer Location Electronics** form is shown in Figure 34.

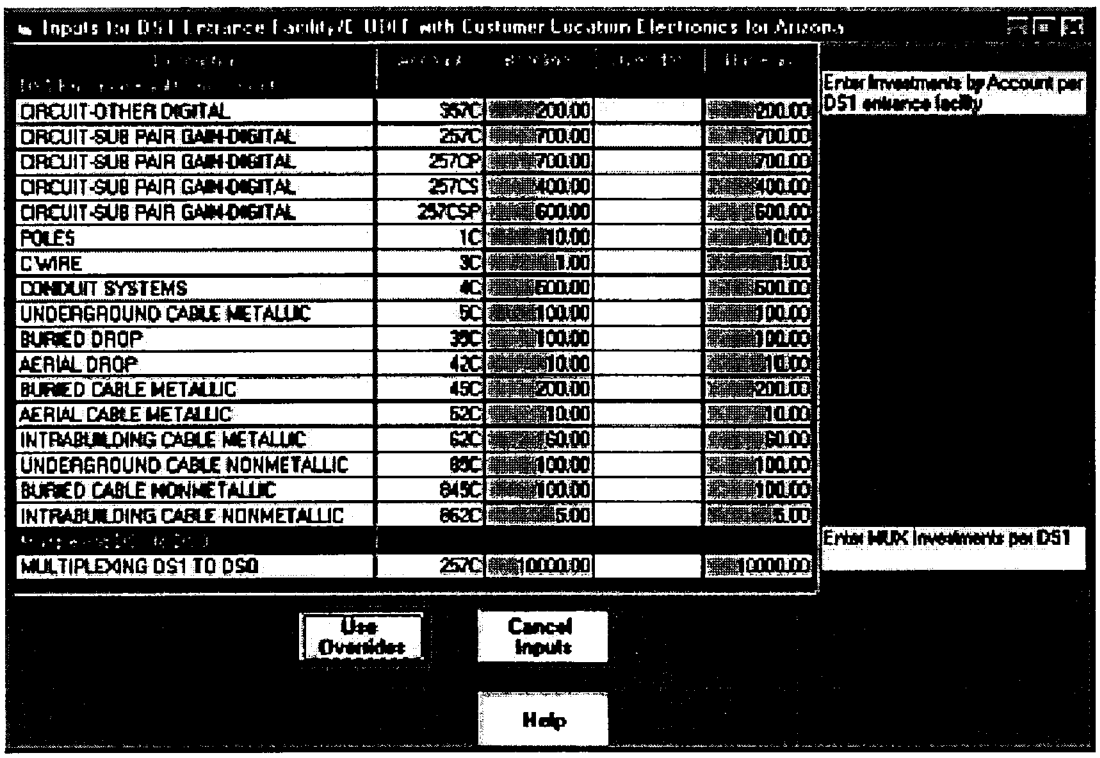


Figure 34

Space is provided in the **Override** column for inputting investments for entrance facilities and multiplexing by account. The default values are the output of the Network Access Channel Model. To change the default values the NAC Model must be run off line. The output of NAC must be manually input into the DS1 and DS3 forms. Please see the NAC User manual for instructions on running NAC.

To accept the override values, click **Use Overrides** or click **Cancel Inputs** to cancel overrides and return to the home screen.

Switch Usage Inputs

The switch usage cost elements consist of both switching investments from the Switching Module, transport investments from TM and other investments and expense such as billing, intercept, measurement investments and expenses. To change switching and transport investments, follow the directions for Making Changes To Switching Input Parameters and Making Changes to Transport Input Parameters. To make changes in the other values, the **Local Usage Model Inputs** form is required.

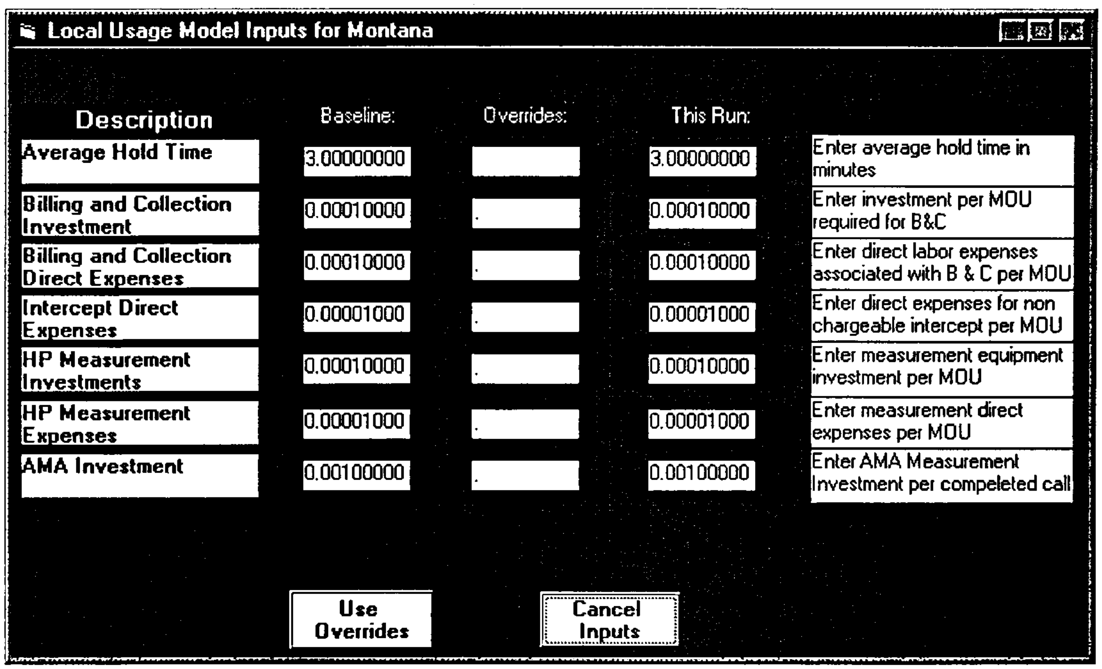


Figure 35

To make changes in billing, intercept, AMA, measurement investments and expenses or to change the average hold time, click **Usage** on **Other Input Categories** screen shown in Figure 33. **The Local Interconnection Usage Model Inputs** form shown in Figure 35 will be displayed. Enter expense and investment values on a per minute of use basis in the **Overrides** column. Enter hold time in seconds.

To accept the override values, click **Use Overrides** or click **Exit/Use Defaults** to cancel overrides and return to the **Home Screen**.

Extension Technology

Two Wire Extension Technology extends the Integrated Services Digital Network Basic Rate Interface signal when the CLEC's end user's unbundled loop has more than 40 decibels in loss measured at 40 kHz (based upon 2 Binary 1 Quantinary (2B1Q) line encoding), or the distance is beyond approximately 18 kilofeet between the Qwest's distribution frame (or equivalent) and the network interface of the CLEC end user.

Extension technology requires investment outputs from the Loop Module. ICM does not run the Loop Module to calculate extension technology investments because of the multiple Loop Module runs required to calculate the investments. To change extension technology investments the Loop Module must be run external to ICM. See the Loop Module User Manual for instructions on running the Loop Module. The extension technology investments must be manually inserted into the so named range in the ModelOut.xls workbook and Loop Module output spreadsheet.

To open the ModelOut.xls workbook click **View Model Outputs** on the Home Screen to open the **Output Selection** screen. On the menu bar, click **View** and **View Output Spreadsheet** to open the workbook. A list of the spreadsheets can be found in Appendix B. To return to ICM, the user must click the **Output Selection** button in the **Start** area at the bottom of the screen. **Do not close the output spreadsheet or Excel.**

Signaling, LIDB and 8XX

Signaling, LIDB and 8XX requires investment outputs from the SS7, LIDB and 8XX Models. ICM does not run these. To change signaling, LIDB and 8XX investments and expenses these models must be run external to ICM. See the SS7 Model description on running the SS7 Model. The signaling, LIDB and 8XX investments and expenses must be manually inserted into the ModelOut.xls workbook using the Signaling Calculations, LIDB - Inv & Exp Inputs and 8XX - Inv & Exp Inputs tabs. To ensure proper model operation, only change the numbers in Red.

To open the ModelOut.xls workbook, click **View Model Outputs** on the Home Screen to open the **Output Selection** screen. On the menu bar, click **View** and **View Output Spreadsheet** to open the workbook. A list of the spreadsheets can be found in Appendix B. To return to ICM, the user must click the **Output Selection** button in the **Start** area at the bottom of the screen. **Do not close the output spreadsheet or Excel.**

Shared Transport

Shared Transport is defined as the Co-Provider use of capacity on the Qwest's interoffice message trunk network and central office routing tables for the delivery of switched, voice grade traffic between Qwest end offices and tandem switches within the local calling area.

Shared Transport is only provided with Unbundled Local Switch Port elements. The existing routing tables resident in the switch will direct both Qwest and Co-Provider traffic over Qwest interoffice message trunk network. The Co-Provider may custom route operator services and directory assistance calls to unique trunks. The Co-Provider may not mix unbundled dedicated interoffice message trunk transport and shared transport in the same local calling area.

This study uses the U S West Transport Model (TM) and the Switch Module (SM) to calculate the investments associated with transporting calls over the Qwest interoffice network. The Shared Transport spreadsheet calculates weighted average investments of three Transport types and combines this with Tandem switching investment. These investments are in turn converted to per MOU costs using the factors calculated by the Expense Factors Module and Capital Costs Module. In addition, direct expenses associated with implementing the service are calculated, spread over five years of demand and added to the costs.

To change switching and transport investments, follow the directions for Making Changes To Switching Input Parameters and Making Changes to Transport Input Parameters. To make changes in the other values, the **Shared Transport Model Inputs** form is required. To make changes in trunk miles or trunk weighting, click **Shared Transport** on **Other Input Categories** screen shown in Figure 33. The **Shared Transport Model Inputs** form shown in Figure 36 will be displayed. Enter data in the **Overrides** column as described on the form. The total override trunk weighting must equal 100%.

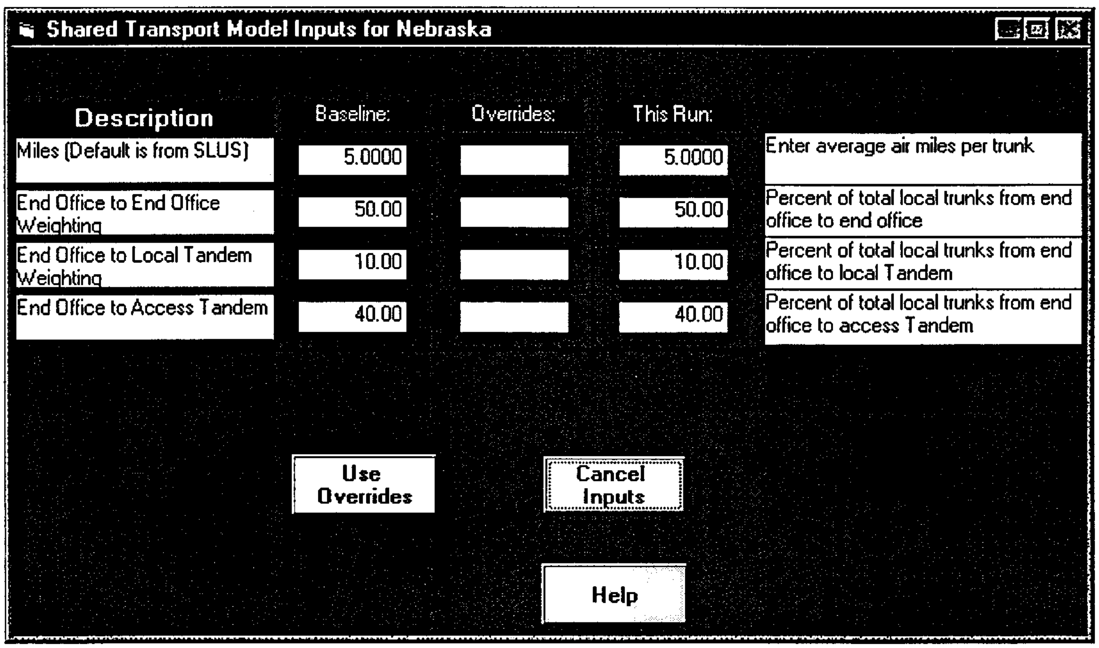


Figure 36

To accept the override values, click **Use Overrides** or click **Exit/Use Defaults** to cancel overrides and return to the **Home Screen**.

UDIT and E-UDIT without Customer Location Electronics Inputs

UDIT cost elements require outputs from the Transport Module (TM) for interoffice transport investments and the Network Access Channel model for E-UDIT without Customer Location Electronics investments. TM is implemented in ICM. To make changes to TM inputs see Making Changes Transport Input Parameters.

To make changes to E-UDIT without Customer Location Electronics inputs, click E-UDIT button on **Other Input Categories** screen shown in Figure 33. The form clicked will be displayed. The **E-UDIT Without Customer Location Electronics Inputs** form is shown in Figure 37.

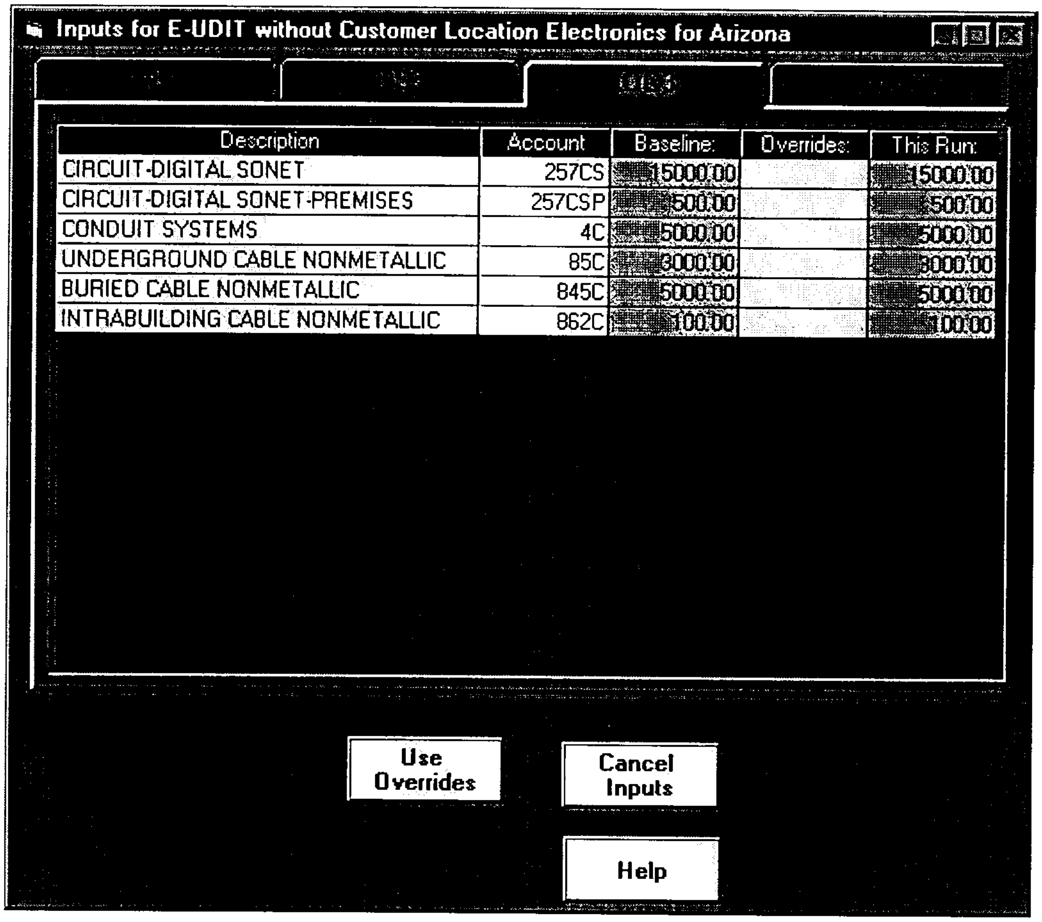


Figure 37

Space is provided in the **Override** column for inputting investments by account. The default values are the output of the Network Access Channel Model. To change the default values the NAC Model must be run off line. The output of NAC must be manually input into the E-UDIT form. Please see the NAC User manual for instructions on running NAC.

To accept the override values, click **Use Overrides** or click **Cancel Inputs** to cancel overrides and return to the home screen.

Capital Costs Module

Introduction and Purpose

The Capital Cost Factors Module produces ratios (factors) that are used to translate investments into annual recurring cost estimates. These recurring cost estimates are combined with operating expenses from the Expense Module to estimate recurring costs for services and network elements. The Capital Cost Module translates investments into three types of recurring costs: 1) depreciation, 2) the return on capital owed to investors who provided the funds, and 3) income tax.

The rate of depreciation depends on the expected productive life of an asset. The return on capital is a weighted average of the returns owed to debt and equity, two alternative sources of funds. Income tax, paid on the return to equity, incorporates state and federal income tax rates. Capital Cost ratios relate each of these three costs (depreciation, return on capital, and income tax) to the amount of up-front investment. Capital cost ratios vary by class of asset and by state. Variations among classes of assets and across states are functions of: 1) differences in expected productive lives for different classes of assets; 2) tax codes; and 3) regulatory and competitive conditions. In the ICM, the capital cost ratios are multiplied by investments to estimate capital costs for each class of asset.

The process for estimating capital costs is depicted in Figure 38.

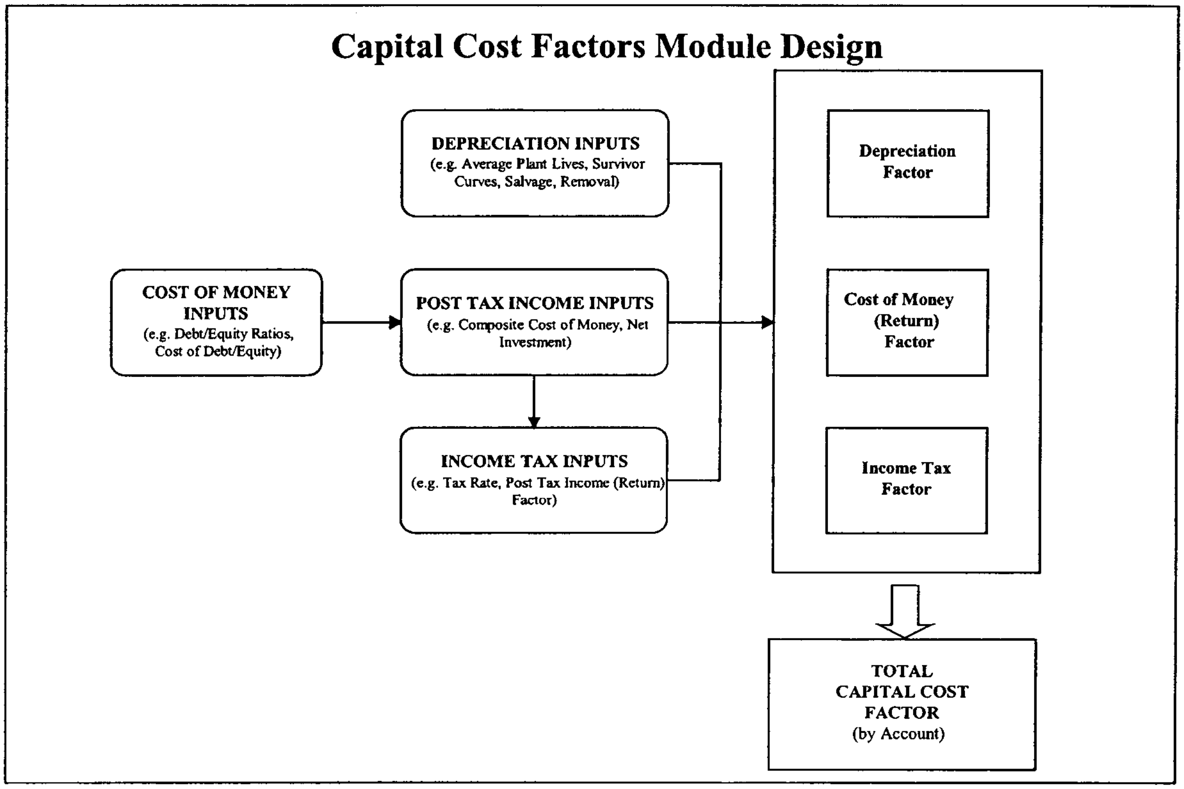


Figure 38

As shown, there are three major components of the Capital Cost Factor: depreciation, the return to investors, and income taxes. Depreciation is estimated directly from information on the expected productive lives for assets, the expected salvage percents and costs of removal. Return to investors is used both to calculate the Cost of Money Factor[1], and to determine the amount that return must be "grossed-up" to account for the expected tax liability. The Income Tax Factor is a function of the Cost of Money and tax rates. Each of these components is described below.

Depreciation

Depreciation spreads the up-front cost of an investment over the years of the expected useful life of the asset. Depreciation is caused by: 1) the physical deterioration of the asset, which leads to a lower quantity or quality of output; 2) increased maintenance costs; 3) the introduction of superior substitutes; and 4) a decrease in demand for the product produced by the asset.[2] Accurate estimates of these four factors require a forward-looking perspective. For example, the introduction of new technologies and changes in demand may depart substantially from historic trends with the onset of local competition.

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[1] The Cost of Money Factor is sometimes called Post Tax Income Factor in Qwest documentation and models. The two are the same factor.

[2] It is important to note that forward-looking depreciation rates will depart from historical patterns due to the effects of heightened competition on rate of technological change and firm specific demand.

In the Capital Cost Factors Module, the default method of depreciation is the straight-line equal-life group (ELG) method for most accounts[3]. This method specifies that the expected change in value for an asset is constant over the asset's useful life. The functional meaning of this assumption is that the annual rate of depreciation is equal to the difference between the asset's current value (the up-front investment amount) and its terminal value (the asset's value at the end of its usable life), divided by the expected life (in years). The usable life is defined as the number of years before it is cost effective to replace the asset, and the terminal value is the asset's salvage value minus the cost of removal. The depreciation factor is calculated as depreciation expense divided by investment.

The Capital Cost Factors Module also provides the capability for the user to specify other than the straight line method of depreciation. Alternative depreciation methods are discussed in the Capital Cost Factors Module Users Manual.

Return on Capital (Cost of Money)

The cost of capital is used to calculate the return owed to investors for use of their financial capital. There are two sources of financial capital: debt and equity. Because the cost of capital includes compensation to investors for investment risk as well as the time value of money, the market return owed on each source of capital differs. In particular, the cost of equity, the riskier form of investment, exceeds the cost of debt. The composite cost of money, therefore, is the weighted average of the cost of debt and the cost of equity. The return owed is calculated by multiplying the composite cost of money by the investment amount.

Income Tax

Income taxes are incurred on the return required for the equity portion of the capital. Income taxes apply because federal and state tax regulations provide for taxing remaining income after payment of operations costs and other deductible amounts. Costs required to compensate investors are grossed-up to account for the need to pay income taxes prior to paying investors.[4] Although income tax is expressed as a fraction of the return, it is recovered by applying this fraction directly to estimated investment.

Total Capital Costs

In summary, capital costs consist of three components: depreciation, return on capital, and income tax expense. Each is expressed as a fraction of investment. Total capital costs, therefore, are calculated by multiplying each fraction by investments.

---

3 The exceptions to this is land, special purpose vehicles, garage work equipment, other work equipment, public telephone equipment and aerial wire.

4 Income tax expense does not reflect the actual taxes Qwest pays. Instead, it represents the taxes that are reported as paid on the income statement. The difference between the income tax expense and the taxes owed (paid) is due to an accelerated depreciation schedule that is used in calculated income reported for tax purposes.

Making Changes to Capital Cost Input Parameters

Figure 39 is the input screen for making changes to the capital cost factors inputs. Shown are the default values for calculating the capital cost factors. The user can either select the default values by clicking on the **Exit (Use Defaults)** button or make changes in one of a number of inputs:

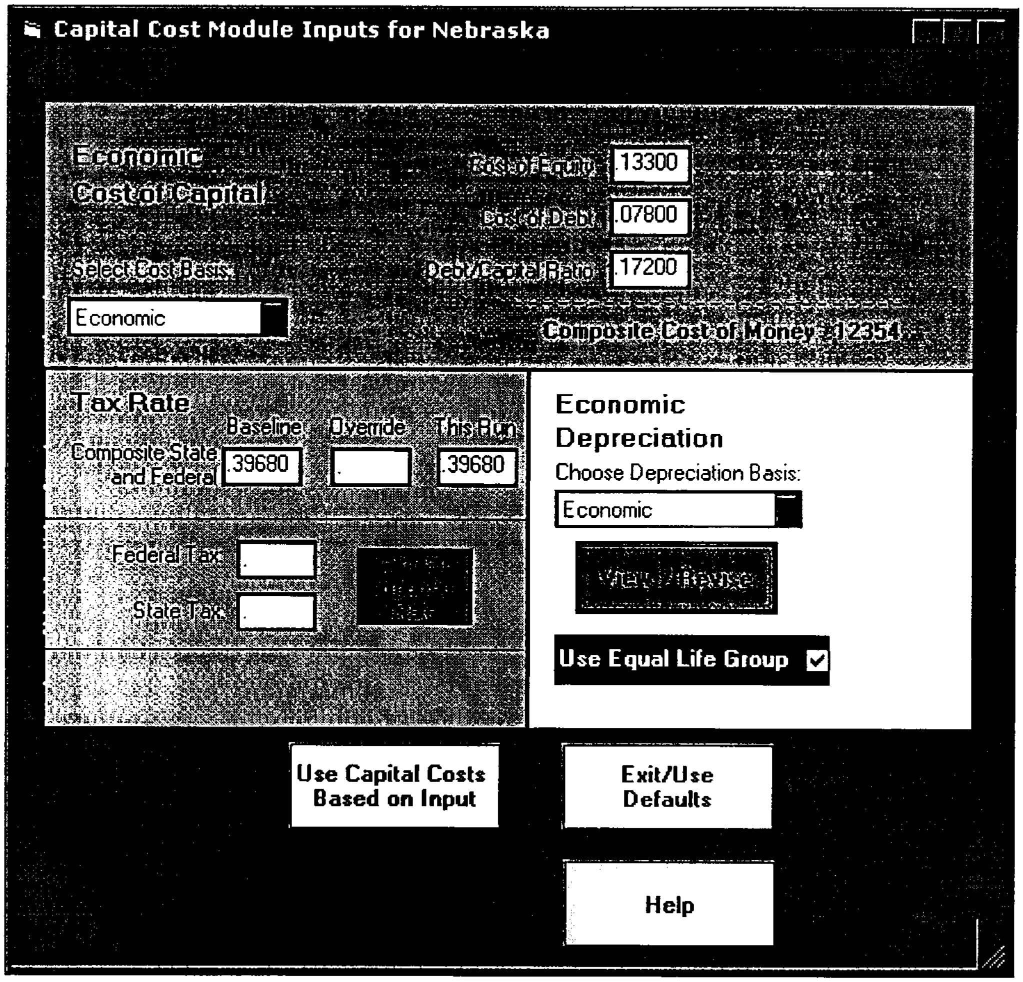


Figure 39

Cost of capital

There are five options available as shown in the drop down list shown in Figure 40. Choose the cost basis that you want to run. (Federal Prescribed is not yet available.) Selecting **Other** allows the user to enter override values for cost of equity, cost of debt and debt/capital ratio as shown in Figure 41.

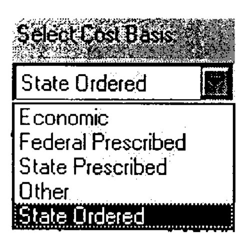


Figure 40

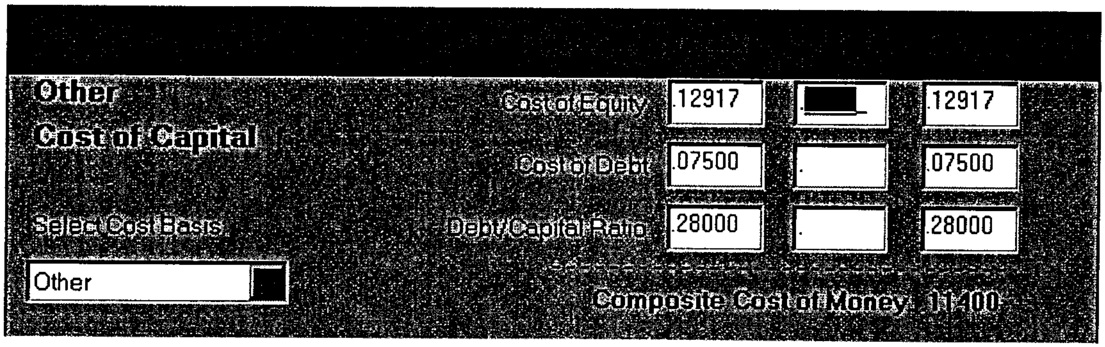


Figure 41

Tax Rate

The user can either use the default value which is the actual value of Qwest's composite federal and state rate or enter an override value in one of two ways. The first option is to enter a composite rate in the **Override** data entry space shown in Figure 42 below. The other option is to enter separate **Federal Tax** and **State Tax** rates and click the **Calculate Composite Rate** button. ICM will calculate the override composite rate and enter the value in the **Override** data entry space.

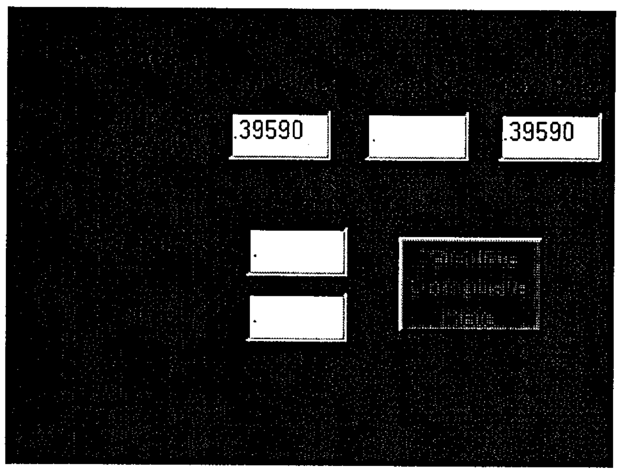


Figure 42

Depreciation Lives

Choose from four different sets of depreciation lives. If the user does not make a choice, the default Qwest economic lives are used. To choose a set of lives click on the drop down list titled **Choose Depreciation Basis** as shown in Figure 43. (FCC is not available.)

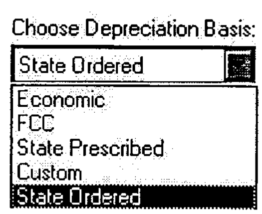
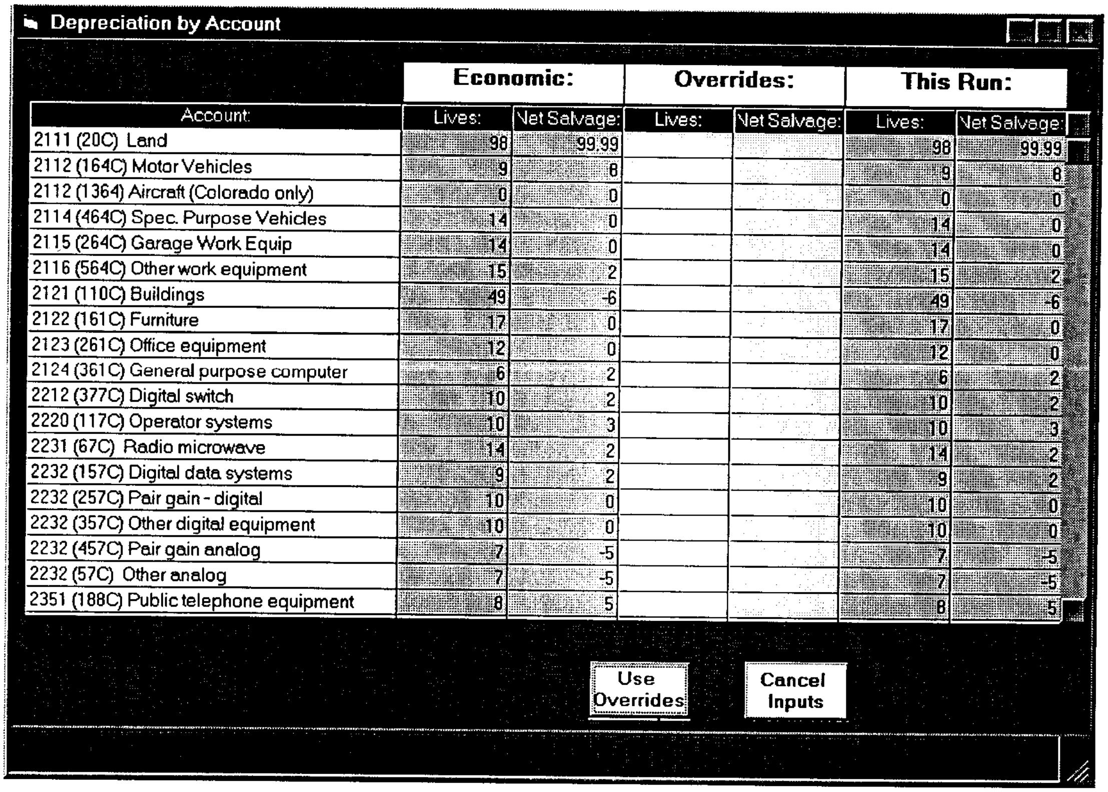


Figure 43

Any of the individual average plant lives and the net can salvage percent can be changed by clicking the **View/Revise** button shown in Figure 39.

The **Depreciation by Account** input screen Figure 44 will appear allowing the user to enter **Overrides.** After entering overrides, the user should click the **Use Overrides** button to calculate the Capital Cost Module using the overrides and return to the **Capital Costs Module Inputs** screen shown in Figure 39. Click **Cancel Inputs** to return to the **Capital Costs Module Inputs** screen shown in Figure 39 without changing lives and salvage.



Depreciation by Account

	Economic:		Overrides:		This Run:	
Account:	Lives:	Net Salvage:	Lives:	Net Salvage:	Lives:	Net Salvage:
2111 (20C) Land	98	99.99			98	99.99
2112 (164C) Motor Vehicles	9	8			9	8
2112 (1364) Aircraft (Colorado only)	0	0			0	0
2114 (464C) Spec. Purpose Vehicles	14	0			14	0
2115 (264C) Garage Work Equip	14	0			14	0
2116 (564C) Other work equipment	15	2			15	2
2121 (110C) Buildings	49	-6			49	-6
2122 (161C) Furniture	17	0			17	0
2123 (261C) Office equipment	12	0			12	0
2124 (361C) General purpose computer	6	2			6	2
2212 (377C) Digital switch	10	2			10	2
2220 (117C) Operator systems	10	3			10	3
2231 (67C) Radio microwave	14	2			14	2
2232 (157C) Digital data systems	9	2			9	2
2232 (257C) Pair gain - digital	10	0			10	0
2232 (357C) Other digital equipment	10	0			10	0
2232 (457C) Pair gain analog	7	-5			7	-5
2232 (57C) Other analog	7	-5			7	-5
2351 (188C) Public telephone equipment	8	5			8	5

Use Overrides
Cancel Inputs

Figure 44

Use Equal Life Groups

Turn the Equal Life Group (ELG) option on/off by clicking on the **Use Equal Life Group** check box. A check will appear when the option is on as shown in Figure 39. The default for ELG is <u>on</u> for all accounts except FRC's 20C, 464C, 264C, 564C, 188C, 858C and 3C.

ICM also allows the user to have direct access to the Capital Cost module by clicking the menu item **View** and **Capital Cost Base Module.** Please refer to the Capital Cost Module User Manual for instructions on the use of the Capital Cost Module.

Viewing Capital Cost Factors

Capital cost factors may be viewed in the output workbook described in Appendix C. From the **Home Screen** shown in Figure 2, click **View Model Outputs**. The **Output Selection** form is displayed as shown in Figure 50. On the **Output Selection** form, click the **View** menu item. Next, click **View Output Spreadsheet**. Microsoft Excel will be launched and the output workbook will open. The user should then navigate to the Investment Based Factors spreadsheet.

Printing Capital Cost Values

Follow the procedures above under Viewing Capital Cost Factors. The Investment Based Factors spreadsheet may be printed by clicking the Microsoft Excel print icon while the spreadsheet is displayed.

Expense Factors Module

Description

The Expense Factor Module produces ratios (factors) that are used in conjunction with investments and direct expenses to estimate forward-looking operating expenses. Operating expenses are annual costs associated with maintaining, operating, marketing, and administering services and network elements. Historic accounting data provide the basic information used to develop the expense ratios. These data are updated prior to creating expense ratios by adjusting for inflation and capital productivity and allowing for additional forward-looking cost savings or increases. The process is depicted with the following flow diagram:

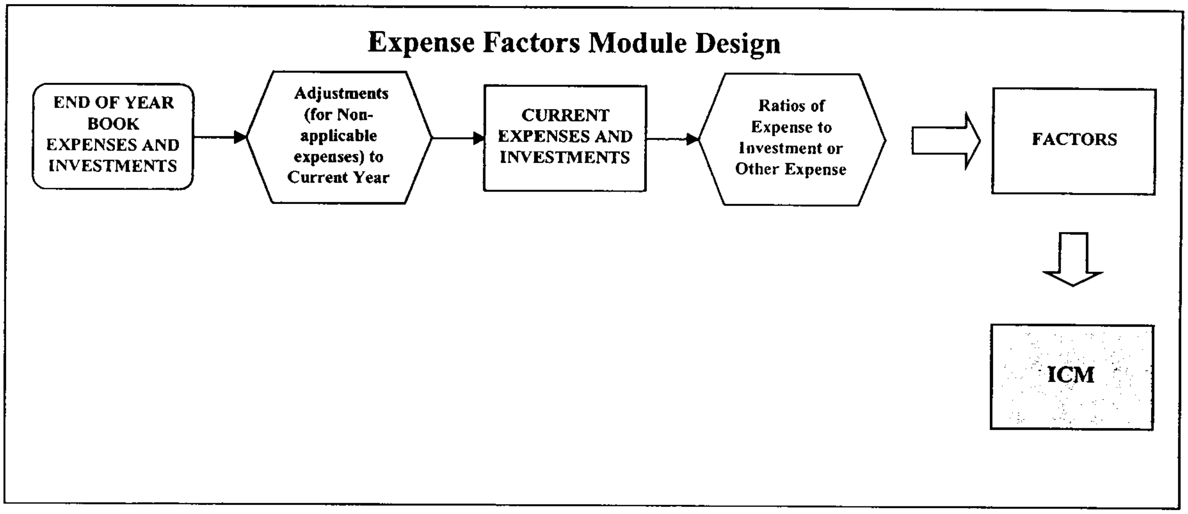


Figure 45

Expenses are either related directly to specific investments (Investment Related) or to a broad group of investments or other expenses (Expense Related). Investment related ratios are applied to specific investments to estimate operating expenses that are directly related to the investments. For example, investment related ratios are used to estimate maintenance expense for central office equipment, outside plant, and land and buildings. They are also used to estimate "right to use" fees for digital electronics and property taxes for all telephone plant in service.[5] Consistent with how these ratios are used, investment related ratios are composed of expenses in the numerators and investment levels in the denominators.

Expense related ratios are used to estimate operating expenses that are related or tracked to a broad group of investments or to other expenses, as opposed to specific investments.

[5] Note that the set of investments for which there are investment related factors is not exhaustive. Investments for many types of capital equipment, for example, motor vehicles, are converted to annual capital costs and treated as an expense within the Expense Related category.

It is useful to distinguish three types of these expenses: Directly Assigned, Directly Attributed, and Common. These categories are distinguished by the historic relationships established for the different expense categories.

- **Directly Assigned**: expenses tracked directly to a product or service (e.g. sales expense)

Directly Assigned Factors
Product Management Expense
Sales Expense
Product Advertising Expense
Business Fees

- **Directly Attributed**: expenses not tracked directly to a product or service with accounting data, but causally attributed to individual products or services (e.g. human resources expense)

Directly Attributed Factors
Network Operations
Network Support Assets
General Support Assets
Computers
Uncollectibles
Accounting and Finance Expenses
Human Resource Expenses
Information Management Expenses
Intangibles

- **Common**: expenses related to production as a whole, but not tracked directly to or causally attributed to a specific product or service (e.g. executive expense); these expenses are systematically allocated to products and services.

Common Factors
Executive Expenses
Planning Expenses
External Relations Expenses
Legal Expenses
Other Procurement Expenses
Research and Development Expenses
Other General and Administration Expenses

The Expense Factors Module User Manual provides a detailed description of each annual cost factor.

Making Changes to Expense Factor Input Parameters

To get to the **Factors Module Inputs** screen, click on **Expense Factors** from the **Select Model Input Category** drop down list and click **Go To Model Inputs** shown in Figure 2. The **Factors Module Inputs** screen shown in Figure 46 is displayed. This screen allows the user to change cost savings and inflation either uniformly for all accounts or on an account specific basis. The cost savings and inflation percentages are expressed on a total amount basis, not on an amount of increase per year. For example, if the base year data is 1996 and the study year is 1998, the inflation percentage will not cause expenses within the module to be inflated once from 1996 to 1997 and than again from 1997 to 1998. It will be inflated once from 1996 to 1998 by the amount input.

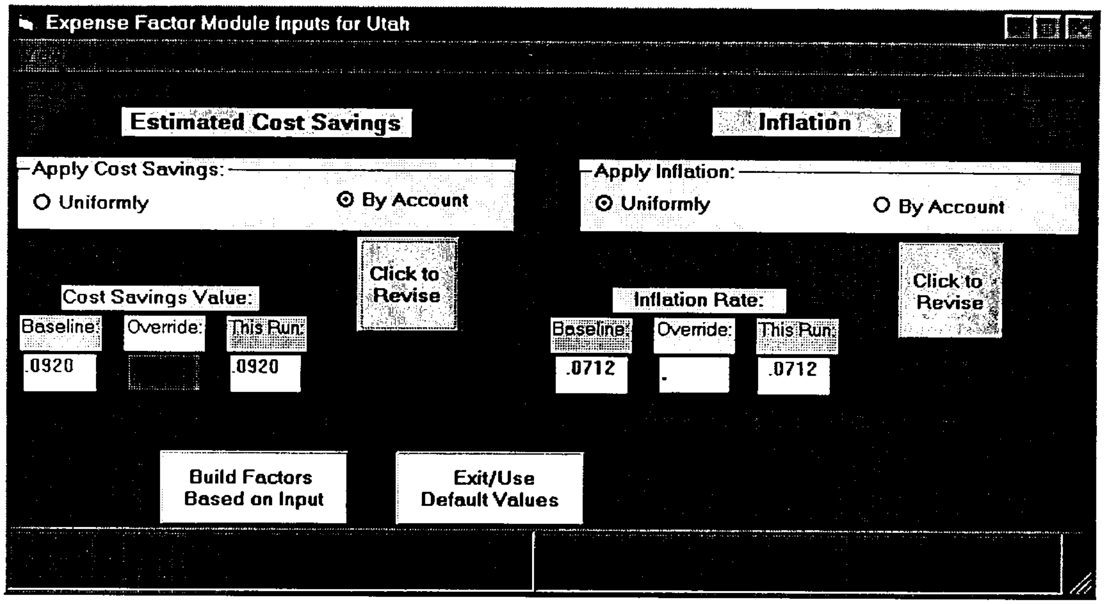


Figure 46

The default values for cost savings and inflation are shown under the **Baseline** labels. To use the default values click **Exit/Use Default Values**. The user is then returned to the **Home Screen** shown in Figure 2.

Cost Savings Inputs

To override the default values for cost savings uniformly for all accounts select **Uniformly** by clicking the radio button in the **Apply Cost Savings** section. Type the new value in **Override** input box.

To override the default values of cost savings for specific accounts, click select **By Account** by clicking the radio button in the **Apply Cost Savings** section. Then click the button, **Click to Revise.** The **Specify Estimated Cost Savings Values** screen is displayed as shown in Figure 47.

Specify Estimated Cost Savings Values

Account Category:	Baseline:	Override:	This Run:
Central Office Switching	.0920		.0920
Operator Systems	.0920		.0920
Circuit Equipment	.0920		.0920
Info Origination/Termination	.0920		.0920
Poles	.0920		.0920
Aerial Cable-Metallic	.0920		.0920
Aerial Cable-Nonmetallic	.0920		.0920
Undergrnd Cable-Metallic	.0920		.0920
Undergrnd Cable-Nonmetallic	.0920		.0920
Buried Cable-Metallic	.0920		.0920
Buried Cable-Nonmetallic	.0920		.0920
Submarine Cable-Metallic	.0920		.0920
Submarine Cable-Nonmetallic	.0920		.0920
Aerial Wire	.0920		.0920

Use Overrides   Exit/Use Defaults

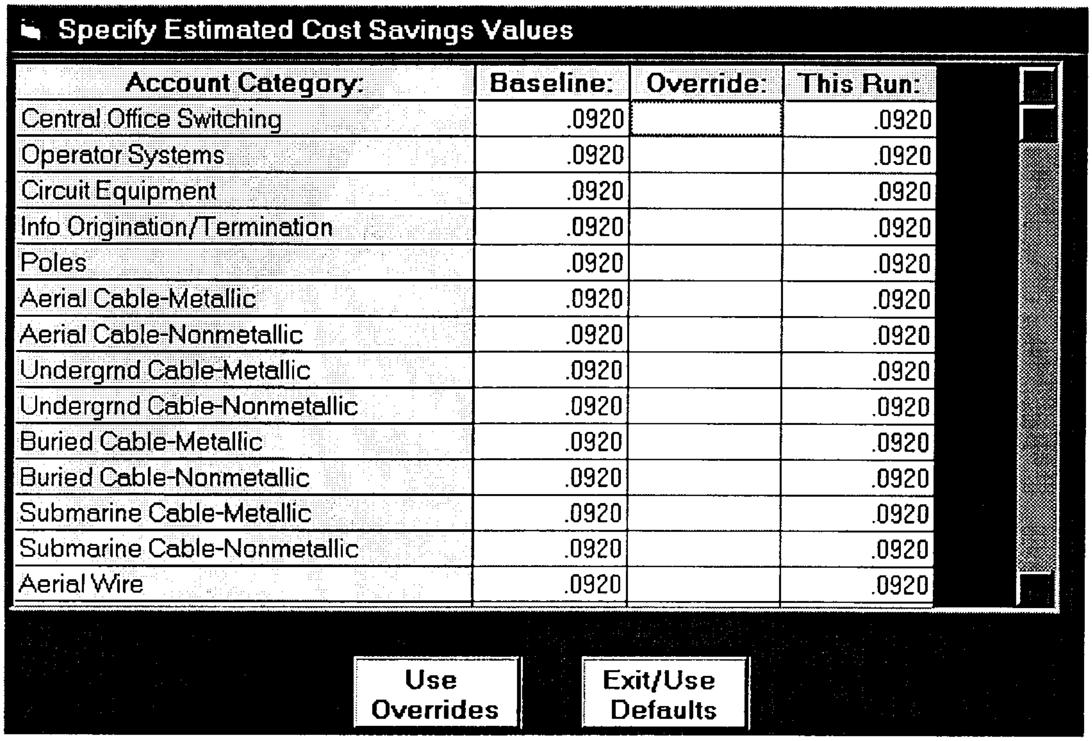
Figure 47

To use the default (baseline) values without calculating new factors click on **Exit/Use Defaults**. To override the default cost savings type the new values in the **Override** column. Use the scroll bar to move to other items on the list. Click **Use Overrides** to return to the **Factors Module Inputs** screen and override the baseline values.

Inflation Inputs

To override the default values for inflation uniformly for all accounts select **Uniformly** by clicking the radio button in the **Apply Inflation** section. Type the new value in **Override** input box.

To override the default values of inflation for specific accounts click select **By Account** by clicking the radio button in the **Apply Inflation** section. Then click the button, **Click to Revise.** The **Specify Inflation Values** screen is displayed as shown in Figure 48.



Account Category:	Baseline:	Override:	This Run:
Central Office Switching	.0920		.0920
Operator Systems	.0920		.0920
Circuit Equipment	.0920		.0920
Info Origination/Termination	.0920		.0920
Poles	.0920		.0920
Aerial Cable-Metallic	.0920		.0920
Aerial Cable-Nonmetallic	.0920		.0920
Undergrnd Cable-Metallic	.0920		.0920
Undergrnd Cable-Nonmetallic	.0920		.0920
Buried Cable-Metallic	.0920		.0920
Buried Cable-Nonmetallic	.0920		.0920
Submarine Cable-Metallic	.0920		.0920
Submarine Cable-Nonmetallic	.0920		.0920
Aerial Wire	.0920		.0920

Figure 48

To use the default (baseline) values without calculating new factors click on **Cancel Inputs**. To override the default inflation type the new values in the **Override** column. Use the scroll bar to move to other items on the list. Click **Use Overrides** to return to the **Factors Module Inputs** screen and override the baseline values.

Viewing Expense Factors

Expense Factors may be viewed in the output workbook described in Appendix C. From the **Home Screen** shown in Figure 2, click **View Model Outputs**. The **Output Selection** form is displayed as shown in Figure 50. On the **Output Selection** form, click the **View** menu item. Next click, **View Output Spreadsheet**. Microsoft Excel will be launched and the output workbook will open. The user should then navigate to the Factors spreadsheet that contains all factors produced by the factors module except Ad Valorem and Maintenance. Ad Valorem and Maintenance factors may be viewed by navigating to the Investment Based Factors spreadsheet.

Printing Expense Factors

Follow the procedures above under Viewing Expense Factors. The Factors spreadsheet and the Investment Based Factors spreadsheet may be printed by clicking the Microsoft Excel print icon while the spreadsheet is displayed. The expense factors are also printed on the Develop Total Prod Costs printouts which is the first page printed when printing a specific cost element output. See Viewing and Printing Cost Element Outputs.

Running ICM's Modules

After making changes to the input parameters for all modules click **Run Cost Modules** on the **Home Screen** to run the modules. The **Run Cost Modules Using User Input** screen shown in Figure 49 will be displayed. ICM determines which modules the user has entered override values as indicated in the **Run Status** column. It may be necessary to force the running of a module if the user opened a module and made manual changes without using the customized input screens provided by ICM. To force a module to run click the appropriate check box in the Check to Force Run column. To run the selected modules click **Run the Modules**. With the exception of the Switch Module, run times are typically under ten minutes for each module on a 200 MHz computer with 64 Mb of RAM. The Switch Module requires about 30 minutes on a 200 MHz computer with 64 Mb of RAM. The **Status** indicator will tell the user which module is running and which modules are done running. When all modules are done, click **Exit** to return to the **Home Screen**.

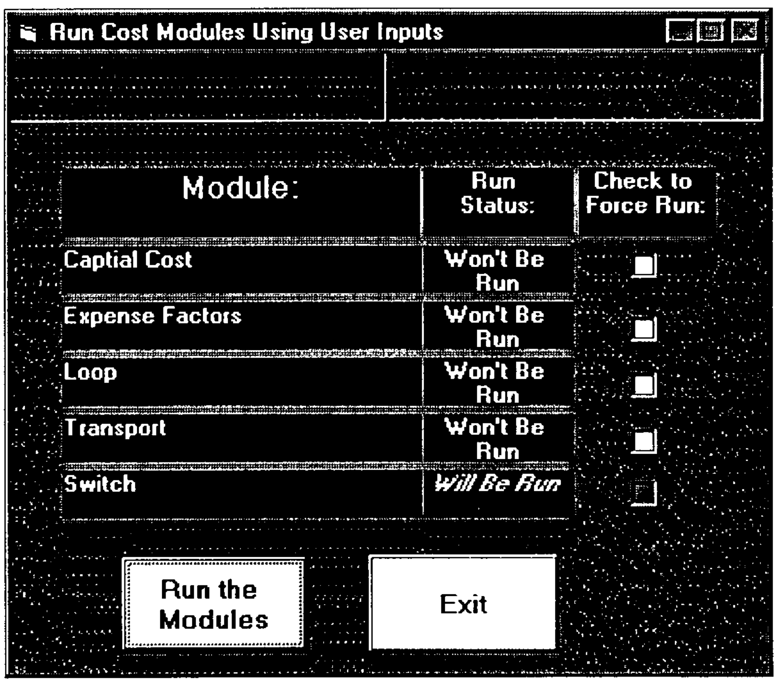


Figure 49

Viewing and Printing Cost Element Outputs

Clicking **View Model Outputs** button on the **Home Screen** loads the outputs from each of the modules into the output workbook. The **Output Selection** screen shown in Figure 50 is displayed which allows the user to select outputs to view and print.

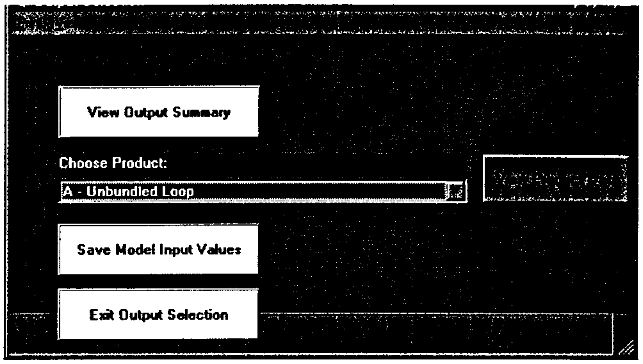


Figure 50

Viewing Cost Results

Cost results can be viewed either summarized for all cost elements or by product group. Clicking **View Output Summary** on the **Output Selection** screen displays the results summary for the cost elements listed in Appendix A. The summary includes the total investment, TELRIC, Common costs and TELRIC + Common for each cost element.

The product group data has detailed spreadsheets showing the application of expense and investment factors for each cost element by product group. To view the detailed spreadsheets, choose a product group from the **Choose Product** drop down list. Click **View Product Data**. The spreadsheet labeled **Total** is displayed. The Total spreadsheet shows cost detail by investments, investment costs, directly assigned costs, directly attributed costs, TELRIC, common and TELRIC + Common categories.

Click the **Investment** tab as shown in Figure 51 to display an expansion of the investment costs by account code. To view the factors only, click the **Factors** tab.

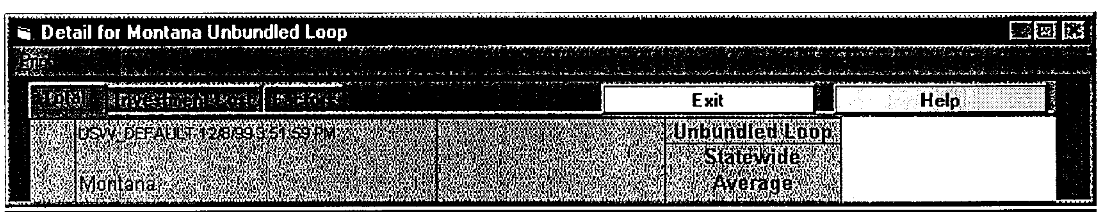


Figure 51

To return to the **Output Selection** screen click **Exit**.

ICM also allows the user to go directly to the output workbook. On the menu bar, click **View** and **View Outputs Spreadsheet** to open the workbook. A list of the spreadsheets can be found in Appendix B. To return to ICM, the user must click the **Output Selection** button in the **Start** area at the bottom of the screen. **Do not close the output spreadsheet or Excel.**

View Input Comparison

The user can view a comparison of the Default and Override inputs by selecting **View** and **View Input Comparison** from the menu bar.

Printing Output Spreadsheets

Printing is available by clicking Print in the menu bar in both the **Output Selection** (Figure 50) and the **Detail** (Figure 51) screens. Printing from the detail screens prints all the spreadsheets associated with that cost element.

To exit Output Selection and return to the Home Screen, click **Exit Output Selection**.

Exiting the Program

Click **Exit Program** on the Home Screen in Figure 2 to end the program.

Model Support

This model is the property of Qwest Communications.

General questions and questions regarding the documentation and the output workbook should be directed to:

Brian E. Farrow
1314 Douglas on the Mall, 6th Floor
Omaha, Nebraska 68102
Phone: 402-422-4183
Fax: 402-422-5534
E-mail: befarro@qwest.com

Questions about model programming should be directed to:

Marty Auskaps
1801 California 20th Floor
Denver, Colorado
Phone: 303-896-6054
Fax: 303-896-5276
E-mail: mauskap@qwest.com

Appendix A - Cost Element List

Cost Element

Section A – Unbundled Loop

2 Wire Statewide Average

Unbundled Loop (2 Wire) Statewide Average
Distribution (2 Wire) Statewide Average
Network Interface Device (2 Wire) Statewide Average

2 Wire Zone 1 Through 5

Unbundled Loop (2 Wire)
Distribution (2 Wire)

4 Wire Statewide Average

Unbundled Loop (4 Wire) Statewide Average
Distribution (4 Wire) Statewide Average
Network Interface Device (4 Wire) Statewide Average

4 Wire Zone 1 Through Zone 5

Unbundled Loop (4 Wire)
Distribution (4 Wire)

Section B – Extension Technology

2-Wire Extension Technology

Section C – Line and Trunk Ports

DS0 Analog Line Port
Each Addditional DS0 Analog Line Port
DS0 Trunk Port
DS1 Trunk Port
ISDN BRI Port
ISDN PRI Port
DID/PBX Trunk Port per DS0

Section D – Local Traffic

Local Switching UNE per Minute of Use
Tandem Switching UNE per Minute of Use
Local Switching LIS per Minute of Use
Tandem Switching LIS per Minute of Use

Tandem Switched Local Transport

Fixed per Minute of Use 0 to 8 Miles
Fixed per Minute of Use 8 to 25 Miles
Fixed per Minute of Use 25 to 50 Miles
Fixed per Minute of Use Over 50 Miles
Distance Sensitive per Minute of Use per Mile from 0 to 8 miles

Cost Element

Distance Sensitive per Minute of Use per Mile from 8 to 25 miles
Distance Sensitive per Minute of Use per Mile from 25 to 50 miles
Distance Sensitive per Minute of Use per Mile over 50 miles

Section E – Entrance Facilities and Direct Trunked Transport

Entrance Facilities/E-UDIT With Customer Location Electronics
DS1 Entrance Facility/E-UDIT with Customer Location Electronics
DS3 Entrance Facility/E-UDIT with Customer Location Electronics

Multiplexing
Multiplexing DS3 to DS1
Multiplexing DS1 to DS0

DS1 Direct Trunked Transport
Over 0 to 8 Miles, Fixed
Over 0 to 8 Miles, Per Air Mile
Over 8 to 25 Miles, Fixed
Over 8 to 25 Miles, Per Air Mile
Over 25 to 50 Miles, Fixed
Over 25 to 50 Miles, Per Air Mile
Over 50 Miles, Fixed
Over 50 Miles, Per Air Mile

DS3 Direct Trunked Transport
Over 0 to 8 Miles, Fixed
Over 0 to 8 Miles, Per Air Mile
Over 8 to 25 Miles, Fixed
Over 8 to 25 Miles, Per Air Mile
Over 25 to 50 Miles, Fixed
Over 25 to 50 Miles, Per Air Mile
Over 50 Miles, Fixed
Over 50 Miles, Per Air Mile

Section F – Intentionally left blank

Section G - 8XX Database Services

Basic Query
Call Handling and Destination
POTS Translation

Section H - Line Information Database

LIDB Query

Section I - Signaling

Cost Element

TCAP Signal Transport
TCAP Signal Switching
ISUP Signal Formulation
ISUP Signal Transport
ISUP Signal Switching
STP Port

Section J - Shared Transport

Shared Transport per MOU

Section K - Unbundled Dedicated Interoffice Transport (UDIT)

DS0 UDIT

Over 0 to 8 Miles, Fixed
Over 0 to 8 Miles, Per Air Mile
Over 8 to 25 Miles, Fixed
Over 8 to 25 Miles, Per Air Mile
Over 25 to 50 Miles, Fixed
Over 25 to 50 Miles, Per Air Mile
Over 50 Miles, Fixed
Over 50 Miles, Per Air Mile

DS1 UDIT

Over 0 to 8 Miles, Fixed
Over 0 to 8 Miles, Per Air Mile
Over 8 to 25 Miles, Fixed
Over 8 to 25 Miles, Per Air Mile
Over 25 to 50 Miles, Fixed
Over 25 to 50 Miles, Per Air Mile
Over 50 Miles, Fixed
Over 50 Miles, Per Air Mile

DS3 UDIT

Over 0 to 8 Miles, Fixed
Over 0 to 8 Miles, Per Air Mile
Over 8 to 25 Miles, Fixed
Over 8 to 25 Miles, Per Air Mile
Over 25 to 50 Miles, Fixed
Over 25 to 50 Miles, Per Air Mile
Over 50 Miles, Fixed
Over 50 Miles, Per Air Mile

OC3 UDIT

Cost Element

Over 0 to 8 Miles, Fixed
Over 0 to 8 Miles, Per Air Mile
Over 8 to 25 Miles, Fixed
Over 8 to 25 Miles, Per Air Mile
Over 25 to 50 Miles, Fixed
Over 25 to 50 Miles, Per Air Mile
Over 50 Miles, Fixed
Over 50 Miles, Per Air Mile

OC12 UDIT
Over 0 to 8 Miles, Fixed
Over 0 to 8 Miles, Per Air Mile
Over 8 to 25 Miles, Fixed
Over 8 to 25 Miles, Per Air Mile
Over 25 to 50 Miles, Fixed
Over 25 to 50 Miles, Per Air Mile
Over 50 Miles, Fixed
Over 50 Miles, Per Air Mile

E-UDIT Without Customer Location Electronics
DS1 E-UDIT Without Customer Location Electronics
DS3 E-UDIT Without Customer Location Electronics
OC3 E-UDIT Without Customer Location Electronics
OC12 E-UDIT Without Customer Location Electronics

Appendix B - Spreadsheet List

Section	Description	Spreadsheet
Summary of Results	All cost elements	Summary of Results Wire Center Summary 2W
A	Unbundled Loop	Loop - Dev Total Prod Costs 2W Loop - Dev Total Prod Costs 4W Avg Loop - Investment Cost 2W Loop Zone 1- Investment Cost 2W Loop Zone 2- Investment Cost 2W Loop Zone 3- Investment Cost 2W Loop Zone 4- Investment Cost 2W Loop Zone 5- Investment Cost 2W Zone Costs 2W Zone Costs 4W Wire Center Loop Costs 2W Loop - Defaults & Overrides Loop Grooming – Inv Development Loop Grooming Data Loop Module Output Loop Length Zone Data
B	Extension Technology	Ext Tech- Develop Total Prod Costs Ext Tech -Investment Cost Calc ET Grooming – Inv Development
C	Line and Trunk Ports	Port - Develop Total Prod Costs Port - Investment Cost Calc Ports Inv & Exp Summary ISDN RTU Fees Calculation ISDN Line Forecast ISDN X.75 Link Investment Dev ISDN X.75 Investment Builder DS0 Trunk Investment Dev DID PBX Investment Development SM Port Feature Output
D	Local Traffic	Local-Develop Total Prod Costs Local - Investment Cost Calc Local - Defaults & Overrides Local UNE – Inv & Exp Development Local LIS – Inv & Exp Development Local Transport Inv Development SM Usage Output DS0 Switched TM Output Hold Times

Section	Description	Spreadsheet
E	Entrance Facility and Direct Trunk Transport	DS1 - Develop Total Prod Costs DS3 - Develop Total Prod Costs DS1 - Investment Cost Calculation DS3 - Investment Cost Calculation DS1 - Defaults & Overrides DS3 - Defaults & Overrides DS1 TM Output DS3 TM Output
F	Intentionally left blank	
G	8XX Database Services	8XX – Develop Total Product Costs 8XX-Investment Cost Calculation 8XX – Inv & Exp Inputs
H	Line Information Database	LIDB - Develop Total Prod Costs LIDB – Investment Cost Calc LIDB – Inv & Exp Inputs
I	Signaling	Signal-Develop Total Prod Costs Signal - Investment Cost Calc Signaling - Inv & Exp Inputs SS7 STP-Inv & Exp Development
J	Shared Transport	ST – Develop Total Prod Costs ST –Investment Cost Calculation ST – Defaults and Overrides ST – Investment Development ST – Direct Expense Development ST – Traffic Calculations ST – DS0 TM Output
K	Unbundled Dedicated Interoffice Transport (UDIT)	DS0 UDIT- Dev Total Prod Costs DS1 UDIT- Dev Total Prod Costs DS3 UDIT- Dev Total Prod Costs OC3 UDIT- Dev Total Prod Costs OC12 UDIT- Dev Total Prod Costs EUDIT- Dev Total Prod Costs DS0 UDIT-Investment Cost Calc DS1 UDIT-Investment Cost Calc DS3 UDIT-Investment Cost Calc OC3 UDIT-Investment Cost Calc OC12 UDIT-Investment Cost Calc EUDIT-Investment Cost Calc EUDIT Defaults and Overrides DS0PL UNE TM Output DS1PL UNE TM Output DS3PL UNE TM Output OC3PL UNE TM Output OC12PL UNE TM Output

Section	Description	Spreadsheet
Appendix	Other Supporting Sheets	Expense Factors Investment Based Factors Billing L & B Factors Investment Loadings Run Data

Appendix C - Description of Output Workbook

The output workbook calculates TELRIC and common costs by applying investment factors and expense factors to investment inputs and direct expense inputs. Throughout the workbook there are cells with a red dot in the upper left-hand corner. These are cells that have associated notes. There are two ways to display the notes. The first way is to move the cursor over the cell. The note will automatically be displayed. Some of the notes are too long to be displayed completely by this method. If that is the case, the second method (for Microsoft Excel 7.0 only) is to select the cell by clicking on it, click Tools in the menu bar, click Options, select the View tab, click Info Window and click OK. The full note will be displayed. To close the Info Window, click File and Close. An easier way to open the Info Window is to move the Info Window button to the toolbar and use it. See your Excel instructions.

The output workbook is divided into sections as listed in Appendix B. The following is a description of each of the spreadsheets that are included in the output workbook:

General Descriptions

Summary of Results

This is a summary of the results calculated in the Develop Total Prod Costs spreadsheets. It includes the total investment if applicable, TELRIC, Common costs, and TELRIC + Common for each rate element. The investment is shown if there is a depreciable investment included in the costs. Element Specific Expenses are also shown.

Wire Center Summary 2W

This spreadsheet summarizes the average loop costs by wire center. The user can use this spreadsheet to sort results by CLLI, wire center name, loop length, lines, wire center zone, investment or costs.

Develop Total Product Costs

These spreadsheets calculate the TELRIC, Common and TELRIC + Common costs from Investment related expenses calculated in the Investment Cost Calculation spreadsheet and Other Direct Expense Inputs. It applies the expense factors from the Factors spreadsheet to calculate costs. An individual expense for each factor and each rate element is calculated before summing to TELRIC, Common and TELRIC + Common. The calculation process is as follows:

- Total Investment Based Costs are copied from the appropriate Investment Cost Calculation spreadsheet.

- Other Direct Expense Inputs are copied from Defaults & Overrides spreadsheets or elsewhere depending upon the product. Other Direct Expense Inputs are non-investment related direct expenses associated with the service. For example, typically the Other Direct Expense Inputs are billing expenses. These direct expenses are in addition to those calculated by expense factors.

- With the exception of Business Fees, each Directly Assigned Factor (Product Management, Sales Expense and Product Advertising Expense) is multiplied times the sum of Total Investment Based Costs and Other Direct Expense Inputs (referred to as "Expense" on the summary page).

- Business fees are calculated by multiplying the Total Investment Based Costs + Other Direct Expense Inputs + Product Management + Sales Expense + Product Advertising Expense by the Business fees factor.

- The Directly Assigned Costs are totaled.

- The Total Direct is calculated by taking the sum of Total Investment Based Costs, Other Direct Expense Inputs and Directly Assigned Costs.

- Each Directly attributed factor is multiplied times the Total Direct and then totaled to calculate the Total Directly Attributed Costs.

- TELRIC is calculated as the sum or the Total Direct and the Total Directly Attributed Costs.

- Common costs are calculated by multiplying TELRIC by each of the eight common factors. Total Common Costs is the sum of the costs calculated by each of the common factors.

- Finally, TELRIC + Common is calculated by summing TELRIC and Total Common Costs.

There is a Develop Total Product Costs spreadsheet for each group of cost elements as follows:

Develop Total Product Costs Spreadsheet List

Section	Spreadsheet Name
A	Loop - Dev Total Prod Costs 2W Loop - Dev Total Prod Costs 4W
B	Ext Tech - Develop Total Prod Costs
C	Port - Develop Total Prod Costs
D	Local - Develop Total Prod Costs

Section	Spreadsheet Name
E	DS1 - Develop Total Prod Costs DS3 - Develop Total Prod Costs
G	8XX – Develop Total Product Costs
H	LIDB - Develop Total Prod Costs
I	Signal - Develop Total Prod Costs
J	ST – Develop Total Prod Costs
K	DS0 UDIT- Dev Total Prod Costs DS1 UDIT- Dev Total Prod Costs DS3 UDIT- Dev Total Prod Costs OC3 UDIT- Dev Total Prod Costs OC12 UDIT- Dev Total Prod Costs EUDIT- Dev Total Prod Costs

Investment Cost Calculation

These spreadsheets use the investment related factors from the Investment Factors spreadsheet to calculate monthly or per event depreciation, cost of money, income tax, ad Valorem and maintenance expenses for recurring cost elements. The land and buildings investments are calculated from the circuit and switching investments by applying the appropriate factors from the L & B Factors spreadsheet.

Monthly costs are calculated for services sold on a monthly basis by multiplying the total investment by the factor and dividing by 12. Per event costs for services sold on a per event basis such as switching minutes of use are calculated by multiplying the per event investment by the factor.

The Investment Cost Calculation spreadsheets are customized for each service because of differences in account codes by cost element. There is a Investment Cost Calculation spreadsheet for each group of cost elements as follows:

Investment Cost Calculation Spreadsheet List

Section	Spreadsheet Name
A	Avg Loop - Investment Cost 2W Loop Zone 1- Investment Cost 2W Loop Zone 2- Investment Cost 2W Loop Zone 3- Investment Cost 2W Loop Zone 4- Investment Cost 2W Loop Zone 5- Investment Cost 2W Avg Loop - Investment Cost 4W Loop Zone 1- Investment Cost 4W Loop Zone 2- Investment Cost 4W Loop Zone 3- Investment Cost 4W Loop Zone 4- Investment Cost 4W

Section	Spreadsheet Name
	Loop Zone 5- Investment Cost 4W
B	Ext Tech –Investment Cost Calc
C	Port – Investment Cost Calc
D	Local – Investment Cost Calc
E	DS1 – Investment Cost Calculation DS3 – Investment Cost Calculation
G	8XX-Investment Cost Calculation
H	LIDB – Investment Cost Calc
I	Signal - Investment Cost Calc
J	ST –Investment Cost Calculation
K	DS0 UDIT-Investment Cost Calc DS1 UDIT-Investment Cost Calc DS3 UDIT-Investment Cost Calc OC3 UDIT-Investment Cost Calc OC12 UDIT-Investment Cost Calc EUDIT-Investment Cost Calc

Defaults & Overrides

The Defaults & Overrides spreadsheets display the default and user override data that the user input using the procedures outlined in the section of the user manual titled Other Inputs. These spreadsheets do not show the override data that the user input to ICM's Investment and Factor modules. To view all default and override inputs, follow the directions in the Viewing and Printing Cost Element Outputs section of this document. **The Defaults & Overrides spreadsheets should not be used as an input area.** The user should follow the input procedures outlined in the user manual in the section titled Other Inputs for entering overrides. If the user has input and requested that override data be used, the spreadsheet will determine this and display the override data in the **This Run** column. If the user has not entered Overrides the default values will displayed in the **This Run** column. There are seven Defaults & Overrides spreadsheets as follows:

Defaults & Overrides Spreadsheet List

Section	Spreadsheet
A	Loop - Defaults & Overrides
C	Port - Defaults & Overrides
D	Local - Defaults & Overrides
E	DS1 - Defaults & Overrides DS3 - Defaults & Overrides
J	ST - Defaults & Overrides
K	EUDIT – Defaults and Overrides

ICM Investment Module Outputs

Loop Module Outputs

This spreadsheet summarizes the investment outputs of the Loop Module. These results are used in the calculation of unbundled loop costs and extension technology costs. The Loop Module Output contains the investment output, zones, loop lengths and number of loops by wire center. Loop Length Zone Data contains investments by distance zone when the user has selected the distance zone option.

Transport Module (TM) Outputs

These spreadsheets summarize the results of the Transport Module. Switched investments are labeled at three levels. The first level is by mileage band. The second level is for conversation minute or set up. The third level is fixed or variable. Fixed and variable are not economic terms. Fixed refers to investments that do not change based on distance. Variable investments are distance sensitive. Non switched investments exclude the conversation minute/set up level and have only two levels of investments, by mileage band and by fixed and variable. The TM output spreadsheets are as follows:

Transport Module Outputs List

Section	Spreadsheet	Notes
D	DS0 Switched TM Output	Switched
E	DS1 TM Output DS3 TM Output	Non-switched direct trunked transport
J	ST – DS0 TM Output	Switched
K	DS0PL UNE TM Output DS1PL UNE TM Output DS3PL UNE TM Output OC3PL UNE TM Output OC12PL UNE TM Output	Non-switched UDIT

Switch Module Outputs

There are two Switch Module (SM) outputs as follows:

- SM Usage Output

This spreadsheet summarizes the results of the usage module of SM. Usage investments are shown per message and minute. MDF investments are per pair. These usage unit investment results are used in the Usage Switching Calculations spreadsheet. The MDF investments are used in the loop Develop Total Product Costs spreadsheets.

- SM Port Feature Output

The SM Port Feature Output is the switching port and feature investments required for the line and trunk ports.

Factors, Investment Loadings and ICM Inputs

Expense Factors

The Expense Factors spreadsheet is populated with the factors calculated by the expense factors module of ICM. These factors are used by the Develop Total Product Costs spreadsheets.

Investment Based Factors

This spreadsheet is populated with data from the Capital Cost Module run and the Expense Factors Module run by ICM. The Capital Cost Module calculates the Cost of Money, Depreciation and Income Tax factors. Total CAPCOST is the sum of the sum of cost of money, depreciation and income tax. The expense factors module calculates the Ad Valorem and maintenance factors. All of the factors used on this sheet are applied to investments by the Develop Total Product Costs spreadsheets.

Billing

This spreadsheet holds the results of the billing study. Included are the per minute of use investments and expenses used in the switching usage calculations, the per bill investments and direct expenses used in the unbundled loop calculations and the factor used to calculate billing from transport investment related costs. When required Billing expenses are used in the Develop Total Product Costs spreadsheets as Element Specific Expenses.

L & B Factors

This spreadsheet has land and building factors specific to the state being studied. These factors are not calculated in the model. They are used by the Investment Cost Calculation spreadsheet to calculate the amount of land and buildings investment required for switching and circuit equipment.

Investment Loadings

Investment loading factors calculate capitalized investments that are required in addition to the material or EF&I investments to determine total investment. They are used to calculate power, sales tax, Qwest engineering and interest during construction. These factors are used only when an investment module or program has not loaded these investments.

Run Data

This spreadsheet is populated with the user inputs from the Other Inputs section of the model. It also contains the state name and the name of the run. The state name and run name are used as headings on most spreadsheets. The other data is used by the Defaults & Overrides spreadsheets.

Other Spreadsheets by Section

This section primarily discusses where the investments and direct expenses are calculated. In addition, each section has a Develop Total Product Costs spreadsheet and a at least one Investment Cost Calculation spreadsheet. Some section also have a Defaults and Overrides List. These three types of spreadsheets are described earlier. More detail, however, will be provided in what follows on the Investment Cost Calculation spreadsheets.

Section A – Unbundled loop

Zone Costs 2W
Zone Costs 4W
Wire Center Loop Costs 2W

These spreadsheets calculate unbundled and deaveraged loop costs by zone and by wire center. The Zone Costs spreadsheets summarize the same calculations displayed in the Develop Total Product Costs sheets and the Investment Cost Calculation sheets without the detail by factor.

Loop Grooming – Inv Development

This spreadsheet calculates unbundled loop grooming investments for the unbundled loop cost elements using data from the Loop Grooming Data spreadsheet.

Loop Grooming Data

The Loop Grooming Data spreadsheet contains investment data for the loop grooming equipment and line count data to calculate the percent of digital loop carrier used in very small/small and medium/large size offices. This data is used in the ET Grooming – Inv Development (Section B) and Loop Grooming – Inv Development spreadsheets.

Section B – Extension Technology

Ext Tech –Investment Cost Calc

Extension Technology has one Investment Cost Calculation spreadsheet, Ext Tech - Investment Cost Calc. The Extension Technology Investment Cost Calculation spreadsheet calculates investment related expenses separately for 2-wire loops and unbundled loop grooming. The loop investment data comes from the Loop Module Outputs spreadsheet. The loop investment data represents the difference between the ISDN investment output of the Loop Module and the Plain Old Telephone Service (POTS) output of the Loop Module.

The unbundled loop grooming investment data is from the ET Grooming – Inv Development spreadsheet.

ET Grooming – Inv Development
This spreadsheet calculates unbundled loop grooming investments for extension technology. The other extension technology calculations are made on the Loop Module Outputs spreadsheet.

Section C –Line and Trunk Ports

Port – Investment Cost Calc
Line and Trunk Ports has one Investment Cost Calculation spreadsheet, Port – Investment Cost Calc. The investment data is from the Ports Inv & Exp Summary spreadsheet.

Ports Inv & Exp Summary
Summarizes the investments and expenses calculated in the following spreadsheets and the SM Port Feature Output by rate element.

ISDN RTU Fees Calculation
Calculates the ISDN RTU fees on a per line basis.

ISDN Line Forecast
BRI Line forecast data used for ISDN X.75 link and ISDN RTU Fees Calculation.

ISDN X.75 Link Investment Dev
Calculates X.75 link investments per BRI ISDN line using ISDN line forecasts and Investments from **ISDN X.75 Investment Builder**

ISDN X.75 Investment Builder
Applies investment loading factors and fill factors to BRI X.75 link material prices. This data is used by ISDN X.75 Link Investment Dev.

DS0 Trunk Investment Dev
Converts DS1 investments to DS0 using SM Port feature output investments.

DID PBX Investment Development

Converts DS1 investments to DS0 using Mux investments from section E and MDF investments section D. Applies probability of analog lines to the total.

Section D – Local Traffic

Local - Investment Cost Calc

This spreadsheet calculates investment-related costs for local switching, tandem switching, fixed transport and mileage sensitive transport. The switching and transport investments are from the Local UNE-Inv & Exp Development and Local LIS-Inv & Exp Development spreadsheets and the transport investments are from the Usage Transport Calculations spreadsheet.

Local UNE-Inv & Exp Development

Local LIS-Inv & Exp Development

There are two separate Investment and Expense Development spreadsheets unbundled network elements (UNE) and local interconnection services (LIS). These spreadsheets develop end office switching and tandem switching investments by applying demand data to setup and conversation minute unit investments from SM. Measurement and billing investments and direct expenses are also summarized on this spreadsheet. The investments are used in the Local - Investment Cost Calculation spreadsheet. The Local - Develop Total Prod Costs spreadsheet, uses the direct expenses calculated in these spreadsheets.

Local Transport-Inv Development

This spreadsheet develops transport investments by applying demand data to setup and conversation minute unit investments from TM. The investments are used in the Local - Investment Cost Calculation spreadsheet.

Hold Times

The Hold Times spreadsheet calculates the hold time from actual minutes of use and attempts for use by the Local UNE-Inv & Exp Development, Local LIS-Inv & Exp Development and Local Transport-Inv Development spreadsheets.

Section E – Entrance Facilities and Direct Trunk Transport

DS1 - Investment Cost Calculation

DS3 - Investment Cost Calculation

The DS0, DS1 and DS3 Investment cost calculation spreadsheets calculate entrance facility and direct trunk transport investment related costs. In addition the DS1 and DS3 sheets also calculate entrance facility and multiplexing investment related costs. The transport investments are from the TM Output spreadsheets and the entrance facility and multiplexing are from the DS1 Form and DS3 Form spreadsheets.

Section F – Intentionally left blank

Section G – 8XX Database Services

8XX – Investment Cost Calculations

The 8XX – Investment Cost Calculation spreadsheet calculates investment related costs using investment data from the **8XX - Inv & Exp Inputs** spreadsheet.

8XX - Inv & Exp Inputs
This spreadsheet contains the investments and expenses calculated in the 8XX Process Spreadsheet – Query.

Section H – Line Information Database

LIDB – Investment Cost Calculation
The LIDB – Investment Cost Calculation spreadsheet calculates investment related costs using investment data from the LIDB – Inv & Exp Inputs spreadsheet.

LIDB – Inv & Exp Inputs
This spreadsheet contains the investments and expenses calculated in the....

Section I – Signaling

Signal – Investment Cost Calc
This spreadsheet calculates investment related costs for Transaction Capabilities Application Part (TCAP) and Integrated Services Digital Network User Part (ISUP) cost elements as well as for STP per Port cost element. The investments are from the **Signaling – Inv & Exp Inputs** and **SS7 STP–Inv&Exp Development** spreadsheets.

Signaling – Inv & Exp Inputs
This spreadsheet contains the investments and expenses calculated in the SS7 Summary Spreadsheet. Loading factors are applied to central office equipment investments to account for power, sales tax, engineering and interest during construction.

SS7 STP–Inv&Exp Development
This spreadsheet calculates the investments and expenses for a Signal Transfer Point (STP) port. Hardware and software investments for both the STP and its ports are calculated using vendor prices and capacities of the equipment. Hardware per port investments are inflated to the studied year via Telephone Plant Index factors and are loaded with state specific power, sales tax, telephone company engineering and interest during construction to create an investment per port. Per port software expenses, which are not capitalized, are levelized over the life of the equipment.

Section J – Shared Transport

ST –Investment Cost Calculation
This calculates Local network and access network investment related costs. The investments are from the ST - Map Inv & Exp to Rate Elements spreadsheet.

ST – Investment Development

This spreadsheet applies miles and hold times to the Transport Module output to calculate trunk investments on a per minute of use basis for end office to end office, end office to local tandem and end office to access tandem trunks. It weights the three investments to calculate an investment per MOU.

ST – Direct Expense Development

This spreadsheet calculates the direct expenses associated with setting up Shared Transport service. These expenses are spread over 5 years of demand for the service.

Section K – Unbundled Dedicated Interoffice Transport (UDIT)

DS0 UDIT-Investment Cost Calc
DS1 UDIT-Investment Cost Calc
DS3 UDIT-Investment Cost Calc
OC3 UDIT-Investment Cost Calc
OC12 UDIT-Investment Cost Calc

The UDIT Investment cost calculation spreadsheets calculate dedicated trunk transport investment related costs. The transport investments are from the UNE TM Output spreadsheets.

Appendix D - Supporting Documentation List

The following documents describe ICM's modules, supporting programs and the principles and methodology used to produce cost studies. Each document is contained on the ICM CD along with this manual in the Document directory. Acrobat Reader is required to read the documents. To install Acrobat Reader, run the acrobat.exe program located on the ICM CD.

Document	File Name	Description
Integrated Cost Model User Manual	USWICM21.pdf	Description and instructions on running ICM.
Loop Module User Manual	Loopmod2.pdf	Technical description and instructions on running the LoopMod program.
Loop Module Default Values	Loop Default.pdf	Qwest proprietary document listing and justifying the default inputs used in the Loop Module.
Switching Module User Manual	Scm_User.pdf	Technical description and instructions on running the Switching Cost Model program.
Transport Module Technical Description	Transport-V4.pdf	Technical description of the Transport Module program
Capital Cost Factors Module User Manual	Capcost 99V2.pdf	Technical description and instructions on running the Capital Cost Factors Module program.
Expense Factors Module User Manual	Expense 99V2.pdf	Technical description and instructions on running the Expense Factors Module program.
Network Access Channel Program Documentation	Nac.pdf	Technical description and instructions on running the Network Access Channel Program.
Investment Loading Factors Technical Description	Loadings.pdf	Descriptions of methodologies used to calculate investment loading factors which are used to calculate capitalized investments
Other Supporting Programs Technical Descriptions	Other.pdf	Description of CRIS billing and collection, SS7, operator services programs.
Cost Methodology and Processes	Methods.pdf	TSLRIC/TELRIC methods, definitions, processes and concepts.

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
Chairman
JAMES M. IRVIN
Commissioner
MARC SPITZER
Commissioner

IN THE MATTER OF	)	
INVESTIGATION INTO QWEST	)	
CORPORATION'S COMPLIANCE	)	DOCKET NO. T-00000A-00-0194
WITH CERTAIN WHOLESALE	)	
PRICING REQUIREMENTS FOR	)	
UNBUNDLED NETWORK	)	
ELEMENTS AND RESALE	)	
DISCOUNTS	)	

DIRECT TESTIMONY OF RICHARD CHANDLER

ON BEHALF OF THE JOINT CASE OF

AT&T COMMUNICATIONS OF THE MOUNTAIN STATES, INC.,

WORLDCOM, INC. AND XO ARIZONA, INC.

RE: UNBUNDLED PACKET SWITCHING, END OFFICE SWITCHING, AND SIGNALING

MAY 16, 2001

EXHIBIT
Admitted
ATT7

TABLE OF CONTENTS

Executive Summary

I have been retained by AT&T, WorldCom, and XO to evaluate the engineering basis for the pricing of Unbundled Packet Switching (UPS) as well as that for circuit switching and signaling proposed by QWEST in Arizona. I find the following:

- Qwest's proposed service, contrary to the purpose of the Telecommunications Act of 1996, would effectively impede technological innovation by withholding higher-quality ATM service classes from CLECs;
- Qwest's UPS cost study is not forward-looking, is not fully open to examination, and is essentially useless as a means for explaining the rate elements and supporting the prices Qwest proposes in this proceeding;
- The technical descriptions of the UPS rate elements Qwest provides in testimony are inadequate, ambiguous, and, if taken at face value, describe a service that is inappropriate and cumbersome for applications typically used by current DSL subscribers;
- In spite of Qwest's claims to the contrary, its Switching Cost Model is a "black box" and cannot be reviewed to the extent necessary to verify the pricing levels that Qwest proposes in this proceeding
- Qwest's signaling model cannot be used to verify the validity of the proposed signaling prices because critical inputs are undocumented.

According to Qwest's testimony, Qwest's UPS offering would support a very basic service that is cumbersome for the user and that does not offer the "always on" characteristic touted by Qwest in its own DSL service advertising. Furthermore, Qwest's proposal would withhold higher-quality ATM (Asynchronous Transfer Mode) service categories from potential competitors, thus frustrating technological innovation and competition.

Qwest's UPS cost study models an explicitly non-forward-looking equipment configuration, in that it assumes a copper-based digital loop carrier system for the bulk of its modeled UPS network elements. Such a system is by definition not forward-looking and also entails investments that are greater than those required for a true forward-looking technology.

The proposed prices that result from Qwest's UPS cost study taken as a whole are higher than the retail price Qwest charges for its basic DSL service, which includes packet switching. Qwest's entire UPS cost study and the supporting testimony are thoroughly flawed and should not be considered in this proceeding.

Qwest's Switching Cost Model is a "black box" in that several associated database files cannot be viewed without a password, critical inputs information such as switch investments and configurations are not available in any form, and there is no documentation that explains in any detail the functioning of the model. Because of these shortcomings, the switching cost elements proposed by Qwest should be rejected from this proceeding.

Qwest's signaling model relies on undocumented and unsubstantiated input investment, capacity, and demand values. As a result, the proposed signaling rate element prices cannot be determined to be either reasonable or appropriate, and the rate elements should be rejected.

I. INTRODUCTION AND WITNESS QUALIFICATION

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Richard Chandler. I am a Senior Vice President of HAI Consulting, Inc., and my business address is 737 29th Street, Boulder, Colorado, 80303.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I have BSEE and MSEE degrees from the University of Missouri and an MBA from the University of Denver. I also have completed additional graduate study in electrical engineering at the University of Colorado. I worked as an electronic engineer at the Institute for Telecommunication Sciences studying microwave and optical propagation and analyzing radar systems.

I then worked at Bell Laboratories in the exploratory development of customer switching systems. While at Bell Labs, I worked extensively on packet switching and circuit switching technologies. I then transferred to AT&T, where I was a product manager working on, among other things, product strategies for packet switching systems.

After working at AT&T, I joined a startup mobile satellite company as vice president of network engineering. In that role, I developed the ground system network architecture, which included packet switching capabilities, for the proposed system.

At HAI (and its predecessor, Hatfield Associates, Inc.), I have been the principal developer of the Hatfield/HAI cost models. I have also analyzed a range of telecommunications technologies and systems for a number of clients. Many of these investigations have involved the study of packet switching technologies. I have, for example, worked extensively on packet radio techniques for a major international company engaged in package delivery service. I also worked as a technical advisor to a major Bell company wireless subsidiary, performing technical due diligence for its proposed acquisition of a European packet radio system.

I have also taught graduate-level telecommunications technology courses in digital switching, including packet switching, basic telephony, and cellular and wireless communications, including packet radio systems, at the University of Colorado, the University of Denver, and Pace University.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I have been retained by AT&T, WorldCom, and XO to evaluate the engineering basis for the pricing of Unbundled Packet Switching (UPS) as well as that for circuit switching, and signaling proposed by QWEST in Arizona. In doing so, I will demonstrate to the Arizona Corporation Commission ("ACC") that:

- Qwest's proposed service, contrary to the purpose of the Telecommunications Act of 1996,[1] would effectively impede technological innovation by withholding higher-quality ATM service classes from CLECs;
- Qwest's UPS cost study is not forward-looking, is not fully open to examination, and is essentially useless as a means for explaining the rate elements and supporting the prices Qwest proposes in this proceeding;
- The technical descriptions of the UPS rate elements Qwest provides in testimony are inadequate, confusing, and, if taken at face value, describe a service that is

[1] The general purpose of the Act is "To promote competition and reduce regulation in order to secure lower prices and higher quality services for American Telecommunications consumers and **encourage the rapid development of new telecommunications technologies**" 47 U.S.C. § 151 *et seq.*(emphasis added).

inappropriate and cumbersome for applications typically used by current DSL subscribers;

- Despite Qwest's claims to the contrary, its Switching Cost Model is a "black box" and cannot be reviewed to the extent necessary to verify the pricing levels that Qwest proposes in this proceeding;
- Qwest's signaling model similarly cannot be used to verify the validity of the proposed signaling prices because critical investment and capacity inputs are entirely undocumented or explained at any level of detail.

II. QWEST'S UNBUNDLED PACKET SWITCHING PROPOSAL IS NOT BASED ON A FORWARD-LOOKING COST STUDY AND IMPEDES COMPETITION AND TECHNOLOGICAL INNOVATION

Q. FIRST, PLEASE EXPLAIN WHAT END USER SERVICE THAT WOULD BE SUPPORTED BY QWEST'S PROPOSED UPS RATE ELEMENTS?

A. It is difficult to tell from Qwest's testimony or cost study documentation what services a competitor using the UPS rate elements could provide to an end user. The testimony itself describes switched connections that would require packet switching users served by ADSL (Asymmetric Digital Subscriber Line) connections to set up calls to Internet service providers using service request and dialing procedures analogous to those required today for conventional telephone service.

Q. IS THIS THE LEVEL OF SERVICE QUALITY THAT END USERS WOULD EXPECT TODAY FROM ITS ADSL PROVIDER?

A. Definitely not. A key feature of ADSL service as it is offered around the nation today by ILECs and their few remaining competitors is the fact that it is "always on." This means that a user does not need to use the service request and dialing procedures that appear to be required under Qwest's UPS proposal. Qwest touts the "always on" feature in its own advertising for DSL service.[2] As I describe later in my testimony, the "always on" characteristic derives from what are known as permanent virtual connections. I am unaware of any service provider that now requires customers to use the switched connections Qwest discusses in testimony pertaining to UPS in Arizona.

Q. WHAT IS PACKET SWITCHING?

A. Packet switching is a technique originally designed for the efficient routing of data. User data are encapsulated into discrete packets for transmission. In some cases, successive packets transmitted by a given user to a given destination may follow different routes through the network. Packet switching efficiency results from the fact that network capacity is only used when packets are transmitted. In many types of application, such as Internet access, users only occasionally transmit and receive data. This type of data traffic is usually described as "bursty."

Q. HOW DOES PACKET SWITCHING DIFFER FROM OTHER FORMS OF SWITCHING?

A. Conventional telephone service uses switched voice connections in which voice information is transmitted across the connection a significant part of the time. For this reason, voice connections are almost always "circuit-switched;" that is, the connection consists of dedicated network capacity assigned for the duration of the call. In this case, the network capacity, or circuit, is established by end-user signaling (the user takes the telephone off-hook and then dials the desired destination) when the call is set up, and the

[2] "DSL," an abbreviation for Digital Subscriber Line, has become synonymous with ADSL in the popular press as well as in service provider advertising. Qwest advertises the "always-on" aspect of its service in a number of locations, including its web site: see http://www.qwest.com/dsl/learn/faq.html.

circuit is similarly removed at the end of the call, again as a result of end-user signaling (when the subscriber hangs up the telephone). It is important to note that bursty data traffic (again such as Internet access traffic), given its relatively infrequent demand for transmission, does not efficiently use network capacity in a circuit-switched connection because the dedicated capacity is idle much, if not most, of the time.

Q. ARE THERE DIFFERENT CLASSIFICATIONS OF PACKET SWITCHING?

A. Yes. Packet switching can be connectionless as well as connection-oriented.

Q. WHAT IS CONNECTIONLESS PACKET SWITCHING?

A. In a connectionless protocol, there is no "call setup" process. Each packet contains the complete destination address which is read by various network elements, such as routers, to send the packet to its destination. Each packet is thus routed independently of all previous and subsequent packets, and there is no network-level association, temporary or permanent, between source and destination. For example, the Internet Protocol (IP) is connectionless. One could also think of the U.S. Postal Service as operating a connectionless system, in that each letter and parcel sent through the system carries with it all the addressing information the system requires to deliver the item to its destination. There is no logical association between the sending address and the destination address required to ensure correct routing of the item.

Q. WHAT IS CONNECTION-ORIENTED PACKET SWITCHING?

A. Unlike connectionless packet switching, a connection-oriented protocol, such as Asynchronous Transfer Mode (ATM), requires a logical association, usually called a virtual circuit or virtual channel, between the endpoints of the connection. The term "virtual" is key in this context. Once the virtual channel is established, the network then knows to send all packets generated at one end point to the other end point in the virtual connection. The virtual circuit is just the association of the endpoints of the connection and does not imply anything about network capacity. All packet switching systems make capacity available only on demand. Thus, there is no capacity dedicated to the virtual connection as there is in the physical connection in the circuit-switched case.

Q. ARE THERE DIFFERENT TYPES OF VIRTUAL CIRCUITS?

A. There are two general types of virtual circuits – switched and permanent. ATM can support either type.

Q. WHAT IS A SWITCHED VIRTUAL CHANNEL?

A. A switched virtual channel (SVC)[3] is similar to a circuit-switched voice connection, except for the important difference that, unlike the circuit-switched connection, the SVC has no network capacity dedicated to it for the duration of the connection. Switched virtual circuits are generally not very useful for data transmission and are commonly used only for packetized voice service, which is relatively rare. Switched virtual circuits require end-user signaling to be established and removed. This signaling process is analogous to the offhook/dialing/onhook signaling sequence used to establish and remove a circuit-switched voice connection.

Q. WHAT IS A PERMANENT VIRTUAL CHANNEL, AND HOW IS IT SET UP?

A. Unlike an SVC, which is established and removed by the end user via prescribed signaling procedures, a permanent virtual channel (PVC) must be administered; that is, it is set up and removed by a network administrator using a suitable OSS terminal. A PVC

[3] I use "virtual circuit" and "virtual channel" interchangeably. The preferred ATM nomenclature is "virtual channel."

is generally established over a long period, typically months or even years, hence the adjective "permanent." The PVC is the basis for the "always on" feature often mentioned in conjunction with ADSL (asymmetrical digital subscriber line) service. Because the virtual circuit is permanently assigned, the user does not have to invoke a call setup procedure each time the user wants to communicate with, for example, his or her Internet service provider. Because bandwidth is not dedicated to the PVC, the permanent nature of the virtual connection does not reduce overall network capacity when the user is idle.

Q. WHAT OTHER TYPES OF VIRTUAL CONNECTION DOES ATM SUPPORT?

A. ATM also allows virtual path connections. A virtual path contains a number of virtual channels; a Permanent Virtual Path (PVP), for example, can contain several PVCs. PVPs are useful for managing resources. If an ILEC has made PVP connections available to a CLEC, a CLEC can lease PVPs, with associated service categories, and then administer its own PVCs within the PVPs to facilitate serving its subscribers without relying on the underlying carrier for PVC provisioning for individual users.

Q. DOES ATM PROTOCOL SUPPORT DIFFERENT LEVELS OF SERVICE?

A. ATM allows a provider to offer a range of service categories. The lowest level of service is known as UBR, for Unspecified Bit Rate. This is sometimes known as a "best-effort" service and carries with it no service quality guarantees. UBR cells carry the lowest priority in an ATM network. Thus, for example, the effective data transmission rate and the delays packets encounter as they travel through the network can and will vary, and the underlying service provider, makes no guarantee regarding the variation of either rate or delay. UBR is useful for applications such as casual Internet access in which variable cell delays are not critical and which do not require quality of service guarantees. It is unsuitable for packet voice, video, circuit emulation (such as DS-1 service) or other more sophisticated applications.

Q. PLEASE PROVIDE AN EXAMPLE OF OTHER ATM SERVICE CATEGORIES.

A. There are several such categories. One of these, for example, real-time Variable Bit Rate (rt-VBR), is designed to support such services as packet-switched voice communications. Voice service is particularly sensitive to end-to-end delays in transmission as well as to variations in the end-to-end delay. Excessive delay can lead to "echoes" over a circuit which can be disorienting if the delay is sufficiently long, and unacceptable variations in delay can lead to difficulties in reconstructing the analog signal at the destination. The rt-VBR service category is designed to support such delay-sensitive applications and carries with it service guarantees that ensure a suitable quality of service for them.

Q. WHAT ATM SERVICE CATEGORIES DOES QWEST PROPOSE TO SUPPORT?

A. Qwest's documentation does not indicate what ATM service categories will be available to a CLEC purchases its UPS rate elements. The UPS cost study, however, assumes UBR service only. There is no mention in that cost study of any of the other standard ATM service categories.

Qwest's testimony does refer to DSLAM functionality and indicates that this functionality includes "Uncommitted Bit Rate" or "Committed Bit Rate at 256 Kbps, 512 Kbps, 768 Kbps, 1 Mbps, or 7 Mbps."[4] The testimony does not explain or define either "Uncommitted Bit Rate" or "Committed Bit Rate," and these are not standard ATM

[4] Supplemental Direct Testimony of Barbara J. Brohl ("Brohl Supplemental") at p 5.

terms. If Qwest, in fact, intends to provide support for such services, it needs to define the services by describing the range of technical parameters that specify the service quality that will be guaranteed or supported. There are several quality of service parameters that one can use in describing and defining packet switching services, and none of those appear in Qwest's supporting testimony or in any of the other Qwest-supplied documentation, to the best of my knowledge. It is also not clear that Qwest will support PVPs, although they are rather nebulously mentioned in the Executive Summary provided with the UPS cost study as follows:

> "Unbundled Packet Switch Customer Channel – this element consists of DSLAM functionality and a virtual channel that will serve as the originating and terminating points for Virtual Path Connections (VPC) and Virtual Channel Connections (VCC)."[5]

Q. ASSUMING THAT QWEST, IN FACT, INTENDS TO OFFER ONLY ELEMENTS THAT WILL SUPPORT UBR SERVICE, HOW WOULD QWEST'S LIMITED SERVICE OFFERING IMPEDE TECHNOLOGICAL INNOVATION?

A. ATM, in combination with ADSL and other forms of DSL, can readily support packet voice and other advanced services in addition to the relatively simple Internet access. If, for example, Qwest were to make rt-VBR available to CLECs under its UPS rate elements, competitors could offer high-quality packetized voice service over DSL connections. A competitor could also offer advanced video services using ATM service categories with guaranteed quality of service levels. Qwest's proposal would impede the development of such innovative services by restricting competitors' access to more advanced ATM service categories.

[5] Executive Summary Arizona Unbundled Packet Switching UNE Ordered Lives Cost Study, February 2001, Study ID # 4731 ("Executive Summary") at p 1.

Q. COULD PACKET VOICE SERVICE ALSO PROMOTE CONSUMER CHOICE OF SERVICE PROVIDER FOR RESIDENTIAL SUBSCRIBERS?

A. Absolutely. The availability of such service over DSL connections to CLECs would afford residential subscribers an alternative source for switched voice service. This could allow the CLEC to offer competitive voice service to, say, a residential or home-office customer by supporting additional voice lines using packet techniques over a single DSL connection and Qwest's ATM service.

Q. IF THE BASIC UBR SERVICE QWEST WILL SUPPORT IS A PACKET-SWITCHED SERVICE, WHY CAN'T IT BE USED FOR PACKETIZED VOICE OR VIDEO SERVICE?

A. Voice service and certain types of video service are very sensitive to delays in transmission as well as in changes in transmission delay. As I previously noted, UBR carries no quality of service assurances, including specifications of delay and delay variation. UBR would therefore offer substandard service levels. The rt-VBR service category is specifically designed for delay-sensitive applications such as packetized voice and video.

Q. DO YOU BELIEVE THAT QWEST, BY FAILING TO OFFER SUPERIOR ATM SERVICE CATEGORIES, WOULD EFFECTIVELY RESERVE SUCH SERVICES FOR ITSELF?

A. It's certainly possible, although clearly I can't anticipate what services Qwest might itself offer using its ATM network. It is equally clear that Qwest, by withholding such service categories from its rate elements, precludes the offering of innovative and advanced services by competitors whether or not it offers such services itself.

Q. YOU REMARKED IN YOUR INTRODUCTION THAT QWEST AMBIGUOUSLY DESCRIBES PACKET SWITCHING. PLEASE EXPLAIN.

A. Qwest observes that a virtual channel is "a non-permanent channel"[6] and that "the channel is set up in advance of the routing of the packets as is in place throughout the transmission of the packets." At this point, the testimony notes that "[t]his creates the virtual path over which all packets for this particular transmission will go." This description ends with the statement that "[o]nce the packets are transmitted, the path is released." The testimony either completely misrepresents the nature of virtual channels and packet switching, or else it is intentionally saying that Qwest will only support SVCs in its unbundled packet switching service.

Q. WHAT WILL BE THE EFFECT ON CLECS AND THEIR CUSTOMERS IF THE TESTIMONY IS ACCURATE AND QWEST REALLY INTENDS TO OFFER ONLY SVCS?

A. If the testimony is correct in suggesting that only SVCs are to be available, then end users who choose a competitive carrier will not be allowed the "always on" connections that they now have almost universally with their ADSL service. To the best of my knowledge, no other service provider in the country now offers only SVC-based service over DSL and ATM. This means that only Qwest and the few remaining facilities-based ADSL carriers would be able to provide the level of ADSL service that customers now expect.

[6] Brohl Supplemental at p 2.

Q. OTHER THAN QWEST'S SUPPORTING TESTIMONY, WHAT OTHER DESCRIPTIVE DOCUMENTATION DOES QWEST PROVIDE REGARDING UNBUNDLED PACKET SWITCHING?

A. Not much. The Executive Summary briefly describes the rate elements and discusses, also briefly, some of the assumptions used in cost study 4731. There are no detailed descriptions of the equipment assumed in the cost study, nor are there any explanations of equipment investments in the cost study workbook that would enable a reviewer to determine whether equipment investments are properly assigned to the UPS rate elements. Other than the cursory discussion in the Executive Summary, I am aware of nothing Qwest has made available in this proceeding that describes the service, the equipment required to support it, traffic and other operating assumptions, or equipment capacities and configurations.

Q. IS THE COST STUDY ITSELF USEFUL IN THE ANALYSIS OF THE CALCULATIONS THAT PRODUCED THE UPS RATES PROPOSED BY QWEST?

A. Only in a limited sense. The workbook containing the cost study[7] (TKM-20 UPS WP.xls) is locked with a password, making it very difficult to trace through the calculations in the model. Also, in several places Qwest has "hidden" rows in locked worksheets to keep reviewers from scrutinizing certain inputs that Qwest has deemed "vendor proprietary.".

[7] TKM-20 UPS WP.xls.

Q. WERE YOU ABLE TO OBTAIN THE PASSWORDS FOR THE LOCKED WORKSHEETS?

A. I have requested them in a data request sent to Qwest and have not yet received them.

Q. HAS QWEST RESPONDED IN ANY WAY TO YOUR DATA REQUEST CONCERNING MODEL PASSWORDS?

A. Yes. Qwest responded through a letter sent by their outside law firm, Fennemore Craig, and attached to my testimony as Exhibit RAC-1. This letter notes that the requested passwords would "[u]nfortunately … provide access to vendor proprietary information," and that "Qwest intends to object to providing the passwords … but it is nevertheless in the process of seeking vendor authorization to release this information."

It would be mildly helpful to receive the passwords from Qwest, but the password is not necessary to see the contents of hidden rows and columns in a locked Excel worksheet . The information contained in the hidden rows in the model is scarcely enlightening, as the entries are labeled with arcane abbreviations pertaining to various items of equipment from specific vendors. Although the meanings of a few of these labels can be divined to a limited extent, they are as a whole essentially useless, and there is furthermore no detailed description of equipment configurations and capacities of equipment components either in the model itself or in separate documentation that one could apply to a definitive analysis of the system capacity and unit-level investment in the modeled components.

Q. WHAT WERE YOU ABLE TO LEARN FROM THE COST STUDY?

A. The study addresses digital loop carrier equipment modified to support ADSL service. According to the parts of the cost study I could examine, the technology assumed is clearly not forward-looking, in spite of Qwest's statement to the contrary in the Executive

Summary that "[we] consider all equipment and facilities to be forward looking equipment [*sic*]."[8] The cost model shows explicitly that the modeled equipment configurations use copper feeder facilities. Any copper-based DLC system is not forward-looking.

Q. WHAT ARE THE COMPONENTS OF A DLC SYSTEM?

A. A typical DLC system is designed to support voice service. Such a system consists of a digital terminal located in a wire center, and a remote terminal ("RT") which also contains electronics, located some distance away from the wire center and close to concentrations of subscribers. The wire center terminal and the RT communicate using digital information transmitted over a fiber feeder facility, in the forward-looking case. The feeder facility can consist of copper cables that carry T1 digital signals, but this is an obsolescent application for DLC systems.

Q. HOW DOES A DLC SYSTEM TRANSMIT VOICE INFORMATION FOR CONVENTIONAL TELEPHONE CONNECTIONS?

A. A DLC RT converts the analog voice signal from a given subscriber into a 64 kbps (DS-0) digital signal that is then transmitted along the feeder connection ("upstream") to the terminal in the wire center. There is a corresponding downstream DS-0 signal that is converted by the remote terminal to an analog signal which is then sent along the copper distribution connection to the subscriber. An active voice conversation requires a pair of DS-0 channels, one in each direction, on the feeder facility.[9]

[8] Executive Summary Arizona Unbundled Packet Switching UNE Ordered Lives Cost Study, February 2001, Study ID #4731 ("Summary"), p 3.

[9] In an unconcentrated DLC system, the DS-0 pair is dedicated to a given line appearance. In a concentrated system, the DS-0 pair is assigned dynamically to call attempts, so that the number of DS-0 pairs in the feeder facility is smaller than the number of subscribers served by the system.

Q. IS IT NECESSARY TO MODIFY A DLC SYSTEM TO ALLOW IT TO SUPPORT ADSL SERVICE?

A. Yes. The complication caused by ADSL is that the high-bit-rate digital signal associated with each ADSL user on the DLC system must also be placed on the feeder facility along with the DS-0 signals required to support voice service.

Q. WHAT IS INVOLVED IN SUCH A MODIFICATION?

A. If a subscriber has ADSL service at, say, 256 kbps (symmetrical), then the feeder facility must have sufficient capacity to carry the 256 kbps signal in both directions along with the DS-0 channel in each direction to support the user's voice service. A DLC system supporting ADSL will therefore require significantly increased feeder transmission capacity over that required just for voiceband telephone service. A fiber-based DLC system must include additional electronics to carry the high-bit-rate ADSL signals. These modifications are generally nontrivial and may not be possible with older systems.

Q. CAN A COPPER-BASED DLC SYSTEM BE UPGRADED AS WELL?

A. Yes, it is possible. A copper-based DLC system, however, is particularly difficult to upgrade because of the fact that its feeder connections are a set of T1 lines usually supported by conventional T1 transmission technology. A possibly large number of additional T1s may be required to carry the high-bit-rate signals depending on the ADSL demand at the remote terminal. Besides being non-forward-looking, this is also a very expensive approach, and a cost study such as Qwest's that considers copper-based DLC technology for supporting ADSL service will severely overstate costs.

Q. IS THERE ANY OTHER ASPECT OF THE COST STUDY THAT YOU BELIEVE RESULTS IN OVERSTATED COSTS?

A. Yes, there are two. First, the underlying equipment investments for supporting ADSL access to packet switching services are certainly overstated because of the inappropriate technology addressed by the study. Second, it appears that Qwest assumes that relatively few subscribers will be served per T1 feeder connection.

Q. WOULD YOU ELABORATE FURTHER ON THE SECOND POINT?

A. Certainly. The Executive Summary states that "[t]he Network engineer provided us with the assumption that 60 subscribers could be serviced over a DS1, with all subscribers receiving UBR level service." Assuming a symmetric transmission speed of 256 kbps per subscriber, this means that the assumed oversubscription ratio is 10:1, which is a low value.[10] One usually assumes the oversubscription ratio to be twenty to forty or even higher for UBR subscribers.[11] This means that Qwest's computed costs per UPS subscriber will be two or four times or more what they would be if Qwest assumed a more realistic oversubscription ratio.

Q. DO YOU HAVE ANY OTHER OBSERVATIONS REGARDING THE UPS COST STUDY?

A. I have already noted Qwest's inadequate documentation of the study, the model, and input assumptions. I will add that much of the DLC investment, equipment as well as

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[10] Oversubscription is recognition of the fact that users of packet data services only occasionally transmit and receive data. For example, sixty users each operating at 256 kbps would require 15.36 Mbps of transmission capacity if they were all active simultaneously. If each is active an average of 10% of the time, then all sixty can be accommodated by a facility operating at the DS-1 rate.

[11] UBR is Unspecified Bit Rate, an ATM service category with no service quality guarantees; it is the lowest quality service category specified for ATM.

feeder transmission facility, serves both POTS and ADSL subscribers, and how these investments are assigned by the model to the different services is critical. Once again, Qwest provides no analysis or discussion whatsoever of how the investments are assigned.

Q. WHAT IS THE IMPACT OF MISASSIGNING INVESTMENTS BETWEEN POTS AND ADSL?

A. Misassignment will result in users of one service subsidizing another service. Whether and to what degree this is happening in Qwest's cost study is impossible to determine, but the investments computed by the cost study are very high for all four components, and particularly those for "customer channel," "DSLAM functionality," and the DS-1 packet switch port. Finally, it is important to recognize that the sum of the customer channel and DSLAM rate elements is $45.48 per month, which is more than twice the retail price for Qwest's lowest-level ADSL service.

Q. WHAT DO YOU CONCLUDE ABOUT THE PROPOSED UPS RATE ELEMENTS AND HOW, IF THEY ARE ADOPTED, THEY WOULD AFFECT ARIZONA SUBSCRIBERS?

A. Qwest has failed to justify its proposed rates. First, Qwest's description of the rate elements and meager discussion of the assumptions and procedures used to derive the proposed rates are entirely inadequate.

Second, the wholesale rates that the Qwest study produces are over twice the lowest retail rate for existing ADSL service in the Qwest region, making it impossible for a new entrant to compete on a retail basis with Qwest.

Third, the UBR service Qwest addresses in its cost model is unsuitable for anything but simple interactive data applications such as basic Internet access. Qwest's proposal is technically unsuitable for commercial-grade packet voice or video service. By restricting the service quality it offers on a wholesale basis, Qwest reserves for itself, and thus effectively removes from the competitive landscape, the superior ATM service classes required for services more advanced than casual Internet access.

III. QWEST'S CIRCUIT SWITCHING COST MODEL IS A "BLACK BOX" AND HENCE INSCRUTABLE: IT SHOULD NOT BE CONSIDERED IN DEVELOPING UNE SWITCHING PRICES

Q. HAVE YOU REVIEWED QWEST'S SWITCHING COST MODEL (SCM)?

A. I have studied an evaluated the SCM to the extent possible. Qwest provides very little detailed documentation that explains the workings of SCM (or, for that matter, any of the cost models presented in this proceeding). One therefore is left to attempt to scrutinize the workbooks, databases, and other files the model uses and produces in order to determine input values and assumptions and how these factors are used to produce the model's results.

Q. DOES QWEST CLAIM THE ICM TO BE AN "OPEN" MODEL?

A. Qwest states the following about ICM, of which the SCM is a component:

> The ICM is an **open model**. The model makes it easy for the user to review the study inputs, calculation processes, and output results. All aspects of the model are open to investigation by the user – eliminating any "black box" concerns.[12] [Emphasis in original]

[12] Direct Testimony of Theresa K. Million, March 15, 2001, ("Million Direct"), at p 11.

Q. ARE QWEST'S CLAIMS ACCURATE?

A. No. The SCM, for example, has several associated databases and other files. Some of the database files are locked with a password, making it impossible to observe their contents without the password. The switching system investment assumptions are also unavailable. Qwest maintains that the switch investments are proprietary to Qwest's vendors and thus cannot be made available. These investments are absolutely critical to the model review process. Without knowing the investment levels, the model results are essentially meaningless.

Q. WHAT WOULD A THOROUGH REVIEW OF SCM ENTAIL?

A. One of the most critical items, is the ability to study and evaluate the switch investment assumptions. It is also necessary to determine whether the basic model assumptions are forward-looking. For example, some existing host-remote assignments are not forward-looking, and a reviewer must be able to determine whether the modeled switch homing arrangements that define the assignment of remotes to host switches are suitably forward-looking. It is also vital to understand how switch capacity is modeled to determine how costs are assigned to various switching functions, such as call setup, signaling message processing, feature processing, and other items.

Q. IS IT REASONABLY POSSIBLE TO STUDY THESE ITEMS TO AN ADEQUATE EXTENT USING THE SCM INFORMATION THAT QWEST HAS PROVIDED?

A. No. As an example, I have tried to determine just the switch homing arrangements that are actually modeled and have been unable to do so. The critical switch investment data, as I have noted, are not available in the model in any form that I can determine. Qwest does not provide a comprehensive description of the SCM's calculations and operation beyond a brief model description packaged with ICM.[13] The document mostly consists of marginally useful discussions of switch capacity calculations and descriptions of the major SCM components.

Q. DOES THE SCM DESCRIPTION EXPLAIN IN DETAIL HOW CRITICAL VALUES AND QUANTITIES ARE CALCULATED?

A. Not at all. The document contains such general statements as follows:

> The model "assigns (partitions) each piece of equipment to functional categories and determines equipment capacity; calculates quantities and list prices for each piece of equipment; . . . ; calculates how much standby an efficiently engineered switch will require over the study period.[14]

These general statements are characteristic of the sparse description of SCM functions and operation that Qwest provides.

Q. CAN THE DETAILS OF MODEL OPERATION AND ALGORITHMS USED TO COMPUTE INVESTMENT AND COST BE DETERMINED BY SCRUTINIZING THE MODEL ITSELF?

A. No. As I previously stated, some of the associated model files are locked and are thus unviewable. Model calculations are extremely difficult to follow from beginning to end, and it is not even clear that a reviewer with unlimited available time could study the model in enough detail to determine precisely how it operates.

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[13] Switching Cost Model (SCM) Technical Description (Switching Modules), February, 2001 ("SCM Description").
[14] *Id.*, p 10.

Q. HAVE YOU REQUESTED THE MODEL'S PASSWORDS FROM QWEST?

A. Yes.I requested the SCM passwords and the UPS cost model passwords in the same data request. Qwest has responded that the passwords protect vendor proprietary information and cannot be provided unless and until Qwest receives authorization from the affected vendors.[15] In my view, if Qwest intended to rely on such information in its cost studies, it should have requested and obtained vendor permission before filing the studies with the Commission. Qwest's failure to do so essentially prevents any critical evaluation of the model.

It is telling that Qwest's response effectively admits, in so many words, that SCM is a "black box." In the response, Qwest, through its attorneys, admits that it is not possible to separate the vendor proprietary information from certain of the calculations in the model.[16]

Q. WHAT DO YOU CONCLUDE ABOUT QWEST'S PRICING PROPOSALS FOR SWITCHING ELEMENTS?

A. Qwest has failed to support its proposed switching rate element prices to any satisfactory extent. It is impossible to determine the underlying switch investment assumptions that drive the results, and it is similarly impossible to review the SCM's functions to any useful degree in order to determine the validity of the model's assumptions and calculations. Despite Qwest's boasts that its cost model is "open," SCM is demonstrably a "black box" in the best tradition of ILEC cost models. This model should therefore be rejected by the ACC from any consideration in this proceeding.

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[15] Exhibit RAC-1.
[16] *Id.*

IV. QWEST'S SIGNALING COST MODEL CANNOT BE USED TO DETERMINE THE VALIDITY OF THE PROPOSED SIGNALING RATE ELEMENT PRICES AND MUST BE REJECTED FROM THIS PROCEEDING

Q. WHY CAN'T QWEST'S PROPOSED SIGNALING PRICES BE VALIDATED BY THE SIGNALING COST MODEL?

A. As is the case with the other models I have discussed, the switching cost model is poorly documented, and its investment inputs are not documented at all. The model is essentially a calculator, in that it receives certain inputs, including investments, from external processes which cannot be identified from either the model or its documentation, and it performs simple arithmetic calculations to arrive at its output results.

Q. PLEASE GIVE AN EXAMPLE OF THE MODEL'S INVESTMENT INPUTS.

A. A typical investment input is that for "local" STP (Signal Transfer Point, a Signaling System 7 message switch) hardware. It is shown as "LSTP SUMMARY REPORT/MILLISECOND, SERVICES: ALL" with a value of 1.83425779904791.[17] This defies scrutiny. The reader has no way of knowing what equipment configuration is being modeled, what the capacity of the equipment might be, or any of the equipment component investments. This input value is apparently a statement of some part of a local STP's investment expressed per millisecond of the STP's processing capacity, but absolutely none of the underlying data or assumptions is described or even mentioned anywhere in the documentation or in the model itself. It may be that at least some of these values are produced by the SCM, but it cannot be reviewed, and the documentation doesn't provide any enlightment.

[17] Signaling model contained in the file "SIS,v5.xls," 'Model Source Data' worksheet, cell G114.

Q. YOU HAVE EMPHASIZED SEVERAL TIMES THE LACK OF INFORMATION CONCERNING EQUIPMENT CONFIGURATION AND CAPACITY WITH RESPECT TO EACH OF THESE MODELS. WHY IS THIS INFORMATION IMPORTANT?

A. This information is critical to the determination of the reasonableness of the proposed rates and the validity of the models themselves. If Qwest had made such information available to reviewers, a reviewer with a working technical knowledge of these technologies could assess the appropriateness of the input assumptions, including capacity, demand, and investment, and how they are treated by the model's calculations. Qwest's refusal to supply adequate documentation renders these models useless as vehicles for justifying Qwest's rate proposals.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

BEFORE THE ARIZONA CORPORATION COMMISSION

IN THE MATTER OF	)	
INVESTIGATION INTO QWEST	)	
CORPORATION'S COMPLIANCE	)	DOCKET NO. T-00000A-00-0194
WITH CERTAIN WHOLESALE	)	
PRICING REQUIREMENTS FOR	)	
UNBUNDLED NETWORK	)	
ELEMENTS AND RESALE	)	
DISCOUNTS	)	

REBUTTAL TESTIMONY OF RICHARD CHANDLER

ON BEHALF OF

AT&T COMMUNICATIONS OF THE MOUNTAIN STATES, INC.,

AND WORLDCOM, INC.

SEPTEMBER 27, 2001

tabbies EXHIBIT

Admitted

ATT8

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Richard Chandler and I am Senior Vice President of HAI Consulting, Inc., 1355 South Boulder Road, Louisville, Colorado 80027.

Q. HAVE YOU SUBMITTED TESTIMONY IN THIS PROCEEDING?

A. Yes. I filed direct testimony on May 14, 2001.

Q. PLEASE DESCRIBE YOUR BACKGROUND AND EXPERIENCE.

A. My direct testimony contains this information.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. This testimony, which is filed on behalf of AT&T Communications of the Mountain States, Inc. and WorldCom, Inc., responds to rebuttal testimony filed by Garrett Fleming, dealing with criticisms of the HAI Model's switching modulation and rebuttal testimony of Joseph Craig, Theresa Million, and Barbara Brohl concerning unbundled packet switching. I have also included in this testimony further comments on Qwest's Switching Cost Model. I adopt by this reference those portions of the Direct Testimony of Douglas Denney that have been deferred to this phase of the proceeding

My colleague, A. Daniel Kelley, addresses in his testimony economic issues raised by Mr. Fleming in his rebuttal that pertain to the HAI Model's switching calculations.

HAI MODEL SWITCHING

Q. MR. FLEMING CHARACTERIZES THE HAI MODEL'S SWITCHING CALCULATIONS AS A "GRAY BOX" AND COMPLAINS THAT THEY ARE COMPLEX AND DIFFICULT TO FOLLOW. IS HE CORRECT?

A. No, and this is a particularly ironic statement, given that the investment calculations in Qwest's Switching Cost Model (SCM) are not even viewable. When the HAI Model was under development, my clients, AT&T and MCI (now WorldCom) decided that the Model should remain as a set of Excel workbooks to allow commissioners and their staffs to view and analyze its calculations without having to learn a high-level programming language. Excel formulas are relatively easy to analyze, and Excel has a set of auditing tools that enables the user, even one with little computer experience or skill, to trace through calculations.

Although whoever actually wrote Mr. Fleming's testimony (which is, in most sections, word-for-word identical to testimony filed by other Qwest witnesses in other jurisdictions)[1] undoubtedly intended the term "gray box" to be clever, it is instead merely hypocritical, given the essential opacity of SCM.

[1] See, *e.g.*, "Rebuttal and Cross Answer testimony of Robert Brigham," submitted to the Public Utilities Commission of the State of Colorado, Docket No. 99A-577T, July 20,2001, p 147.

Q. MR. FLEMING FURTHER CLAIMS THAT THE HAI MODEL DOES NOT PRODUCE SUFFICIENT TANDEM TRUNKS. DO YOU AGREE WITH THIS ANALYSIS?

A. No. Mr. Fleming's analysis is patently incorrect. His Exhibit 11 shows his calculations, which are based on a gross, and flawed, assumption of the total number of trunks in Qwest's Arizona network and the misapplication of certain user-adjustable input factors in the HAI Model filed in this proceeding.

Q. HAVE YOU CORRECTED MR. FLEMING'S CALCULATIONS?

A. Yes. In Exhibit RC-1, attached to this testimony, I have prepared a pair of tables, one reproducing Mr. Fleming's analysis with comments indicating his errors, and a second showing a correct form of his analysis.

Q. WHAT IS THE EFFECT OF MR. FLEMING'S MISCALCULATIONS?

A. Mr. Fleming concludes from his calculations that the HAI Model should equip more than 97,000 tandem trunks for Qwest's Arizona network. The number produced by the Model is 31,125. Had Mr. Fleming correctly calculated this value, he would have arrived at a required total tandem trunk count of 28,350. The Model is thus estimating about 3,000 more tandem trunks than Mr. Fleming's corrected analysis would require.

Q. WHAT ARE THE MISTAKES IN MR. FLEMING'S ANALYSIS?

A. Mr. Fleming begins by assuming a total count of all end-office trunks in Arizona based on an overall line-to-trunk ratio of eight to one. This assumption itself is incorrect and leads to double-counting of direct trunks. For the purposes of my study, however, I ignored this error and based my results on his original total trunk count assumption. The tandem trunks he addresses include those carrying local traffic, intraLATA toll traffic, and interLATA, or access, traffic.

His first fundamental mistake is misinterpreting the Model's inputs for toll tandem fractions, which the Model uses to compute the number of tandem and direct trunks required to carry intraLATA toll and access traffic. He applied, for example, the intraLATA tandem fraction (whose default is 0.20, indicating that 20% of intraLATA toll traffic is to be carried over tandem trunks) to the end office trunk total instead of to the intraLATA toll trunk total which is considerably small than the end office total. He makes the same mistake in calculating the number of tandem trunks required to carry tandem-routed access traffic. These mistakes combined lead to a very large overstatement of the required number of tandem trunks.

His second mistake is including tandem-to-IXC (interexchange carrier) trunks in his tandem trunk totals. The tandem-to-IXC connections are special access facilities, and the costs for these connections, including tandem trunk ports, are recovered in Qwest's special access tariff. The Model in fact computes investment for these trunks and their associated tandem trunk ports but properly includes their costs under special access, or dedicated transport. They thus should not be included in the general category of tandem trunks, as that leads to double recovery of tandem trunk port costs.

Exhibit RC-1 contains a detailed description of his errors and the correct calculations, according to Mr. Fleming's initial assumption of total end office trunks.

Q. **WHAT IS THE "ANALOG LINE CIRCUIT OFFSET FOR DLC LINES" INPUT IN THE HAI MODEL MENTIONED IN MR. FLEMING'S TESTIMONY?**

A. This is an adjustment the Model makes to end office switching investment in order to capture the switch investment reduction that results from the deployment of integrated digital loop carrier systems.

Q. **MR. FLEMING NOTES THAT THIS INPUT IS INCORRECTLY DESCRIBED IN THE HAI INPUTS PORTFOLIO AND FURTHER THAT IT SHOULD BE SET TO ZERO. IS HE RIGHT?**

A. Mr. Fleming is correct that the description of this input in the HAI Model Inputs Portfolio (HIP) stating that it was calculated in the FCC Inputs Order is incorrect. However, his further contention that the input value should be set to zero instead of its default of $30 per line is not correct.

Q. **WHY SHOULD THE INPUT REMAIN AT ITS DEFAULT OF $30?**

A. In the FCC's study of existing ILEC end office switch investment, 18.3% of the lines in the study were served by DLC systems. Because DLC systems are a forward-looking network technology, forward-looking cost studies usually assume much higher DLC penetrations than 18.3%. This makes it necessary to adjust the FCC's switching investments to account for the cost savings inherent in integrated DLC systems. In Arizona, for example, the HAI Model calculates a 70.8% DLC penetration. If this adjustment were not made, switching investment and hence cost would be overstated on a forward-looking basis.

QWEST SCM

Q. HAVE YOU BEEN ABLE TO ANALYZE THE SCM?

A. Only to a limited degree. The SCM is poorly documented, and there is no detailed description of how the model works, let alone a discussion and listing of the formulas used by the model to compute investment. Furthermore, several critical input files are password-protected.

Q. HAVE YOU OBTAINED THE PASSWORD FROM QWEST?

A. Yes. Qwest partly responded to a data request by providing the password.

Q. IS THE PASSWORD HELPFUL IN DETERMINING HOW THE SCM WORKS?

A. No. The SCM files protected by the password are primarily input files containing specific switch investment and related inputs. There are, for example, separate input database files for 5ESS and DMS-100 switches. The databases contain tables that include what appear to be list prices of switch piece parts, tables indicating discounts, and still other tables whose purpose is unclear. Although each investment record contains an "equipment description" field, this field is often unused or it contains a cryptic description. For example, in the "PRICES" table of the ISW101a1.mdb database containing Lucent 5ESS information, there is a record for an item entitled "CM2DL16" with a description of "COMM MOD 2 DATA LINK LIS" and an investment. There is no description of the function or capacity of this item or how it might be included in a given switch configuration. Many equipment descriptions just say "NONE."

The ISW201a1.mdb file, which contains Nortel investment data for DSM-100/200 switches, is even less useful. Most of its entries in the "PRICE" table have no equipment description whatsoever. Instead, one just finds records such as "A0286474" with a price and no explanation. There is not even any mnemonic significance, as there is with some of the 5ESS inputs (and, at that, even those are useless without cogent functional and capacity descriptions).

Q. WHY CAN'T THE USER JUST TRACE THROUGH THE CALCULATIONS AS YOU DESCRIBED FOR THE HAI SWITCHING MODULE?

A. Because, to the best of my knowledge, the SCM's calculations are not viewable, as I noted earlier. The "core" of the SCM calculations are in an executable file called "scmcore4.exe." This file cannot be usefully viewed, as it contains object code.

Q. DO YOU HAVE ANY REASON TO MODIFY YOUR ORIGINAL ASSESSMENT THAT THE SCM IS ESSENTIALLY AN INSCRUTABLE MODEL?

A. No. All that has changed is that I have been able to look at a few password-protected Microsoft Access databases. These databases shed no light on the overall working of the SCM. Although they are marginally useful in assessing isolated facts about Qwest's switching investment inputs, they do nothing to explain how switches are configured by the SCM and how investments for these configuration are calculated.

Q. EVEN THOUGH ONE CANNOT ANALYZE THE SCM'S CALCULATIONS, CAN YOU MAKE ANY GENERAL STATEMENTS REGARDING THE LEVEL OF INVESTMENT PRODUCED BY SCM?

A. No. Without seeing how switches are configured by SCM, there is no way of assessing the appropriateness of its results. Also, there is no way of knowing whether the manufacturer discount inputs represent the actual current discounts Qwest obtains from its switch vendors.

Q. ARE THE DEFAULT DISCOUNT INPUTS USEFUL AT ALL?

A. Yes, to a limited extent. The SCM database file "Osw301a1.mdb," for example, shows in its "INPUT PARAMETERS" table that the "system discount for purchase of new switch" is identical to the "system discount for growth addition." It also shows a single (and considerably higher) "line card discount." I can only infer from these inputs that SCM assumes that investment in growth equipment costs no more than that for equivalent new system equipment.

Dr. Kelley discusses the economics of Qwest's switch growth investment assumptions in his testimony.

UNBUNDLED PACKET SWITCHING

Q. IN ADDRESSING YOUR TESTIMONY REGARDING UNBUNDLED PACKET SWITCHING, MR. CRAIG IMPLIES THAT YOU ARE UNAWARE OF THE EXISTENCE OF OTHER FORMS OF DSL THAN ADSL. IS THIS CORRECT?

A. Of course not. I noted in my direct testimony that the term "DSL" has come to represent ADSL in the popular press as well as in service provider advertising, such as that of Qwest in print ads as well as on the Internet, and I also allude to other forms of DSL in my testimony. I have worked with clients using and contemplating other forms of xDSL, including SDSL, HDSL, and g.SHDSL, and I have taught xDSL technologies and packet switching in graduate telecommunications programs for several years.

Q. AREN'T YOU NITPICKING WHEN YOU CRITICIZE QWEST WITNESSES FOR THEIR TERMINOLOGY WHEN THEY DISCUSS PACKET SWITCHING AND DSL SERVICE?

A. Not at all. None of the Qwest witnesses in this proceeding, either in their direct or rebuttal testimony, have been able to describe in cogent technical terms the rate elements proposed by Qwest for unbundled packet switching, and they thereby obfuscate the offering. Correct terminology is obviously vital to potential competitor's understanding of what it is they will be able to obtain from Qwest and what services they in turn will be able to offer using Qwest's proposed rate elements.

The terminology pertaining to technical aspects of ADSL and ATM is standardized by such bodies as the ATM Forum and the ADSL Forum, both of which are industry groups participating in the standard-making process. Using standard terminology removes any doubt about what is being offered and how it will work.

Q. PLEASE GIVE SOME EXAMPLES OF INCORRECT CONFUSING TERMINOLOGY USED BY QWEST'S WITNESSES.

A. One notable example is Mr. Craig's use of the terms "constant bit rate," "variable bit rate," and "unspecified bit rate" in his rebuttal testimony. He was attempting to respond to statements in my direct testimony discussing various ATM service categories that involve these terms and that would be useful to CLECs. Mr. Craig apparently assumes these describe a user's options with respect to the line rate available with ADSL service. These are, instead, technical terms precisely defined by the ATM Forum and are critical to the understanding of Qwest's proposed rate elements. They apply to ATM service and not ADSL, as I clearly used these terms in my direct testimony.

Mr. Craig's discussion of virtual channels, virtual paths, and virtual circuits is similarly incorrect. The ATM Forum and ADSL Forum clearly describe and define virtual paths and virtual channels, definitions my direct testimony comports with. I should also note that Qwest also describes these terms accurately in separate technical publications that have not been introduced in this proceeding by Qwest.[2]

Q. DOES QWEST USE TECHNICALLY ACCURATE LANGUAGE IN ITS FILED DESCRIPTIONS OF ITS PROPOSED UPS RATE ELEMENTS?

A. No. I discussed this in my direct testimony at some length. What is interesting is that terminology used in Qwest's filed rate element descriptions does not even correspond to that used in Qwest's own technical publications pertaining to UPS.

As an example, I noted in my direct testimony that the term "Committed Bit Rate" is imprecise and does not instruct a potential purchase of the UPS rate elements about what is being offered. Qwest's Technical Publication 77408, which discusses Unbundled Packet Switching, does not use this term and instead uses the proper ATM term of "Unspecified Bit Rate." It goes on to describe other details, including service quality parameters, of this ATM service class, again using precise terms that allow the reader to understand unambiguously the nature of the service.

Q. GIVEN THAT THERE IS A TECHNICALLY COMPETENT DESCRIPTION OF UPS PRODUCED BY QWEST, DOES IT ADDRESS YOUR CONCERN THAT QWEST HAS NOT PROVIDED RATE ELEMENTS THAT ARE USEFUL TO A CLEC?

A. No. The Qwest technical publication describes in technically precise language a service that is not especially interesting to a potential competitor, for all the reasons I cited in my direct testimony. The document just confirms that the proposed rate elements describe nothing more than the components of services available today to residential end users. They do not include the service classes or quality of service guarantees that would allow a CLEC to offer, for example, packet voice service over DSL, which would enable the offering of competitive voice service. These rate elements would support only the lowest level of DSL and ATM service, useful primarily for email access and casual internet usage. They are not suitable, as I have previously noted, for the provision of more advanced services that CLECs could offer business and those residential users requiring them.

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[2] See, *e.g.*, Asymmetrical Digital Subscriber Line Forum, Technical Report TR-002, ATM over ADSL Recommendations, March, 1997, p 8/17, and Qwest Communications International Inc. Technical

Q. **EVEN THOUGH QWEST ONLY PROPOSES THE MOST BASIC LEVEL OF SERVICES IN ITS UPS RATE ELEMENTS, CAN QWEST ITSELF OFFER THE HIGHER-LEVEL SERVICES YOU DISCUSS?**

A. Of course it can. It is free to offer whatever ATM service classes it desires to its customers, all the while denying these to its competitors.

Q. **MS. BROHL COMPLAINS IN HER REBUTTAL TESTIMONY THAT YOU DO NOT ACKNOWLEDGE THE FCC'S REQUIREMENTS FOR THE OFFERING OF UNBUNDLED PACKET SWITCHING BY ILECS. IS HER CRITICISM VALID?**

A. It is not valid. I am a technical, not a policy, witness. I believe, however, that this Commission is not limited by the FCC's requirements in this matter and in fact can go beyond what the FCC has said to foster competition in Arizona. I have described for the Commission the inadequacy of the technical aspects of Qwest's proposed UPS rate elements and the failure of Qwest's witnesses to give a cogent explanation of what is being offered.

Q. **IN YOUR DIRECT TESTIMONY, YOU EXPLAINED WHY QWEST'S UPS COST STUDY WAS NOT FORWARD-LOOKING. HAS QWEST CORRECTED THIS IN THEIR CURRENT UPS COST STUDY?**

A. No. The new cost study again assumes what appears to be a Lucent "overlay" system that works with a copper-based digital loop carrier (DLC) system. As I

Publication 77408, Issue B, June, 2001, Unbundled Packet Switching, p 2-2.

explained in my earlier testimony, DLC on copper feeder facilities is not forward-looking. This new study does not correct the earlier deficiency.

Q. BUT MS. MILLION POINTS OUT IN HER REBUTTAL TESTIMONY THAT THE HAI MODEL ITSELF USES COPPER FEEDER FACILITIES. IS SHE CORRECT?

A. She is correct in stating that the HAI Model uses copper feeder. It does not, however, equip digital loop carrier systems using copper feeder. It instead always uses fiber feeder with DLC serving main clusters.

Q. MR. CRAIG STATES THAT QWEST USES AN "OVERLAY" TO PROVIDE ADSL ON EXISTING DLC SYSTEMS. IS THIS APPROPRIATE?

A. Qwest has chosen to provide ADSL to some of their customers now served on copper-based DLC systems with the "overlay" approach. That may be an entirely appropriate way to extend newer services to subscribers now served by an obsolete loop carrier system. It is not an appropriate basis for a forward-looking cost study, however. There is certainly nothing wrong with Qwest's attempting to circumvent the limitations of antiquated plant, but it is entirely wrong to use such an architecture to develop forward-looking costs. The correct forward-looking technology is fiber-based DLC, and Qwest should have used this in their cost study.

Q. MS. BROHL STATES THAT QWEST'S DSL SERVICE IS "ALWAYS ON." DO YOU AGREE?

A. Qwest's current ADSL retail services are "always on." I do not and did not, in my direct testimony, dispute that.[3] My concern was, and is, that Qwest's witnesses have failed to describe their proposed rate elements using technically competent language so that potential competitors can understand precisely what would be available to them using these rate elements.

SUMMARY

Q. PLEASE SUMMARIZE YOUR TESTIMONY

A. Mr. Fleming's criticisms of the HAI Model's switching calculations are unfounded. He has, for example, incorrectly assumed that the Model produces too few tandem trunks and hence investment by using a demonstrably flawed analysis. He also inappropriately and ironically complains that he cannot decipher the Model's switching investment calculations when in fact they are entirely viewable and auditable while the SCM's corresponding calculations cannot even be seen.

Regarding the SCM, even the availability of the passwords that are required to view some of its constituent database files does not allow one to analyze the model's calculations, and it is not possible to determine the validity of its results.

[3] Qwest in the past offered (but no longer offers) a service known as Qwest DSL Select^{SM} that allows users only limited connection intervals. Mr. Craig attempted to describe that service in his rebuttal, but the service had already been "grandfathered" at the time his rebuttal was submitted. See Qwest Tech Pub 77392, Issue H, May, 2001, p 2-8.

Finally, Qwest has failed entirely to produce technically valid testimony explaining its proposed UPS rate elements, even though Qwest has elsewhere published documentation that describes in technically accurate terms the nature of its proposed service. The proposed level of service is no greater than that of Qwest's current residential retail ADSL service and is insufficient to allow potential competitors the ability to offer sophisticated ATM-based services to their end users.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

Fleming analysis

Ref	Description	Value	Source	Comments
A	Number of working lines in AZ	2,959,791	HAI	
B	Line to end office trunk ratio	8	Typical configurations in Qwest	
C	Estimated end office trunks	369,974	A / B	
D	Interoffice Local Actual Minutes	33,274,339,645	HAI DZ Report, Inputs tab, cell C103	
E	Toll Actual Minutes	15,272,928,000	HAI DZ Report, Inputs tab, cells C104+C105	
F	Total Trunk Minutes	48,547,267,645	D + E	
G	Local % of end ofc trunks	0.69	D / F	
H	Local end ofc trunks	253,580	C * G	
I	Tandem fraction of intraLATA	0.20	HAI DZ Report, Inputs tab, cells C32	Erroneous application of tandem factor; Fleming applies to total end office trunks; should be applied to total intraLATA trunks
J	Tandem trks for IntraLATA	50,716	H * I	Incorrect product
K	Toll end ofc trunks	116,393	C - H	
L	Tandem fraction of interLATA	0.20	HAI DZ Report, Inputs tab, cells C33	Erroneous application of tandem factor; Fleming applies to total toll trunks; should be applied to total interLATA trunks
M	End ofc to tdm trks for InterLATA	23,279	K * L	Incorrect product
N	Tandem to IXC trunks	23,279	Assumed same a M	Tandem to IXC trunks are special access facilities; trunks and trunk port costs recovered in access tariff. This total should not be included here, as it leads to double recovery of cost.
O	Total tandem trunks	97,273	J + M + N	

Corrected analysis using basic Fleming assumptions

A	eo trunks (Fleming)	369,974	Fleming assumption
B	toll fraction of total minutes	0.202	(3006928 + 12266000)/75735999; see usage table below
C	total toll trunks	116,393	A x B
D	intralata fraction of toll	0.197	3006928/15272928
E	intralata trunks	22,915	C x D
F	tandem fraction of intralata	0.20	HM input assumption
G	**intralata tandem trunks**	**4,583**	E x F
H	interlata fraction of toll	0.803	1 - D
I	interlata trunks	93,478	
J	tandem fraction of interlata	0.20	HM input assumption
K	**tandem interlata trunks**	**18,696**	I x J
L	total local trunks	253,580	A - C
M	tandem fraction of local traffic	0.02	HM input assumption
N	**tandem local trunks**	**5,072**	L x M
	total tandem trunks - Fleming assumptions	**28,350**	G + K + N
	total tandem toll trunks from HM	**25,473**	
	total local tandem trunks from HM	**5,652**	
	total tandem trunks from HM	**31,125**	

ARMIS usage data from HM

		fraction of total
local DEMs, thousands	**60,463,071**	0.798
intrastate DEMs, thousands	**3,006,928**	0.040
interstate DEMs, thousands	**12,266,000**	0.162

CERTIFICATE OF SERVICE

I hereby certify that the original and 10 copies of the Notice of Filing Rebuttal Testimony of Richard Chandler and Daniel Kelley, regarding Docket No. T-00000A-00-0194, were hand delivered this 27th day of September, 2001, to:

Arizona Corporation Commission
Docket Control – Utilities Division
1200 West Washington Street
Phoenix, AZ 85007

and that a copy of the foregoing was hand-delivered this 27th day of September, 2001 to the following:

Deborah Scott
Director – Utilities Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

Maureen Scott
Legal Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

Lyn Farmer
Chief Hearing Officer
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

Dwight D. Nodes, Administrative Law Judge
Hearing Division
Arizona Corporation Commission
1200 West Washington
Phoenix, AZ 85007

and that a copy of the foregoing was sent via United States Mail, postage prepaid, on the 27th day of September, 2001 to the following:

Timothy Berg
Fennemore Craig, P.C.
3003 North Central Ave.
Suite 2600
Phoenix, AZ 85012
Attorneys for Qwest

Janet Livengood
Z-TEL Communications, Inc.
601 South Harbour Island
Suite 220
Tampa, Florida 33602
Attorneys for Z-Tel Communications, Inc.

Steve Sager, Esq.
McLeod USA Telecommunications Service, Inc.
215 South State Street, 10th Floor
Salt Lake City, Utah 84111
Attorneys for McLeod USA

Ray Heyman
Roshka Heyman & DeWulf
400 North 5th Street
Suite 1000
Phoenix, AZ 85004
Attorneys for Alltel Communications

Michael B. Hazzard
Kelley Drye and Warren
1200 19th Street, NW
Washington, DC 20036
Attorneys for Z-Tel Communications

Scott S. Wakefield
RUCO
2828 N. Central Avenue
Suite 1200
Phoenix, AZ 85004

Andrea Harris
Allegiance Telecom
2101 Webster
Suite 1580
Oakland, CA 94612

Armie Bonzales

BEFORE THE ARIZONA CORPORATION COMMISSION

IN THE MATTER OF	)	
INVESTIGATION INTO QWEST	)	
CORPORATION'S COMPLIANCE	)	DOCKET NO. T-00000A-00-0194
WITH CERTAIN WHOLESALE	)	
PRICING REQUIREMENTS FOR	)	
UNBUNDLED NETWORK	)	
ELEMENTS AND RESALE	)	
DISCOUNTS	)	

CROSS ANSWER TESTIMONY OF RICHARD CHANDLER

ON BEHALF OF

AT&T COMMUNICATIONS OF THE MOUNTAIN STATES, INC.,

AND WORLDCOM, INC.

OCTOBER 19, 2001

EXHIBIT
tabbies
Admitted
ATT9

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Richard Chandler and I am Senior Vice President of HAI Consulting, Inc., 1355 South Boulder Road, Louisville, Colorado 80027.

Q. HAVE YOU SUBMITTED TESTIMONY IN THIS PROCEEDING?

A. Yes. I filed direct testimony on May 14, 2001 and rebuttal testimony on September 27, 2001.

Q. PLEASE DESCRIBE YOUR BACKGROUND AND EXPERIENCE.

A. My direct testimony contains this information.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I am responding to Staff rebuttal testimony submitted by William Dunkel concerning, among other things, recurring switching feature costs.[1]

Q. DO YOU AGREE WITH MR. DUNKEL THAT A SEPARATE FEATURE COST SHOULD BE ADDED TO THE EXISTING PORT COST CALCULATED BY THE HAI MODEL FOR QWEST IN ARIZONA?

A. No. As has been explained in other testimony in this proceeding,[2] the FCC switching investments used in the Model already include investments required to support features. The corresponding recurring costs of these investments are

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[1] Dunkel Rebuttal Testimony, p 13.

[2] See, *e.g.*, Rebuttal Testimony of Daniel Kelley, p.11.

therefore included in the switching costs computed by the Model, and no additions for features need be added.

Q. ARE THE FEATURE COSTS INCLUDED EXCLUSIVELY IN THE TOTAL PORT COST?

A. No. There is a usage component as well. The Model, once it has determined the total annual end office switching cost, divides this cost into fixed and usage-sensitive components using the default 60% fixed and 40% usage-sensitive fractions. Thus, 40% of feature-related costs are included in the switch usage cost, expressed per minute, and 60% of feature-related costs are included in the port cost.

Q. IS IT TECHNICALLY APPROPRIATE TO INCLUDE FEATURES IN USAGE COSTS AS WELL AS IN PORT COSTS?

A. Yes. When a subscriber invokes a feature, there is an effect on the switch's processor capacity, even though it may be very slight. It is thus appropriate that there be a feature-related component of the overall switch usage cost. The Model correctly accounts for this.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

CERTIFICATE OF SERVICE

ACC Docket No. T-00000A-00-0194

I hereby certify that on the 18th day of October 2001, the original and fifteen (15) copies of the ***Cross Answer Testimony of Richard Chandler on behalf of AT&T Communications of the Mountain States, Inc. and WorldCom, Inc.,*** in the above-referenced docket, were sent for filing via FedEx, next business morning delivery, to:

Docket Control
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

And, I further certify that on the 18th day of October 2001, a true and correct copy of the above was sent via FedEx, next business morning delivery, to:

Maureen Scott ACC – Legal Division 1200 W. Washington Street Phoenix, AZ 85007	William Dunkel Dunkel and Associates 8625 Farmington Cemetery Road Pleasant Plains, IL 62677
John M. Devaney Perkins Coie LLP 607 Fourtheenth Street, NW, Suite 800 Washington, DC 20005-2011	Timothy Berg Theresa Dwyer Fennemore Craig, P.C. 3003 North Central Avenue, Suite 2600 Phoenix, AZ 85012-2913
Caroline Butler Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007	Dwight D. Nodes Hearing Division Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007
Jane Rodda Hearing Division Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007	

And one true and correct copy of the foregoing was sent via U.S. Mail, postage prepaid, on the 18th day of October 2001, to:

Lyn Farmer Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007	Thomas F. Dixon, Jr. WorldCom 707 17th Street Denver, CO 80202

Penny Bewick New Edge Networks, Inc. P.O. Box 5159 3000 Columbia House Blvd., Suite 106 Vancouver, WA 98668	Thomas H. Campbell Lewis & Roca 40 N. Central Avenue Phoenix, AZ 85007
Michael W. Patten Roshka Heyman & DeWulf, PLC Two Arizona Center 400 North 5th Street, Suite 1000 Phoenix, AZ 85004-3906	Eric S. Heath Sprint Communications Company L.P. 100 Spear Street, Suite 930 San Francisco, CA 94105
Joan S. Burke Osborn Maledon, P.A. 2929 North Central Avenue, 21st Floor Phoenix, AZ 85012-2794	Steven J. Duffy Ridge & Isaacson, P.C. 3101 North Central Avenue, Ste. 1090 Phoenix, AZ 85012-2638
K. Megan Doberneck Covad Communications, Inc. 7901 Lowry Boulevard Denver, CO 80230	Andrea Harris, Senior Manager Allegiance Telecom Inc. of Arizona 2101 Webster, Suite 1580 Oakland, CA 94612
William Mundell, Chairman Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007	Paul Walker Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007
James M. Irvin, Commissioner Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007	Patrick Black Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007
Scott S. Wakefield Residential Utility Consumer Office 2828 N. Central Avenue, Suite 1200 Phoenix, AZ 85004	Jeffrey W. Crockett Snell & Wilmer LLP One Arizona Center Phoenix, AZ 85004-2202
Marc Spitzer, Commissioner Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007	Hercules Alexander Dellas Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007

Kath Thomas Advance TelCom Group, Inc. 110 Stony Point Rd., Suite 130 Santa Rosa, CA 95401	Darren S. Weingard Stephen H. Kukta Sprint Communications Co. 1850 Gateway Drive, 7th Floor San Mateo, CA 94404-2467
David R. Conn McLeodUSA Telecommunications Services 6400 C Street, S.W. Cedar Rapids, IA 52406	Jon Poston Arizonans for Competition in Telephone Service 6733 E. Dale Lane Cave Creek, AZ 85331-6561
Carrington Phillip Cox Arizona Telecom, Inc 1400 Lake Hearn Drive, Atlanta , GA 30319	Diane Bacon Communications Workers of America 5818 N. 7th Street, Suite 206 Phoenix, AZ 85014-5811
Deborah A. Verbil Senior Counsel SBC Telecom, Inc. 5800 Northwest Parkway, Suite 125 Room 1-T-20 San Antonio, TX 78249	Raymond S. Heyman Randy Warner Roshka Heyman & DeWulf, PLC Two Arizona Center, Suite 1000 400 North 5th Street Phoenix, AZ 85004
Michael B. Hazzard Kelley, Drye & Warren 1200 19th Street, NW, 5th Floor Washington, DC 20036	Dennis D. Ahlers Eschelon Telecom, Inc. 730 Second Avenue South, Suite 1200 Minneapolis, MN 55402
Lisa Crowley Regional Counsel Covad Communications Company 4250 Burton Drive Santa Clara, CA 95054	

Dated this October 18, 2001 by Kamy J Weathers

BEFORE THE ARIZONA CORPORATION COMMISSION

IN THE MATTER OF	)	
INVESTIGATION INTO QWEST	)	
CORPORATION'S COMPLIANCE	)	DOCKET NO. T-00000A-00-0194
WITH CERTAIN WHOLESALE	)	
PRICING REQUIREMENTS FOR	)	
UNBUNDLED NETWORK	)	
ELEMENTS AND RESALE	)	
DISCOUNTS	)	

REBUTTAL TESTIMONY OF DANIEL KELLEY

ON BEHALF OF

AT&T COMMUNICATIONS OF THE MOUNTAIN STATES, INC.,

AND WORLDCOM, INC.

SEPTEMBER 27, 2001

EXHIBIT
tabbies
Admitted
ATT 10

Q. PLEASE STATE YOUR NAME.

A. My name is Daniel Kelley.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR TITLE?

A. I am employed by HAI Consulting. My title is Senior Vice President.

Q. PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE.

A. My professional experience began in 1972 at the Antitrust Division of the U.S. Department of Justice where I analyzed mergers, acquisitions and business practices in a number of industries, including telecommunications. While at the Department of Justice, I was a member of the economics staff of U.S. v. AT&T. In 1979, I moved to the Federal Communications Commission ("FCC") where I held positions as Senior Economist in the Common Carrier Bureau and the Office of Plans and Policy, and also served as Special Assistant to the Chairman. After leaving the FCC, I was a Project Manager and Senior Economist at ICF, Incorporated, a public policy consulting firm. From September 1984 through July of 1990, I was employed by MCI Communications Corporation as its Director of Regulatory Policy. At MCI, I was responsible for developing and implementing MCI's public policy positions. In August of 1990, I joined Hatfield Associates, Inc. (the predecessor of HAI) as Senior Vice President. In my current position, I conduct economic and policy studies on a wide variety of telecommunications issues, including dominant firm regulation, local exchange competition, and the cost of local service. I have advised foreign government officials on telecommunications policy matters and have taught seminars in regulatory economics in a number of foreign countries.

Q. PLEASE DESCRIBE YOUR EDUCATION.

A. I received a Bachelor of Arts degree in Economics from the University of Colorado in 1969, a Master of Arts degree in Economics from the University of Oregon in 1971 and a Ph.D. in Economics from the University of Oregon in 1976.

Q. HAVE YOU PUBLISHED RESEARCH IN ECONOMICS?

A. Yes, I have published articles in antitrust and telecommunications economics. A copy of my resume is attached as Exhibit DK-R1.

Q. HAVE YOU TESTIFIED PREVIOUSLY?

A. Yes, I have testified on telecommunications issues before the California, Colorado, Connecticut, Florida, Georgia, Hawaii, Maryland, Massachusetts, Michigan, New Jersey, New York, Oregon, Pennsylvania, Utah and Washington Commissions, as well as the Federal Communications Commission and the State-Federal Joint Board investigating universal service reform.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I have been asked by AT&T Communications of the Mountain States, Inc. and WorldCom, Inc. to respond to portions of the June 27, 2001 Rebuttal Testimony of Garrett Y. Fleming on behalf of Qwest Corporation ("QWEST"). Specifically, I have been asked to address economic issues raised by Mr. Fleming's discussion of the HAI estimates of the economic cost of local switching. My colleague Richard Chandler is addressing technical issues raised by Mr. Fleming's testimony.

Q. WHAT ARE MR. FLEMING'S PRINCIPAL CONCERNS WITH THE HAI SWITCHING ESTIMATES?

A. Mr. Fleming maintains that the HAI switching cost estimates are understated because the HAI 5.2a bases its approach on the algorithm developed by the FCC. Mr. Fleming raises two specific objections to the FCC switching methodology. The first is that the FCC does not include the ". . . ongoing upgrade investments necessary to keep a switch technologically current once it is installed" in its TELRIC investment. The second is that the FCC does not include the ". . . costs of those lines that need to be added to a switch as customer demand increases over the life of the switch." [Fleming Rebuttal, p. 84]

Q. ARE MR. FLEMING'S CONCERNS LEGITIMATE?

A: No. The proper application of TELRIC principles excludes from forward looking switching costs both ongoing upgrade costs and the costs of adding new lines. Calculating forward-looking switching costs in this way does not prevent Qwest from making any necessary or prudent investment in capacity to meet future needs.

Q. WHAT DID THE FCC CONCLUDE REGARDING UPGRADE COSTS?

A. The FCC considered and rejected arguments from ILECs including Qwest that upgrade costs should be included in its USF Inputs Order, CC Docket No. 96-45, Released November 2, 1999 ("Inputs Order"). Specifically, the FCC found that:

> The model platform we adopted is intended to use the most cost-effective, forward-looking technology available at a particular period in time. The installation costs of switches estimated above reflect the most cost-effective forward-looking technology for meeting industry performance requirements. Switches, augmented by upgrades, may provide carriers the ability to provide supported services, but do so at greater costs. Therefore, such augmented switches do not constitute cost-effective forward-looking technology. In addition, as industry performance requirements change over time, so will the costs of purchasing and installing new switches. The historical cost data employed in this analysis reflect such changes over time, as do the time-trended cost estimates. [¶ 317, footnotes omitted]

Q. WHY ARE ONGOING UPGRADE COSTS PROPERLY EXCLUDED FROM FORWARD-LOOKING SWITCHING COSTS?

A. The FCC's TELRIC methodology, which is based on the economic concept of Total Service Long Run Incremental Cost, does not incorporate technical advances that are not yet available to or widely used by local telephone companies. Thus, the cost of switch upgrades that have not yet been released are properly excluded from the charges that current customers must pay. Moreover, as the FCC notes in the paragraph quoted above, an upgraded older generation switch may be less cost effective than a new switch that includes the features and functions that the upgrade provides.

Q. DOES MR. FLEMING ENDORSE INCLUDING UNDEPLOYED TECHNOLOGY ELSEWHERE IN HIS TESTIMONY?

A. No. He specifically rejects this approach. He points out that "prices based on the cost of a hypothetical network or system designs that have never actually been deployed would ultimately impact the investment decisions of all parties in the market." [Fleming Rebuttal, p. 11] The HAI switching estimates are based on technology, equipment, and architectures that are being deployed by telephone companies today. Including the effect of hypothetical upgrades would not be appropriate.

Q. MR. FLEMING ALSO SEEMS TO ARGUE THAT THE FCC APPROACH IS DEFECTIVE BECAUSE THE COST OF SWITCH UPGRADES MADE SINCE THE FCC'S DATA WERE GATHERED ARE NOT INCLUDED. [P. 84] DO YOU AGREE?

A. No. The FCC used the best available data. These data are based on historical depreciation information filed by the local telephone companies. The data were used to build a regression equation that captures cost trends for a new switch, including adjustments for inflation and productivity changes. The adjustments are designed to account for changes in switching costs that have occurred since the data were gathered. As the Commission noted in its Inputs Order, "U S West agrees that the costs of the equipment such as switches and multiplexers, used to provide telecommunications services are declining, and that the per-unit cost of providing more services on average is declining." [Inputs Order, ¶ 313] If Qwest has better data that can be verified by third parties, it should have been made available to this Commission and interested parties by now. Certainly Qwest has the incentive to bring forth data that support its positions. I would also note that the FCC attempted to gather additional information through data requests to the large telephone companies, but did not receive usable information. [See Inputs Order, ¶ 301]

Q. ARE THERE OTHER REASONS TO EXCLUDE UPGRADE COSTS?

A. Yes. Upgrades are made for a variety of reasons and have a variety of effects. For example, an upgrade might result in more efficient switch operation resulting in lower operating expenses. An upgrade might also enable the switch to perform functions that are the basis for new services for which Qwest could derive revenue from third parties. Adding upgrade costs to the cost of the switching UNE without taking into account the effect of the upgrade on other costs or revenues would not be appropriate because the change would be partial and could lead to inconsistencies. Even Mr. Fleming recognizes that "a comprehensive and consistent approach to analyzing inputs and assumptions is critical to arriving at reasonable conclusions regarding inputs and assumptions." [Fleming Rebuttal, p. 10] Moreover, I would note that upgrades can have the effect of extending the life of a switch well beyond the 10-year economic life used in the Model. Some 1AESS switches were in service for decades because they were upgradable. If the cost of potential upgrades were to be included, then the lives of switches would have to be lengthened considerably. Finally, there is no guarantee that Qwest will continue to make upgrades. Mr. Fleming admits that at one time U S West was four generics behind in its upgrades. [Fleming Rebuttal, p. 88] Qwest could decide to stop investing in its network once again.

Q. ARE UPGRADES A LEGITIMATE COST OF DOING BUSINESS?

A. Certainly. But that does not mean the anticipated cost should be included in a TELRIC model. Proxy models are useful precisely because they allow the Commission to focus on the costs of efficiently providing the particular facilities needed to serve current demand. The existing local telephone company networks were built over a period of years to provide a variety of regulated and unregulated services. Modeling a network optimized to provide the precise services that Qwest is required to unbundle under the 1996 Act and determining the TELRIC of those services is a different exercise than modeling the Qwest legacy network, which has been designed to advance Qwest's long term strategic business interests.

Q. SHOULD THE COST OF PROVIDING GROWTH LINES BE INCLUDED IN THE SWITCHING COST ESTIMATES?

A No. TELRIC is designed to estimate the cost of providing the current level of demand. Including the cost of capacity needed to serve future demand would unfairly and uneconomically burden today's customers. In other words, to do so would result in an intergenerational cross-subsidy. Today's customers would be paying for capacity designed to serve tomorrow's customers.

Q. WHY WOULD A TELEPHONE COMPANY WANT TO ENGAGE IN SUCH A CROSS-SUBSIDY?

A. There is less competition today than there may be at a later date. By forcing current customers to bear the costs for expansion designed to serve future customers, the local telephone company can both earn higher current margins and raise it current rivals' costs.

Q. WOULD A COMPETITIVE FIRM ENGAGE IN THIS TYPE OF BEHAVIOR?

A. No. A competitive firm would be unable to do so. Suppose an automobile manufacturer anticipates growing demand and builds a manufacturing plant with capacity to build 150 percent of today's demand. If this firm were to attempt to recover the cost of carrying the excess capacity from its current customers it would fail. Consumers would turn to other manufacturers who would be quite willing to base their prices on the cost of serving current demand. This does not mean the auto manufacturer is irrational for building excess capacity. In the long term it is better off for having done so. The total cost over time of serving both current and future demand will be reduced because it enjoys economies of scale with the larger plant.

Q. ARE THERE LEGITIMATE CONCERNS ABOUT THE COST OF GROWTH LINES VERSUS THE COST OF LINES INITIALLY INSTALLED WITH THE SWITCH?

A. Possibly yes. If switch vendors are engaging in a razor and razor blades strategy – charging a relatively low price for initial lines and a relatively high price for growth lines, then it would be appropriate to somehow average the cost of initial and growth lines. However, Mr. Fleming does not provide data to show that this is in fact the case. As Mr. Chandler's rebuttal testimony shows, Qwest's model inputs show the same cost for initial and growth lines. The SCM inputs show a higher discount for 'non-getting-started' investment and a constant discount for line circuits.

Q. MR. FLEMING ALSO COMPLAINS ABOUT FILL LEVELS IN THE HAI MODEL? DO YOU HAVE A COMMENT?

A. Yes. Mr. Fleming complains that the 94 percent switching fill factor used in the model is too high because it does not reflect lines needed for growth. [Fleming Rebuttal, p. 92] This appears to be the analytical equivalent to the growth line problem discussed above. The proper fill level in a TELRIC model is one that allows efficient current operation. Capacity beyond that level should not be included in TELRIC rates. The FCC adopted the 94 percent number in the Inputs Order. [¶ 330] In arriving at that number, the FCC specifically rejected U S West arguments in favor of a lower fill factor. The FCC found that "U S West's average fill factor of 78 percent is based on data that include switches with unreasonably low fill factors." [¶ 332]. In particular the FCC notes that seven U S West switches had a combined fill factor of .027 percent. [fn. 1072]

Q. HOW DO YOU EXPLAIN THE LOWER FILL LEVELS IN THE QWEST NETWORK?

A. There are three possible explanations. First, the extra capacity may be installed for future use. Second, the capacity may be the result of inefficiency. Third, switches may have just come on line and have not reached planned usage levels or switches may be in the decommissioning process. If the capacity is for future use, then it is entirely appropriate for Qwest to build it into its network. What is not appropriate is to charge today's customers for tomorrow's usage.

Q. IS THERE PRECEDENT FOR CHARGING FOR CAPACITY BASED ON HOW IT IS USED OVER TIME?

A. Yes. That is exactly the role that depreciation plays. The cost of a capital investment is spread over the economic life of the asset. Even though Qwest may buy a switch today, it does not charge the full cost of the switch to today's customers. It has bought capacity to serve tomorrow's customers as well. Similarly, even though Qwest may have purchased the switch with enough line capacity to serve demand some years in the future, it should not charge current customers for any of the cost of that excess capacity. The proper economic treatment of the investment is to include capital costs for capacity needed to serve today's demand in today's rates and defer the depreciation and return on excess capacity to the time when that capacity is used. This means that the economic treatment of the asset may differ from the accounting treatment.

Q. MR. FLEMING ARGUES THAT AN ACCOUNTING ANOMALY MAY HAVE AFFECTED THE FCC'S RESULTS. DO YOU HAVE A COMMENT?

A. Mr. Fleming maintains that since 1992 the cost of applications software has been booked to a capital account while other large telephone companies expense it. [Fleming Rebuttal, p. 93]. The implication is evidently that the HAI costs are understated because the FCC does not pick up this expense in its switching cost data and HAI does not include it in its switching operating expense data. Application software that was purchased with a new switch would have already been included in the FCC depreciation data and is included. Moreover, the FCC used data from multiple telephone companies. In any event, the FCC expense ratio, which is used to produce the HAI Arizona results, is quite conservative. I would also note that the fact that different telephone companies use different accounting assumptions and change them over time is just one more reason why external models provide a better basis for cost estimation than company embedded accounting data.

Q. DOES MR. FLEMING RAISE OTHER SWITCHING COST ISSUES?

A. Yes. Mr. Fleming maintains that "the HAI 5.2a does not include many vertical feature related costs. These are the application software costs, SS7 costs and some feature hardware related costs." He also maintains that "since the early 1990's, when those depreciation reports were filed with the FCC, input/output ports, recorded announcements and conference circuits have had to be added due to new features and increased demand for existing features. So clearly the FCC Switch Algorithm does not include these investments." [Fleming Rebuttal, p. 98]

Q. HOW DO YOU RESPOND?

A. All capitalized investment, including applications software and feature hardware, are included in the FCC's price inputs. The hardware items he discusses were in the FCC's prices and the trending regression the FCC used would have captured their growth, if any.

Q. MR. FLEMING STATES THAT THE LARGE GAP BETWEEN FORWARD LOOKING INVESTMENT AND EMBEDDED INVESTMENT PROVES THAT THE HAI MODEL UNDERSTATES COST. [p. 83] DO YOU HAVE A COMMENT?

A. Yes. There are a number of reasonable explanations for the gap between forward-looking and embedded investment. First, embedded fill factors are inefficiently low. Mr. Fleming notes that the digital line fill factor is only 43 percent [Fleming Rebuttal, p. 91]. As demand grows, Qwest will realize the benefits of this low fill. Second, Qwest may be operating too many switches – the FCC's TELRIC assumption preserves existing switch locations but not the number of switches. Third, switching capacity may have been retired but not yet removed from the books. Fourth, Qwest may have invested in substantial capacity in anticipation of serving Centrex customers that either were not acquired or were lost to PBXs. Finally, the cost of switches has fallen. Mr. Fleming disputes the extent to which switch prices have fallen. [Fleming Rebuttal, p. 83] However, switches are basically special purpose digital computers. The cost of computer processing capacity has obviously fallen substantially in the past decade. The USTA UNE Fact Report (submitted by USTA to the FCC May 26, 1999 on behalf of Ameritech, Bell Atlantic, BellSouth, GTE, SBC and US WEST) stated that "on a per-line basis, prices declined over 60 percent from 1986 to 1996 and were projected to fall another 12 percent by 2000."

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

Exhibit DK-R1

Daniel Kelley

PROFESSIONAL EXPERIENCE

Senior Vice President, HAI Consulting, Inc., Boulder Colorado, current position.

Conducting economic and applied policy analysis of domestic and international telecommunications issues. Recent assignments include investigation of broadband competition and interconnection, antitrust analysis of local telephone company mergers, and costing and interconnection studies in various countries. Other assignments have included analysis of competitive conditions in wireless markets, the economics of cable television regulation, analysis of the prospects for local telephone competition, and measuring the economic cost of local service.

Director of Regulatory Policy, MCI Communications Corporation, 1984-1990.

Responsible for developing and implementing MCI's public policy positions on issues such as dominant carrier regulation, Open Network Architecture, accounting separations and Bell Operating Company line of business restrictions. Also managed an interdisciplinary group of economists, engineers and lawyers engaged in analyzing AT&T and local telephone company tariffs.

Senior Economist and Project Manager, ICF Incorporated, 1982-1984.

Telecommunications and antitrust projects included: forecasting long distance telephone rates; analysis of the competitive effects of AT&T's long distance rate structures; a study of optimal firm size for cellular radio markets; analysis of the FCC's Financial Interest and Syndication Rules, and competitive analysis of mergers and acquisitions in a variety of industries.

Senior Economist, Federal Communications Commission, 1979-1982.

Served as Special Assistant to the Chairman during 1980-1981. Advised the Chairman on proposed regulatory changes in the broadcasting, cable television and telephone industries; analyzed legislation and drafted congressional testimony. Coordinated Bureau and Office efforts on major common carrier matters such as the Second Computer Inquiry and the Competitive Carrier Rulemaking. Also held Senior Economist positions in the Office of Plans and Policy and the Common Carrier Bureau.

Staff Economist, U.S. Department of Justice, 1972-1979.

Analyzed proposals for restructuring the Bell System as a member of the economic staff of U.S. v. AT&T; investigated the competitive effects of mergers and business practices in a wide variety of industries.

EDUCATION

1976	Ph.D. in Economics	University of Oregon
1971	M.A. in Economics	University of Oregon
1969	B.A. in Economics	University of Colorado

PAPERS AND COMPLETED RESEARCH

"New Zealand Telecommunications: The State of Competition" (1998), with Todd Telecommunications Consortium.

"Cable and Wireless Alternatives to Residential Local Exchange Service," Berkeley Conference on Convergence and Digital Technology (1997), with Alan J. Boyer and David M. Nugent.

"A General Approach to Local Exchange Carrier Pricing and Interconnection Issues," Telecommunications Policy Research Conference, Solomons, Md., (1992).

"Gigabit Networks: Is Access a Problem?" IEEE Gigabit Networking Workshop (1992).

"Advances in Network Technology" in Barry Cole, ed., After the Break-Up: Assessing the New Post-AT&T Divestiture Era (1991).

"Alternatives to Rate of Return Regulation: Deregulation or Reform?" in Alternatives to Rate Base Regulation in the Telecommunications Industry, NARUC (1988).

"AT&T Optional Calling Plans: Promotional or Predatory" in Harry M. Trebing, ed., Impact of Deregulation and Market Forces on Public Utilities: The Future Role of Regulation (1985).

"The Economics of Copyright Controversies in Communications" in Vincent Mosco, ed., Policy Research in Telecommunications (1984).

"Deregulation After Divestiture: The Effect of the AT&T Settlement on Competition," FCC, OPP Working Paper No. 8 (1982).

"The Transition to Structural Telecommunications Regulation," in Harry M. Trebing, ed., New Challenges for the 1980's (1982), with Charles D. Ferris.

"Social Objectives and Competition in Common Carrier Communications: Incompatible or Inseparable?" in Harry M. Trebing ed., Communications and Energy in Transition (1981), with Nina W. Cornell and Peter R. Greenhalgh.

"An Empirical Survey of Price Fixing Conspiracies," Journal of Law and Economics (1974), with George A. Hay. Reprinted in Siegfried and Calvari, ed., Economic Analysis and Antitrust Law (1978) and the Journal of Reprints for Antitrust Law and Economics (1980).

TESTIMONY BEFORE REGULATORY AGENCIES

Federal Communications Commission, Application of Cellular Communications of Cincinnati, July 25, 1983 (with Robert J. Reynolds): Optimum firm size in the cellular radio market.

Maryland Public Service Commission, Case No. 0450-Phase II, May 31, 1983: Access charge implementation issues.

New York Public Service Commission, Case No. 28425, June 1983: Access charge implementation issues.

Florida Public Service Commission, Docket No. 820537-TP, June 30, 1983, November 4, 1983, April 9, 1984, June 4, 1984, September 7, 1984, October 25, 1984 and August 15, 1985: Access charge implementation issues.

Pennsylvania Public Utility Commission, Docket No. R-832, August 5, 1983: Rate Case.

New Jersey Board of Public Utilities, Docket No. 83-11, February 20, 1984: Access Charge.

New York Public Service Commission, Case 88-C-102, March 2, 1990: Alternative Operator Service Issues.

California Public Service Commission, A.90-07-015, July 10, 1990: AT&T Deregulation.

New York Public Service Commission, Case 28425, October 8, 1990: IntraLATA Dial 1 Competition.

Massachusetts Department of Public Utilities, DPU 90-133, October 17, 1990: AT&T Deregulation.

Georgia Public Service Commission, 3905-U, November 16, 1990: Incentive Regulation.

California Public Service Commission, I-87-11-033, September 23, 1991: IntraLATA Competition.

Georgia Public Service Commission, Docket No. 3987-U, January 31, 1992: Cross-Subsidy.

Colorado Public Utilities Commission, Docket No. 92R-050T, August 24, 1992: Collocation.

Connecticut Department of Public Utility Control, Docket No. 9106-10-06, September 25, 1992: Infrastructure.

Maryland Public Service Commission, Case No. 8584, Phase II, July 21, 1995: Local Competition.

Connecticut Department of Public Utility Control, Docket No. 95-06-17, September 8, 1995: Local Competition .

Federal-State Joint Board on Universal Service, CC Docket No. 96-45, June 5, 1996: Cost Modeling.

TESTIMONY (CONT'D)

Colorado Public Utilities Commission, Docket No. 96A-287T, September 6, 1996: Arbitration.

Hawaii Public Utilities Commission, October 17, 1996: Arbitration.

Oregon Public Service Commission, Dockets ARB 3 & 6, September 6, 1996: Arbitration.

Michigan Public Service Commission, October 24, 1996: Arbitration.

New York Public Service Commission, Case No. 28425, May 9, 1997: Access Charges.

Colorado Public Utilities Commission, Docket No. 97F-175T, July 18, 1997: Access Charges.

Utah Public Service Commission, Docket No. 97-049-08, October 2, 1997: Access Charges.

Connecticut Department of Public Utility Control, Docket No. 96-04-07, February 10, 1998: Access Charges.

Massachusetts Department of Public Utility Control, Docket No. 98-15, August 14, 1998: Wholesale Discount.

Connecticut Department of Public Utility Control, Docket No. 95-06-17RE02, August 3, 1999: Wholesale Discount.

Washington Utilities and Transportation Commission, Docket No. UT-991991, March 24, 2000: WCOM-Sprint Merger.

California Public Utilities commission, Application No. 9-12-012, April 14, 2000: WCOM-Sprint Merger.

CERTIFICATE OF SERVICE

I hereby certify that the original and 10 copies of the Notice of Filing Rebuttal Testimony of Richard Chandler and Daniel Kelley, regarding Docket No. T-00000A-00-0194, were hand delivered this 27th day of September, 2001, to:

Arizona Corporation Commission
Docket Control – Utilities Division
1200 West Washington Street
Phoenix, AZ 85007

and that a copy of the foregoing was hand-delivered this 27th day of September, 2001 to the following:

Deborah Scott
Director – Utilities Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

Maureen Scott
Legal Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

Lyn Farmer
Chief Hearing Officer
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

Dwight D. Nodes, Administrative Law Judge
Hearing Division
Arizona Corporation Commission
1200 West Washington
Phoenix, AZ 85007

and that a copy of the foregoing was sent via United States Mail, postage prepaid, on the 27th day of September, 2001 to the following:

Timothy Berg
Fennemore Craig, P.C.
3003 North Central Ave.
Suite 2600
Phoenix, AZ 85012
Attorneys for Qwest

Janet Livengood
Z-TEL Communications, Inc.
601 South Harbour Island
Suite 220
Tampa, Florida 33602
Attorneys for Z-Tel Communications, Inc.

Steve Sager, Esq.
McLeod USA Telecommunications Service, Inc.
215 South State Street, 10th Floor
Salt Lake City, Utah 84111
Attorneys for McLeod USA

Ray Heyman
Roshka Heyman & DeWulf
400 North 5th Street
Suite 1000
Phoenix, AZ 85004
Attorneys for Alltel Communications

Michael B. Hazzard
Kelley Drye and Warren
1200 19th Street, NW
Washington, DC 20036
Attorneys for Z-Tel Communications

Scott S. Wakefield
RUCO
2828 N. Central Avenue
Suite 1200
Phoenix, AZ 85004

Andrea Harris
Allegiance Telecom
2101 Webster
Suite 1580
Oakland, CA 94612

EXHIBIT
S-1
Admitted

Arizona
Docket No. T-00000A-00-0194
STF 18-264

INTERVENOR: Arizona Corporation Commission Staff

REQUEST NO: 264

In the Company Study #5542 provided on CD, the Company appears to be amortizing the capitalized right-to-use, feature expenses over 36 months.

A. Please provide copies of any ACC or FCC ruling or order that determined these expenses should be amortized or depreciated over 36 months.

B. Please state over what period the FCC amortizes or depreciates capitalized right-to-use expenses. Provide a copy of the FCC ruling or order that determines the amortization period for these costs.

C. Please state over what period the ACC amortizes or depreciates capitalized right-to-use expenses. Provide a copy of the ACC ruling or order that determines the amortize period for these costs.

RESPONSE:

Right to Use (RTU) software is acquired under a capital lease arrangement and as such falls under the guidance of FASB Statement of Financial Accounting Standards #13, *Accounting for Leases,* (SFAS 13). Paragraph 11 of SFAS 13 states that amortization period for capital leases "*shall be the lease term*". Since the lease under which RTU software is acquired is a 36 month lease, the capitalized amounts are amortized on a straight-line basis over 36 months.

Since Qwest accounts for capitalized leases according to GAAP and both the ACC and FCC allow for capital lease accounting, there are no specific ACC or FCC rulings or orders specifically setting amortization lives other than those specified by SFAS 13.

Respondent: Bill Muir, Staff Accountant, Qwest

EXHIBIT
S-2
Admitted

Arizona
Docket No. T-00000A-00-0194
STF 19-278

INTERVENOR: Arizona Corporation Commission Staff

REQUEST NO: 278

On page 18 of Mr. Brigham's Direct, lines 10-17, the calculation of the capital lease right to use fees is discussed.

A. Are these fees charged to Qwest on an annual or monthly basis by the vendors?

B. The Company response to Request STF 18-264 indicates that capitalized leases are for a 36 month period. What happens at the end of the 36 month assuming that the Company wants to continue the current software? For example, does the Company have to pay a similar charge to the software vendor for the right to use the software for the next 36 month period, or is that charge significantly lower for the 36 month period after the initial period, or is there no charge for the additional period after the first 36 month period? Please explain what charges are imposed in the period after the first 36 months if the company decides to continue to use the same program and provide the same features.

RESPONSE:

A. Capital lease "fees" are not charged by the vendors. Qwest procures Network Application software (a.k.a. "RTU software") on a one-time basis from the vendors. The rights to this software are then "sold" and then leased back from a financing company. Qwest makes rental payments for these leases on a monthly basis.

B. Under the terms of the master lease agreement, Qwest has the option to repurchase the rights to the software at the end of the lease term for the lower of fair market value or 15 percent of the lessor's original cost. There are no additional costs for that software after the first 36 month period.

Based on the Network Applications software that was procured from the vendor in the years 1998-2000, Study 5542 estimates the average annual rental payments made to financing companies. Because Qwest must procure new applications software on an ongoing basis, Qwest will continue to incur similar costs in future years for Network Applications software.

Respondent: Jennifer Peppers

EXHIBIT
S-3
Admitted

Arizona
Docket No. T-00000A-00-0194
STF 19-280

INTERVENOR: Arizona Corporation Commission Staff

REQUEST NO: 280

For remote collocation, are there other non-recurring charges that apply in addition to the non-recurring charges shown on Exhibit RHB-1? For example, if a CLEC ordered one remote collocation space for one standard mounting unit, and that was all that CLEC ordered as part of that order, what charges would that CLEC pay (if any) in addition to the $868.13 non-recurring charge shown on Exhibit RHB-1? Please identify each such additional charge and the amount of each such charge.

RESPONSE:

For Remote Collocation, the other non-recurring charge is the Quote Preparation Fee (QPF) which is determined on an individual case basis (ICB). This ICB charge will include drive time to the remote terminal, site assessment and development of the engineering work order.

For the example given, a CLEC who ordered one remote collocation space for one standard mounting unit would pay the following non-recurring charges: $868.13 for the space, $558.99 for FDI terminations and the determined QPF.

Respondent: Erica Hollis, Unbundled Packet Switching Manager, Qwest

EXHIBIT
S-4
Admitted

Arizona
Docket No. T-00000A-00-0194
STF 19-282

INTERVENOR: Arizona Corporation Commission Staff

REQUEST NO: 282

On Exhibit RHB-1, under 9.24.1, "DSLAM functionality" is shown.

A. Is this "DSLAM functionality" charge per end user customer line? If not, on what basis is this provided?

B. If a CLEC was to provide xDSL service to an individual customer, and use the "DSLAM functionality" service of Qwest, would that CLEC have to pay $20.28 per line for that functionality? If not, what would they have to pay?

C. Is it a correct statement that this charge does not include the use of Qwest's loop for xDSL services? If that is not a correct statement, please provide the correct statement.

D. Assume a CLEC wished to provide xDSL service to a customer premise using the Qwest provided "DSLAM functionality" and other Qwest facilities to bring that service to a CLEC fiber located in or near the Qwest central office. What charges other than the $20.20 would that CLEC have to pay per line in order to provide service using Qwest's UNE rates? Identify each charge that would apply and the amount of each charge. Please separately provide the recurring and non-recurring charges for each of these functions. If there are several different configurations that could be employed, please assume the most common configuration.

E. Does DSLAM functionality also include the "splitter" function?

F. Would the CLEC also have to pay for any cabling, tie pairs, or other equivalents within the central office in addition to paying the DSLAM functionality rate, and whatever UNE rate or line sharing charge that the CLEC would pay for the loop it would be utilizing.

RESPONSE:

A. DSLAM functionality is a charge per each end user customer line. CLECs can provide DSLAM functionality to customers through two methods. First, CLECs can purchase DSLAM functionality only and provide the feeder loop from the remotely placed Qwest DSLAM back to the central office. Second, CLECs can purchase the Unbundled Packet Switch Customer Channel that includes both the DSLAM functionality and the virtual transport from the remotely placed DSLAM to the central office.

B. CLECs providing xDSL services to individual customers by utilizing DSLAM functionality, the CLEC would pay $20.28 per line for the DSLAM functionality. If the CLEC was to provide xDSL services by utilizing the Unbundled Packet Switch Customer Channel, the CLEC would pay $23.39. This charge includes both the DSLAM functionality and virtual transport.

C. The $20.28 charge for DSLAM functionality does not include the use of a Qwest loop. CLECs may choose to purchase an Unbundled Distribution Loop in combination with Unbundled Packet Switching to transport the xDSL service to the individual customer's premises.

D. CLECs wishing to provide xDSL services to an end user could not directly connect the Unbundled Packet Switching elements to a CLEC owned fiber. All virtual channel traffic will be handed off to CLECs through the Unbundled Packet Switch Interface Port at the Interconnection Distribution frame (ICDF). The interface to the Qwest ATM Switch through the ICDF demarcation is the industry User-to-Network (UNI) standard.

In the most common configuration, CLECs may utilize Unbundled Packet Switching through purchasing the following elements:

First, the CLEC would purchase a DS1 Unbundled Packet Switch Interface Port. The charges are $135.05 recurring and $227.50 nonrecurring.

Second, the CLEC would request the Unbundled Packet Switch Customer Channel and the distribution portion of a Shared Loop. The CLEC would pay the recurring charge of $23.39 for the Unbundled Packet Switch Customer Channel and the recurring charge for the distribution portion of the Shared Loop. The nonrecurring charge for the Unbundled Packet Switch Customer Channel and distribution portion of the Shared Loop is $60.14.

E. DSLAM functionality does include the splitter function.

F. The CLEC will not pay any additional charges for cabling, tie pairs or other equivalents when ordering Unbundled Packet Switching.

Respondent: Erica Hollis, Product Manager, Qwest

Arizona
Docket No. T-00000A-00-0194
STF 20-285

EXHIBIT
S-5
Admitted

INTERVENOR: Arizona Corporation Commission Staff

REQUEST NO: 285

A. Provide the documents which prove that the $42.58 rate was "based on a retail rate, less the NEC avoided cost discount" as claimed on page 14, line1-3, of Exhibit RHB-R1.

B. Provide the calculations showing the calculation of the $42.58 rate "based on a retail rate, less the NEC avoided cost discount".

RESPONSE:

A. The Company's statement on page 14, lines 1-3, was based upon the Commission's statement in Decision No. 60635, page 29. Qwest does not have the documentation showing the calculation of $42.58 as shown on Appendix A of the Decision mentioned above, and is unable to determine precisely how this amount was derived.

B. Please see part A above.

Judy Steward - Manager Witness Support, Qwest

EXHIBIT
S-7
Admitted

Arizona
Docket No. T-00000A-00-0194
STF 20-286

INTERVENOR: Arizona Corporation Commission Staff

REQUEST NO: 286

Regarding Page 12, lines 1-4 of Exhibit RHB-R1;

A. Has QWEST deployed "hundreds" of "DA Hotels" in Arizona? If yes, provide the documents which support this claim.

B. Is the sole purpose for the deployments referenced about been to provide space for CLECs to collocate? If yes, provide the documents which support this claim.

C. Is it a correct statement that QWEST will generally not build a "DA Hotel" for CLECs prior to the time a CLEC requests such facilities in that location? If no, provide the documents which support this claim.

D. Please provide a description of what facilities are called a ""DA Hotel"

RESPONSE:

A. The list is on the Qwest web site at the following URL: www.qwest.com /disclosures/netdisclosure459

When at this site, choose "Remote DSL DMT Interface Deployment Locations". This will launch an Excel file called "RemoteDSLAMDisclosure101901.xls". This file lists the state, the deployment date, the wire center and address for the deployments. A sort by State will give you the number of deployments in each state and Arizona currently lists 385 deployments.

B. No.

C. Qwest will generally build a "DA Hotel" with additional space for CLECs.

D. The "DA Hotel" is the cabinet, cement pad, power supply equipment, as well as, other components necessary to house the electrical equipment necessary for Remote Terminal Collocation usage (i.e., DSLAM). The cabinet is "hardened", which is to say that it is sufficiently built to protect the encased equipment from various environmental conditions such as water and extreme temperature variations.

Respondent: Lisa Avery

EXHIBIT

S-8

Admitted

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO U S WEST COMMUNICATION, INC.'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS.	)	**DOCKET NO. T-00000A-00-0194** **NOTICE OF FILING STAFF'S PHASE II-A SWITCHING REBUTTAL TESTIMONY**

Arizona Corporation Commission Staff ("Staff") hereby files the redacted rebuttal testimony of William Dunkel; in the above-referenced matter. Unredacted versions are being provided to the Hearing Division and those parties who are signatories to the Protective Agreement herein.

RESPECTFULLY SUBMITTED this 27th day of September, 2001.

Maureen A. Scott

Christopher C. Kempley, Chief Counsel
Maureen A. Scott, Attorney
Legal Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007
Telephone: (602) 542-6022
Facsimile: (602) 542-4870
e-mail: maureenscott@cc.state.az.us

The Original and ten (10) copies of the foregoing filed this 27th day of September, 2001 with:

Docket Control
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007
Public Version

...

Copies of the foregoing were mailed this
27th day of September, 2001 to:

Jon Poston
Arizonans for Competition in Telephone Service
6733 East Dale Lane
Cave Creek, Arizona 85331-6561
Public-Redacted Version

Richard S. Wolters
AT&T Communications of the
Mountain States, Inc.
1875 Lawrence Street, Room 1575
Denver, CO 80202-1847
Unredacted-Confidential Version

Mary E. Steele
Davis-Wright-Tremaine
2600 Century Square
1505 – 4th Avenue
Seattle, WA 98101-1688
Unredacted-Confidential Version

Joan Burke
Osborn Maledon, P.A.
2929 N. Central Avenue, 21st Floor
Phoenix AZ 85067-6379
Unredacted-Confidential Version

Gregory Kopta
Davis Wright Tremaine
2600 Century Square
1501 Fourth Avenue
Seattle, WA 98101-1688
Unredacted-Confidential Version

Drake Tempest
Qwest Communications
555 Seventeenth Street
Denver, CO 80202
Unredacted-Confidential Version

Kathryn E. Ford
QWEST COMMUNICATIONS, INC.
1801 California Street, Suite 4900
Denver, CO 80202
Unredacted-Confidential Version

Timothy Berg
Fennemore Craig, P.C.
3003 North Central Avenue, Suite 2600
Phoenix, AZ 85012
Unredacted-Confidential Version

Michael W. Patten
Roshka Heyman & DeWulf
One Arizona Center
400 East Van Buren, Suite 800
Phoenix, AZ 85004
Unredacted-Confidential Version

Jeffrey W. Crockett
Jeffrey B. Guldner
Snell & Wilmer L. L. P.
One Arizona Center
Phoenix, AZ 85004-2202
Public-Redacted Version

Steve Sager
McLeodUSA
215 S. State Street, 10th Floor
Salt Lake City, Utah 84111
Unredacted-Confidential Version

Rex Knowles
Nextlink Communications
111 East Broadway, Suite 1000
Salt Lake City, Utah 84111
Unredacted-Confidential Version

Michael Grant
Todd C. Wiley
GALLAGHER & KENNEDY
2575 E. Camelback Road
Phoenix, AZ 85016-9225
Unredacted-Confidential Version

Thomas H. Campbell
LEWIS & ROCA
40 N. Central Avenue
Phoenix, AZ 85007
Unredacted-Confidential Version

Thomas F. Dixon, Jr.
MCI WORLDCOM
707 17th Street
Denver, CO 80202
Unredacted-Confidential Version

Eric S. Heath, Esq.
SPRINT COMMUNICATIONS CO., L.P.
100 Spear Street, Suite 930
San Francisco, CA 94105
Unredacted-Confidential Version

Scott S. Wakefield
RUCO
2828 N. Central Avenue, Suite 1200
Phoenix, AZ 85004
Unredacted-Confidential Version

Timothy Peters
ELECTRIC LIGHTWAVE, INC.
4400 NE 77th Avenue
Vancouver, WA 98668
Unredacted-Confidential Version

Kath Thomas
Advanced Telecom Group, Inc.
100 Stoney Point Road, Suite 130
Santa Rosa, CA 95401
Public-Redacted Version

Douglas Hsiao
RHYTHMS LINKS, INC.
6933 S. Revere Pkwy.
Englewood, CO 80112
Unredacted-Confidential Version

NEW EDGE NETWORKS
P.O. Box 5159
3000 Columbia House Blvd.
Vancouver, WA 98668
Public-Redacted Version

Andrea Harris, Sr. Mgr.
ALLEGIANCE TELECOM INC. OF AZ
2101 Webster, Suite 1580
Oakland, CA 94612
Public-Redacted Version

K. Megan Doberneck
COVAD COMMUNCIATIONS
4250 Burton Street
Santa Clara, CA 95054
Confidential - Unredacted Version

Traci Grundon
DAVIS, WRIGHT TREMAINE L.L.P.
1300 S.W. Fifth Avenue
Portland, OR 97201
Attorneys for Nextlink, Inc., & ATG, Inc.
Public-Redacted Version

Marti Allbright, Esq.
Mpower Communications Corp.
5711 South Benton Circle
Littleton, Colorado 80123
Public-Redacted Version

Dennis D. Ahlers, Sr. Attorney
Eschelon Telecom, Inc.
730 Second Ave. South, Ste 1200
Minneapolis, MN 55402
Unredacted-Confidential Version

Janet Livengood, Reg. VP
Z-Tel
601 S. Harbour Is. Blvd.
Tampa, FL 33602
Unredacted-Confidential Version

Michael B. Hazzard
Kelley Drye & Warren LLP
1200 – 19th St., NW 5th Fl.
WA DC 20036
Unredacted-Confidential Version

Ray Heyman
Roshka-Heyman & DeWulf
One Arizona Center
400 East Van Buren, Suite 800
Phoenix, AZ 85004
Attorneys for Alltel Communications
Unredacted-Confidential Version

Lyndon J. Godfrey
Vice President – Government Affairs
AT&T
111 West Monroe, Suite 1201
Phoenix, AZ 85003
Public-Redacted Version

Kevin Chapman, Dir. Reg. Rel.
SBC Telecom, Inc.
5800 Northwest Parkway
Suite 125, Room 1-S-20
San Antonio, TX 78249
Public-Redacted Version

Brian Thomas, Vice-President Regulatory-West
Time Warner Telecom, Inc.
520 S.W. 6th Avenue, Suite 300
Portland, Oregon 97204
Public-Redacted Version

By: Viola R. Kizis
Assistant to Maureen A. Scott

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BEFORE THE

ARIZONA CORPORATION COMMISSION

IN THE MATTER OF INVESTIGATION	)	
INTO QWEST CORPORATIONS'	)	
COMPLIANCE WITH CERTAIN WHOLESALE	)	DOCKET NO. T-00000A-00-0194
PRICING REQUIREMENTS FOR	)	PHASE II-A
UNBUNDLED NETWORK ELEMENTS	)	
AND RESALE DISCOUNTS	)	

DIRECT TESTIMONY AND SCHEDULES

OF

WILLIAM DUNKEL

ON BEHALF OF

THE STAFF OF THE ARIZONA CORPORATION COMMISSION

SEPTEMBER, 2001

PROPRIETARY COPY

NOTICE: THIS TESTIMONY CONTAINS INFORMATION CLAIMED TO BE PROPRIETARY BY QWEST. THROUGHOUT THIS TESTIMONY, PROPRIETARY INFORMATION IS DESIGNATED AS FOLLOWS: **PROPRIETARY**

I. STATEMENT OF QUALIFICATIONS AND INTRODUCTION

Q. PLEASE STATE YOUR NAME AND YOUR BUSINESS ADDRESS.

A. My name is William Dunkel. My business address is 8625 Farmington Cemetery Road, Pleasant Plains, Illinois 62677.

Q. WHAT IS YOUR PRESENT OCCUPATION?

A. I am a consultant providing services in telephone rate proceedings. I am the principal of William Dunkel and Associates, which was established in 1980. Since that time, I have regularly provided consulting services in telephone regulatory proceedings throughout the country. I have participated in over 130 state regulatory telephone proceedings before over one-half of the state commissions in the United States, as shown on Appendix A attached hereto. I have participated in telephone regulatory proceedings for over 20 years.

I currently provide, or in the past have provided, services in telecommunications proceedings to the following clients:

The Public Utility Commission or the Staffs in the States of:

Arkansas	Missouri
Arizona	New Mexico
Delaware	U.S. Virgin Islands
Georgia	Utah
Guam	Virginia
Illinois	Washington
Maryland	Kansas
Mississippi	

The Office of the Public Advocate, or its equivalent, in the States of:

Colorado	Missouri
District of Columbia	New Jersey
Georgia	New Mexico
Hawaii	Ohio
Illinois	Oklahoma
Indiana	Pennsylvania
Iowa	Utah
Maine	Washington
Florida	

The Department of Administration in the States of:

Illinois	South Dakota
Minnesota	Wisconsin

Q. ON WHOSE BEHALF ARE YOU TESTIFYING?

A. I am testifying on behalf of the Staff of the Arizona Corporation Commission (ACC).

Q. HAVE YOU PREVIOUSLY PARTICIPATED IN ANY PROCEEDINGS IN ARIZONA?

A. Yes. Most recently, I filed testimony on behalf of the ACC Staff in Phase II of this proceeding, Docket No. T-00000A-00-0194. In addition, I filed testimony on behalf of the ACC Staff in the general rate case, Docket No. T-01051B-99-0105. I also filed rebuttal testimony in Docket No. T-01051B-97-0689 on behalf of the ACC Staff regarding depreciation. In addition, I conducted a Cost of Service Study on behalf of the Staff of the Arizona Corporation Commission in an undocketed matter preparing a cost study pertaining to Qwest Corporation (formerly US West Communications (USWC)). I was a rate design witness in general rate case, Docket No. E-1051-93-183, involving USWC on behalf of the ACC Staff.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. By agreement among several of the parties, certain issues in Phase II were deferred to this phase (Phase II-A) of this proceeding. The purpose of my testimony is to present Staff's recommendation pertaining to the issues that are being addressed in this phase of this proceeding. In addition, I will respond to the Direct testimony filed by Qwest in this phase of this proceeding.

II. STAFF RECOMMENDATION

Q. WHAT RATES DOES STAFF RECOMMEND FOR THE SERVICES BEING ADDRESSED IN PHASE II-A OF THIS PROCEEDING?

A. The rates that Staff recommends are shown on Schedule WD-1 attached hereto.

III. MODEL USED AND INPUTS

Q. WHAT MODEL DID STAFF USE IN ARRIVING AT THE STAFF RECOMMENDED RATES?

A. Staff used the same model it used in Phase II of this proceeding, which is the HAI 5.2a model (Hatfield).

Q. PRIOR TO THIS PROCEEDING, THE ACC HAD ESTABLISHED UNE RATES IN DECISION NO. 60635 DATED JANUARY 30, 1998.[1] WHAT MODEL DID THE ACC RELY ON IN THAT DECISION?

A. Throughout that Decision, the ACC repeatedly relied on the Hatfield model. In addition, the usage portion of the FCC Synthesis Model relies heavily on the HAI model.

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[1] Docket No. U-3021-96-448 et. al.

Q. WHAT INPUTS TO THE MODEL DID STAFF UTILIZE?

A. Staff used the inputs that the ACC had chosen in its Decision No. 60635. In that Decision, the ACC adopted a number of input values. For example, the ACC adopted 50% support facilities sharing with other utilities.[2] In this proceeding, I used those same input values as determined by the ACC. For those inputs that were not addressed by the ACC in Decision No. 60635, I used the inputs as determined by the FCC. The FCC held extensive proceedings to determine the appropriate input values. As a result of that extensive analysis, the FCC in its 10th Order specified the values to be used for model inputs. (Order FCC 99-304) The FCC used those input values in the FCC Model that was used to determine the amount of federal universal service support for non-rural carriers. There are hundreds of inputs to these models. The inputs Staff utilized are the inputs that have been determined to be appropriate by the regulators. In Phase II, Staff also utilized the HAI 5.2a model, used the ACC approved inputs, and used the FCC inputs for those items that the ACC had not addressed. The costs that result from using the ACC and FCC inputs in the HAI 5.2a model are shown on Schedule WD-2.

IV. OVERHEAD COSTS

Q. WHAT TREATMENT OF OVERHEAD COST DOES STAFF PROPOSE?

A. Staff recommends the same treatment of overhead cost that it recommended in Phase II of this proceeding. As Staff discussed in Phase II of this proceeding, there are a number of problems with the expenses as proposed by Qwest. In Decision No. 60635, the ACC selected a 15% overhead factor. This 15% factor included the attributed, joint and common overhead costs. The Arizona Court in the Jennings order did not remand that 15% factor.[3]

I recommend that the 15% overhead factor adopted by the Commission in Decision No. 60635 be used in this proceeding. This factor is applied to the "direct" cost. This 15% factor specifically includes what Qwest calls the "attributed," and "common" costs.

In the prior Phase II of this proceeding, Qwest tried to claim that the 15% factor includes only "common" overhead, and did not include the "attributed" costs. However, this Qwest position misstates the Commission Order. The Commission Order specifically stated:

> Therefore, we will adopt an overhead cost factor, including attributed, joint and common costs, of 15 percent.[4]

In addition to the clear wording of the ACC's Order, it was also apparent from the discussion in the Order that this Commission's selected factor did include the attributed cost. For example,

> In its Reply Brief, U S WEST claimed that only the 5 percent factor was overhead, while the 22 percent is attributed costs.[5]

This makes it very clear that the 15% factor does not include just the "common" costs, because Qwest itself stated that the "common" cost was only 5%. Clearly, the 15% factor includes more than just the "common" costs.

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[2] Page 20, ACC Decision No. 60635.
[3] Jennings, 46 F. Supp. 2d 1004, 6, May 4, 1999 hereinafter referred to as the "Jennings Order."
[4] Page 13, Decision No. 60635.
[5] Page 12, Decision No. 60635.

The factors that Qwest used in its cost studies in this proceeding generally result in a **32%** overhead increase over the direct costs. This difference in overhead by itself would result in a Staff recommended rate that is **13%** below the Qwest recommended rate, in addition to any other differences other than overhead that may exist.[6]

Q. WHAT COST OF MONEY DID STAFF UTILIZE?

A. Staff used the 9.61% overall cost of money and associated capital structure from the ACC's March 30, 2001 decision in the general rate proceeding, Decision No. 63487. Qwest's testimony in this phase of this proceeding states they also utilized the 9.61% overall cost of money from that Commission Decision.[7]

Q. WHAT DEPRECIATION RATES DID STAFF UTILIZE?

A. Staff utilized the depreciation rates that are calculated using the lives, net salvage, and other parameters as determined by the ACC in the most recent depreciation case, Docket No. T-01051B-97-0689.

V. FILL FACTOR

Q. WHAT FILL FACTOR DID QWEST USE IN ITS COST STUDIES?

A. The fill factors that Qwest used varied. Qwest used fill factors as low as **33%**.[8]

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[6] (100 direct + 15 overhead (ACC Staff))/(100 direct + **32** overhead (Qwest)) = 115/**132** = **87%** of Qwest rate.
[7] Brigham Direct, Phase II-A, page 7, line 14.
[8] Page 7, Qwest Cost Study 5635 Collocation: Remote Terminal, "Space Utilization Factor."

In Decision No. 60635, the ACC did not address all fill factors, but for the fill factors that it did address, the ACC selected fill factors that were significantly higher than what Qwest has proposed. In that prior case, Qwest had claimed that for cable "approximately 35% of its plant is currently in use."[9] The Commission adopted the fill factors that were used in the Hatfield model, which were 71.5% for feeder, and approximately 51% for distribution cable, after sizing for standard cables was considered.[10] For similar reasons, Staff believes Qwest's use of the **33%** fill factor in the current study is inappropriate. Staff has replaced it with a 61.25% fill factor to be more consistent with the prior ACC Order.[11]

VI. OTHER QWEST ERRORS

Q. WERE THERE OTHER ERRORS IN QWEST'S STUDIES?

A. Yes. In the cost studies Staff reviewed in detail, there were other obvious errors that improperly increased the cost. For example, the "Collocation: Remote Terminal" cost study includes a calculation of the cost of a "cabinet" that would be installed outdoors. That cabinet would house certain equipment. That "cabinet" is in effect the "building" for the equipment that it houses. However, the Company increased that cabinet investment by a "building" factor. Such "building" factors are the way that the cost of the buildings that house equipment are added onto the cost of the equipment. Therefore, Qwest calculated the cost of the cabinet, which is a form of a "building", and then

[9] Page 16, Decision No. 60635.
[10] Page 16, Decision No. 60635.
[11] This is the average of the 71.5% and 51% fill factors that the Commission found to be appropriate.

increased that as if that outdoor cabinet was inside a building. It is not. Qwest is effectively double charging for the building/cabinet.

Q. HAVE YOU CORRECTED THE COLLOCATION: REMOTE TERMINAL STUDY FOR THE ABOVE-REFERENCED PROBLEMS?

A. My revised calculation:

1. Changes the space utilization factor from Qwest's **33%** factor to 61.25%;

2. Utilizes the 15% overhead factor. The Qwest factors had the effect of increasing the costs by approximately **32%** for overheads.

3. Eliminates the building factors, since that cost was already directly included as the cost of the cabinet (which is effectively the building).

4. Uses the cost of money and income tax factors that are based upon a 9.61% cost of money, and used the depreciation expense that is determined using the Commission prescribed depreciation parameters. In some cases, the factors that Qwest used were slightly different than the figures that are properly calculated using these inputs.

The result of this analysis is a Staff proposed non-recurring charge of $406.50 for remote collocation "space" (per standard mounting unit) as compared to Qwest's proposed rate of $868.13.[12] The corrected recurring rate for this item is 63 cents, as compared to Qwest's proposal of $1.35, as is shown on Schedule WD-3.

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[12] Qwest Exhibit RHB-1, page 1, Item 8.8, attached to Mr. Brigham's Direct testimony in Phase II-A.

VII. NON-RECURRING RATES

Q. WHAT HAS QWEST PROPOSED FOR NON-RECURRING RATES?

A. As shown on Qwest Exhibit RHB-1, Qwest has proposed numerous non-recurring rates. For example, for the first Analog Port[13], Qwest proposes a non-recurring charge of $145.57. Qwest's non-recurring cost studies generally consist of presenting estimates of the time that each function would be required, multiplied by the loaded labor rate. Qwest weights the cost by Qwest's estimate of the "probability" that function would occur. For example, the Qwest non-recurring cost study for the "Analog Port" is attached as Schedule WD-4.

Because some of the key inputs are based upon one's best judgement, the resulting cost results may vary greatly. For example, for the "Analog Port" Qwest alleges a non-recurring cost of **$145.57**, whereas AT&T/Worldcom/XO (Joint Intervenors) determined the non-recurring installation cost for the same item is $1.68.[14] Qwest cost studies generally assume a relatively large amount of manual order activities by Qwest personnel, whereas the Joint Intervenors assume automated data transfer from the CLECs to Qwest.

It certainly appears that some of the time estimates and probabilities that Qwest has assumed are on the high side. For example, as shown on page 2 of Schedule WD-4,

[13] Analog Line Side Port, first port. Qwest Exhibit RHB-1, page 1.

[14] Exhibit RL-2, line 36, attached to Mr. Lathrop's Direct testimony in Phase II of this proceeding. Also see page 20 of Exhibit MH-1R attached to the Summary Testimony of Michael Hydock in Phase II of this proceeding. AT&T calculates the disconnect separately, as being $1.57 non-recurring. Even if the installation and disconnect are considered together, as Qwest does, the non-recurring cost for the installation and disconnection of an Analog Port is either $3.25 using AT&T's cost analysis, or **$145.57** using Qwest's cost analysis.

Qwest assumed that it would require an average of **five minutes** of manual effort to "obtain telephone numbers", with a probability of "one." (The probability of "one" means this function would always occur.) It certainly is logical that obtaining a telephone number is a procedure that could be computerized.

On the other hand, the Joint Intervenors non-recurring numbers are very likely on the low side. They assume the computerized interface between the CLECs and Qwest operates with virtually no fallout that requires manual processing. Certainly an automated interface is the goal, but I do not believe it is reasonable to assume virtually 100% successful automated interface. In my opinion, the correct number is between the Joint Intervenors' and Qwest numbers. Since the goal is to have a computer interface between the CLECs and Qwest, I believe the appropriate non-recurring costs are closer to the Joint Intervenors' numbers than to Qwest's numbers. The reasonable assumption is an automated interface with some minor percent falling out, (and therefore requiring manual intervention). The Joint Intervenors' study is closer to this than is Qwest's study. Qwest's study assumes significant manual effort required on all orders, and includes very large time estimates for those manual functions, such as the previously referenced **five minute** to "obtain telephone numbers." The current non-recurring charge for the analog line port is $42.58. This is clearly within the range the above analysis produces. Therefore, I recommend the current non-recurring rate of $42.58 for the analog port be continued, as is shown on Schedule WD-5.[15]

The current rate is approximately 30% of the rate that Qwest has proposed. It is also several times the rate that the Joint Intervenors propose.

It should be noted that the all rates (including non-recurring) should be at least **13%** below the Qwest proposal, as a result of replacing the overhead factors that Qwest used with the ACC ordered 15% overhead factor, as previously discussed.

VIII. FEATURES

Q. PLEASE COMMENT ON THE CURRENT FEATURE RATES.

A. Currently, the interconnection rates in effect for Qwest in Arizona include the cost of features in the "port" recurring cost, and include no additional recurring charge for features. There is also generally no separate non-recurring charge for features. In Phase II of this proceeding, certain intervenors proposed the continuation of this practice. In Phase II, the sponsors of the HAI (Hatfield) model stated that the feature cost was already incorporated in the "port" cost in the HAI model, and therefore they believed no additional charge for features was appropriate.[16]

In its past filings in Phase II, Qwest proposed recurring rates for features, but in its filing in this Phase II-A, Qwest has proposed no non-recurring charges for features, but instead proposes to include the feature costs in the port rate.[17]

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[15] If there is a concern that some CLECs might fax in orders instead of using the more efficient electronic interface, a lower rate could be established for those orders that are presented through the electronic interface, with a higher rate for those orders that are sent to Qwest from the CLECs by fax.
[16] Page 43, Hydock Direct; Page 31, Denney Direct; Phase II.

Staff proposes to continue the current practice of incorporating the feature cost into the port charge, thereby requiring no separate recurring charge for features.

Therefore, the key question becomes how much additional cost, if any, should be added into the port cost that is calculated using the HAI model. The HAI port cost includes the cost of at least the initial programming for features, according to the parties presenting the HAI model.[18] The switching inputs that the FCC adopted include the costs incurred at installation, and within three years of installation, but do not include later upgrades.[19] The FCC expenses are based on actual expenses.

Qwest's Exhibit RHB-3 shows the summary of the additional costs that Qwest proposes to include in the recurring port charge for features. Exhibit RHB-3 shows Qwest includes significant costs for "Centrex 21" features. However, the list of services that are being offered to the CLECs, as shown on Exhibit RHB-1, does not show "Centrex 21" as being one of the services being offered. Therefore, "Centrex 21" costs should not be included in any additional features cost. In addition, Qwest calculates the feature cost per line from the one study as 65 cents per line.[20] Qwest also calculates a 51 cent feature cost from a different study. The cost studies that Qwest provided do not provide any explanation as to why the sum of these two calculations of features should be added to the port costs that are derived from the Hatfield model, which already includes some feature costs. Another problem is that in its "Capital Lease" study, the Company uses a

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[17] Qwest Exhibit RHB-1 attached to Mr. Brigham's Direct testimony in Phase II-A.
[18] Page 31, Denney Direct, Phase II.
[19] Paragraphs 295 and 301, FCC Order 99-304 (Tenth Order and Report, CC Docket No. 96-45, 97-160).
[20] See Qwest Exhibit RHB-3.

factor which marks up direct costs by approximately **32%** for overheads. I believe a 15% markup for attributed, joint, and common costs, which the Commission ordered in Decision No. 60635, is appropriate, as discussed elsewhere.

Q. WHAT ADDITIONAL COSTS DO YOU RECOMMEND BE ADDED FOR FEATURES TO THE "PORT" COSTS AS DETERMINED FROM THE HAI MODEL?

A. As the above discussion demonstrates, I believe the appropriate number is below Qwest's proposed addition, but greater than the Joint Interveners' proposal, which in Phase II was no addition. The current recurring charge for the Analog Line Side Port is $1.61.[21] The recurring port cost as calculated from the Hatfield model utilizing the ACC and FCC inputs is $1.10 per month per line, as shown on Schedule WD-2 attached hereto. If the current rate was continued, this would effectively include a 51 cent per line per month allowance for the cost of providing features, above the feature cost that is already included in the HAI port cost. This is a reasonable figure that is well within the range established by the other parties in this proceeding. There is no valid reason from the evidence in the record to modify this rate. Staff recommends the current recurring rate of $1.61 for line port be continued. This rate includes feature costs. Therefore, no additional recurring charge for features should be imposed.

IX. CONCLUSION

Q. WHAT DO YOU RECOMMEND?

A. I recommend that the ACC adopt the rates shown on Schedule WD-1 for the reasons set forth above.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

[21] Schedule WD-17 attached to Rebuttal testimony of William Dunkel in Phase II.

William Dunkel, Consultant
8625 Farmington Cemetery Road
Pleasant Plains, Illinois 62677

Qualifications

The Consultant is a consulting engineer specializing in telecommunication regulatory proceedings. He has participated in over 140 state regulatory proceedings as listed on Appendix A attached hereto.

The Consultant has provided cost analysis, rate design, jurisdictional separations, depreciation, expert testimony and other related services to state agencies throughout the country in numerous telecommunication state proceedings. The Consultant has also provided depreciation testimony to state agencies throughout the country in several electric utility proceedings.

The Consultant made a presentation pertaining to Video Dial Tone at the NASUCA 1993 Mid-Year Meeting held in St. Louis.

In addition, the Consultant also made a presentation to the NARUC Subcommittee on Economics and Finance at the NARUC Summer Meetings held in July, 1992. That presentation was entitled "The Reason the Industry Wants to Eliminate Cost Based Regulation--Telecommunications is a Declining Cost Industry."

The Consultant provides services almost exclusively to public agencies, including the Public Utilities Commission, the Public Counsel, or the State Department of Administration in various states.

William Dunkel currently provides, or in the past has provided, services in telecommunications proceedings to the following clients:

The Public Utility Commission or the Staffs in the States of:

Arkansas	Mississippi
Arizona	Missouri
Delaware	New Mexico
Georgia	Utah
Guam	Virginia
Illinois	Washington
Maryland	U.S. Virgin Islands

The Office of the Public Advocate, or its equivalent, in the States of:

Colorado	Maryland
District of Columbia	Missouri
Georgia	New Jersey
Hawaii	New Mexico
Illinois	Ohio
Indiana	Pennsylvania
Iowa	Utah
Maine	Washington

The Department of Administration in the States of:

Illinois	South Dakota
Minnesota	Wisconsin

In April, 1974, the Consultant was employed by the Illinois Commerce Commission in the Electric Section as a Utility Engineer. In November of 1975, he transferred to the Telephone Section of the Illinois Commerce Commission and from that time until July, 1980, he participated in essentially all telephone rate cases and other telephone rate matters that were set for hearing in the State of Illinois. During that period, he testified as an expert witness in numerous rate design cases and tariff filings in the areas of rate design, cost studies and separations. During the period 1975-1980, he was the Separations and Settlements expert for the Staff of the Illinois Commerce Commission.

From July, 1977 until July, 1980, he was a Staff member of the FCC-State Joint Board on Separations, concerning the "Impact of Customer Provision of Terminal Equipment on Jurisdictional Separations" in FCC Docket No. 20981 on behalf of the Illinois Commerce Commission. The FCC-State Joint Board is the national board which specifies the rules for separations in the telephone industry.

The Consultant has taken the AT&T separations school which is normally provided to the AT&T personnel.

The Consultant has taken the General Telephone separations school which is normally provided for training of the General Telephone Company personnel in separations.

Since July, 1980 he has been regularly employed as an independent consultant in telephone rate proceedings across the nation.

He has testified before the Illinois House of Representatives Subcommittee on Communications, as well as participating in numerous other schools and conferences pertaining to the utility industry.

Prior to employment at the Illinois Commerce Commission, the Consultant was a design engineer for Sangamo Electric Company designing electric watt-hour meters used in the electric utility industry. The Consultant was granted patent No. 3822400 for a solid state meter pulse initiator.

The Consultant graduated from the University of Illinois in February, 1970 with a Bachelor's of Science Degree in Engineering Physics with emphasis on economics and other business-related subjects. The Consultant has taken several post-graduate courses since graduation.

RELEVANT WORK EXPERIENCE OF WILLIAM DUNKEL

ARIZONA

- U.S. West Communications	Cost of Service Study
Wholesale cost/UNE case	Docket No. T-00000A-00-0194
General rate case	Docket No. E-1051-93-183
Depreciation case	Docket No. T-01051B-97-0689
General rate case	Docket No. T-01051B-99-0105

ARKANSAS

- Southwestern Bell Telephone Company	Docket No. 83-045-U

CALIFORNIA

(on behalf of the California Cable Television Association)

- General Telephone of California	I.87-11-033
- Pacific Bell	
Fiber Beyond the Feeder Pre-Approval Requirement	

COLORADO

- Mountain Bell Telephone Company	
General Rate Case	Docket No. 96A-218T et al.
Call Trace Case	Docket No. 92S-040T
Caller ID Case	Docket No. 91A-462T
General Rate Case	Docket No. 90S-544T
Local Calling Area Case	Docket No. 1766
General Rate Case	Docket No. 1720
General Rate Case	Docket No. 1700
General Rate Case	Docket No. 1655
General Rate Case	Docket No. 1575
Measured Services Case	Docket No. 1620
- Independent Telephone Companies	
Cost Allocation Methods Case	Docket No. 89R-608T

DELAWARE

- Diamond State Telephone Company	
General Rate Case	PSC Docket No. 82-32
General Rate Case	PSC Docket No. 84-33
Report on Small Centrex	PSC Docket No. 85-32T
General Rate Case	PSC Docket No. 86-20
Centrex Cost Proceeding	PSC Docket No. 86-34

DISTRICT OF COLUMBIA	
- C&P Telephone Company of D.C.	
Depreciation issues	Formal Case No. 926
FCC	
- Review of jurisdictional separations	FCC Docket No. 96-45
FLORIDA	
- BellSouth, GTE, and Sprint	
Fair and reasonable rates	Undocketed Special Project
GEORGIA	
- Southern Bell Telephone & Telegraph Co.	
General Rate Proceeding	Docket No. 3231-U
General Rate Proceeding	Docket No. 3465-U
General Rate Proceeding	Docket No. 3286-U
General Rate Proceeding	Docket No. 3393-U
HAWAII	
- GTE Hawaiian Telephone Company	
Depreciation/separations issues	Docket No. 94-0298
Resale case	Docket No. 7702
ILLINOIS	
- Geneseo Telephone Company	
EAS case	Docket No. 99-0412
- Central Telephone Company	
(Staunton merger)	Docket No. 78-0595
- General Telephone & Electronics Co.	
Usage sensitive service case	Docket Nos. 98-0200/98-0537
General rate case (on behalf of CUB)	Docket No. 93-0301
(Usage sensitive rates)	Docket No. 79-0141
(Data Service)	Docket No. 79-0310
(Certificate)	Docket No. 79-0499
(Certificate)	Docket No. 79-0500
- General Telephone Co.	Docket No. 80-0389
- Ameritech (Illinois Bell Telephone Company)	
Alternative Regulation Review	Docket No. 98-0252
Area code split case	Docket No. 94-0315
General Rate Case	Docket No. 83-0005
(Centrex filing)	Docket No. 84-0111
General Rate Proceeding	Docket No. 81-0478
(Call Lamp Indicator)	Docket No. 77-0755
(Com Key 1434)	Docket No. 77-0756
(Card dialers)	Docket No. 77-0757
(Concentration Identifier)	Docket No. 78-0005

ILLINOIS (CONT.)

(Voice of the People)	Docket No. 78-0028
(General rate increase)	Docket No. 78-0034
(Dimension)	Docket No. 78-0086
(Customer controlled Centrex)	Docket No. 78-0243
(TAS)	Docket No. 78-0031
(Ill. Consolidated Lease)	Docket No. 78-0473
(EAS Inquiry)	Docket No. 78-0531
(Dispute with GTE)	Docket No. 78-0576
(WUI vs. Continental Tel.)	Docket No. 79-0041
(Carle Clinic)	Docket No. 79-0132
(Private line rates)	Docket No. 79-0143
(Toll data)	Docket No. 79-0234
(Dataphone)	Docket No. 79-0237
(Com Key 718)	Docket No. 79-0365
(Complaint - switchboard)	Docket No. 79-0380
(Porta printer)	Docket No. 79-0381
(General rate case)	Docket No. 79-0438
(Certificate)	Docket No. 79-0501
(General rate case)	Docket No. 80-0010
(Other minor proceedings)	Docket No. various
- Home Telephone Company	Docket No. 80-0220
- Northwestern Telephone Company	
Local and EAS rates	Docket No. 79-0142
EAS	Docket No. 79-0519

INDIANA

- Public Service of Indiana (PSI)	
Depreciation issues	Cause No. 39584
- Indianapolis Power and Light Company	
Depreciation issues	Cause No. 39938

IOWA

- U S West Communications, Inc.	
Local Exchange Competition	Docket No. RMU-95-5
Local Network Interconnection	Docket No. RPU-95-10
General Rate Case	Docket No. RPU-95-11

KANSAS

- Southwestern Bell Telephone Company
  - Commission Investigation of the KUSF — Docket No. 98-SWBT-677-GIT
- Rural Telephone Service Company
  - Audit and General rate proceeding — Docket No. 00-RRLT-083-AUD
  - Request for supplemental KUSF — Docket No. 00-RRLT-518-KSF
- Southern Kansas Telephone Company
  - Audit and General rate Proceeding — Docket No. 01-SNKT-544-AUD

MAINE

- New England Telephone Company
  - General rate proceeding — Docket No. 92-130

MARYLAND

- Chesapeake and Potomac Telephone Company
  - General rate proceeding — Docket No. 7851
  - Cost Allocation Manual Case — Case No. 8333
  - Cost Allocation Issues Case — Case No. 8462
- Verizon Maryland
  - PICC rate case — Case No. 8862
  - USF case — Case No. 8745

MINNESOTA

- Access charge (all companies) — Docket No. P-321/CI-83-203
- U. S. West Communications, Inc. (Northwestern Bell Telephone Co.)
  - Centrex/Centron proceeding — Docket No. P-421/91-EM-1002
  - General rate proceeding — Docket No. P-321/M-80-306
  - Centrex Dockets — MPUC No. P-421/M-83-466; MPUC No. P-421/M-84-24; MPUC No. P-421/M-84-25; MPUC No. P-421/M-84-26
  - General rate proceeding — MPUC No. P-421/GR-80-911
  - General rate proceeding — MPUC No. P-421/GR-82-203
  - General rate case — MPUC No. P-421/GR-83-600
  - WATS investigation — MPUC No. P-421/CI-84-454
  - Access charge case — MPUC No. P-421/CI-85-352
  - Access charge case — MPUC No. P-421/M-86-53
  - Toll Compensation case — MPUC No. P-999/CI-85-582
  - Private Line proceeding — Docket No. P-421/M-86-508
- AT&T
  - Intrastate Interexchange — Docket No. P-442/M-87-54

MISSISSIPPI

- South Central Bell
  - General rate filing — Docket No. U-4415

MISSOURI

- Southwestern Bell	
General rate proceeding	TR-79-213
General rate proceeding	TR-80-256
General rate proceeding	TR-82-199
General rate proceeding	TR-86-84
General rate proceeding	TC-89-14, et al.
Alternative Regulation	TC-93-224/TO-93-192
- United Telephone Company	
Depreciation proceeding	TR-93-181
- All companies	
Extended Area Service	TO-86-8
EMS investigation	TO-87-131

NEW JERSEY

- New Jersey Bell Telephone Company	
General rate proceeding	Docket No. 802-135
General rate proceeding	BPU No. 815-458 OAL No. 3073-81
Phase I - General rate case	BPU No. 8211-1030 OAL No. PUC10506-82
General rate case	BPU No. 848-856 OAL No. PUC06250-84
Division of regulated from competitive services	BPU No. TO87050398 OAL No. PUC 08557-87
Customer Request Interrupt	Docket No. TT 90060604

NEW MEXICO

- U.S. West Communications, Inc.	
E-911 proceeding	Docket No. 92-79-TC
General rate proceeding	Docket No. 92-227-TC
General rate/depreciation proceeding	Case No. 3008
Subsidy Case	Case No. 3325
- VALOR Communications	
Subsidy Case	Case No. 3300

OHIO

- Ohio Bell Telephone Company	
General rate proceeding	Docket No. 79-1184-TP-AIR
General rate increase	Docket No. 81-1433-TP-AIR
General rate increase	Docket No. 83-300-TP-AIR
Access charges	Docket No. 83-464-TP-AIR
- General Telephone of Ohio	
General rate proceeding	Docket No. 81-383-TP-AIR
- United Telephone Company	
General rate proceeding	Docket No. 81-627-TP-AIR

OKLAHOMA

- Public Service of Oklahoma	
Depreciation case	Cause No. 96-0000214

PENNSYLVANIA

- GTE North, Inc.	
Interconnection proceeding	Docket No. A-310125F002
- Bell Telephone Company of Pennsylvania	
Alternative Regulation proceeding	Docket No. P-00930715
Automatic Savings	Docket No. R-953409
Rate Rebalance	Docket No. R-00963550
- Enterprise Telephone Company	
General rate proceeding	Docket No. R-922317
- All companies	
InterLATA Toll Service Invest.	Docket No. I-910010
- GTE North and United Telephone Company	
Local Calling Area Case	Docket No. C-902815

SOUTH DAKOTA

- Northwestern Bell Telephone Company	
General rate proceeding	Docket No. F-3375

TENNESSEE

(on behalf of Time Warner Communications)

- BellSouth Telephone Company	
Avoidable costs case	Docket No. 96-00067

UTAH

- U.S. West Communications (Mountain Bell Telephone Company)	
General rate case	Docket No. 84-049-01
General rate case	Docket No. 88-049-07
800 Services case	Docket No. 90-049-05
General rate case/ incentive regulation	Docket No. 90-049-06/90-049-03
General rate case	Docket No. 92-049-07
General rate case	Docket No. 95-049-05
General rate case	Docket No. 97-049-08

VIRGIN ISLANDS, U.S.

- Virgin Islands Telephone Company	
General rate case	Docket No. 264
General rate case	Docket No. 277
General rate case	Docket No. 314
General rate case	Docket No. 316

VIRGINIA	
- General Telephone Company of the South	
Jurisdictional allocations	Case No. PUC870029
Separations	Case No. PUC950019
WASHINGTON	
- US West Communications, Inc.	
Interconnection case	Docket No. UT-960369
General rate case	Docket No. UT-950200
- All Companies-	Analyzed the local calling areas in the State
WISCONSIN	
- Wisconsin Bell Telephone Company	
Private line rate proceeding	Docket No. 6720-TR-21
General rate proceeding	Docket No. 6720-TR-34

STAFF RECOMMENDED RATES

		Recurring Fixed		Recurring	Non-Recurring	
7.0	Interconnection					
	7.6 Local Traffic					
	7.6.1 End office call termination, per minute of use			$0.00147		
	7.6.2 Tandem Switched Transport					
	7.6.2.1 Tandem Switching, per Minute of Use			$0.00059		
	7.6.2.1 Tandem Transmission, per Minute					
	of Use, all Mileage bands					
	0 to 8 miles, per mile, per minute	$0.00048		$0.00008		
	8 to 25 miles, per mile, per minute	$0.00048		$0.00004		
	25 to 50 miles, per mile, per minute	$0.00048		$0.00002		
	Over 50 miles, per mile, per minute	$0.00048		$0.00001		
8.0	Collocation					
	8.8 Remote Collocation					
	Space (per Standard Mounting Unit)			$0.63000	$406.50	
	FDI Terminations (per binder group [25-PR])			$0.71000	$485.82	
9.0	Unbundled Network Elements (UNEs)					
	9.11 Local Switching					
	9.11.1 Analog Line Side Port, First Port	$1.61	(1)		$42.58	(1)
	9.11.2 Analog Line Side Port, Each Additional	$1.61	(1)		$42.58	(1)
	9.11.3 Local Usage, Per Minute of Use			$0.00		
	9.11.4 Vertical Features					
	10XXX Direct Dialed Blocking			$0.00	$0.00	
	Account Codes - per system			$0.00	(2)	
	Attendant Access Line - per station line			$0.00	(2)	
	Audible Message Waiting			$0.00	(2)	
	Authorization Codes - per system			$0.00	(2)	
	Auto Callback			$0.00	$0.00	
	Automatic Line			$0.00	(2)	
	Automatic Route Selection-Common Eq. Per system			$0.00	(2)	
	Blocking of pay per call services			$0.00	$0.00	
	Bridging			$0.00	$0.00	
	Call Drop			$0.00	(2)	
	Call Exclusion - Automatic			$0.00	(2)	
	Call Exclusion - Manual			$0.00	(2)	
	Call Forward Don't Answer - All Calls			$0.00	$0.00	
	Call Forwarding Incoming Only			$0.00	$0.00	
	Call Forwarding Intra Group Only			$0.00	$0.00	
	Call Forwarding Variable Remote			$0.00	$0.00	
	Call Forwarding: Busy Line (Expanded)			$0.00	$0.00	
	Call Forwarding: Busy Line (External			$0.00	$0.00	
	Call Forwarding: Busy Line (External) Don't Answer			$0.00	$0.00	
	Call Forwarding: Busy Line (Overflow)			$0.00	$0.00	
	Call Forwarding: Busy Line (Overflow) Don't Answer			$0.00	$0.00	
	Call Forwarding: Busy Line (Programmable)			$0.00	$0.00	
	Call Forwarding: Busy Line/Don't Answer Programmable Svc. Establishment			$0.00	(2)	
	CF Don't Answer/CF Busy Customer Programmable - Per Line			$0.00	(2)	
	Call Forwarding: Busy Line/Don't answer (Expanded)			$0.00	(2)	

STAFF RECOMMENDED RATES

	Recurring Fixed	Recurring	Non-Recurring
Call Forwarding: Don't Answer		$0.00	(2)
Call Forwarding: Don't Answer (Expanded)		$0.00	$0.00
Call Forwarding: Don't Answer (Programmable)		$0.00	$0.00
Call Forwarding: Variable		$0.00	$0.00
Call Forwarding: Variable - no call complete option		$0.00	$0.00
Call Hold		$0.00	$0.00
Call Hold/3-Way/Call Transfer		$0.00	$0.00
Call Park (Basic - Store & Retrieve)		$0.00	$0.00
Call Pickup		$0.00	$0.00
Call Transfer		$0.00	$0.00
Call Waiting Dial Originating		$0.00	$0.00
Call Waiting Indication - per timing state		$0.00	(2)
Call Waiting Originating		$0.00	$0.00
Call Waiting Terminating - All Calls		$0.00	$0.00
Call Waiting Terminating - Incoming Only		$0.00	$0.00
Call Waiting/Cancel Call Waiting		$0.00	$0.00
Centrex Common Equipment			(2)
Centrex Management System (CMS)		$0.00	$0.00
Centrex Plus DID numbers per number		$0.00	$0.00
Centrex Plus to Centrex Plus		$0.00	$0.00
Centrex Plus to IC Carrier		$0.00	$0.00
Centrex Plus to PBX/Key Blocked		$0.00	$0.00
Centrex Plus to PBX/Key Non-Blocked		$0.00	$0.00
CFBL - All Calls		$0.00	$0.00
CFBL - Incoming Only		$0.00	(2)
CFDA Incoming Only		$0.00	$0.00
CLASS - Anonymous Call Rejection		$0.00	$0.00
CLASS - Call Trace		(2)	$0.00
CLASS - Call Waiting ID		$0.00	$0.00
CLASS - Calling Name & Number		$0.00	$0.00
CLASS - Calling Number Delivery		$0.00	$0.00
CLASS - Calling Number Delivery - Blocking		$0.00	$0.00
CLASS - Continuous Redial		$0.00	(2)
CLASS - Last Call Return		$0.00	(2)
CLASS - Priority Calling		$0.00	(2)
CLASS - Selective Call Forwarding		$0.00	(2)
CLASS - Selective Call Rejection		$0.00	(2)
Common Equipment per 1.544 Mbps facility (DS1)		$0.00	0
Conference Calling - Meet Me		$0.00	(2)
Conference Calling - Preset		$0.00	(2)
Custom Ringing First Line (Short/Long/Short)		$0.00	$0.00
Custom Ringing First Line (Short/Short)		$0.00	$0.00
Custom Ringing First Line (Short/Short/Long)		$0.00	$0.00
Custom Ringing Second Line (Short/Long/Short)		$0.00	$0.00
Custom Ringing Second Line (Short/Short)		$0.00	$0.00
Custom Ringing Second Line (Short/Short/Long)		$0.00	$0.00
Custom Ringing Third Line (Short/Long/Short)		$0.00	$0.00
Custom Ringing Third Line (Short/Short)		$0.00	$0.00
Custom Ringing Third Line (Short/Short/Long)		$0.00	$0.00
Data Call Protection (DMS 100)		$0.00	$0.00
Dir Sta Sel/Busy Lamp Fld per arrangement		$0.00	(2)
Directed Call Pckup with Barge-in		$0.00	(2)

STAFF RECOMMENDED RATES

	Recurring Fixed	Recurring	Non-Recurring
Directed Call Pickup without Barge-in		$0.00	(2)
Distinctive Ring/Distinctive Call Waiting		$0.00	(2)
Distinctive Ringing		$0.00	$0.00
EBS - Set Interface - per station line		$0.00	$0.00
Executive Busy Override		$0.00	$0.00
Expensive Route Warning Tone - per system		$0.00	(2)
Facility Restriction Level - per system		$0.00	(2)
Feature Display		$0.00	$0.00
Group Intercom		$0.00	(2)
Hot line - per line		$0.00	(2)
Hunting: Multiposition Circular Hunting		$0.00	$0.00
Hunting: Multiposition Hunt Queuing		$0.00	(2)
Hunting: Multiposition Series Hunting		$0.00	$0.00
Hunting: Multiposition with Announcement in Queue		$0.00	(2)
Hunting: Multiposition with Music In Queue		$0.00	(2)
Incoming Calls Barred		$0.00	$0.00
International Direct Dial Blocking		$0.00	$0.00
ISDN Short Hunt		$0.00	(2)
Line Side Answer Supervision		$0.00	$0.00
Loudspeaker Paging - per trunk group		$0.00	(2)
Make Busy Arrangements - per group		$0.00	(2)
Make Busy Arrangements - per line		$0.00	(2)
Message Center - per main station line		$0.00	(2)
Message Waiting Indication Audible/visual		$0.00	$0.00
Message Waiting visual		$0.00	(2)
Music On Hold - per system		$0.00	(2)
Network Speed Call		$0.00	$0.00
Night Service Arrangement		$0.00	$0.00
Outgoing Calls Barred		$0.00	$0.00
Outgoing Trunk Queuing		$0.00	$0.00
Privacy Release		$0.00	(2)
Query Time		$0.00	(2)
Speed Calling 1 Digit Controller		$0.00	$0.00
Speed Calling 1 Digit User		$0.00	$0.00
Speed Calling 1# List Individual		$0.00	$0.00
Speed Calling 2 Digit Controller		$0.00	$0.00
Speed Calling 2 Digit User		$0.00	$0.00
Speed Calling 2# List Individual		$0.00	$0.00
Speed Calling 30 Number		$0.00	$0.00
Speed Calling 8 Number		$0.00	$0.00
Station Camp-On Service - per main station		$0.00	(2)
Station Dial Conferencing (6 Way)		$0.00	$0.00
Station Message Detail Recording (SMDR)		$0.00	$0.00
Three Way Calling		$0.00	$0.00
Time and Date Display		$0.00	$0.00
Time of Day Control for ARS - per system		$0.00	(2)
Time of Day NCOS Update		$0.00	(2)
Time of Day Routing - per line		$0.00	(2)
Toll Restriction Service		$0.00	$0.00
Trunk Answer Any Station		$0.00	$0.00
Trunk Verification from Designated Station		$0.00	(2)
UCD in hunt group - per line		$0.00	(2)

STAFF RECOMMENDED RATES

	Recurring Fixed	Recurring	Non-Recurring
UCD with Music After Delay		$0.00	$0.00
CMS - System establishment - Initial Installation			(2)
CMS - System establishment - Subsequent Installation			(2)
CMS - Packet Control Capability, per system			(2)
SMDR-P - Service establishment charge, Initial Installation			(2)
SMDR-P - Archived Data			(2)
9.11.5 Subsequent Order Charge			$0.00
9.11.6 Digital Line Side Port (Supporting BRI ISDN)			
First Port		NR	NR
Each Additional Port		NR	NR
9.11.7 Digital Trunk Ports			
DS1 Local Message Trunk Port		NR	NR
Message Trunk Group, First Trunk		NR	NR
Message Trunk Group, Each Additional		NR	NR
DS1 PRI ISDN Trunk Port		NR	NR
DS1/DID Trunk Port		NR	NR
9.11.8 DS0 Analog Trunk Port			
First Port			$42.58
Each Additional Port			$42.58 or less
9.12 Customized Routing			
9.12.1 Development of Custom Line Class Code-DA or Operator Svs. Routing Only			NR
9.12.2 Installation Charge, per Switch DA or Operator Svc. Routing Only			NR
9.12.3 All Other Custom Routing			NR
9.24 Unbundled Packet Switching			
9.24.1 Unbundled Packet Switch Customer Channel		NR	$0.00
DSLAM Functionality		NR	$0.00
9.24.2 Customer Channel and Shared Distribution Loop		$0.00	NR
Customer Channel and Unbundled Distribution Subloop		$0.00	NR
Customer Channel and CLEC Provided Loop		$0.00	NR
9.24.3 Unbundled Packet Switch Port			
DS1 Interface		NR	NR
DS3 Interface		NR	NR

(1) Continue present rate.

(2) Staff is not making a specific recommendation for these non-recurring rates for features. However, they generally should be significantly less than the Qwest proposal. Qwest proposes non-recurring charges for these elements. The Qwest studies generally assume significant manual efforts. In Phase II, Joint Intervenors proposed a zero non-recurring charge for features (AT&T Exhibit MH-1). Their studies generally assumed automated interface. Qwest rates would be reduced by 13% if the only correction was to the overhead factors. With other adjustments, the Staff recommends a non-recurring rate for analog line side port that is approximately 30% of the Qwest proposed non-recurring rate.

"NR" Indicates Staff is presenting no recommendation on this rate.

Cost results from the HAI 5.2a Model using the ACC inputs from ACC Decision No. 60635, and for those inputs not addressed by the ACC, using the inputs the FCC adopted in its 10th Order (FCC Order 99-304).

Schedule WD-2
Page 2 of 2
Phase II-A
Docket No. T-00000A-00-0194

		Annual Cost	Units			Unit Cost	
End office switching	$	130,175,079					
Line Port		39,052,524	2,959,791	switched lines	$	1.10	per line/month
Non-Line Port		91,122,555	62,141,633,323	actual minutes	$	0.00147	per actual minute (for rate per DEM, see "Cost detail" sheet)
Signaling network elements	$	5,012,332					
Links		172,224	511	links	$	28.08	per link per month
STP		2,537,787	41,094,682,805	TCAP+ISUP msgs	$	0.00006	per signaling message
SCP		2,302,321	2,118,313,400	TCAP queries	$	0.00109	per query
Transport network elements							
Dedicated							
Sw+Sp Transport	$	8,749,095	351,789	trunks	$	2.07	per DS-0 equivalent per month
Switched		3,443,640	138,464	trunks	$	0.00021	per minute
Special		5,305,455	213,325	trunks			
Transmission Terminal		19,263,003	351,789	trunks	$	4.56	per DS-0 equivalent per month
					$	0.00045	per minute
					$	0.00066	total per minute
Common							
Transport	$	1,319,573	3,703,400,627	minutes	$	0.00034	per minute per leg (orig or term)
Transmission Terminal		1,875,906	3,703,400,627	minutes	$	0.00048	per minute
					$	0.00081	total per minute
Direct							
Transport	$	4,963,127	16,120,464,725	minutes	$	0.00031	per minute
Transmission Terminal		8,550,617	16,120,464,725	minutes	$	0.00053	per minute
					$	0.00084	total per minute
Tandem switch	$	1,963,948	3,322,868,975	minutes	$	0.00059	per minute
Operator systems	$	6,414,122					
Public Telephones	$	4,919,883					
Total (w/ Public)	$	752,434,212					
Total cost of switched network elements (w/o Public)	$	19.51	per line/month				

SUMMARY OF STAFF CHANGES TO THE QWEST COLLOCATION: REMOTE TERMINAL COST STUDY

1. Staff changed the Space Utilization Factor. Qwest used a **33%** factor. Staff used 61.25%, which is the average of the Feeder and Distribution Fill factors the Commission approved in the prior UNE Docket, Docket No. T-500000A-00-0104. This change is included on pages 7 and 9 of the cost study.

2. Staff used the same depreciation, cost of money, and income tax factors that it used in Phase II. Staff used the 9.61% overall cost of money and associated capital structure from the ACC's March 30, 2001 decision in the general rate proceeding, Decision No. 63487. Staff utilized the depreciation rates that are calculated using the lives, net salvage, and other parameters as determined by the ACC in Docket No. T-01051B-97-0687. These changes are included on page 20 of the cost study.

3. Staff replaced the "directly attributed" and "common" factors Qwest used in its cost model with a 15% overhead (common, joint and attributed) cost factor that Staff applied to the "Total Direct Costs", as ordered by the ACC in Docket No. T-500000A-00-0104. These changes are included on pages 20-22 of the cost study.

4. Staff eliminated the building and COE building factors on page 20 of the study. There should be no additional building costs to house the cabinet, since the cabinet itself is the "building" for the equipment. This change is included on page 20 of the study.

Rate E[illegible]
PhaseIIRemoteTermOurs.xls

Collocation: Remote Terminal

Remote Terminal Collocation: Arizona

Rate Summary*

	NRC	RC
Space (per Standard Mounting Unit)	$ 406.50	$ 0.63
FDI Terminations (per binder group (25-PR))	$ 485.82	$ 0.71
Power (see Collocation rates)		

* Costs Not Included:
- Shelf Cost
- Element Management System (EMS)
- Remote Test Access Unit
- Technician time to re-jumper the FDI through DA Hotel.

PROPRIETARY

PROPRIETARY

QWEST'S STUDY FOR NON-RECURRING

ANALOG LINE SIDE PORT

'ROPRIETARY**

NONRECURRIN_ _OST DETAIL SUMMARY

Study Name: ARIZONA DOCKET NONRECURRING ELEMENTS
Study Year: 2001
Analyst: Deffley
Product Group: Interconnection
State: Arizona

ENRC Version: 2.14
Date: 06/20/01

Work Item	Time Minutes	Prob #1	Prob #2	Prob #3	Prob #4	Applied Time (Minutes)	Labor /Minutes	Cost
A	B	C	D	E	F	G	H	I
						B * (C Thru F)		H * G
ANALOG LINESIDE PORT FIRST								
ADD								
-INTERCONNECT SERVICE CENTER (ISC)								
Reviews LSR (Local Service Request) for completeness and accuracy	0.5	1.000				0.50	$0.65	$0.33
Verifies CFA (Connecting Facilities Arrangement) in TIRKS (Trunk InventoryRecords Keeping Sy	2.5	1.000				2.50	$0.65	$1.63
Analyzes request to determine the co-provider, type of order and installation option	2.5	1.000				2.50	$0.65	$1.63
Verify if U S West service is to be disconnected	1	1.000				1.00	$0.65	$0.65
Determine if the end user has U S West directory advertising	1	1.000				1.00	$0.65	$0.65
Determine if the end user has U S West retail contract	1	1.000				1.00	$0.65	$0.65
Validates switch location and determine switch port availability	5	1.000				5.00	$0.65	$3.26
Obtain telephone numbers	5	1.000				5.00	$0.65	$3.26
Determine crtical dates	2	1.000				2.00	$0.65	$1.31
.5 probability is % accounts forecasted to have directory advertising.								
Remove directory assistance account	3	0.500				1.50	$0.65	$0.98
Review FOC (Firm Order Confirmation)	1	1.000				1.00	$0.65	$0.65
Input unbundled port order into service order processor	10	1.000				10.00	$0.65	$6.53
Subtotal - INTERCONNECT SERVICE CENTER (ISC)						33.00		$21.54
-LOOP PROVISIONING CENTER (LPC)								
.4 weighting is probability order will fall out for manual assistance.								
Clear RMA (Request for manual assistance)	11.25	0.400				4.50	$0.63	$2.83
Subtotal - LOOP PROVISIONING CENTER (LPC)						4.50		$2.83
-DESIGN								
Probabilities are % manual work required. Reciprocal is mechanization rate.								
Order handling/screening	5	0.200				1.00	$0.74	$0.74
GOC (Generic Order Control) order log	6	0.200				1.20	$0.74	$0.89
Enter WA (Work Authorization) mask	5	0.100				0.50	$0.74	$0.37
Prepare loop input/DRI (Design Related Information)	10	0.200				2.00	$0.74	$1.48
Circuit design	20	0.100				2.00	$0.74	$1.48
Distribute WORD (Work Order Record Detail) document	2	0.050				0.10	$0.74	$0.07
Subtotal - DESIGN						6.80		$5.02
-CENTRAL OFFICE RESOURCE ADMINISTRATION CENTER (CORAC)								
.15 probability is % orders that require manual dispatch.								
.03 probability is % orders when workitem performed in unmanned office.								
Screen order	2	0.150				0.30	$0.63	$0.19
Load work request to technician	5	0.150				0.75	$0.63	$0.47
Close out work request with technician	3	0.150	0.030			0.01	$0.63	$0.01

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ROPRIETARY

NONRECURRIN_ _OST DETAIL SUMMARY

Study Name: ARIZONA DOCKET NONRECURRING ELEMENTS
Study Year: 2001
Analyst: Deffley
Product Group: Interconnection
State: Arizona

ENRC Version: 2.14
Date: 06/20/01

Work Item	Time (Minutes)	Prob #1	Prob #2	Prob #3	Prob #4	Applied Time (Minutes)	Labor/Minutes	Cost
A	B	C	D	E	F	G	H	I
						B * (C Thru F)		H * G
ANALOG LINESIDE PORT FIRST (con't)								
Subtotal - CENTRAL OFFICE RESOURCE ADMINISTRATION CENTER (CORAC)						1.06		$0.67
-CENTRAL OFFICE FRAMES								
2 probability is for cross-connects placed at Main Distributing Frame and Interconnect Distribution Frame.								
Analyze order	5	1.000				5.00	$0.73	$3.65
Complete cross connect	4	2.000				8.00	$0.73	$5.84
Dial Tone and AIN test	1	1.000				1.00	$0.73	$0.73
Complete work request with CCT-I (Customer Communication Technician-Implementor)	3	1.000				3.00	$0.73	$2.19
Post work request complete in WFA-DI (Work Force Administration - Dispatch In Module)	2	1.000				2.00	$0.73	$1.46
Subtotal - CENTRAL OFFICE FRAMES						19.00		$13.87
-SERVICE DELIVERY IMPLEMENTOR								
Screen WFA (Work Force Administration) for circuit	10	1.000				10.00	$0.73	$7.30
Verify LNO completion	5	1.000				5.00	$0.73	$3.65
Test Circuit	15	1.000				15.00	$0.73	$10.95
Notify customer	5	1.000				5.00	$0.73	$3.65
Complete circuit in WFA/C	10	1.000				10.00	$0.73	$7.30
Subtotal - SERVICE DELIVERY IMPLEMENTOR						45.00		$32.86
DISCONNECT								
-INTERCONNECT SERVICE CENTER (ISC)								
Reviews LSR (Local Service Request) for completeness and accuracy	1	1.000				1.00	$0.65	$0.65
Verifies existing account and obtains closing bill address	2	1.000				2.00	$0.65	$1.31
Input disconnect of port order into the service order processor	8	1.000				8.00	$0.65	$5.22
Subtotal - INTERCONNECT SERVICE CENTER (ISC)						11.00		$7.18
-DESIGN								
Probabilities are % manual work required. Reciprocal is mechanization rate.								
Order handling/screening	5	0.100				0.50	$0.74	$0.37
GOC (Generic Order Control) order log	6	0.100				0.60	$0.74	$0.44
Enter WA (Work Authorization) mask	5	0.100				0.50	$0.74	$0.37
Disconnect circuit	5	0.100				0.50	$0.74	$0.37
Distribute WORD (Work Order Record Detail) document	2	0.050				0.10	$0.74	$0.07
Subtotal - DESIGN						2.20		$1.62
-CENTRAL OFFICE FRAMES								
2 probability is for cross-connects removed at Main Distributing Frame and Interconnect Distribution Frame.								
Analyze order	5	1.000				5.00	$0.73	$3.65

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NONRECURRIN_ COST DETAIL SUMMARY

Study Name: ARIZONA DOCKET NONRECURRING ELEMENTS
Study Year: 2001
Analyst: Deffley
Product Group: Interconnection
State: Arizona

Work Item	Time Minutes	Prob #1	Prob #2	Prob #3	Prob #4	Applied Time (Minutes)	Labor /Minutes	Cost
A	B	C	D	E	F	G B * (C Thru F)	H	I H * G
ANALOG LINESIDE PORT FIRST (con't)								
Remove cross-connect	2.3	2.000				4.60	$0.73	$3.36
Complete work request in WFA-DI (Work Force Administration - Dispatch In Module)	2	1.000				2.00	$0.73	$1.46
Subtotal - CENTRAL OFFICE FRAMES						11.60		$8.47
SERVICE DELIVERY IMPLEMENTOR								
Screen WFA (Work Force Administration) for circuit	5	1.000				5.00	$0.73	$3.65
Contact customer	5	1.000				5.00	$0.73	$3.65
Complete circuit in WFA/C (Work Force Administration - Control Module)	5	1.000				5.00	$0.73	$3.65
Subtotal - SERVICE DELIVERY IMPLEMENTOR						15.00		$10.95
Total For Service:						149.16		$105.02

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Phase II-A
Docket No. T-00000A-00-0194

NONRECURRING COST DETAIL SUMMARY

Study Name: ARIZONA DOCKET NONRECURRING ELEMENTS
Study Year: 2001
Analyst: Deffley
Product Group: Interconnection
State: Arizona

	Work Item	Time Minutes	Prob #1	Prob #2	Prob #3	Prob #4	Applied Time (Minutes)	Labor Minutes	Cost
	A	B	C	D	E	F	G	H	I
							B * (C Thru F)		H * G

ANALOG LINESIDE PORT FIRST (con't)

18002	Direct Cost				$105.02				
18003									
18004		Costs Calculation		Costs Factor	Costs				
18005									
18006		B		D	E				
18007	*Directly Assigned*								
18008	Product Management Expense	D18008*E18002		0.034281	$3.60				
18009	Sales Expense	D18009*E18002		0.011333	$1.19				
18010	Product Advertising Expense	D18010*E18002		0.000000	$0.00				
18011	Business Fees (Other Operating Taxes)	D18011*Sum(E18002:E18010)		0.001848	$0.20				
18012	*Directly Assigned Costs*	Sum(E18002:E18011)			$4.99				
18013									
18014	*Total Direct Costs*	E18002+E18012			$110.01				
18015									
18016	*Directly Attributed*								
18017	Network Operations	D18017*E18014		0.050289	$5.53				
18018	Network Support Assets	D18018*E18014		0.015375	$1.69				
18019	General Support Assets	D18019*E18014		0.080638	$8.87				
18020	General Purpose Computers	D18020*E18014		0.036437	$4.01				
18021	Uncollectible	D18021*E18014		0.001017	$0.11				
18022	Accounting & Finance Expense	D18022*E18014		0.009035	$0.99				
18023	Human Resources Expense	D18023*E18014		0.008723	$0.96				
18024	Information Management Expense	D18024*E18014		0.061932	$6.81				
18025	Intangibles	D18025*E18014		0.002516	$0.28				
18026	*Directly Attributed Costs*	Sum(E18017:E18025)			$29.26				
18027									
18028	*TELRIC*	E18017+E18026			$139.27				
18029									
18030	*Common*								
18031	Executive Expense	D18031*E18028		0.006949	$0.97				
18032	Planning Expense	D18032*E18028		0.000598	$0.08				
18033	External Relations Expense	D18033*E18028		0.009812	$1.37				
18034	Legal Expense	D18034*E18028		0.006427	$0.90				
18035	Other Procurement Expense	D18035*E18028		0.002432	$0.34				
18036	Research & Development Expense	D18036*E18028		0.000037	$0.01				
18037	Other General and Admin Expense	D18037*E18028		0.018952	$2.64				
18038	*Common Costs*	Sum(E18031:E18037)			$6.30				
18039									
18040	*TELRIC + Common Costs*	E18028+E18038			$145.57				

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Phase II-A
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NON-RECURRING PORT RATES

		U-3021-96-448, et. al. Current Rates	Qwest Proposed (Exhibit RHB-1)	ATT/Worldcom/XO Proposed (Hydock Direct Testimony May 18, 2001 ATT Exhibit MH-1)		Staff Proposed Rate
				CONNECT	DISCONNECT	
9.11.1	Analog Line Side Port - First Port	$42.58	$145.57	$1.68	$1.57	$42.58
9.11.2	Analog Line Side Port - Each Additional	$42.58	$95.75	NA	NA	$42.58
9.11.8	DSO Analog Trunk Port					
	First Port	$42.58	$123.11	$1.68	$1.57	$42.58
	Each Additional	$42.58	$28.75	NA	NA	$42.58 or less

EXHIBIT
S-9
Admitted

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
Chairman
JIM IRVIN
Commissioner
MARC SPITZER
Commissioner

IN THE MATTER OF THE INVESTIGATION INTO U S WEST COMMUNICATION, INC.'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS.	**DOCKET NO. T-00000A-00-0194** **NOTICE OF ERRATA FILING PHASE II-A SWITCHING REBUTTAL TESTIMONY**

On September 27, 2001, the Arizona Corporation Commission Staff ("Staff") filed the redacted rebuttal testimony of William Dunkel in the above-referenced matter. Staff hereby files this errata to the redacted rebuttal testimony to correct Schedule WD-2, page 2 of 2. (This schedule was not deemed proprietary.) Please substitute the attached page 2 of 2 for that page contained in Staff's September 27, 2001, filing.

RESPECTFULLY SUBMITTED this 22nd day of October, 2001.

Maureen A. Scott

Maureen A. Scott, Attorney
Legal Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007
Telephone: (602) 542-6022
Facsimile: (602) 542-4870
e-mail: maureenscott@cc.state.az.us

The Original and ten (10) copies of the foregoing filed this ____ day of October, 2001 with:

Docket Control
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007

Copies of the foregoing were mailed this
____ day of October, 2001 to:

Jon Poston
Arizonans for Competition in Telephone Service
6733 East Dale Lane
Cave Creek, Arizona 85331-6561

Richard S. Wolters
AT&T Communications of the Mountain States, Inc.
1875 Lawrence Street, Room 1575
Denver, CO 80202-1847

Mary E. Steele
Davis-Wright-Tremaine
2600 Century Square
1505 – 4th Avenue
Seattle, WA 98101-1688

Joan Burke
Osborn Maledon, P.A.
2929 N. Central Avenue, 21st Floor
Phoenix AZ 85067-6379

Gregory Kopta
Davis Wright Tremaine
2600 Century Square
1501 Fourth Avenue
Seattle, WA 98101-1688

Drake Tempest
Qwest Communications
555 Seventeenth Street
Denver, CO 80202

Kathryn E. Ford
QWEST COMMUNICATIONS, INC.
1801 California Street, Suite 4900
Denver, CO 80202

Timothy Berg
Fennemore Craig, P.C.
3003 North Central Avenue, Suite 2600
Phoenix, AZ 85012

Michael W. Patten
Roshka Heyman & DeWulf
One Arizona Center
400 East Van Buren, Suite 800
Phoenix, AZ 85004

Jeffrey W. Crockett
Jeffrey B. Guldner
Snell & Wilmer L. L. P.
One Arizona Center
Phoenix, AZ 85004-2202

Steve Sager
McLeodUSA
215 S. State Street, 10th Floor
Salt Lake City, Utah 84111

Rex Knowles
Nextlink Communications
111 East Broadway, Suite 1000
Salt Lake City, Utah 84111

Michael Grant
Todd C. Wiley
GALLAGHER & KENNEDY
2575 E. Camelback Road
Phoenix, AZ 85016-9225

Thomas H. Campbell
LEWIS & ROCA
40 N. Central Avenue
Phoenix, AZ 85007

Thomas F. Dixon, Jr.
MCI WORLDCOM
707 17th Street
Denver, CO 80202

Eric S. Heath, Esq.
SPRINT COMMUNICATIONS CO., L.P.
100 Spear Street, Suite 930
San Francisco, CA 94105

Scott S. Wakefield
RUCO
2828 N. Central Avenue, Suite 1200
Phoenix, AZ 85004

Timothy Peters
ELECTRIC LIGHTWAVE, INC.
4400 NE 77th Avenue
Vancouver, WA 98668

Douglas Hsiao
RHYTHMS LINKS, INC.
6933 S. Revere Pkwy.
Englewood, CO 80112

NEW EDGE NETWORKS
P.O. Box 5159
3000 Columbia House Blvd.
Vancouver, WA 98668

Andrea Harris, Sr. Mgr.
ALLEGIANCE TELECOM INC. OF AZ
2101 Webster, Suite 1580
Oakland, CA 94612

K. Megan Doberneck
COVAD COMMUNCIATIONS
4250 Burton Street
Santa Clara, CA 95054

Traci Grundon
DAVIS, WRIGHT TREMAINE L.L.P.
1300 S.W. Fifth Avenue
Portland, OR 97201
Attorneys for Nextlink, Inc., & ATG, Inc.

Marti Allbright, Esq.
Mpower Communications Corp.
5711 South Benton Circle
Littleton, Colorado 80123

Dennis D. Ahlers, Sr. Attorney
Eschelon Telecom, Inc.
730 Second Ave. South, Ste 1200
Minneapolis, MN 55402

Janet Livengood, Reg. VP
Z-Tel
601 S. Harbour Is. Blvd.
Tampa, FL 33602

Michael B. Hazzard
Kelley Drye & Warren LLP
1200 – 19th St., NW 5th Fl.
WA DC 20036

Ray Heyman
Roshka-Heyman & DeWulf
One Arizona Center
400 East Van Buren, Suite 800
Phoenix, AZ 85004
Attorneys for Alltel Communications

Lyndon J. Godfrey
Vice President – Government Affairs
AT&T
111 West Monroe, Suite 1201
Phoenix, AZ 85003

Kevin Chapman
Director-Regulatory Relations
SBC Telecom, Inc.
5800 Northwest Parkway
Suite 125, Room 1-S-20
San Antonio, TX 78249

Thomas H. Campbell
LEWIS & ROCA
40 N. Central Avenue
Phoenix, AZ 85004

Brian Thomas
Vice-President Regulatory-West
Time Warner Telecom, Inc.
520 S.W. 6th Avenue, Suite 300
Portland, Oregon 97204

By: ______________________
Assistant to Maureen A. Scott

s-legal-mai-maureen-pleading 00-194 noffilingphaseII-rebut errata

Schedule WD-2
Revised page 2 of 2
Phase II-A
Docket No. T-00000A-00-0194

		Annual Cost	Units			Unit Cost	
End office switching	$	130,175,079					
Line Port		39,052,524	2,959,791	switched lines	$	1.10	per line/month
Non-Line Port		91,122,555	62,141,633,323	actual minutes	$	0.00147	per actual minute (for rate per DEM, see "Cost detail" sheet)
Signaling network elements	$	5,012,332					
Links		172,224	511	links	$	28.08	per link per month
STP		2,537,787	41,094,682,805	TCAP+ISUP msgs	$	0.00006	per signaling message
SCP		2,302,321	2,118,313,400	TCAP queries	$	0.00109	per query
Transport network elements							
Dedicated							
Sw+Sp Transport	$	8,749,095	351,789	trunks	$	2.07	per DS-0 equivalent per month
Switched		3,443,640	138,464	trunks	$	0.00021	per minute
Special		5,305,455	213,325	trunks			
Transmission Terminal		19,263,003	351,789	trunks	$	4.56	per DS-0 equivalent per month
					$	0.00045	per minute
					$	0.00066	total per minute
Common							
Transport	$	1,319,573	3,703,400,627	minutes	$	0.00034	per minute per leg (orig or term)
Transmission Terminal		1,875,906	3,703,400,627	minutes	$	0.00048	per minute
					$	0.00081	total per minute
Direct							
Transport	$	4,963,127	16,120,464,725	minutes	$	0.00031	per minute
Transmission Terminal		8,550,617	16,120,464,725	minutes	$	0.00053	per minute
					$	0.00084	total per minute
Tandem switch	$	1,963,948	3,322,868,975	minutes	$	0.00059	per minute

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO] QWEST CORPORATION'S COMPLIANCE] WITH CERTAIN WHOLESALE PRICING] REQUIREMENTS FOR UNBUNDLED] NETWORK ELEMENTS AND RESALE] DISCOUNTS.]	DOCKET NO. T-00000A-00-0194 PHASE II-A

TESTIMONY OF

ROBERT H. BRIGHAM

ON BEHALF OF

QWEST CORPORATION

AUGUST 31, 2001

INDEX OF TESTIMONY

EXECUTIVE SUMMARY

Purpose of Testimony

On August 3, 2001, a stipulation was filed by Qwest, AT&T, Worldcom, XO, Cox and Staff proposing to defer local interconnection and switching cost issues to the present phase of this proceeding. On August 7, 2001, the Commission approved this stipulation. Therefore, my testimony is presenting costs and rates for Local Interconnection Service (LIS) elements and switching Unbundled Network Elements (UNEs), as summarized in Exhibit RHB-1.

Studies Filed

The Commission should consider TELRIC data filed by Qwest in the previous phase of this docket, as well as several new studies Qwest is filing with this testimony.

First, in the present phase of this docket, the Commission should consider TELRIC data filed with the rebuttal testimony of Ms. Teresa Million on June 27, 2001, for the following LIS and UNE elements:

Element	Recurring Study	Nonrecurring Study
Local Interconnection Service		
• End Office Call Termination	Study 5206 (ICM)	NA
• Tandem Switching	Study 5206 (ICM)	NA
• Tandem Transmission	Study 5206 (ICM)	NA
Unbundled Network Elements		
• Analog Line Side Port (excluding Features)	Study 5206 (ICM)	Study 5207
• Features	(New Study)	Study 5207
• Local Switching Usage	Study 5206 (ICM)	NA
• Digital Line Side Port (BRI ISDN)	Study 5206 (ICM)	Study 5207
• Digital Trunk Ports (DS1 Message, PRI ISDN, DID)	Study 5206 (ICM)	Study 5207
• Analog Trunk Port	Study 5206 (ICM)	NA
• Packet Switching	(New study)	Study 5299 Study 5300
• Subsequent Order Charge	NA	Study 5207

The Commission should also consider the new TELRIC data that I am providing for the following elements:

Element	Recurring Study	Nonrecurring Study
Unbundled Packet Switching	5646	(Existing study)
Analog Line Side Port (Features)	Study 5541 & 5542	NA
Customized Routing	NA	Study 5611
Remote Terminal Collocation	Study 5635	Study 5635

Exhibit RHB-1 provides a summary of Qwest's proposed TELRIC-based costs/prices for the LIS and UNE elements that are under consideration in this proceeding. Exhibit RHB-2, which is provided in compact disc format, contains the new cost studies that Qwest is filing at this time.

Conclusion

The Commission should establish prices for LIS and UNE elements based on the new and existing TELRIC data that Qwest has filed in this docket. The Qwest cost studies follow an appropriate TELRIC methodology, and are designed to fully comply with the FCC's TELRIC rules.

I. IDENTIFICATION OF WITNESS

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND POSITION WITH THE QWEST CORPORATION.

A. My name is Robert H. Brigham. My business address is 1801 California Street, Denver, Colorado. I am employed as a Director - Service Costs in the Qwest Services Corporation Policy and Law department. I am testifying on behalf of Qwest Corporation ("Qwest").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND EMPLOYMENT EXPERIENCE.

A. In 1983, I received a Master of Business Administration (MBA) degree from the University of Colorado in Denver, Colorado. My area of emphasis was financial analysis. I received a Bachelor of Arts degree in 1974 from Stetson University in Deland, Florida.

I began my employment with Qwest (formerly Mountain Bell and U S WEST) in 1976. Between 1976 and 1980, I held various positions in the Mountain Bell Commercial (marketing) department. In 1980, I accepted the position of Analyst in the Cost, Rates and Regulatory Matters department, working primarily on the development of embedded cost data. In June 1987, I accepted the position of Manager in the U S WEST Service Cost organization, with responsibility for economic analysis and the development of incremental costing methodologies. In September 1992, I accepted the position of Director- Product Cost Specialist, and assumed responsibility for developing and supporting U S WEST cost studies in formal regulatory proceedings, and representing U S WEST in costing and pricing workshops sponsored by various regulatory commissions in the U S WEST region. Between May 1994, and June 1997, I served as Director- Product and Market Issues. In that position, I managed competitive and local interconnection issues for U S WEST and supported U S WEST's interconnection negotiation and arbitration efforts. In June 1997, I rejoined the U S WEST cost organization as Director- Service Costs. In my current position with Qwest, I am responsible for managing cost issues, developing cost methods and representing Qwest in proceedings before regulatory commissions.

Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY BEFORE THIS COMMISSION?

A. Yes. I previously presented cost testimony in Docket E-1051-93-183.

Q. HAVE YOU TESTIFIED BEFORE OTHER STATE REGULATORY COMMISSIONS?

A. Yes. I have presented testimony before commissions in Colorado, Iowa, Montana, Nebraska, New Mexico, North Dakota, Oregon, South Dakota, Utah and Wyoming.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to present Total Element Long Run Incremental Cost (TELRIC) data in support of Qwest's Statement of Generally Available Terms and Conditions (SGAT). This cost data serves as the basis for Qwest's pricing proposals in this phase of this proceeding.

On August 3, 2001, a stipulation was filed by Qwest, AT&T, Worldcom, XO, Cox and Staff proposing to defer local interconnection and switching cost issues to the present phase of this proceeding. On August 7, 2001, the Commission approved this stipulation. Therefore, at this time, Qwest is proposing costs and rates for Local Interconnection Service (LIS) elements and switching Unbundled Network Elements (UNEs). The TELRIC results for these elements provide the basis for the proposed prices that are summarized in Exhibit RHB-1.

III. QWEST TELRIC DATA

A. Recurring and Nonrecurring Costs

Q. DO QWEST'S TELRIC STUDIES IDENTIFY RECURRING AND NONRECURRING COSTS?

A. Yes. *Recurring costs* are the ongoing costs associated with providing a service. These costs are generally investment-related and include both capital costs and operating expenses. Recurring costs are often presented as a flat cost per month or per unit of usage (e.g., minute of use) and are incurred throughout the time period the service is provided to a customer. *Nonrecurring costs* include the one-time costs that are incurred at the time a customer establishes, disconnects or changes service. These costs normally result from a customer order and are predominantly labor-related.[1]

Q. PLEASE SUMMARIZE HOW RECURRING COSTS ARE CALCULATED.

A. The Integrated Cost Model (ICM) *and the additional Qwest recurring cost studies* filed in this case employ the same basic procedures to arrive at a monthly recurring TELRIC cost estimate:

[1] For collocation elements, including Remote Terminal Collocation, the cost of installing equipment (material and labor) are considered to be a nonrecurring cost.

1. **Define the Network Element or Service**. The cost analyst works with Qwest product management and technical staff to define the element or service to be studied. This step includes identification of all the network components that are needed to provide the element or service, and an estimation of demand for the element or service.

2. **Development of Investment.** The investment required to provide the service or element is developed. The investment includes the actual vendor prices for material and equipment, plus the cost to place the equipment, including capitalized labor costs. Determination of the correct amount of investment is key to the accuracy of any predictive cost model. Therefore, in addition to utilizing actual vendor material information and contractor or internal placement costs, Qwest relies on sound engineering practices to model the amount of investment needed to provide a given service at a particular level of usage or demand.

3. **Estimation of Investment-related Capital Costs.** Investment-related capital costs (depreciation, cost of money, income tax) are calculated based on the application of annual cost factors to the investment. Capital costs comprise a large portion of total service cost, and the level of capital cost is impacted by the depreciation lives for the relevant plant accounts and the weighted cost of debt and equity capital.

4. **Estimation of Operating Costs.** Operating expenses are estimated, in most cases, utilizing annual cost factors. Investment-related operating expenses (e.g., maintenance expense) are calculated based on annual cost factors that are applied

to investment, while other operating expenses (e.g., marketing expenses) are normally calculated based on factors that are applied to the investment-related costs. These cost factors consider the historic relationships between expenses and investment that the Company has experienced in the past, adjusted for inflation/deflation and productivity increases. These operating expenses are added to the capital costs to provide the TELRIC for the network element.

An appropriate share of common costs is allocated to the TELRIC costs to yield the total cost (TELRIC plus Common).

5. **Validation of Results**. After costs have been estimated, this data is reviewed and cross-checked with other cost data, to assure reasonableness. Results are compared across states and across services. TELRIC results are also compared with cost results derived from other cost models.

Q. PLEASE SUMMARIZE THE GENERAL PROCEDURES THAT QWEST USES TO CALCULATE NONRECURRING COSTS.

A. Qwest calculates nonrecurring costs utilizing the following five step process:

1. The cost analyst, working with a product team, identifies the one-time activities necessary to establish a particular service or network element. For example, establishing an ISDN BRI Line Side Port for a customer normally requires order-related activities to be performed by the Interconnection Service Center (ISC), the Recent Change Memory Administration Center (RCMAC) and other groups.

2. Based on special studies and input from subject matter experts, the cost analyst estimates the *work time* associated with each of these non-recurring activities, and the *probability* that each activity will occur.

3. The cost analyst then determines the appropriate labor rate for the personnel performing each work activity. The time estimates, probabilities and labor rates are loaded into the Enhanced Nonrecurring Cost (ENRC) model, which multiplies the time estimate by the probability of occurrence and the appropriate labor rate to develop the direct nonrecurring cost of each work activity.

4. The nonrecurring costs for each separate activity are aggregated into a direct nonrecurring cost for each unbundled network element.

5. Annual cost factors are applied to assign additional administrative and other costs to the direct nonrecurring costs, resulting in the nonrecurring TELRIC. An appropriate share of common costs is also allocated to each element.

B. Studies Filed

Q. WHAT TELRIC DATA SHOULD THE COMMISSION CONSIDER IN THE PRESENT PHASE OF THIS PROCEEDING?

A. The Commission should consider TELRIC data filed by Qwest in the previous phase of this docket, as well as several new studies Qwest is filing with this testimony.

Q. PLEASE DESCRIBE THE PREVIOUSLY FILED TELRIC DATA THAT THE COMMISSION SHOULD CONSIDER AT THIS TIME.

A. On August 3, 2001, Qwest, AT&T, Worldcom, XO, Cox, Sprint and Staff stipulated to defer cost/price issues regarding Local Interconnection Service (LIS) and switching Unbundled Network Elements (UNEs) to the present phase of this docket. On August 7, 2001, the Commission approved this stipulation, and set a procedural schedule for the present phase of the proceeding.

While LIS and switching UNE issues have been deferred to the present phase of this proceeding, Qwest has already filed most of the relevant cost studies with the Commission in the previous phase of this docket. On March 15, 2001, Qwest filed the Integrated Cost Model (ICM) with the Commission, along with several additional TELRIC studies. On June 27, 2001, the ICM and the additional studies were updated, primarily to reflect the 9.61% cost of money ordered by the Commission. Since up-to-date cost data was filed in June for the LIS elements and most of the switching UNE elements, the Commission should rely on this data for consideration in this phase of the docket.

Q. WHICH OF STUDIES FILED ON JUNE 27, 2001 SHOULD BE CONSIDERED IN THE PRESENT PHASE OF THIS PROCEEDING?

A. In the present phase of this docket, the Commission should consider TELRIC data filed with the rebuttal testimony of Ms. Teresa Million on June 27, 2001, for the following LIS and UNE elements:

Element	Recurring Study	Nonrecurring Study
• Local Interconnection Service		
• End Office Call Termination	Study 5206 (ICM)	NA
• Tandem Switching	Study 5206 (ICM)	NA
• Tandem Transmission	Study 5206 (ICM)	NA
• Unbundled Network Elements		
• Analog Line Side Port (excluding Features)	Study 5206 (ICM)	Study 5207
• Features	(New Study-See below)	Study 5207
• Local Switching Usage	Study 5206 (ICM)	NA
• Digital Line Side Port (BRI ISDN)	Study 5206 (ICM)	Study 5207
• Digital Trunk Ports (DS1 Message, PRI ISDN, DID)	Study 5206 (ICM)	Study 5207
• Analog Trunk Port	Study 5206 (ICM)	NA
• Packet Switching	(New study –See below)	Study 5299 Study 5300
• Subsequent Order Charge	NA	Study 5207

Q. WERE THESE COST STUDIES FILED AS EXHIBITS TO MS. MILLION'S JUNE 27, 2001 TESTIMONY?

A. Yes. These TELRIC studies were provided via compact disc as exhibits to the June 27, 2001 rebuttal testimony of Ms. Million. The following table provides a mapping of the cost studies to Ms. Million's exhibits:

Study	Exhibit
Study 5206 (ICM)	TKM-02R
Study 5299 (Packet Switching-N)	TKM-22R
Study 5300 (Packet Switching –N)	TKM-21R
Study 5207 (Nonrecurring elements)	TKM-03R

Q. WHAT NEW COST STUDIES IS QWEST FILING AT THIS TIME?

A. Qwest is filing new TELRIC data for the following elements:

Element	Recurring Study	Nonrecurring Study
• Unbundled Packet Switching	5646	(Existing study-See above)
• Analog Line Side Port (Features)[2]	Study 5541 & 5542	NA
• Customized Routing	NA	Study 5611
• Remote Terminal Collocation	Study 5635	Study 5635

Q. ARE YOU PROVIDING AN EXHIBIT THAT SUMMARIZES THE COST RESULTS?

A. Yes. Exhibit RHB-1 provides a summary of the TELRIC-based costs/prices for the LIS and UNE elements that are under consideration in this proceeding. Exhibit RHB-2, which is provided in compact disc format, contains the five new cost studies listed above.[3]

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[2] As described below, new cost data is being filed for vertical features. The NTS portion of the analog line port costs are included in Study 5206 (ICM), which was filed on June 27, 2001.

[3] After producing the compact disc containing the cost studies, Qwest discovered that the executive summary provided with study 5542 (Cap Lease Port) is in error. I am providing a corrected executive summary as

C. The ICM Switching Module

Q. WILL YOU DESCRIBE THE INTEGRATED COST MODEL IN YOUR TESTIMONY?

A. I will not descibe the overall Integrated Cost Model (ICM) in my testimony, since the model was described by Ms. Teresa Million in her March 15, 2001 testimony in the previous phase of this docket. However, I will describe the Switching Cost Model (SCM) that is contained within the ICM.

1. General Description

Q. PLEASE BRIEFLY DESCRIBE THE ICM SWITCHING COST MODEL (SCM) THAT IS USED TO CALCULATE SWITCHING COSTS.

A. The Switching Module of the ICM calculates switch investments utilizing the Switching Cost Model (SCM) program, which is incorporated into the ICM. The purpose of the SCM is to provide per-unit switching investments for various services, features and functions, including line and trunk ports, local switching usage and vertical features.

SCM contains four major modules. The **SCM Core** module calculates busy hour investments by switching function. SCM Core uses engineering information, along with the discounted vendor price for various equipment components, to develop a cost for each function performed by the switch. SCM Core produces costs for functions such as:

Exhibit RHB-2A of my testimony. This summary replaces the study 5542 executive summary contained on the compact disc.

- Investment per analog line
- Investment per processor millisecond
- Investment per network CCS
- Investment per 3-port conference circuit

The **SCM Features** module develops unit investments for vertical features, such as custom calling services.[4] This module uses SCM Core outputs, along with feature usage data, to calculate the cost of a feature, usually on an investment per line basis. For example, Three Way Calling investment is developed by using the SCM Core outputs for "Investment per Millisecond" and "Investment per 3 Port Conference Circuit CCS," along with usage data (e.g., average Three Way Calling busy hour CCS and calls) to derive the Three Way Calling investment per line.

The **SCM Calls** module develops the switching cost per line, and the switching cost for various types of calls:

- Line to line
- Line to trunk
- Trunk to line
- Trunk to trunk

[4] The costs for individual vertical features are calculated in Study 5541, and are not included in the ICM output (Study 5206). However, the feature investments are calculated in the SCM.

The SCM Calls module develops these costs on a per busy hour attempt and per busy hour conversation minute basis, utilizing SCM Core outputs along with data regarding how much of these outputs are consumed, for example, to set up a call.

The **SCM Usage** module converts busy hour unit investments from the SCM Calls module into an investment per call setup and per minute of use for various types of calls. These data are used to develop per minute of use switching costs.

Q. WHAT ARE THE PRIMARY COST DRIVERS THAT IMPACT THE SCM RESULTS?

A. The primary cost drivers for switching equipment include:

- The prices charged to Qwest by switch vendors
- The busy-hour demand per line and per trunk within a switch
- The number of lines served by the switch
- The trunk to line ratio required to meet the demand on the switch

Q. HOW IS THE DATA FROM THE SWITCHING MODULE USED IN THE ICM?

A. The Switching Module calculates switching investments for local switching, tandem switching, end office analog ports, and vertical features.[5] These investments are converted to monthly or per minute of use costs via the application of cost factors, as depicted in the ICM Output Workbook.

[5] As noted earlier, the costs for individual vertical features are included in Study 5541, and are not included in the ICM output. However, the feature investments are calculated in the SCM.

Q. DOES THE QWEST ICM MANUAL CONTAIN A MORE DETAILED DESCRIPTION OF THE SWITCHING COST MODEL?

A. Yes. The ICM manual and the SCM user manual are included in Exhibit TKM-02R, which was filed on June 27, 2001.

2. Switching Module Inputs

Q. WHAT ARE THE KEY INPUTS TO THE SWITCHING MODULE?

A. The key inputs in the Switch Module of ICM are: the Growth Rate, the Administrative Fill Factor for Analog Lines, the Administrative Fill Factor for Integrated Digital Lines, the Administrative Fill Factor for Digital Trunks, and the Average Business Day Equivalents per Year. In addition, the user can make changes to the vendor discount rates that are applied in the ICM for various vendor switches. Descriptions of these discounts are provided in the SCM User Manual.

Q. HOW DOES QWEST DETERMINE THE APPROPRIATE GROWTH RATE TO USE IN THE SWITCH MODULE?

A. The default growth rate input value is based on a five year forecast provided by Local Markets Forecasting using the Integrated Forecasting Tool. First, the forecasted growth in switched analog and integrated digital lines for 1999 through 2003 is determined. Next, this multi-year forecast is divided by 5 to derive an annual growth amount. The annual growth amount is then divided by the base-year demand (i.e., 1999) to determine the growth rate. The growth rate input value is 4.8984%.

Q. PLEASE EXPLAIN WHAT YOU MEAN BY A "FILL FACTOR."

A. "Fill" is an industry term for the assumed utilization to be placed on a piece of investment (e.g., loop plant or a switch) when determining the unit cost.

Q. HOW DOES QWEST DEVELOP THE RECOMMENDED DEFAULT ADMINISTRATIVE FILL FACTORS FOR ANALOG LINES, INTEGRATED DIGITAL LINES AND DIGITAL TRUNKS?

A. Administrative spare capacity for analog and digital lines is used to account for:

- Malfunctioning equipment (e.g., ports)
- Lines set aside for testing
- Lines used for administrative purposes (e.g., lines to Switching Control Center, Network Administration Center, etc.)
- Lines reserved for special events, e.g., once a year events such as state fairs (Wire center dependent)
- Lines set aside in case the line forecast is exceeded prior to a scheduled line growth job
- Churn of dedicated inside plant (lines that are disconnected but left in place for a limited time period awaiting a reconnect at the same location).

Based on an analysis of these various administrative needs, Qwest estimates that the administrative line fill factor for both analog and digital lines is 95%, or 5% administrative spare capacity.

Digital trunk spare capacity occurs because of the unused capacity due to the modularity of trunk ports. The term "modularity" refers to the minimum amount of capacity that must be added to meet the next increment of demand once current capacity reaches exhaustion.

Thus, as each new trunk group is added to meet demand, a certain amount of spare capacity will exist until demand "catches up with" available capacity. The average number of trunks per trunk group is 64, of which Qwest estimates an average of 12 trunks (half of a DS1) will not be in use at any given time because of the effect of modularity. Accordingly, the administrative fill factor due to modularity equals 52 / 64, or 81%.

Q. HOW ARE THE VENDOR DISCOUNTS IN THE SWITCHING MODULE DETERMINED?

A. The vendor discounts are based on actual vendor contracts that Qwest has negotiated with switch vendors. The latest available vendor discounts are entered into the ICM as default values and are contained on pages marked "Vendor Proprietary" in Exhibit TKM-02R, filed on June 27, 2001.

IV. DISCUSSION OF SPECIFIC COST STUDIES

A. Vertical Features / Analog Line Port

Q. PLEASE SUMMARIZE QWEST'S INITIAL PROPOSAL FOR FEATURE COSTS, AS DEFINED IN ITS MARCH 15, 2001 AND JUNE 27, 2001 TESTIMONY IN THE PREVIOUS PHASE OF THIS DOCKET.

A. In the previous phase of this docket, Qwest proposed that the Commission establish individual recurring rates for each vertical feature. These individual feature costs were presented in Exhibit TKM-09R, attached to the June 27, 2001 rebuttal testimony of Ms. Teresa Million. Qwest also proposed nonrecurring rates for some features based on the costs provided in Exhibit TKM-03R.

Q. IS QWEST PRESENTING A NEW RECOMMENDATION FOR THE TREATMENT OF FEATURE COSTS?

A. Yes. Several parties in this proceeding have advocated (in Arizona and in other states) that the cost of features should be included in the switch port.[6] In order to meet the expressed needs of these CLECs, Qwest agrees to move the recurring costs of features into the analog line port UNE. In sum, Qwest is withdrawing its earlier proposal to price features on an individual basis, and is instead proposing to include recurring feature costs in the analog line port UNE. Qwest is not providing a new recommendation for nonrecurring feature rates, which are based on the costs filed on June 27, 2001 (Study 5207; Exhibit TKM-03R).

Q. IN ORDER TO IDENTIFY THE NEW RECURRING COST/PRICE FOR THE ANALOG LINE PORT, WHAT COST DATA ARE YOU CONSIDERING?

A. The analog line port includes three cost components:

- Analog Line Port (including line card, NTS equipment) Study 5206 (ICM)
- Feature Cost per line Study 5541
- Capital Lease Right to Use Fees Study 5542

The price for the Analog Line Port is based on the sum of the costs for these three elements. The basic port cost is derived from the ICM provided in Exhibit TKM-02R filed on June 27, 2001, and the feature and capital lease right to use fee costs are derived from the cost data provided in Exhibit RHB-2 (Studies 5541 and 5542). Exhibit RHB-3 provides

[6] For example, in the earlier phase of this docket, witness Michael Hydock, testifying on behalf of AT&T, WorldCom and XO, stated on page 15 of his direct testimony that "the cost of such features should be part and parcel of the switching port element."

a summation of these elements, yielding the new analog line port rate that is delineated in Exhibit RHB-1.

Q. PLEASE DESCRIBE THE BASIC NTS ANALOG LINE PORT.

A. The first component of the Analog Line Port element, as identified in the ICM, provides access to the basic functionality of the switch, including signaling digit reception and translations, routing and rating, call supervision as well as access to interoffice services. This analog end office port component is a two-wire, POTS type line side switch connection. This component includes the non-traffic sensitive portion of the switch, including the line card and a portion of the main distribution frame.

Q. PLEASE SUMMARIZE THE PROCESS USED TO CALCULATE THE COST FOR THIS COMPONENT OF THE ANALOG PORT IN ICM.

A. The Switching Module of the ICM develops the investment for the analog line port. As described above, the "investment per analog line" is an output of SCM Core. This investment is converted into a monthly cost via the application of cost factors in the ICM.

Q. PLEASE SUMMARIZE THE PROCESS USED TO DEVELOP THE FEATURE COSTS ON A PER PORT BASIS IN STUDY 5541.

A. First, the investment for each feature is calculated utilizing the SCM Features module that I described in the previous section of my testimony. Second, the investment for each feature is converted to a cost per month based on the application of cost factors. Third, the per feature costs are converted to an aggregate feature cost per month, per port. To accomplish this, each individual feature cost is multiplied by the quantity for each feature, to derive a total monthly cost for each feature. The costs for all features are then aggregated to produce a total forward-looking cost for the market basket of features. This aggregate cost is then divided by total Arizona lines in service to derive a monthly feature cost per line.

Q. PLEASE DESCRIBE CAPITAL LEASE RIGHT TO USE FEES.

A. Capital Lease Right to Use fees represent fees paid by Qwest for switch applications software, including the fees paid by Qwest for features software. It does not include the cost of operating systems software, or generic switch upgrades. These costs are not recovered via any other element.

Q. PLEASE SUMMARIZE THE PROCESS USED TO DEVELOP THE CAPITAL LEASE RIGHT TO USE FEE COSTS ON A PER PORT BASIS IN STUDY 5542.

A. In the Capital Lease Right to Use fee study (Study 5542), Qwest has identified the per line capital lease expense incurred by Qwest for applications software, based on the Local Area Management Systems (LAMS) report. In the study, Qwest identifies the annual capital lease applications software expenses incurred by Qwest,[7] and divides this amount by the total number of Qwest lines.[8] The TELRIC is developed via the application of cost factors to the direct expense.

B. Other Switch Ports

Q. YOU HAVE DISCUSSED THE COSTS FOR THE ANALOG LINE PORT. HAS QWEST CALCULATED THE COSTS FOR OTHER TYPES OF SWITCH PORTS?

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7 ISDN and Number Portability expenses are removed.

8 For a more detailed description of the calculations, see the "variables" tab of cost study 5542 in Exhibit RHB-2.

A. Yes. As noted earlier, and as summarized in Exhibit RHB-1, Qwest has developed TELRIC for several types of ports, including the Digital Line Side Port (ISDN-BRI), DS1 digital trunk ports (Message, PRI, DID) and DS0 Analog Trunk Port. Definitions for these port elements are contained in the ICM documentation provided in Exhibit TKM-02R on June 27, 2001.[9]

Q. HOW ARE THE COSTS FOR THESE PORT ELEMENTS DEVELOPED?

A. The port investments are calculated using the Switching Module of the ICM (Study 5206). The investments are converted into a monthly cost per port utilizing annual cost factors.

C. Local Switching Usage

Q. PLEASE DESCRIBE THE SWITCHING USAGE ELEMENT.

A. The ICM (Study 5206) provides costs for two local switching usage elements. First, Qwest has calculated the costs for End Office call Termination, which is provided as a Local Interconnection Service (LIS) element. Second, Qwest has calculated the costs for the Switching Local Usage UNE. Both of these elements include the set up and duration costs associated with switching a call. However, the LIS Call Termination element does not include signaling, while the UNE Switching Usage element does include the costs for signaling (i.e., the SS7 network). When a CLEC purchases LIS Call Termination, signaling elements are purchased separately.

Q. HOW ARE THE LOCAL SWITCHING USAGE COSTS DEVELOPED?

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[9] For example, see the ICM "summary of results" tab of the ICM output workbook. If the user clicks on the element name, a description of the element will be displayed.

A. The local switching usage investments are calculated in the SCM Calls and SCM Usage modules of ICM, as described earlier in my testimony. These investments are converted into a cost per minute of use via the application of annual cost factors.

D. Unbundled Packet Switching

Q. PLEASE BRIEFLY DESCRIBE THE UNBUNDLED PACKET SWITCHING OFFERING.

A. In its Third Report and Order and Fourth Further Notice of Proposed Rulemaking, CC Docket No. 96-98, released November 5, 1999,[10] the FCC required packet switching to be unbundled in certain circumstances. These circumstances are discussed in the direct testimony of Ms. Malone.

In the situations where Qwest is required to offer packet switching, Qwest provides unbundled packet switch Interface Ports at either a DS-1 or DS-3 level in the central office. The ports are the physical entry points into the ATM Cell Relay Service Network and include the electronic equipment used in connecting the channel to the ATM Cell Relay Service Network. In addition, the service includes an unbundled packet switch Customer Channel that provides the path from the remote Digital Subscriber Line Access Multiplexer (DSLAM) to the interface port, including all functionality of the DSLAM. If the CLEC chooses to provide its own facility from the DSLAM to the central office, Qwest offers an alternative to the Customer Channel that only provides the DSLAM functionality. The recurring costs for these elements are calculated in Study 5646, which is contained in Exhibit RHB-2, and the results are summarized in Exhibit RHB-1.

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[10] At paragraph 313.

Q. ARE THERE NONRECURRING COSTS ASSOCIATED WITH UNBUNDLED PACKET SWITCHING?

A. Yes. Nonrecurring costs for the work activities involved in provisioning the DS1/DS3 ATM Switch Interface Port(s) necessary to connect the unbundled packet switch Customer Channel are calculated in cost study 5300. Nonrecurring costs are also calculated in study 5299 for work activities necessary to connect the unbundled packet switch Customer Channel and the Distribution Subloop at an established Field Connection Point (FCP) arrangement. The nonrecurring charges vary depending on the way the CLEC chooses to purchase the Distribution Subloop. Ms. Malone discusses three possible alternatives the CLECs have to purchase Distribution plant, either from Qwest or from another CLEC.

E. Remote Terminal Collocation

Q. PLEASE BRIEFLY DESCRIBE THE REMOTE TERMINAL COLLOCATION OFFERING.

A. Remote Terminal Collocation offers space in available remote cabinets on a Standard Mounting Unit (SMU) level. The Remote Terminal Collocation cost study (Study 5635) includes two cost elements: Collocation Space and the FDI Terminations.

The nonrecurring Collocation Space element includes the cost of the cabinet space, the cost of the cabinet and all of the work and materials associated with placement of the cabinet and providing access to power. The cost study identifies the cost of materials, engineering, splicing, installation and rights of way. The recurring cost includes maintenance costs associated with this equipment, plus a small portion of the power pedestal.

The nonrecurring Feeder Distribution Interface (FDI) Terminations (per 25 pair) element includes the costs associated with augmenting the FDI to provide the requested terminations. This includes the material, engineering and splicing costs associated with installing an SAI 25 pair block, and the material, engineering, splicing and installation costs associated with the cable, conduit and innerduct required to connect the FDI to the remote collocation cabinet. The recurring FDI termination cost includes the maintenance costs associated with this equipment.

Q. HOW ARE THE REMOTE TERMINAL COLLOCATION COSTS DEVELOPED?

A. The Remote Terminal Collocation cost study identifies the material, engineering and installation labor costs associated with various equipment components (e.g., the cabinet, remote DSL pad, power pedestal, etc.) needed to provide the remote terminal collocation elements. Annual cost factors are applied to the direct costs to derive the TELRIC and TELRIC plus Common cost

Q. IS THERE A CHARGE FOR REMOTE TERMINAL COLLOCATION POWER USAGE?

A. Yes. However, the Remote Terminal Collocation cost study does not identify a cost for power consumption, since these costs/rates are identified in the Qwest Collocation Model (CM) that was filed as Exhibit TKM-06R (Study 5238) in the previous phase of this docket.

F. Custom Routing

Q. PLEASE BRIEFLY DESCRIBE CUSTOM ROUTING.

A. Custom Routing combines End Office (EO) switching with dedicated trunks to allow CLECs the ability to request specific traffic routing direction by class of service via a unique Line Class Code (LCC). Custom Routing can be requested for Operator Services and Directory Assistance trunking.

Q. WHAT ELEMENTS ARE IDENTIFIED IN THE QWEST CUSTOM ROUTING COST STUDY?

A. The Custom Routing cost study identifies the nonrecurring costs for Operator Service and Directory Assistance trunking on a per LCC and per switch basis. The study identifies account manager, technical support and complex translations time required to establish the service.

Q. HOW ARE THE CUSTOM ROUTING COSTS CALCULATED?

A. The nonrecurring Custom Routing costs are calculated using the nonrecurring cost methodology identified earlier in my testimony.

V. CONCLUSION

Q. WHAT ACTION SHOULD THE COMMISSION TAKE IN THIS PROCEEDING?

A. Qwest recommends that the Commission establish prices for LIS and UNE elements based on the TELRIC data that Qwest has filed in this docket. The Qwest cost studies follow an appropriate TELRIC methodology, and are designed to fully comply with the FCC's TELRIC rules.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

Arizona Corporation Commission
Docket No. T-00000A-00-0194
Phase II-A, Qwest Corporation
Direct Testimony
Exhibit RHB-1

	Recurring Fixed	Recurring	Non- Recurring	Cost Study I.D. #
7.0 Interconnection				
7.6 Local Traffic				
7.6.1 End office call termination, per minute of use		$0.002143		5206
7.6.2 Tandem Switched Transport				
7.6.2.1 Tandem Switching, per Minute of Use		$0.001589		5206
7.6.2.2 Tandem Transmission, per Minute of Use, all Mileage Bands				
0 to 8 Miles	$0.000456	$0.0000428		5206
8 to 25 Miles	$0.000465	$0.0000212		5206
25 to 50 Miles	$0.000448	$0.0000109		5206
Over 50 Miles	$0.000433	$0.0000039		5206
		Recurring	**Nonrecurring**	
8.0 Collocation				
8.8 Remote Collocation				
Space (per Standard Mounting Unit)		$1.35	$868.13	5635
FDI Terminations (per binder group [25-PR])		$0.82	$558.99	5635
9.0 Unbundled Network Elements (UNEs)				
9.11 Local Switching				
9.11.1 Analog Line Side Port, First Port		$2.45	$145.57	5206/5207 5541/5542
9.11.2 Analog Line Side Port, Each Additional		$2.45	$95.75	5206/5207 5541/5542
9.11.3 Local Usage, Per Minute of Use		$0.002599		5206
9.11.4 Vertical Features				
10XXX Direct Dialed Blocking		$0.00		
Account Codes - per system		$0.00	$80.01	5207
Attendant Access Line - per station line		$0.00	$1.16	5207
Audible Message Waiting		$0.00	$1.01	5207
Authorization Codes - per system		$0.00	$239.29	5207
Auto Callback		$0.00		
Automatic Line		$0.00	$0.34	5207
Automatic Route Selection - Common Equip. per system		$0.00	$2,099.56	5207
Blocking of pay per call services		$0.00		
Bridging		$0.00		
Call Drop		$0.00	$0.34	5207
Call Exclusion - Automatic		$0.00	$1.01	5207
Call Exclusion - Manual		$0.00	$0.67	5207
Call Forward Don't Answer - All Calls		$0.00		
Call Forwarding Incoming Only		$0.00		
Call Forwarding Intra Group Only		$0.00		
Call Forwarding Variable Remote		$0.00		
Call Forwarding: Busy Line (Expanded)		$0.00		
Call Forwarding: Busy Line (External)		$0.00		
Call Forwarding: Busy Line (External) Don't Answer		$0.00		
Call Forwarding: Busy Line (Overflow)		$0.00		
Call Forwarding: Busy Line (Overflow) Don't Answer		$0.00		
Call Forwarding: Busy Line (Programmable)		$0.00		
Call Forwarding: Busy Line/Don't Answer Programmable Svc. Establishment			$15.66	5207
CF DON'T ANSWER/CF BUSY CUSTOMER PROGRAMMABLE - PER LINE			$1.01	5207
Call Forwarding: Busy Line/Don't Answer (Expanded)		$0.00	$37.92	5207
Call Forwarding: Don't Answer		$0.00	$37.92	5207
Call Forwarding: Don't Answer (Expanded)		$0.00		
Call Forwarding: Don't Answer (Programmable)		$0.00		
Call Forwarding: Variable		$0.00		
Call Forwarding: Variable - no call complete option		$0.00		
Call Hold		$0.00		

	Recurring Fixed	Recurring	Non- Recurring	Cost Study I.D. #
Call Hold/3-Way/Call Transfer		$0.00		
Call Park (Basic - Store & Retrieve)		$0.00		
Call Pickup		$0.00		
Call Transfer		$0.00		
Call Waiting Dial Originating		$0.00		
Call Waiting Indication - per timing state		$0.00	$1.01	5207
Call Waiting Originating		$0.00		
Call Waiting Terminating - All Calls		$0.00		
Call Waiting Terminating - Incoming Only		$0.00		
Call Waiting/ Cancel Call Waiting		$0.00		
CENTREX COMMON EQUIPMENT			$1,206.23	5207
Centrex Management System (CMS)		$0.00		
Centrex Plus DID numbers per number		$0.00		
Centrex Plus to Centrex Plus		$0.00		
Centrex Plus to IC Carrier		$0.00		
Centrex Plus to PBX/Key Blocked		$0.00		
Centrex Plus to PBX/Key Non-Blocked		$0.00		
CFBL - All Calls		$0.00		
CFBL - Incoming Only		$0.00	$37.92	5207
CFDA Incoming Only		$0.00	$37.92	5207
CLASS - Anonymous Call Rejection		$0.00		
CLASS - Call Trace		$2.39		5297
CLASS - Call Waiting ID		$0.00		
CLASS - Calling Name & Number		$0.00		
CLASS - Calling Number Delivery		$0.00		
CLASS - Calling Number Delivery - Blocking		$0.00		
CLASS - Continuous Redial		$0.00	$1.26	5207
CLASS - Last Call Return		$0.00	$1.27	5207
CLASS - Priority Calling		$0.00	$1.20	5207
CLASS - Selective Call Forwarding		$0.00	$1.26	5207
CLASS - Selective Call Rejection		$0.00	$1.20	5207
Common Equipment per 1.544 Mbps facility (DS1)		$0.00		
Conference Calling - Meet Me		$0.00	$42.47	5207
Conference Calling - Preset		$0.00	$42.47	5207
Custom Ringing First Line (Short/Long/Short)		$0.00		
Custom Ringing First Line (Short/Short)		$0.00		
Custom Ringing First Line (Short/Short/Long)		$0.00		
Custom Ringing Second Line (Short/Long/Short)		$0.00		
Custom Ringing Second Line (Short/Short)		$0.00		
Custom Ringing Second Line (Short/Short/Long)		$0.00		
Custom Ringing Third Line (Short/Long/Short)		$0.00		
Custom Ringing Third Line (Short/Short)		$0.00		
Custom Ringing Third Line (Short/Short/Long)		$0.00		
Data Call Protection (DMS 100)		$0.00		
Dir Sta Sel/Busy Lamp Fld per arrangement		$0.00	$0.34	5207
Directed Call Pickup with Barge-in		$0.00	$20.16	5207
Directed Call Pickup without Barge-in		$0.00	$20.16	5207
Distinctive Ring/Distinctive Call Waiting		$0.00	$40.31	5207
Distinctive Ringing		$0.00		
EBS - Set Interface - per station line		$0.00		
Executive Busy Override		$0.00		
Expensive Route Warning Tone- per system		$0.00	$71.91	5207
Facility Restriction Level - per system		$0.00	$44.24	5207
Feature Display		$0.00		
Group Intercom		$0.00	$0.46	5207
Hot Line - per line		$0.00	$1.01	5207
Hunting: Multiposition Circular Hunting		$0.00		
Hunting: Multiposition Hunt Queuing		$0.00	$38.59	5207
Hunting: Multiposition Series Hunting		$0.00		
Hunting: Multiposition with Announcement in Queue		$0.00	$38.59	5207
Hunting: Multiposition with Music in Queue		$0.00	$40.75	5207
Incoming Calls Barred		$0.00		
International Direct Dial Blocking		$0.00		
ISDN Short Hunt		$0.00	$1.70	5207
Line Side Answer Supervision		$0.00		
Loudspeaker Paging - per trunk group		$0.00	$176.53	5207
Make Busy Arrangements - per group		$0.00	$0.67	5207
Make Busy Arrangements - per line		$0.00	$0.67	5207

	Recurring Fixed	Recurring	Non- Recurring	Cost Study I.D. #
Message Center - per main station line		$0.00	$0.34	5207
Message Waiting Indication Audible/Visual		$0.00		
Message Waiting Visual		$0.00	$0.34	5207
Music On Hold - per system		$0.00	$23.13	5207
Network Speed Call		$0.00		
Night Service Arrangement		$0.00		
Outgoing Calls Barred		$0.00		
Outgoing Trunk Queuing		$0.00		
Privacy Release		$0.00	$0.47	5207
Query Time		$0.00	$0.34	5207
Speed Calling 1 Digit Controller		$0.00		
Speed Calling 1 Digit User		$0.00		
Speed Calling 1# List Individual		$0.00		
Speed Calling 2 Digit Controller		$0.00		
Speed Calling 2 Digit User		$0.00		
Speed Calling 2# List Individual		$0.00		
Speed Calling 30 Number		$0.00		
Speed Calling 8 Number		$0.00		
Station Camp-On Service - per main station		$0.00	$0.34	5207
Station Dial Conferencing (6 Way)		$0.00		
Station Message Detail Recording (SMDR)		$0.00		
Three Way Calling		$0.00		
Time and Date Display		$0.00		
Time of Day Control for ARS - per system		$0.00	$125.82	5207
Time of Day NCOS Update		$0.00	$0.54	5207
Time of Day Routing - per line		$0.00	$0.52	5207
Toll Restriction Service		$0.00		
Trunk Answer Any Station		$0.00		
Trunk Verification from Designated Station		$0.00	$0.39	5207
UCD in hunt group - per line		$0.00	$0.67	5207
UCD with Music After Delay		$0.00		
CMS - SYSTEM ESTABLISHMENT - INITIAL INSTALLATION			$971.60	5207
CMS - SYSTEM ESTABLISHMENT - SUBSEQUENT INSTALLATION			$485.80	5207
CMS - PACKET CONTROL CAPABILITY, PER SYSTEM			$485.80	5207
SMDR-P - SERVICE ESTABLISHMENT CHARGE, INITIAL INSTALLATION			$339.30	5207
SMDR-P - ARCHIVED DATA			$177.29	5207
9.11.5 Subsequent Order Charge			$13.57	5207
9.11.6 Digital Line Side Port (Supporting BRI ISDN)				
First Port		$10.56	$219.37	5206/5207
Each Additional Port		$10.56	$219.37	5206/5207
9.11.7 Digital Trunk Ports				
DS1 Local Message Trunk Port		$56.98		5206
Message Trunk Group, First Trunk		$15.78	$209.14	5207
Message Trunk Group, Each Additional		$15.78	$50.84	5207
DS1 PRI ISDN Trunk Port		$228.78	$648.55	5206/5207
DS1 / DID Trunk Port		$3.38	$212.74	5206/5207
9.11.8 DS0 Analog Trunk Port				
First Port			$123.11	5207
Each Additional			$28.57	5207
9.12 Customized Routing				
9.12.1 Development of Custom Line Class Code – Directory Assistance or Operator Services Routing Only			$315.87	5611
9.12.2 Installation Charge, per Switch Directory Assistance or Operator Service Routing Only			$231.38	5611
9.12.3 All Other Custom Routing			ICB	
9.24 Unbundled Packet Switching				

	Recurring Fixed	Recurring	Non-Recurring	Cost Study I.D. #
9.24.1 Unbundled Packet Switch Customer Channel		$23.39		5646
DSLAM Functionality		$20.28		5646
9.24.2 Customer Channel and Shared Distribution Loop			$60.14	5299
Customer Channel and Unbundled Distribution Subloop			$127.17	5299
Customer Channel and CLEC Provided Loop			60.14	5299
9.24.3 Unbundled Packet Switch Port				
DS1 Interface		$135.05	$227.50	5646/5300
DS3 Interface		$208.02	$227.50	5646/5300

A. PURPOSE, SCOPE, AND APPLICATION

The purpose of this study is to estimate the long run incremental costs Qwest will incur to purchase Application RTU (Right To Use) fees per Port.

This study develops the unitized total element long run incremental cost (TELRIC).

Costs developed in this study are monthly recurring costs per port for the Application RTU fees component of an unbundled Analog Line Side Port.

B. DESCRIPTION OF SERVICE

The total cost of an unbundled Analog Line Side Port is comprised of three components: Features per Port, Capital Lease RTU per Port, and Nontraffic Sensitive Central Office Equipment per Analog Line (from the ICM model).

The Application Software in this study is classified as Network Switching Software and has been capital leased since the early 1990's. Under this arrangement a sale-leaseback contract is executed. This software, because it is capital leased rather than capitalized as a direct investment, is not included in the investment models.

Right To Use software upgrades are one of the components of unbundled Analog Line Side Ports and the costs, therefore, are included in the port cost.

C. STUDY METHODOLOGY

The software costs identified are direct costs which occur as a result of providing local switching with vertical feature capability.

The capital lease information associated with this software is found in a financial database report called LAMS, which is used to accumulate application software to be capital leased. LAMS is used in this study because it provides a greater level of detail than the general ledger account on the books. The LAMS data, however, was verified to be within one-half percent of the amount booked in that account. This detail allows for the isolation of FRC 377c capital lease costs for features. Since the costs for Wireless are not included in this study, the calculations begin with the category found in LAMS called "Total 377 less Wireless". The total LNP (Local Number Portability) costs are subtracted out since these costs are conceptually recovered in the FCC's LNP rate element. ISDN related RTU's that are capital leased are identified and removed because they are recovered in the direct costs asscociated with ISDN BRI and PRI ports.

C. STUDY METHODOLOGY (cont.)

The net amount described above becomes the principal for the capital lease. Interest expense is computed for a thirty-six month payment period using the Cost of Debt. Since the capital lease term is for three years, only one third of any one sale-leaseback contract's expense is incurred in any given year. However there are capital lease expenses associated with all contracts executed in the previous three years. So, on average, capital lease expense in any one year is equivalent to the total three year expense incurred from contracts executed in any one year.

Total average annual capital lease expense is comprised of the amortization and interest expense. This annual expense is converted to a per port value by dividing it by the total number of working lines. The source for the working lines is the SCM Core database. The annual capital lease per port expense is then divided by twelve months to convert to a monthly expense.

The WINPC3 model develops Total Element Long Run Incremental Costs (TELRIC) from investments and/or expenses associated with Qwest products and services. The expenses utilized in this study are described above. The WINPC3 model loads this expense with directly assigned, directly attributable, and common costs.

D. DESCRIPTION OF LONG RUN INCREMENTAL COSTS

Total Element Long Run Incremental Cost (TELRIC) studies are performed by Qwest to estimate the economic cost of providing network elements. The Qwest TELRIC studies identify the forward-looking costs associated with the provision of the total quantity of a network element in the long run. The forward-looking Qwest TELRIC studies identify the costs that are likely to be incurred in the future, and consider the latest forward-looking technologies and methods of operation that are currently available. These studies are *not* embedded or historical, and do not measure the impact of prior investment decisions by the corporation. The Qwest TELRIC studies also identify the *long run* costs associated with providing a network element--reflectinga time period over which all inputs (including changes in the size of facilities, levels of investment, etc.) can be adjusted.

Qwest TELRIC studies identify recurring and nonrecurring costs. Recurring costs are the ongoing costs associated with providing a network element. Recurring costs are generally investment-related and include both capital costs and operating expenses. These costs are often presented as a cost per month or per unit of usage (e.g., minute of use) and are incurred throughout the time period the network element is provided to a customer.

D. DESCRIPTION OF LONG RUN INCREMENTAL COSTS (Cont.)

Nonrecurring costs are the one-time costs that are incurred at the time a customer establishes, disconnects or changes service. These costs normally result from a customer order, and are predominantly labor-related.

The Qwest recurring and nonrecurring TELRIC studies identify costs on a unitized basis and disaggregates the cost results into the following components:

Total Direct Costs are the forward-looking costs that are caused by offering the network element in the long run. These costs would not be incurred if the network elements were not offered. Total Direct Costs reflect the per-unit forward looking cost associated with providing the entire network element in the most efficient manner, the production of all other network elements produced by the firm. For recurring element costs Total Direct Costs include the capital costs (e.g., depreciation, return,taxes) and maintenance costs associated with the investment required to provision a network, along with other network element-specific costs such as product management expense. For nonrecurring costs, Total Direct Costs include the labor-related expenses associated with the provision of a network element, along with other network element-specific costs such as product management expense.

Directly Attributed Costs include network administration and engineering costs and various administrative costs such as the cost of general-purpose computers and accounting and finance expenses. These costs are not directly associated with a specific network element. However, these costs vary with the provision of all network elements, and are not common to the entire firm.

Total Element Long Run Incremental Costs (TELRIC) represent the sum of Total Direct Costs and Directly Attributable Costs. This measure of costs includes the forward-looking costs incurred in the provision of a network element. This measure of costs is consistent with TELRIC as defined by the FCC.

Common Costs are associated with the enterprise as a whole. These costs do vary based on the total size of the firm, but do not vary with the provisioning of individual network elements. These costs are avoidable only with the elimination of the entire firm, and are sometimes referred to as *general overhead costs*.

Fully Allocated Costs represent the sum of Total Element Long Run Incremental Cost plus Common Costs (TELRIC + CC).

E. STUDY ASSUMPTIONS

1. Application RTU per port expenses from 1998 to 2000 are the most accurate representation of forward looking.

2. All costs displayed are represented on a per port basis.

3. The capital lease interest rate is equal to Qwest's cost of debt.

SUMMARY
ANALOG LINE SIDE PORT RATE ADJUSTMENT

Feature Cost Per Port Calculation

Source	Total Feature Costs	Category
Cost from DALPS 152 report January 2001	$1,108,390.30	CENTRAL OFFICE FEATURES
Cost from DALPS 178 report January 2001	$711,365.74	CENTREX 21 FEATURES
Cost from DALPS 174 report January 2001	$90,286.97	CENTREX PLUS FEATURES
Cost from DALPS 144 report January 2001	$4,510.28	CENTRON I
Total Cost for Arizona	$1,914,553.29	
Total Arizona Lines from SCM	2,934,540	
Feature Cost per Port	**$0.65**	(Study 5206)
Cap Lease Port - Monthly	**$0.51**	(Study 5542)
Analog Line Side Port Cost	**$1.28**	(Study 5541)

Analog Line Side Port Cost
Adjusted to Include Features & Cap Lease

Port Rate, Including Features, & Cap Lease	**$2.45**

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS	)	DOCKET NO. T-00000A-00-0194 Phase II A
	)	AFFIDAVIT OF ROBERT H. BRIGHAM
STATE OF COLORADO	)	
COUNTY OF DENVER	)	

Robert H. Brigham, of lawful age being first duly sworn, deposes and states:

1. My name is Robert H. Brigham. I am Director – Service Costs for Qwest Corporation in Denver, Colorado. I have caused to be filed written testimony and exhibits in support of Qwest Corporation in Docket No. T-00000A-00-0194, Phase II A.

2. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge and belief.

Further affiant sayeth not.

Robert H. Brigham

SUBSCRIBED AND SWORN to before me this 22nd day of August, 2001.

Marjorie O Herbst
Notary Public residing at 2730 W. Wesley Ave #2, Denver Co 80219
Denver, Colorado

My Commission Expires: 3-6-05

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS.	DOCKET NO. T-00000A-00-0194 PHASE II-A

SURREBUTTAL TESTIMONY OF

ROBERT H. BRIGHAM

ON BEHALF OF

QWEST CORPORATION

OCTOBER 19, 2001

EXHIBIT
Admitted
Qwest 2

INDEX OF TESTIMONY

I. IDENTIFICATION OF WITNESS

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND POSITION WITH THE QWEST CORPORATION.

A. My name is Robert H. Brigham. My business address is 1801 California Street, Denver, Colorado. I am employed as a Director - Service Costs in the Qwest Services Corporation Policy and Law department. I am testifying on behalf of Qwest Corporation ("Qwest").

Q. HAVE YOU PREVIOUSLY FILED TESTIMONY IN THIS PROCEEDING?

A. Yes. On August 31, 2001, I filed direct testimony in this proceeding.

Q. ARE YOU ADOPTING TESTIMONY OF OTHER QWEST WITNESSES FROM PHASE II?

A. Yes. I am adopting the testimony of Qwest witnesses Gary Fleming and Teresa Million that was deferred from Phase II to this phase of the docket. In particular, I am adopting page 13, line 8, through page 18, line 15, of Ms. Million's direct testimony and page 54, line 12, through page 57, line 2, of Ms. Million's rebuttal testimony. From Mr. Fleming's rebuttal testimony, I am adopting page 82, line 15, through page 97, line 19.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to respond to the testimony filed by several parties in this proceeding on September 27, 2001. I will respond to the testimony of Mr. William Dunkel filed on behalf of the Commission Staff, the testimony of Mr. Edward Caputo filed on behalf of WorldCom, the testimony of Mr. Sidney Morrison filed on behalf of WorldCom, the testimony of Mr. Timothy Gates filed on behalf of WorldCom, the testimony of Mr. Daniel Kelley filed on behalf of AT&T and WorldCom, and the testimony of Mr. Richard Chandler filed on behalf of AT&T and WorldCom.

III. RESPONSE TO MR. DUNKEL

A. Staff HAI Run

Q. HAS STAFF PERFORMED A RUN OF THE HAI MODEL FOR PURPOSES OF THIS PROCEEDING?

A. Yes. Schedule WD-2 contains a results output from the HAI Model. Mr. Dunkel considers these cost results in some of his pricing recommendations.

Q. DOES MR. DUNKEL'S RUN OF THE HAI MODEL REFLECT THE INPUTS CHOSEN BY THE COMMISSION IN ORDER NO. 60635?

A. According to Mr. Dunkel, his run of the HAI model "used inputs that the ACC had chosen in its Decision No. 60635." When inputs were not addressed in this order, Mr. Dunkel has allegedly "used the inputs as determined by the FCC."[1] Mr. Dunkel notes that in Phase II, he also used the FCC inputs for those items that the ACC had not addressed.

1 Dunkel direct, page 4.

Q. DO YOU KNOW IF MR. DUNKEL HAS PROPERLY INCORPORATED THE FCC'S INPUTS INTO HIS RUN OF THE HAI MODEL?

A. No. Qwest is awaiting an additional discovery response from Staff that should permit me to view Mr. Dunkel's runs and to determine the precise inputs that he used.

However, in Phase II, Dr. William Fitzsimmons, on behalf of Qwest, demonstrated that Mr. Dunkel erred in his attempt to incorporate the inputs described by the FCC in its Tenth Report and Order into the HAI Model, version 5.2a.[2] Please refer to Dr. Fitzsimmons' July 30, 2001 surrebuttal in Phase II of this proceeding, and Qwest's Post Hearing Reply Brief, filed September 21, 2001, for a description of these errors. Dr. Fitzsimmons' surrebuttal testimony, which describes these errors, is attached to this testimony as Exhibit RHB-R1. In sum, the HAI runs previously provided by Mr. Dunkel did not properly reflect FCC inputs. Qwest does not yet know whether Mr. Dunkel has corrected these errors in the HAI run that he has provided with his September 27, 2001 testimony in Phase IIA of this proceeding.

Qwest reserves the right to comment on this issue further upon receipt of a response to the aforementioned data request.

Q. DO YOU AGREE THAT PRICES IN THIS PROCEEDING SHOULD BE BASED ON COSTS THAT REFLECT THE INPUTS ADOPTED BY THE COMMISSION IN

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[2] *In the Matter of Federal-State Joint Board on Universal Service; Forward-Looking Mechanism for High Cost Support for Non-Rural LECs*, CC Docket Nos. 96-45 & 97-160, FCC 99-304, Tenth Report and Order (rel. Nov. 2, 1999) ("*Inputs Order*").

ORDER NO. 60635, AS WELL AS FCC INPUTS AS USED IN THE FCC SYNTHESIS MODEL ("SM")?

A. The prices the Commission adopts should be based on cost studies that utilize reasonable inputs and that are consistent with TELRIC principles. This is true no matter which cost model the Commission relies upon. The Commission should only use inputs that it ordered previously if it determines that those inputs are still current and appropriate for a TELRIC study performed today and are supported by the evidence presented in this proceeding.

In addition, for purposes of developing TELRIC data, the Commission should not use inputs that the FCC used in its SM unless the inputs withstand scrutiny and are consistent with the evidence in this proceeding. It is important to remember that the SM (also known as the "HCPM") was designed to develop costs for Universal Service purposes—not to develop UNE costs. In its *Inputs Order*, the FCC acknowledged that the SM is *not* intended for use in developing costs for unbundled network elements ("UNEs"), in part because the model uses nationwide inputs rather than state-specific inputs: "The federal cost model was developed for the purpose of determining federal universal service support, and it may not be appropriate to use nationwide values for other purposes, such as determining costs for unbundled network elements."[3] Thus, the FCC itself has recognized that parties should be cautious about utilizing the SM or its inputs for developing UNE costs and prices.

Accordingly, for the purpose of calculating Arizona UNE costs, inputs specific to Arizona generally are preferable to nationwide inputs that the FCC developed for

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[3] *Inputs Order at* ¶32.

determining universal funding. The Commission should adopt the inputs used in the Qwest models filed in this case, since these inputs properly reflect TELRIC principles and are specifically appropriate for calculating UNE costs.

B. Overhead Costs

Q. PLEASE SUMMARIZE MR. DUNKEL'S ADVOCACY REGARDING THE TREATMENT OF OVERHEAD COSTS.

A. Mr. Dunkel argues that a 15% overhead factor should be applied to direct costs. According to Mr. Dunkel, based on Commission Decision No. 60635, this factor is supposed to assign "attributed, joint and common overhead costs"[4]

Q. IS IT APPROPRIATE TO APPLY A 15% "OVERHEAD FACTOR" TO DIRECT COSTS IN QWEST'S TELRIC STUDIES?

A. No. First, as I will demonstrate below, it is not at all clear that the Commission intended to utilize the 15% factor in the manner advocated by Mr. Dunkel. Second, the development of alleged "TELRIC" data based on the application of a 15% loading to direct costs would violate the FCC's TELRIC rules.

Q. PLEASE EXPLAIN WHY THE APPLICATION OF THE 15% FACTOR TO DIRECT COSTS DOES NOT APPEAR TO BE CONSISTENT WITH THE COMMISSION'S INTENT IN DECISION NO. 60635.

A. Although Mr. Dunkel implies that the Commission adopted a 15% "overhead factor" that would specifically include all of Qwest's non-direct (i.e., directly

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[4] Dunkel direct, page 4.

attributed and common) costs, he fails to recognize the context in which the Commission ordered the use of that factor. Mr. Dunkel has not quoted the Commission in full context or within the overall framework in which the Commission discussed this factor. To gain a true understanding of what this 15% factor represented, how it was determined, and how it was intended to be used, one must refer back to the original cost docket.

Q. WHAT OVERHEAD ASSIGNMENT PROPOSALS WERE PRESENTED BY PARTIES IN THE PREVIOUS COST DOCKET?

A. The Commission's original decision (Decision No. 60635) contains a section that addresses the appropriate overhead expense factor to use in TELRIC cost estimates. The Commission referred to three proposals, sponsored by U S WEST (now Qwest), AT&T, and ACSI. U S WEST requested an overhead factor of 27% as a mark-up over direct TELRIC investment costs and direct expenses. This factor consisted of 22% for directly attributed costs and 5% for common costs, as applied in U S WEST's cost models. AT&T proposed a 10.4% overhead factor for use in the Hatfield model, and that factor related only to the 6700 series of common cost accounts. This 10.4% was described in the Commission's Order as being "based upon a regression analysis of the industry . . . . [which] produced a 13% overhead estimate, which the Hatfield Model reduced by 3% to reflect competitive market efficiencies."[5] Data requests submitted by AT&T showed that this 13% regression amount was based on a LEC average for 1995 ARMIS account 6700 expenses. The U S WEST overhead factor that was included in the regression analysis was 13.6%. ACSI recommended a 15% mark-up over direct costs. This recommendation was not based on a specific cost analysis but, rather,

[5] Decision No. 60635 at 12.

was a revenue mark-up over TSLRIC costs (direct investment costs + direct expenses) for a specific "competitive" service (Centrex) offered by Pacific Bell.

Faced with these three conflicting percentages, which really represented three different "overhead" calculations, the Commission adopted a 15% overhead cost factor. In its order, the Commission described this factor as "including attributed, joint and common costs." However, the factor was intended to be used solely for the Commission's re-run of the Hatfield Model, as a replacement for the 10.4% overhead cost factor. In the HAI model, the common overhead factor of 10.4% only includes the 6700 series of overhead costs—it does not include any costs that are defined as "directly attributable or joint."

Q. WHAT IS THE BASIS FOR YOUR CONCLUSION THAT THE COMMISSION INTENDED THE 15% FACTOR TO BE USED SOLELY AS A REPLACEMENT FOR THE 10.4% COMMON FACTOR WHEN RE-RUNNING THE HATFIELD (NOW HAI) MODEL?

A. In Decision 60635, the Commission specifically stated: "Despite imperfections in the Hatfield Model, it will be the starting point of our analysis from which to determine the cost of unbundled elements."[6] A review of the section dealing with "Corporate Overhead," where the Commission ordered the 15% factor, reveals that the 15% factor was adopted based on the Commission's concern that AT&T's 10.4% factor was insufficient to cover Qwest's overhead expenses. Thus, the Commission was concerned that the 10.4% HAI overhead loading—which, in reality, is only intended to assign the 6700 series of common accounts—was too low, so it replaced this factor with a 15% factor.

[6] Decision No. 60635 at 12-13.

Q. THE COMMISSION INTENDED THE 15% FACTOR TO BE USED IN RE-RUNS OF THE HAI MODEL. WHY CAN'T THIS FACTOR BE USED IN THE QWEST MODELS AND BE APPLIED TO DIRECT COSTS AS PROPOSED BY MR. DUNKEL?

A. While the HAI model and the Qwest TELRIC studies assign directly attributable and common costs to elements, the models do not categorize the expenses in exactly the same manner. For example, the meaning and application of the "overhead" or "common" cost factors differ substantially between the two models. The "overhead" cost factor (the 10.4%) in the HAI model consists only of the 6700 series of Corporate Operations accounts. The costs for other accounts, such as network operations, network support, and general support, are applied elsewhere in the HAI model, using separate factors. In the Qwest cost studies, only a portion of the 6700-series Corporate Operations accounts are considered as common or "overhead" costs. The remaining 6700 accounts (i.e., accounting and finance, human resources, and information management) are considered to be directly attributable, along with network operations, network support, and general support costs.

Thus, it would be incorrect to simply apply the 15% overhead factor to costs in the *Qwest* models. If this factor (which includes the 6700 accounts) were applied to direct expenses, as Mr. Dunkel recommends, then numerous expense accounts would be excluded from the cost results, including network operations, network support, and general support expenses. This approach would clearly be a methodological error, and it would prevent Qwest from recovering legitimate costs that it incurs to provide UNEs.

Conversely, when the *HAI* model is re-run with the 15% overhead factor, the 15% factor assigns account 6700 expenses. The other expenses, such as network operations, network support, and general support expenses, have already been assigned in the HAI model via other factors. Thus, no accounts are excluded.

In sum, The Commission ordered a re-run of the HAI Model using the 15% factor as a replacement for the 10.4% common overhead factor. When that factor is used in the HAI model, no expense accounts are improperly excluded. However, when the same 15% factor is used in Qwest studies and is applied to direct expenses, many expense accounts are excluded. Thus, Mr. Dunkel's methodology systematically excludes costs from Qwest's studies that would be included in the HAI model. This exclusion violates the FCC's rules relating to TELRIC, which require that direct, directly attributable and common costs be included in a TELRIC study.[7]

Q. DOES THE USE OF A 15% OVERHEAD FACTOR, AS APPLIED TO DIRECT COSTS, RESULT IN A SIGNIFICANT UNDERSTATEMENT OF COSTS?

A. Yes. The assignment to direct costs of the costs associated with network operations, network support, general and computer support, uncollectibles, and intangibles comprises a "mark-up" of approximately 18 to 19 percent over direct

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[7] Paragraph 682 of the FCC's First Interconnection Order, states "We conclude that, under a TELRIC methodology, incumbent LECs' prices for interconnection and unbundled network elements shall recover the forward-looking costs directly attributable to the specified element, as well as a reasonable allocation of forward-looking common costs. . . Directly attributable forward-looking costs include the incremental costs of facilities and operations that are dedicated to the element. Such costs typically include the investment costs and expenses related to primary plant used to provide that element. Directly attributable forward-looking costs also include the incremental costs of shared facilities and operations. Those costs shall be attributed to specific elements to the greatest extent possible.

costs. The costs associated with accounting and finance, human resources, and information management expenses require an additional "mark-up" of about seven to eight percent over direct costs; and common costs, such as costs relating to executive, planning, external relations, legal, and other general and administrative functions, require a further mark-up of approximately five to six percent over direct costs. All of these costs are necessary to the operations of an efficient telecommunications network; far more is needed to run an efficient network than just direct investment, maintenance, property tax, and marketing costs. It should come as no surprise that a 15% mark-up would not even begin to cover all the necessary support costs.

As noted above, even the HAI model does not assume that 15% is a reasonable "mark-up" factor for all of these costs. Mr. Dunkel's recommended use of the 15% factor would lead to an unreasonable result and would not be consistent with the apparent purpose of that factor when the Commission adopted it in Decision 60635. Accordingly, the Commission should reject Mr. Dunkel's recommended use of this factor in Qwest's cost studies.

C. Remote Terminal Collocation

Q. DOES MR. DUNKEL CLAIM THAT ONE OF THE FILL FACTORS USED IN THE REMOTE TERMINAL COLLOCATION STUDY IS TOO LOW AND SHOULD BE INCREASED?

A. Yes. Mr. Dunkel notes that Qwest uses a 33% fill factor in the Remote Terminal Collocation study. This fill factor is applied to various components of the cabinet that is used to provide remote collocation. Mr. Dunkel observes that this fill rate is lower than other fill rates that the Commission has established for other equipment components, such as feeder and distribution plant. He recommends that a 61.25% fill, based on feeder and distribution plant fills, be used for the remote terminal collocation equipment components.

Q. IS THIS APPROPRIATE?

A. No. First of all, there is no basis for using loop plant fills for remote terminal collocation equipment. Different types of equipment in the Qwest network have different characteristics, including different utilization rates. It is necessary to estimate fill rates based on the characteristics that are unique to each type of equipment. It is illogical to argue that a weighting of feeder or distribution fill rates will somehow produce a rate appropriate for remote terminal collocation cabinets. Buried distribution and feeder cables have little in common with a remote terminal collocation cabinet, and there is no reason to believe that these distinct types of facilities should have the same fill rates. Mr. Dunkel observes that feeder and distribution cables -- which are substantially similar facilities -- have different fills (71.5% vs.51%). The fact that similar facilities can have significantly different fill rates demonstrates the inappropriateness of assuming that loop plant and collocation cabinets, which are fundamentally different from each other, will have the same fill rates.

Q. IS THE 33% FILL RATE THAT QWEST USES APPROPRIATE?

A. Yes. In fact, the 33% fill is very conservative, when one considers the actual demand for remote terminal collocation. Qwest sets the fill rate for the remote terminal collocation cabinet at 33% because the projections for CLECs utilizing the

DA Hotel sites are very low. Qwest began formally offering remote terminal collocation to the CLECs in February 2001. Since that time, Qwest has deployed hundreds of sites and, to date, only one customer has ordered this product and has requested only two DA Hotel sites. Considering the take rate of this product thus far, as compared to the DA Hotels deployed by Qwest, the fill rate of 33% is conservative and may in fact not result in full recovery of costs by Qwest. If anything, the 33% fill rate for this equipment is overstated. It is revealing that while he proposes a fill rate of 61.25% for this equipment, Mr. Dunkel has acknowledged in a response to a data request that this recommended fill rate is not based on or informed by any experience or data relating to the use of remote collocation cabinets.[8]

Q. MR. DUNKEL ALLEGES THAT QWEST INAPPROPRIATELY USES THE "BUILDING FACTOR" IN THE REMOTE TERMINAL COLLOCATION STUDY. PLEASE COMMENT.

A. The Building Factor is used in only one isolated recurring cost calculation in the Remote Terminal Collocation Study. This factor is used as a loading for certain power equipment that is shared between Qwest and collocators. If this loading factor is removed (i.e., a value of zero is entered as an input to the study), it has a negligible impact on the study result. In fact, the results, when rounded to the penny, do not change. To address Mr. Dunkel's concern, Qwest will remove the building loading calculation from the study.

Q. MR. DUNKEL CALCULATES RECURRING AND NONRECURRING REMOTE TERMINAL COLLOCATION SPACE COSTS THAT ARE APPROXIMATELY

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[8] *See* Staff Response to Qwest Data Request 1-006.

HALF OF THE QWEST COSTS. SHOULD THE COMMISSION ACCEPT MR. DUNKEL'S COSTS?

A. No. Mr. Dunkel's costs are based on (1) a 15% overhead factor applied to direct costs and (2) a 61.25% fill factor. As I demonstrated above, these inputs are not appropriate and lead to a significant understatement of costs.

D. Analog Line Port

Q. WHAT IS MR. DUNKEL'S RECOMMENDATION REGARDING THE NONRECURRING RATE FOR THE ANALOG LINE PORT?

A. Mr. Dunkel argues that the nonrecurring Analog Line Port cost as calculated in the Qwest nonrecurring cost study is too high, and the cost as calculated in the AT&T Nonrecurring Cost Model ("NRCM") is too low. He recommends that "the current nonrecurring rate of $42.58 for the analog line port be continued, as is shown on Schedule WD-5."[9]

Q. DO YOU AGREE WITH MR. DUNKEL'S RECOMMENDATION?

A. No. The Qwest nonrecurring cost study is based on an analysis of the activities required to process an order for an analog line port. The activities, work times and probabilities of occurrence are all based on input from Qwest subject matter experts who are involved in the order provisioning process. The nonrecurring rate for the analog line port should be set based on these cost estimates.

Q. WHAT IS THE BASIS FOR THE CURRENT $42.58 RATE?

9 Dunkel direct, page 10.

A. The $42.58 rate was established by the Commission in Decision No. 60635, and it is my understanding that the rate is based on a retail rate, less the NRC avoided cost discount per page 29 of the Order. However, in *U S WEST Communications, Inc. v. Jennings*, the Arizona federal district rejected this pricing approach for UNEs, stating that "[t]he 'retail price less avoided costs' formula applies only when a CLEC purchases finished services for resale."[10] Because the analog line port is not a resale service, as the court's decision establishes, the rate for it should not be based on avoided costs. Accordingly, the current rate is not appropriate, and the Commission should establish a new rate based on the TELRIC data that Qwest has provided.

E. Features

Q. WHAT IS MR. DUNKEL'S RECOMMENDATION REGARDING FEATURE COSTS?

A. Mr. Dunkel recommends that the Commission set the analog line port rate, including features, at $1.61 per month. This is the rate established by the Commission in the previous cost docket. According to Mr. Dunkel, this rate includes a $1.10 analog line port cost from his run of the HAI model, along with $0.51 for features.

Q. DO YOU AGREE WITH MR. DUNKEL'S RECOMMENDATION?

A. No. Mr. Dunkel's recommended rate does not include all of the cost components of features. Mr. Dunkel has developed a $1.10 cost for the analog line port, while Qwest has calculated a cost of $1.28 (without features). Mr. Dunkel adds $0.51 to

[10] 46 F. Supp. 1004, 1013 (D. Ariz. 1999).

the port to account for features, while Qwest adds $0.65 for the cost of features and $0.51 for capital lease software expenditures related to features. While the Qwest and Staff basic port costs are not significantly different, Mr. Dunkel's $1.61 rate will not lead to the recovery of the switching equipment-related feature costs and the associated cost of software, which Qwest calculates to be $1.16.

Q. MR. DUNKEL DEVELOPS A $1.10 LINE PORT COST BASED ON HIS RUN OF THE HAI MODEL. DO YOU AGREE THAT THIS IS A PROPERLY CALCULATED COST?

A. No. As calculated in the Qwest ICM, the basic analog line port cost, without features, is $1.28. As demonstrated in Mr. Fleming's June 27, 2001 rebuttal testimony (See pages 82 through 97), the HAI Model understates switching costs. Therefore, I believe the $1.10 cost calculated by Mr. Dunkel using the HAI Model is understated.

Q. DOES THE HAI ANALOG LINE PORT COST INCLUDE THE COST OF FEATURES?

A. While AT&T claims that the HAI analog line port cost includes the costs of features, Qwest does not agree. As noted in Mr. Fleming's Phase II rebuttal testimony filed on June 27, 2001 (see pages 92-93), the FCC switching algorithm adopted by the HAI model does not include applications software costs associated with features. It is also not at all clear that this model includes features hardware, as explained on page 95 of Mr. Fleming's June 27, 2001 rebuttal testimony. Thus, even if the Commission were to accept the understated HAI analog line port cost, feature costs would need to be added to this amount.

Q. MR. DUNKEL CLAIMS THAT "CENTREX 21" FEATURES COSTS SHOULD NOT BE INCLUDED IN THE PER PORT FEATURES CALCULATION. PLEASE COMMENT.

A. Mr. Dunkel notes that Exhibit RHB-3 of my August 31, 2001 testimony includes costs for "Centrex 21" features, and he argues that these costs should not be included in UNE costs. However, I believe Mr. Dunkel may not understand the nature of these data and how they are used. My August 31, 2001 testimony (pages 17-18) describes the methodology that Qwest uses to calculate feature costs:

> First, the investment for each feature is calculated utilizing the SCM Features module that I described in the previous section of my testimony. Second, the investment for each feature is converted to a cost per month based on the application of cost factors. Third, the per feature costs are converted to an aggregate feature cost per month, per port. To accomplish this, each individual feature cost is multiplied by the quantity for each feature, to derive a total monthly cost for each feature. The costs for all features are then aggregated to produce a total forward-looking cost for the market basket of features. This aggregate cost is then divided by total Arizona lines in service to derive a monthly feature cost per line.

In the third step defined above, Qwest multiplies the per feature cost times the quantity for each feature. These quantities, from the DALPS reports, include both POTS and Centrex quantities for a particular feature. This is necessary in order to calculate the total incremental cost of all features in Arizona. This does not mean that Qwest is developing a cost for the retail Centrex 21 offering or any other Centrex or POTS retail offering. What is offered to CLECs is the feature functionality as part of the analog line port UNE. Thus, the Qwest methodology is appropriate.

Q. DOES MR. DUNKEL RECOMMEND A RATE FOR THE LOCAL SWITCHING USAGE UNE?

A. In Schedule WD-1, Mr. Dunkel lists a $0.00 rate for Local Switching, Minute of Use (9.11.3). Schedule WD-2 shows a $0.00147 per minute switching rate, based on Mr. Dunkel's HAI run, as compared with Qwest's proposed rate of $0.002143. I do not know whether the proposed rate is in error or whether Mr. Dunkel is actually recommending a zero rate for local switching usage. Certainly, there is no basis for a zero local switching usage rate, since Qwest clearly incurs usage-related costs for switching a call at the end office. Both Qwest's models and the HAI Model calculate a switching usage cost. These costs are *not* included in the analog switch port, either in Qwest studies or in the HAI model.

The Commission should adopt the Qwest Local Switching per minute of use rate, which is based on the Qwest Switching Cost Model. As demonstrated in Mr. Fleming's June 27, 2001 testimony, and as discussed later in this testimony, the HAI Model understates switching usage costs.

IV. RESPONSE TO MR. CAPUTO

Q. WHAT ISSUES RAISED BY MR. CAPUTO DO YOU ADDRESS?

A. Mr. Caputo alleges that Qwest has overstated the costs for custom routing due to the inclusion of marketing, sales, directly attributed and common costs in the Custom Routing Cost Study (Study #5611). However, his advocacy violates the FCC's TELRIC methodology—each of these categories of costs are appropriately included in the Custom Routing Cost Study, as well as other TELRIC studies.

Q. MR. CAPUTO CLAIMS THAT IT IS IMPROPER TO INCLUDE MARKETING-RELATED EXPENSES IN CUSTOM ROUTING COSTS. IS HE CORRECT?

A. No. Mr. Caputo argues that Qwest has not performed any marketing functions related to custom routing. However, Qwest's Wholesale Carrier market unit is dedicated to serving the needs of Interexchange Carriers and CLECs in order to provide these customers with wholesale services and UNEs, such as custom routing. This market unit incurs wholesale costs that are characterized and recorded as "Marketing - Product Management" costs under Part 32 accounting rules. Qwest employs product managers who perform functions such as product planning, product development and rate and tariff development for all wholesale offerings. Thus, the wholesale product management function is essential to Qwest's custom routing offering. Without these personnel, Qwest would not have been able to develop this service or to offer it.

Thus, it is entirely appropriate to include product management expenses in a custom routing cost study. It should be noted also that in Qwest's cost studies, product management is assigned via a "product management" factor. Qwest develops separate product management factors for retail and wholesale elements. In the custom routing cost study, Qwest has applied the wholesale "interconnection" product management factor.

Q. MR. CAPUTO CLAIMS THAT IT IS IMPROPER TO INCLUDE SALES EXPENSES IN THE CUSTOM ROUTING COST STUDY. IS HE CORRECT?

A. No. Mr. Caputo argues that it is inappropriate to include "sales expense" costs in the Custom Routing Cost Study because allegedly "Qwest is not performing any sales activity associated with this function."[11] In reality, Qwest does perform sales functions relating to custom routing, and it incurs necessary expenses relating to those functions. These functions include customer contact work, along with servicing and implementation work. These functions are necessary (and expected by CLECs) in order to support any offering, such as custom routing. I do not believe WorldCom would be satisfied if Qwest refused any customer contact regarding custom routing or any other UNE.

Thus, it is entirely appropriate to include sales expense in the Custom Routing Cost Study. It should be noted also that in Qwest's cost studies, sales expense is assigned via a "sales expense" factor. Qwest develops separate sales expense factors for retail and wholesale elements. In the Custom Routing Cost Study, Qwest has applied the wholesale "interconnection" sales expense factor.

Q. DOES MR. CAPUTO CLAIM THAT IT IS IMPROPER TO INCLUDE CERTAIN DIRECTLY ATTRIBUTABLE COSTS IN THE CUSTOM ROUTING COST STUDY?

A. Yes. He claims that there is no evidence that certain costs (including network operations, network support assets, general support assets, general purpose computers, accounting & finance expense, human resources expense and information management expense) are directly attributable to custom routing. In essence, he argues that since these directly attributable costs are not directly caused by custom routing, they should not be included in the Custom Routing Cost Study.

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11 Caputo rebuttal, page 5.

Q. DO YOU AGREE?

A. No. It is inaccurate to claim that most of these expenses are not "directly related" to the custom routing UNE. In fact, these costs are not directly caused by any particular UNE or service. These costs are considered to be shared across services ("directly attributable") and are spread across all UNEs, interconnection services (such as collocation) and retail services. That is, the same directly attributable factors are applied to all UNEs and services.

The FCC's TELRIC methodology specifically requires that shared costs, such as network operations, be assigned to all UNEs in a TELRIC study. In its First Report and Order, the FCC stated:

> We conclude that, under a TELRIC methodology, incumbent LECs' prices for interconnection and unbundled network elements *shall recover the forward-looking costs directly attributable to the specified element, as well as a reasonable allocation of forward-looking common costs.* . . . . Directly attributable forward-looking costs include the incremental costs of facilities and operations that are dedicated to the element. Such costs typically include the investment costs and expenses related to primary plant used to provide that element. *Directly attributable forward-looking costs also include the incremental costs of shared facilities and operations.* Those costs shall be attributed to specific elements to the greatest extent possible. . . . More broadly, certain shared costs that have conventionally been treated as common costs (or overheads) shall be attributed directly to the individual elements to the greatest extent possible. . . . [12] (emphasis added).

Thus, the TELRIC methodology assigns directly attributable costs such as network operations to all UNEs and interconnection services, including custom routing. This is entirely appropriate. TELRIC is not limited to the assignment of "direct"

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[12] In the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, CC Docket 96-98, First Report and Order, released August 8, 1996, at ¶682.

costs, which are caused by a particular UNE or service. It is entirely appropriate to assign directly attributable costs to custom routing.

Q. DOES MR. CAPUTO ALSO ARGUE THAT COMMON COSTS SHOULD NOT BE INCLUDED IN THE CUSTOM ROUTING COST STUDY?

A. Yes. Mr. Caputo states that "WorldCom objects to the inclusions of these costs without a further explanation of what these costs are and demonstrable evidence of how these costs are Common to Custom Routing."[13]

Q. PLEASE RESPOND TO THIS STATEMENT.

A. I am not sure what Mr. Caputo has in mind when he says that Qwest must provide more evidence as to how Qwest's common costs (e.g., legal, external relations, research and development, etc.) are "common to Custom Routing." To say a cost could be "common to Custom Routing" is an oxymoron. By definition, these costs are common costs of the firm and are not directly associated with any UNE or service. The FCC's TELRIC methodology requires that these costs be assigned in a TELRIC study. As noted by the FCC, TELRIC studies should include "a reasonable allocation of forward-looking common costs." Thus, there is no basis for the exclusion of these costs.

V. RESPONSE TO MR. KELLEY

Q. DO YOU HAVE ANY GENERAL OBSERVATIONS REGARDING MR. KELLEY'S TESTIMONY?

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13 Caputo rebuttal, page 6.

A. Yes. Mr. Kelley has attempted to rebut several issues raised in the rebuttal testimony of Mr. Fleming, filed on June 27, 2001. However, Mr. Kelley's testimony is fraught with conceptual errors, and twists economic and TELRIC principles in a way that guarantees that Qwest will not be able to recover its forward-looking switching costs, in violation of the Act. I discuss the flaws in Mr. Kelley's advocacy below.

A. Switching Upgrade Costs

Q. DOES MR. KELLEY ARGUE THAT TELRIC STUDIES SHOULD NOT INCLUDE ANY COSTS FOR SWITCH UPGRADES?

A. Yes. Mr. Kelley argues that "the proper application of TELRIC principles excludes from forward looking switching costs both ongoing upgrade costs and the costs of adding new lines."[14]

Q. DO YOU AGREE?

A. No. Essentially, Mr. Kelley argues that switch upgrades may be a legitimate cost of doing business, but that these costs can't be recovered in TELRIC-based rates. In reaching this conclusion, Mr. Kelley has misapplied the FCC's TELRIC methodology.

Q. HAS THE FCC STATED THAT SWITCH UPGRADE COSTS CANNOT BE INCLUDED IN A TELRIC STUDY?

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14 Kelley rebuttal, page 3.

A. No. The FCC did not include upgrade costs in its Synthesis Model ("SM"), as noted by Mr. Kelley. However, this model is used to develop costs for universal service. As I noted in my response to Mr. Dunkel, the FCC specifically stated that the SM was developed for universal service purposes, and does not produce TELRIC data for use in pricing Local Interconnection Service ("LIS") and UNEs.

Q. WHY SHOULD UPGRADE COSTS BE INCLUDED IN A TELRIC STUDY?

A. As noted by Mr. Kelley, switch upgrade costs are a legitimate cost of doing business. The costs of upgrading switches to incorporate the latest switch technology are legitimate and necessary business expenditures. Switch upgrades are triggered by operating system software upgrades, and operating software upgrades frequently require corresponding hardware upgrades, including additions to the existing processing capacity and switch memory. After multiple upgrades, the capacity of the processor is often exhausted, requiring processor replacement. Upgrades to operating software are necessary to meet the requirements of regulatory or legislative mandates, as described in Mr. Fleming's June 27, 2001 rebuttal testimony.[15]

The results of a TELRIC study are used to set prices for LIS and UNEs. Thus, if the costs of switch upgrades are not included in the TELRIC study for switching, Qwest will be unable to recover these legitimately incurred costs, even though it will be incurring upgrade costs on a forward-looking basis. The Act specifically

15 Some regulatory mandates which have required software upgrades include: (1) the Communications Assistance for Law Enforcement Act requirements that could only be met by upgrading to the 5E14 Generic operating software in its 5ESS switches, (2) number pooling requirements – assigning blocks of telephone numbers to carriers in increments of 1,000 rather than 10,000 in order to conserve telephone numbers, (3) international direct digit dialing expansion to 15 digits, (4) interLATA equal access implementation, and (5) flexible automatic number identification (ANI) implementation to facilitate a 2 digit ANI code identifying payphone owners for carrier compensation purposes.

requires that ILECs be permitted to recover the costs they incur, as measured by TELRIC, to provide UNEs to CLECs. Excluding the costs of switch upgrades from TELRIC rates would violate this requirement, as it would deny Qwest compensation for legitimate costs it incurs to provide a UNE.

Q. WHAT IS MR. KELLEY'S RATIONALE FOR EXCLUDING SWITCH UPGRADE COSTS?

A. Mr. Kelley states that a TELRIC study "does not incorporate technical advances that are not yet available to or widely used by local telephone companies." He concludes that these are "hypothetical costs" that are not deployed today, and that therefore, the costs should not be included in a TELRIC study.

Q. DO YOU AGREE?

A. No. Mr. Kelley's advocacy on this matter represents a misapplication of TELRIC principles. The fact that Qwest will need to spend money on switch upgrades is not hypothetical; it is a reality. These are real forward-looking costs that Qwest will incur. As noted in Mr. Fleming's rebuttal testimony in Phase II, in the four years ending December 2000, Qwest spent over $235 million upgrading its digital switches. This translates to $3.71 per line per year. Again, assuming the average life of a switch is 10 years, Qwest will spend about $37.10 per line to upgrade existing switches over their service life. Qwest will continue to incur these upgrade costs in the future.

A TELRIC study should develop the cost of replacing the network today. However, this does not mean that ongoing costs should be ignored. Essentially, Mr. Kelley is arguing that TELRIC represents a "snapshot" of today's replacement network and that ongoing costs should not be considered. If this approach were followed, we would determine the cost to replace a switch today. In the future, we would develop another "snapshot" view of costs, identifying only the replacement cost. Neither of these snapshots would include the ongoing cost of switch upgrades, which would be incurred between the two "snapshot" views of cost. Thus, based on Mr. Kelley's approach, Qwest would be systematically denied the ability to ever recover these costs via TELRIC-based prices. Neither the Act nor the FCC's pricing rules support this result.

Q. ARE THERE ADDITIONAL PROBLEMS AND INCONSISTENCIES WITH MR. KELLEY'S APPROACH?

A. Yes. Mr. Kelley argues for a "snapshot" approach, but he admits that investments in the network will be depreciated over time. Thus, he argues that depreciation expense should be considered over time, but upgrade costs should not. However, if one is to perform a "snapshot" view consistent with Mr. Kelley's advocacy, one would have to modify the depreciation methodology used in TELRIC studies. TELRIC studies identify capital costs, including depreciation, cost of money and income tax. The cost of money (return) calculation is based on the declining net investment over time. That is, as an asset is depreciated, its net investment decreases, and cost of money is applied to a decreasing net investment amount each year. Thus, the resulting return cost component declines each year over the life of the asset. However, in a TELRIC study, these costs are levelized, since a TELRIC study assumes that the same cost/rate will be established during the depreciation life of an asset. This approach is necessary to reflect the reality that rates cannot be re-calculated each year. With this approach, there is a levelized cost/rate, not a cost/rate that is highest in year one and that would decrease over time.

However, in Mr. Kelley's "snapshot" approach, it would be inappropriate to levelize capital costs. If he is going to continue to price based on a "snapshot" in time, he should not levelize capital costs, but should include the higher costs that are incurred in the current year of the asset's depreciation life. That is, the cost of money (return) component of the capital costs should reflect the return on the asset without any depreciation instead of weighting in the lower returns needed in later years. Mr. Kelley's approach attempts to have it both ways.

Q. MR. KELLEY ALLEGES THAT UPGRADES "CAN HAVE THE EFFECT OF EXTENDING THE LIFE OF A SWITCH WELL BEYOND THE 10-YEAR LIFE USED IN THE MODEL."[16] PLEASE COMMENT.

A. Mr. Kelley states that if upgrades are included, the "lives of the switches would have to be lengthened considerably."[17] This statement is incorrect. There is no basis for assuming that the 10-year depreciation life established by the Commission was set based on the assumption that there would be no switch upgrades. The reality is that switch upgrades have been occurring and will continue to occur in the future. The depreciation life of a switch considers this fact.

In reality, if one is to assume, as Mr. Kelley does, that TELRIC should not include upgrade costs, then one could assume that the depreciation life of a switch should be shorter. If no upgrades are to be made, a switch would need to be replaced

16 Kelley rebuttal, page 6.
17 Kelley rebuttal, page 6.

sooner in order to serve customers and to provide adequate service. The problem with Mr. Kelley's approach is he wants to assume no upgrades for cost purposes, but wants to assume that upgrades will occur for purposes of determining depreciation life.

B. Growth Lines and Fill Levels

Q. DOES MR. KELLEY ARGUE THAT TELRIC SHOULD NOT CONSIDER THE COST OF GROWTH LINES?

A. Yes. When Qwest purchases switching equipment, growth lines normally cost more than the initial lines installed with the switch. Mr. Kelley argues that a TELRIC study should ignore the additional cost of lines installed for growth, based on the "snapshot" approach I described earlier. He argues that incorporating the additional cost of growth lines will result in what he calls an "intergenerational cross-subsidy," where today's "customers would be paying for capacity designed to serve tomorrow's customers."[18]

Q. IS THIS A REASONABLE ARGUMENT?

A. No. Once again, Mr. Kelley would like to ignore real forward-looking costs that Qwest will incur in the future after replacing the existing network. The reality is that Qwest has purchased growth lines from vendors in the past and will do it in the future. This approach is the least–cost, long-run method for providing switching elements.

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[18] Kelley rebuttal, page 7.

Q. COULD QWEST SIMPLY BUY A NEW SWITCH RATHER THAN PURCHASE GROWTH LINES IN AN EXISTING SWITCH?

A. Yes, but it would be highly inefficient. For Qwest to avoid purchasing growth lines from switch vendors, it would have to either (1) purchase new switches on a regular basis to serve growth, or (2) purchase more lines than are needed when purchasing a new switch, so that growth lines would not be needed. Either of these alternatives would result in an unwarranted increase in Qwest's costs of doing business. First, simply replacing switches more often rather than purchasing growth lines would result in greatly increased capital expenditures that would be very inefficient. This approach would also lead to shorter switch depreciation lives, resulting in higher costs. Second, Qwest could purchase more lines with the initial switch purchase to avoid purchasing growth lines later. However, this would increase the initial switch cost and would lead to a very high level of spare capacity, or a low level of fill, for much of a switch's life.

This exposes, once again, a basic contradiction in Mr. Kelley's testimony. On the one hand, he says the cost of growth lines should not be considered; on the other hand, he states that a TELRIC study should assume a 94% fill that does not allow for growth. To meet Mr. Kelley's criteria, Qwest would have to either (1) add initial excess capacity in order to avoid needing to add growth lines, and simultaneously maintain a 94% fill level that does not allow for growth (which obviously can't be done); or (2) replace switches more frequently, while not shortening depreciation lives (which also cannot happen). Again, Mr. Kelley can't have it both ways.

In the long run, the least-cost way to serve customers involves serving some demand with lines purchased subsequent to the purchase of a new switch. It is not efficient or least-cost to purchase new switches more often, or to maintain artificially high levels of spare capacity, in order to avoid purchasing growth lines. Mr. Kelley would inappropriately deny Qwest the ability to recover the forward-looking costs it will incur to provide growth lines, even though purchasing growth lines is a key component of any logical deployment strategy for least–cost, long-run switching facilities.

Q. DOES CONSIDERING THE COST OF GROWTH LINES RESULT IN AN "INTERGENERATIONAL CROSS-SUBSIDY" WHERE "TODAY'S CUSTOMERS WOULD BE PAYING FOR CAPACITY DESIGNED TO SERVE TOMORROW'S CUSTOMERS," AS CLAIMED BY MR. KELLEY?

A. No. Mr. Kelley's "intergenerational cross-subsidy" is a flawed concept on several levels. Considering the cost of growth lines does not mean that today's customers will pay to serve tomorrow's customers. Essentially, Mr. Kelley argues that all of today's customers will be served with all new replacement switches, and tomorrow's customers will be served with growth lines. In the real world, this is not the case. Qwest's Arizona network includes switches placed at different points in time. Thus, some of the demand from today's customers will be served with lines that are part of the purchase of an initial switch, and some of today's customers will be served with growth lines. This circumstance has existed in the past, exists today, and will exist in the future.

Mr. Kelley would apparently defer the cost of growth lines into the future. However, using his "snapshot" approach, Qwest would have no way to recover these costs in the future either, because a "snapshot" TELRIC study performed in the future based on Mr. Kelley's approach would also exclude the cost of growth lines.

Mr. Kelley alleges that by including the cost of growth lines, Qwest will "both earn higher margins and raise its current rivals' cost."[19] He argues that a competitive firm would be unable to do this. This makes little sense. In a competitive marketplace, Qwest or any other firm needs to recover its costs. To argue that a competitive firm would intentionally act in a manner that would not allow it to recover its costs is disingenuous. Mr. Kelley would systematically deny Qwest the recovery of costs that it must incur.

Q. EARLIER, YOU DESCRIBED HOW THE "SNAPSHOT" COST APPROACH ADVOCATED BY MR. KELLEY IS INCONSISTENT WITH THE MANNER IN WHICH DEPRECIATION IS HANDLED IN A TELRIC STUDY. DOES THE SAME PROBLEM EXIST WITH THE TREATMENT OF GROWTH LINES?

A. Yes. If the "snapshot" approach is used and the recovery of costs for growth lines is denied, it would not be appropriate to levelize capital costs, as I described earlier. If he is going to advocate pricing based on a "snapshot" in time, Mr. Kelley should not levelize capital costs, but should include the higher costs that are incurred in the current year of the asset's depreciation life.

Q. WHAT LEVEL OF SWITCH FILL DOES MR. KELLEY ADVOCATE?

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19 Kelley rebuttal, page 8.

A. As I noted earlier, Mr. Kelley argues that a 94% fill factor should be used to calculate switching costs. Mr. Kelley argues that this is the proper fill rate that "allows efficient current operation."[20]

Q. IS THIS A REASONABLE LEVEL OF FILL?

A. No. Qwest could never maintain anywhere near this level of fill in its switches. Qwest must always maintain at least 5% spare capacity for administrative purposes; a 94% fill rate would not allow any spare capacity for growth and would not account for the modularity of switching equipment. As demonstrated in the SCM User Manual that Qwest provided with the ICM on June 27, 2001, it is necessary to maintain spare capacity in order to provision service in a timely and efficient manner (Please refer to Exhibit RHB-R2, which contains the relevant pages from the SCM User Manual describing growth and modularity spare). Qwest could never install a switch with 94% utilization. First, modular equipment (e.g., a processor) comes in certain capacities, and cannot be installed to comport with a 94% fill. Second, growth equipment (e.g., line cards) cannot be installed in very small increments without incurring very high costs. It would make no economic sense to keep the switch at 94% fill, which would require Qwest to essentially add one line at a time when demand occurs. This would cause extremely high engineering and installation costs, and a held order would be required for every line. It is much more cost effective in the long run to add more capacity at a given time to serve growth than to add equipment in small increments. A 94% fill rate is simply not realistic for an efficient carrier.

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20 Kelley rebuttal, page 9.

Q. MR. KELLEY ARGUES THAT THE FCC USED A 94% FILL RATE IN THE SM. DOESN'T THIS MEAN THAT A 94% FILL IS APPROPRIATE IN A TELRIC STUDY?

A. No. As I noted earlier, the SM was developed for universal service purposes and does not develop TELRIC data. The FCC does not require the use of this fill in a TELRIC study. In fact, the use of a 94% fill factor would be in direct violation of the FCC's TELRIC rules. In its First Interconnection Order, the FCC stated:

> Per-unit costs shall be derived from total costs using reasonably accurate "fill factors" (estimates of the proportion of a facility that will be "filled" with network usage); that is, the per-unit costs associated with a particular element must be derived by dividing the total cost associated with the element by a *reasonable projection of the actual total usage of the element.*[21] (emphasis added)

A 94% fill factor certainly does not reflect a "reasonable projection of the actual total usage of the element." The unreasonableness of this projected level of usage is demonstrated by Mr. Kelley's inability to identify in discovery any telephone company that operates its switches at this level of fill.[22]

Q. IS A 94% FILL INCONSISTENT WITH OTHER ASPECTS OF MR. KELLEY'S ADVOCACY?

A. Yes. As I mentioned earlier, it is contradictory to argue that a TELRIC study should assume a 94% fill, while at the same time arguing that the study should not consider the cost of growth lines. If a switch were installed at a 94% fill rate, there would be an almost immediate need for growth lines. The only way to avoid this

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[21] First Interconnection Order, ¶ 682.

[22] *See* AT&T Response to Qwest Data Request No. 3.

almost immediate need for growth lines is to install some excess capacity initially, which, in turn, has the unavoidable effect of reducing the fill level.

Q. MR. KELLEY ARGUES THAT "IF CAPACITY IS FOR FUTURE USE, THEN IT IS ENTIRELY APPROPRIATE FOR QWEST TO BUILD IT INTO ITS NETWORK. WHAT IS NOT APPROPRIATE IS TO CHARGE TODAY'S CUSTOMERS FOR TOMORROW'S USAGE."[23] DO YOU AGREE?

A. No. As noted earlier in the discussion of growth lines, the "intergenerational cross-subsidy" argument is flawed, and Mr. Kelley's "snapshot" approach would not allow Qwest ever to recover the costs of spare capacity—costs that Qwest must incur.

C. Other Issues

Q. ARE THE COSTS OF APPLICATIONS SOFTWARE THAT QWEST INCURS INCLUDED IN THE HAI SWITCHING COSTS?

A. No. As explained in Mr. Fleming's Phase II rebuttal testimony, the HAI model's switching algorithm does not account for the applications software costs that Qwest incurs. Qwest expensed these software expenses prior to 1992 and then began treating them as a capital lease after 1992. However, other RBOCs continued to expense these software costs. Thus, the FCC data that are used in the HAI model cannot and do not include Qwest's applications software costs. In a response to a discovery request from Qwest, Mr. Kelley acknowledged that the FCC data include the costs of applications software "[t]o the extent 'applications

[23] Kelley rebuttal, page 10.

software' is required to support these services *and is capitalized . . . .*"[24] Because Qwest has not capitalized these expenses since 1992, by Mr. Kelley's own acknowledgement, they cannot be included in the FCC's switching cost data. Thus, Mr. Kelley's statement that "application software that was purchased with a new switch would have already been included in the FCC depreciation data and is included"[25] is incorrect in Qwest's case. Despite Mr. Kelley's claim, the HAI model does not appear to include any applications software costs.

Q. IN HIS PHASE II REBUTTAL TESTIMONY, DID MR. FLEMING DEMONSTRATE THAT THE HAI 5.2A TOTAL SWITCHING INVESTMENT WAS SIGNIFICANTLY LOWER THAN THE EMBEDDED INVESTMENT?

A. Yes. In his rebuttal testimony, Mr. Fleming compared the total switching investment in the HAI Model with the total embedded switching investment. He found that the HAI 5.2a switching investment was approximately 30% of the embedded switching investment. While embedded investment should not necessarily be equal to forward-looking investment, a forward-looking investment amount that is less than 30% of the booked investment "raises a red flag" that something is wrong with the HAI Model switching calculation.

Q. DOES MR. KELLEY ATTEMPT TO EXPLAIN THE GAP BETWEEN FORWARD-LOOKING AND EMBEDDED SWITCHING COSTS?

A. Yes. First, he states, without any evidence, that the embedded fill factors are inefficiently low. He seems to believe that the digital fill factor in Qwest's model somehow represents an embedded fill, which it does not. I am not aware of any

[24] *See* AT&T Response to Qwest Data Request No. 4.
[25] Kelley rebuttal, page 11.

calculation of fill that applies to the embedded plant that is on the books. This investment is not considered in TELRIC studies. Second, he suggests, without evidence, that Qwest may be operating too many switches. This makes little sense, especially given that the FCC's TELRIC methodology requires studies to consider the existing locations of switches. Third, he suggests that switching capacity may have been retired but not yet removed from the books. Again, he provides no evidence of this. Fourth, he alleges that Qwest may have added excess capacity to serve Centrex customers. There is absolutely no basis for this claim. In sum, each of these statements represents little more than unsupported conjecture.

Mr. Kelley may be correct that, in general, digital switching equipment costs have decreased over time. However, even if the data presented on page 13 of Mr. Kelley's testimony are accurate, these decreases come nowhere close to explaining the large gap between the HAI model's switching investment and Qwest's embedded switching investment. For example, the estimate of a 12 percent decrease in switching costs between 1996 and 2000 that Mr. Kelley cites, even if accurate, is really only a decrease of less than 3% per year. An annual decrease of 3% does not do not explain why the HAI switching investment is less than 30% of the embedded investment.

The reality is that this large discrepancy is likely symptomatic of the HAI Model's substantial understatement of switching costs.

VI. RESPONSE TO MR. CHANDLER

A. Switching

Q. DOES MR. CHANDLER ADDRESS THE "ANALOG LINE CIRCUIT OFFSET FOR DLC LINES" INPUT TO THE HAI MODEL?

A. Yes. He states that the HAI Model "makes an adjustment to the end office switching investments in order to capture the switch investment reduction that results from the deployment of integrated digital loop carrier systems."[26] The offset amount is $30 per line.

Q. IS THIS INPUT CONSISTENT WITH THE HAI INPUTS PORTFOLIO DOCUMENTATION?

A. No. As noted by Mr. Fleming in his Phase II rebuttal, the HAI Model Inputs Portfolio ("HIP") states that the HAI Model uses the FCC's switching inputs. However, the FCC utilized a zero value for this input, rather than $30. In his rebuttal, Mr. Chandler admits that the HIP states that FCC inputs are used in the HAI, and that the FCC value for this input is zero, but he nonetheless argues that the $30 should be used as an input.

Q. DID THE FCC CONSIDER THIS ADJUSTMENT IN DEVELOPING ITS SWITCHING COST ALGORITHM?

A. Yes. The FCC specifically rejected this adjustment on the basis that their algorithm already reflected the use of integrated digital circuits, leaving no room for

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[26] Chandler rebuttal, page 5.

additional adjustments.[27] The ACC should also reject Mr. Chandler's $30 adjustment.

Q. HAS THE HAI MODEL CONSISTENTLY APPLIED THIS DLC INVESTMENT OFFSET?

A. No. In Arizona the HAI Model included the offset. However, in Colorado, AT&T removed the offset. More recently, in Nebraska, the adjustment was back again. All these cases have been filed in the last year and are currently before the respective Commissions. It appears the HAI modelers are unsure as to whether they want to conform to the FCC inputs order. In this proceeding, they decided not to conform. Apparently, when the FCC inputs do not produce the desired result, AT&T enters another input.

Q. IS THERE ANOTHER HAI MODEL INPUT THAT AT&T APPEARS TO BE CHANGING FROM STATE TO STATE?

A. Yes. In the filing in this case, AT&T assumes that 30% of the total switching investment is assigned to the switch port. Recently, the HAI model, as filed in Colorado and Nebraska, was adjusted to assign 60% of the total switching investment to the calculation of the switch port cost. This has a significant and direct impact on minute of use and port costs for switching. The HAI documentation for this traffic sensitive factor as filed in Arizona states: "This factor is an HAI estimate of the average over several different switching technologies." In more recent documentation filed in Nebraska, the support for the new factor states: "This factor is an estimate of the average over several different switching technologies." For AT&T, the same vague documentation can be used to support

[27] *Inputs Order at* ¶ 327.

dramatic changes in input values. For years, the HAI model has supported a 30% non-traffic sensitive assignment of switching costs. However, in other states, the changing of this one number in the study increased the non-traffic sensitive assignment by more than two times without requiring any wording changes in the model's ambiguous documentation.

Q. ARE THERE ANY FINAL PROBLEMS THAT YOU HAVE IDENTIFIED WITH THE HAI MODEL SWITCHING COST ANALYSIS?

A. Yes. The HAI Model completely ignores the cost of billing for switch usage. Collecting the calling volumes, compiling the bills and documenting the charges all cause Qwest to incur costs. These costs are ignored by the HAI model or are assigned for recovery from other products and services that do not require actual usage billing data. Regulators have historically recognized the legitimacy of including the cost of billing usage sensitive rate elements in the cost of providing those elements. The HAI model ignores these legitimate costs or tries to assign them to product services and elements that do not require these billing procedures.

Q. MR. CHANDLER ALLEGES THAT THE DISCOUNT FOR THE PURCHASE OF A NEW SWITCH IS THE SAME AS THE DISCOUNT FOR A GROWTH ADDITION. DO YOU AGREE?

A. No. Mr. Chandler has viewed the SCM data for one of the switch types on the SCM (Switch type 3) and has concluded that the new and growth discounts are the same. However, this is only true for the system discount for this switch type. The data file Osw301a1.mdb contains more than one discount. He failed to note that there is an additional discount under "Integrated Business Plan Discount for Getting Started Equip" that is applied to the purchase of a new switch. Thus, for

Switch type 3, the discount for a new switch purchase is greater than the discount for a growth purchase.

Q. DOES MR. CHANDLER CRITICIZE THE ANALYSIS OF TANDEM SWITCHING TRUNKS PROVIDED IN MR. FLEMING'S PHASE II REBUTTAL TESTIMONY?

A. Yes. In Exhibit RC-1, he provides a "corrected" analysis that purports to show that the number of tandem trunks in the HAI Model is reasonable.

Q. DO YOU AGREE WITH HIS ANALYSIS?

A. No. While I have not been able to totally evaluate this "corrected" analysis, I have identified at least two errors. First, Mr. Chandler assumes that for Switched Access Service there need be only one trunk port in the tandem switch cost. The relevant service in this proceeding is LIS, for which there should be two trunk ports included in the costs of the tandem switch, (both ports are used when a call traverses the local tandem). There is no reason to exclude one of these ports, as Mr. Chandler has done. Second, Mr. Chandler assumes a 2% "tandem fraction of local" percentage. In Arizona, this percentage is over 7%. If these two errors alone are corrected, then the HAI model does not include sufficient trunks.

Q. ARE THERE ADDITIONAL PROBLEMS WITH THE HAI TANDEM SWITCHING CALCULATION?

A. Yes. While the HAI Model systematically understates switching costs, there are two specific problems that may account for some of this understatement. First, the HAI Model assumes too high of a Busy Hour (BH) CCS (Centi-Call Second) per trunk, which leads to an understatement of the number of trunks needed.[28] Second, Qwest's analysis of the HAI switching costs indicates that the study assumes a 100% trunk fill, which is not realistic and would lead to an understatement of costs.

Q. MR. CHANDLER ARGUES THAT THE SCM IS AN "INSCRUTABLE" MODEL. DO YOU AGREE?

A. No, the model is not "inscrutable." Calculating switching costs is complex, and the SCM is properly designed to carry out this complex exercise. Mr. Chandler improperly equates complexity with inscrutability. The switching module of the HAI model is at least equally complex.

B. Packet Switching

Q. MR. CHANDLER STATES THAT THE QWEST UNBUNDLED PACKET SWITCHING ("UPS") COST STUDY IS NOT FORWARD-LOOKING. DO YOU AGREE?

A. No. The Qwest UPS study reflects the cost of the forward-looking technology that Qwest will use to provide UPS. Qwest will provide UPS when certain conditions are met, as required by the FCC. These conditions are described in the August 31 testimony of Ms. Malone. Mr. Chandler appears to want Qwest to use a different technology to offer a different service without regard to the FCC's packet switching

[28] The HAI Model appears to use a High Use trunk-engineering table to compute the number of trunks needed for all types of trunk groups. In fact, the number of trunk circuits required to handle a given load is significantly lower for a High Use trunk group than it is for a Final trunk group. Tandem switches generally terminate Final trunk groups.

requirements, which are quite specific. Qwest is not required to offer Mr. Chandler's version of packet switching, and as described by Mr. Craig, is not required to adopt Mr. Chandler's preferred choice of technology.

The Qwest UPS TELRIC study appropriately considers the forward-looking technology that will be deployed by Qwest. Please refer to the June 27, 2001 testimony of Ms. Million, pages 54-57 for further discussion.

VII. RESPONSE TO MR. GATES

Q. WHAT IS THE GENERAL THRUST OF MR. GATES' TESTIMONY.

A. Mr. Gates addresses the costs for two elements: Daily Usage Record File and Category 11 Mechanized Record Charge. He proposes that the Commission set a zero rate for these elements. If the Commission determines that a rate is appropriate, he proposes rates that are a fraction of Qwest's proposed rates.

Q. ARE THESE ELEMENTS APPROPRIATELY ADDRESSED IN THIS PHASE OF THIS DOCKET?

A. No. Costing and pricing issues regarding these elements were not deferred to Phase IIA of this docket. In fact, none of the testimony that was previously filed regarding these elements was defined as a "portion of testimony to be considered in later part of phase II" in the Commission's August 3, 2001 procedural order. As the Commission is aware, Qwest has filed a motion to strike Mr. Gates's testimony on this basis. Nonetheless, as Qwest awaits the Commission's ruling, I will address several issues in Mr. Gates' testimony.

Q. DOES MR. GATES CLAIM THAT QWEST'S DAILY USAGE RECORD FILE ("DUF") STUDY IS "FLAWED AND IN CERTAIN INSTANCES UNSUPPORTED"?

A. Yes. However, his criticisms are generally unfounded. Mr. Gates argues that the calculations cannot be followed, and that the supporting data, such as the Expense Factors Module, were not provided with the CD that Qwest filed in Phase II.

Q. DO YOU AGREE?

A. No. I believe Mr. Gates has taken a relatively simple TELRIC study and made it seem complicated. All of the calculations in the study can be observed in the Excel workbook provided in Study #5211, filed on June 27, 2001. In addition, certain supporting data that Mr. Gates could not find, such as the Expense Factors Module, was in fact filed with the June 27, 2001 filing in Phase II.

Q. CAN YOU BRIEFLY DESCRIBE HOW THE CALCULATIONS FLOW THROUGH THE STUDY?

A. Yes. The key input data to the study is contained in the "dvlp calc," "toll data entry" and "eo measurement" worksheets within the Excel workbook. These contain the three cost elements: (1) MCR development, (2) toll data entry and (3) end office measurement.

Q. PLEASE DESCRIBE THE MCR DEVELOPMENT COSTS.

A. The "dvlp calc" worksheet calculates the costs of Mechanized Change Record (MCR) development. These are the costs incurred by Qwest to set up the CLEC to receive customer usage records. The development hours are multiplied by the labor rate to yield the total development costs, which are then spread over a two-year forecast of demand. The resulting "cost per message" is shown in cell C32 of the worksheet.

Q. DOES MR. GATES PROPOSE THAT COSTS SUCH AS THIS BE RECOVERED ON A NONRECURRING BASIS?

A. Yes. He states that he would "advocate that this type of charge should be developed and applied on a one-time, nonrecurring basis."[29]

Q. COULD QWEST SEEK TO RECOVER THESE DEVELOPMENT COSTS VIA A NONRECURRING CHARGE?

A. Qwest could do this, but I would imagine CLECs would protest if Qwest sought to establish a nonrecurring rate element. I am surprised that Mr. Gates recommends a nonrecurring charge, when AT&T and WorldCom have often argued that nonrecurring charges are a barrier to entry and have generally supported the recovery of costs via recurring charges. It makes sense to recover a one-time development cost over time via a recurring charge.[30]

Q. ONCE THE DEVELOPMENT COST PER MESSAGE IS CALCULATED, HOW DOES IT FLOW THROUGH THE STUDY?

A. The cost per message is entered into the "WINPC Investments" worksheet (Cell C5). The cost is then input into Cell BE21 of the "WINPC Output" worksheet, where it is added to the "toll data entry" amount in Cell BE25. Annual cost factors are applied to this value in the "WINPC Output" worksheet to derive the final result

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29 Gates rebuttal, page 23.

30 It is important to understand that a one-time development cost is quite different from a nonrecurring cost. A nonrecurring cost is generally related to a customer placing an order for service, and is incurred each time an order is placed. A one-time development cost is only incurred once to set up the service.

(Cell FD25). The application of factors is also displayed in the "Total Product Costs" worksheet.

Q. YOU MENTIONED THAT ANNUAL COST FACTORS ARE APPLIED TO THE COST. ARE THESE FACTORS DISPLAYED IN THE STUDY?

A. Yes. These factors are shown in the "Total Product Costs" worksheet, and also in the "WINPC Output" worksheet. These factors are derived from the "WINPC ACF Outputs" worksheet. This sheet shows all of the cost factors that are used in the study.

Q. WHERE DO THE COST FACTORS COME FROM?

A. The annual expense factors are developed in the ICM Expense Factors Module.[31]

Q. DID QWEST PROVIDE THE ICM EXPENSE FACTORS MODULE ON CD IN THIS PROCEEDING?

A. Yes. The ICM was filed with the Commission on June 27, 2001, as Exhibit TKM-02R (Study 5206). The Expense Factor Base Module is included in the ICM, as noted in the ICM documentation. To access this module, go to the ICM Home Screen. From the home screen, select the "factors" input category from the "select model input category" and push the "go to model inputs" button. Select "View Expense Factor Base Module" from the "view" menu. This will open the Expense Factors Module of ICM, where all expense factor calculations can be observed. In fact, if the user pushes the "summary" button, the expense factors will be displayed. These are the same expense factors that are included in the "WINPC ACF Outputs" worksheet in the Daily Usage Record File study. All of the factor

[31] Capital cost factors are developed in the ICM Capcost Module.

calculations can be followed in the Expense Factors Module, which is essentially an Excel workbook.

Thus, Mr. Gates' claim that the Cost Factors Module was not included in the CD-ROM provided on June 27, 2001, is not accurate. The supporting data and calculations were provided and can be analyzed by Mr. Gates.

Q. PLEASE DESCRIBE THE TOLL DATA ENTRY COSTS.

A. These costs, which are quite small, are incurred for assembly and editing. These toll data entry expenses are processed through the cost study in the same manner as I described for MCR development. The small investment portion follows the same process, with the additional application of capital cost factors.

Q. PLEASE DESCRIBE THE END OFFICE MEASUREMENT COSTS.

A. These are the costs incurred to measure traffic at the central office. However, Qwest has determined that these costs are also recovered in the unbundled switching usage UNE. Therefore, Qwest will agree to remove these costs from the Daily Usage Record File cost study. This reduces the cost to $0.000694 per record.

Q. DOES MR. GATES QUESTION THE APPLICATION OF DIRECT AND DIRECTLY ATTRIBUTABLE FACTORS IN THE DAILY USAGE RECORD FILE STUDY?

A. Yes. His testimony is similar in this area to the testimony of Mr. Caputo. In my response to Mr. Caputo, I demonstrated that these factors are appropriately applied in all TELRIC studies, so I will not repeat that testimony here.

Q. DOES QWEST "ERRONEOUSLY COMPOUND" THESE FACTORS AS ALLEGED BY MR. GATES?

A. No. While each level of factors is applied to the previous level of factors (e.g., the directly attributed factors are applied to direct expense, and the common factors are applied to TELRIC), this does not result in an inflation of the cost results, since the denominators of the factors are adjusted to account for this cumulative effect.

Q. MR. GATES IS CONCERNED THAT INVESTMENT IN LAND AND BUILDINGS IS INCLUDED IN THE COST STUDY. PLEASE COMMENT.

A. With the removal of end office measurement, there is no land and building investment included in the study.

Q. MR. GATES HAS CALCULATED THE DUF RATE TO BE $0.000038. IS THIS REASONABLE?

A. No. This rate would not allow Qwest to cover its forward-looking costs. In fact, based on Mr. Gates' exhibit, the $0.000038 rate appears to be based on a cost that includes only the investment-based costs of measurement. The MCR change and toll data entry costs appear to be excluded. In addition, Mr. Gates has inappropriately set all directly assigned and directly attributable factors to zero. In sum, Mr. Gates has produced a cost that is grossly understated.

VIII. RESPONSE TO MR. MORRISON

Q. DOES MR. MORRISON ARGUE THAT REMOTE TERMINAL COLLOCATION EQUIPMENT COSTS SHOULD BE RECOVERED VIA RECURRING CHARGES?

A. Yes. Mr. Morrison argues that remote terminal collocation costs should be recovered via a recurring charge, rather than a nonrecurring charge. This is similar to the arguments made by Mr. Lathrop in Phase II of this proceeding.

Q. DO YOU AGREE?

A. No. The cost of collocation equipment that is dedicated to CLECs should be recovered via a nonrecurring charge. This issue was debated at length in Phase II of this proceeding, and the rebuttal testimony of Mr. Garrett Fleming (pages 39-48) explained why collocation equipment that is dedicated to CLECs should be recovered via a nonrecurring charge.

Q. IS THE TREATMENT OF RECURRING AND NONRECURRING COSTS IN THE REMOTE TERMINAL COLLOCATION STUDY CONSISTENT WITH THE FCC'S COLLOCATION PRINCIPLES?

A. Yes. In its Second Report and Order in CC Docket No. 93-162, regarding pricing for collocation, the FCC set out principles for determining whether a cost should be recovered through a nonrecurring charge. In Paragraph 32 of that order the FCC states:

> While carriers typically recover investment costs through recurring charges, we find that it is not unreasonable for LECs to assess nonrecurring charges to recover the cost of equipment. Inasmuch as physical collocation is a new service, LECs may have difficulty projecting either the length of time that equipment will be used by an interconnector or the useful life of that equipment for depreciation purposes. When a LEC imposes a recurring charge to recover the depreciation of an asset over time, overestimating the life of the equipment or the length of time that an interconnector would use the equipment could prevent the LEC from recovering the total cost of its investment. We will not, however, permit LECs to recover initially an amount greater than the total installed cost of the equipment, plus a reasonable overhead loading.

The FCC went on to say in paragraph 33:

> We do not agree with ALTS' position that nonrecurring charges developed in conformance with these requirements constitute a barrier to entry. To the extent that the equipment needed for expanded interconnection service is dedicated to a particular interconnector, we believe that requiring that interconnector to pay the full cost of the equipment up front is reasonable because LECs should not be forced to underwrite the risk of investing in equipment dedicated to the interconnectors use, regardless of whether the equipment is reusable....

It is clear from these ordering paragraphs that the FCC recognizes that LECs should not be held accountable for underwriting all the risk of building an interconnector's network. The FCC established the costing principle that the cost of facilities constructed solely for the provisioning of collocation (i.e. dedicated to collocation) can be recovered through nonrecurring up-front charges. In fact, the order goes so far as to imply that anything else would result in an unreasonable transfer of the risk of constructing a CLEC network to the ILEC that is providing collocation. The Act was designed to give competitors access to critical network elements that are currently owned by the ILECs. This access to elements was considered critical to meeting the competitive objectives of the Act. Nowhere in the Act did Congress decide that it was also the ILEC's responsibility to finance a co-provider's entry into the market.

Q. MR. MORRISON COMPARES REMOTE TERMINAL COLLOCATION EQUIPMENT WITH SWITCH PORTS OR LOOPS. IS THIS A VALID COMPARISON?

A. No. The equipment used to provide the Unbundled Switching Port and Unbundled Loop UNEs may be reused by Qwest to provide service to other CLECs or its retail customers. Remote Terminal Collocation equipment that is recovered via a nonrecurring charge is dedicated to CLECs and will not be reused by Qwest. When equipment is dedicated to CLECs, the costs must be recovered up front, consistent with the FCC policy quoted above.

In addition, as noted on page 46 of Mr. Fleming's June 27, 2001 Phase II testimony:

> However, the FCC does not require states to use nonrecurring charges as the basis for recovering nonrecurring costs. Instead the FCC, in its first Report and Order on interconnection, opined that states may spread the recovery of nonrecurring costs over a "reasonable period of time" if it can be assured that "any such reasonable arrangement would ensure that incumbent LECs are fully compensated for their nonrecurring costs." (Para 749) (emphasis added). In order to "ensure" Qwest recovers its costs, there must be some evidence that there is no risk to Qwest in deferring this cost recovery. The evidence indicates the risks to Qwest of deferring this recovery of these costs are both real and probable. Mr. Lathrop premises his whole recurring charge argument on a reuse assumption that he never defends nor substantiates. There is simply no basis for assuming that recurring collocation rates proposed by Mr. Lathrop will "ensure" that Qwest would be "fully compensated" for the costs it incurs in providing collocation.

Mr. Morrison's testimony is telling. He objects to a nonrecurring charge because "[i]f after paying this charge the competitor should somehow lose the customer, the competitor is stuck with RT collocation space that it may no longer need, yet the competitor has paid a huge up-front charge that it cannot recoup."[32] Mr. Morrison would rather that Qwest put up the money up front, so Qwest will be left "holding the bag" for the remaining recovery if the CLEC loses the customer. This is an inappropriate transfer of risk to Qwest and is exactly the situation that the FCC says is inappropriate in the quotes offered above.

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[32] Morrison rebuttal, page 13.

Q. MR. MORRISON ARGUES THAT THE APPLICATION OF FACTORS IN THE REMOTE TERMINAL COLLOCATION STUDY IS INAPPROPRIATE, AND THAT THE UTILIZATION OR FILL LEVEL IS TOO LOW. WILL YOU ADDRESS THESE CONCERNS?

A. I have addressed these issues earlier in my testimony, in my responses to Mr. Dunkel and Mr. Caputo. Therefore, I will not repeat those arguments here.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS	)))))))	DOCKET NO. T-00000A-00-0194 Phase II A AFFIDAVIT OF ROBERT H. BRIGHAM
STATE OF COLORADO	))	
COUNTY OF DENVER	))	

Robert H. Brigham, of lawful age being first duly sworn, deposes and states:

1. My name is Robert H. Brigham. I am Director – Service Costs in the Policy and Law department of Qwest Services Corporation in Denver, Colorado. I have caused to be filed written surrebuttal testimony and exhibits in support of Qwest Corporation in Docket No. T-00000A-00-0194, Phase II A.

2. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge and belief.

Further affiant sayeth not.

Robert H. Brigham

SUBSCRIBED AND SWORN to before me this 8th day of October, 2001.

Marjorie [illegible]
Notary Public residing at 2730 W. Wesley Ave #2
Denver, Colorado 80219

My Commission Expires: March 4, 2005

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS	) DOCKET NO. T-00000A-00-0194) PHASE II-A

EXHIBITS OF

ROBERT H. BRIGHAM

ON BEHALF OF QWEST CORPORATION

OCTOBER 19, 2001

Arizona Corporation Commission
Docket No. T-00000A-00-0194
Phase II-A Qwest Corporation
Surrebuttal Testimony
Exhibit RHB-R1
October 19, 2001

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
Chairman
JAMES M. IRVIN
Commissioner
MARC SPITZER
Commissioner

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS	DOCKET NO. T-00000A-00-0194 PHASE II

SURREBUTTAL TESTIMONY OF

WILLIAM L. FITZSIMMONS

ON BEHALF OF QWEST CORPORATION

JULY 30, 2001

Q. PLEASE STATE YOUR NAME AND POSITION.

A. My name is William L. Fitzsimmons. I am a Director at LECG, LLC; my business address is 2000 Powell Street, Suite 600, Emeryville, CA 94608.

Q. ARE YOU THE SAME WILLIAM L. FITZSIMMONS WHO FILED DIRECT AND REBUTTAL TESTIMONY IN THIS DOCKET?

A. Yes.

Q. WHY ARE YOU FILING SURREBUTTAL TESTIMONY AT THIS TIME?

A. On page 62 of my rebuttal testimony, I explained that many of the input values used by Mr. Dunkel in his run of HAI 5.2a are not based on the Arizona Corporation Commission values, the FCC's Tenth Report and Order, or the HAI 5.2a default values. In Exhibit WLF-3 attached to my rebuttal testimony, I identified the distribution and feeder input values from Mr. Dunkel's run of the model that are not supported by the FCC. During the first week of the proceedings in this case, Mr. Dunkel filed surrebuttal testimony that identified the source of the input values that he portrayed as values used by the FCC when it ran its cost model for Arizona. Immediately after I testified in Phoenix on July 19, 2001, I began investigating Mr. Dunkel's claim that the source he identified includes the values for inputs used by the FCC to estimate feeder and distribution investments. This testimony presents the results of that investigation.

Q. DID YOU INVESTIGATE MR. DUNKEL'S CLAIM THAT HE USES THE FCC'S INPUT VALUES IN HIS RUN OF THE HAI 5.2A MODEL [DUNKEL SURREBUTTAL, P. 1]?

A. Yes. To investigate Mr. Dunkel's claim that he uses FCC specified input values in his run of the HAI 5.2a model, I reviewed the FCC's Tenth Report and Order[1] and the User Manual for the FCC's cost model,[2] and Debra Stump, a consultant on my staff, contacted FCC staff to confirm my findings.

Q. DID THIS REVIEW CONFIRM YOUR EARLIER CONCLUSION THAT MR. DUNKEL'S RUN OF HAI 5.2A DOES NOT REFLECT THE FCC'S SPECIFIED VALUES FOR KEY INVESTMENT INPUTS? [FITZSIMMONS REBUTTAL, P. 62]

A. Yes. My investigation confirms that Mr. Dunkel does not use the FCC's specified values for feeder or distribution investment inputs in his run of the HAI 5.2a model. Mr. Dunkel states that "[t]he FCC inputs that I used are the FCC inputs exactly as used by the FCC in the actual run that the FCC used to determine universal service fund eligibility for Qwest in Arizona."[3] This claim is inaccurate.

Mr. Dunkel apparently uses input values from the worksheet titled "User Adjustable Inputs" in the file "AZ Mountain Bell-Arizon_Default

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1 *Federal-State Joint Board on Universal Service, Forward-Looking Mechanism for High Cost Support for Non-Rural LECs,* Tenth Report and Order, CC Docket Nos. 96-45 and 97-160, FCC 99-304 (rel. October 21, 1999) ("Tenth Report and Order").

2 Le, Hung and W. W. Sharkey, "The HCPM/HAI Interface for a Cost Proxy Model Synthesis: A User Manual," Federal Communications Commission, March 26, 1999 ("User Manual").

3 Dunkel Surrebuttal, p. 1.

Scenario_WC.xls," which he downloaded from the FCC's website.[4] He claims that these are the input values specified by the FCC. He is mistaken. A review of the FCC's model documentation shows that the FCC's input values for distribution and feeder investment are not located in this worksheet. The feeder and distribution investment input values in this worksheet are not the values specified by the FCC and are not the values used in the FCC's run of their model.

Q. WOULD YOU PLEASE ELABORATE ON WHAT THE USER MANUAL DESCRIBES RELATIVE TO THE USE OF INPUT VALUES?

A. To run the FCC's model, the user selects an HCPM input file and a HAI scenario.[5] In October 1999, the FCC adopted input values for the HCPM model and described these values in the Tenth Report and Order.[6] These FCC-specified values are located in the file "HCPM_inputs_October 1999.xls."[7] This file is downloaded automatically when a user downloads the FCC's model. A copy of this file is attached as Exhibit WLF-5. The inputs described in this file match the inputs specified by the FCC in its Tenth Report and Order, and they match the

4 Dunkel Surrebuttal, p. 1 and Schedule WD-20. The file is available by downloading the "Results Zip File" available at http://www.fcc.gov/ccb/apd/hcpm/.

5 User Manual, p. 5.

6 "In this Report and Order, we complete the selection of a model to estimate forward-looking cost by selecting input values for the synthesis model we previously adopted." Tenth Report and Order, paragraph 2.

7 The FCC-specified values are also described in documentation provided when a user downloads the FCC model from the FCC's website. See Bush, CA, DM Kennet, J Prisbrey, and WW Sharkey, Federal Communications Commission, and Vaikunth Gupta, Panum Telecom, LLC, "Computer Modeling of the Local Telephone Network," October 1999, Appendix A, p. 22.

values listed in the "FCC" column of Exhibit WLF-3 of my rebuttal testimony.[8] They are not the values for feeder and distribution investments used by Mr. Dunkel in his run of the HAI 5.2a model.

When the FCC's model is run, the HCPM input values from the file "HCPM_inputs_October 1999.xls" are written to a file called "Hcpm_current_inputs.xls."[9] This new file contains the values for the HCPM inputs that are actually used when the model is run. When the HCPM is run with the "HCPM_inputs_October 1999.xls" file, the values for feeder and investment inputs match Exhibit WLF-3.

Q. **DID YOU VERIFY YOUR FINDINGS WITH EXPERTS AT THE FCC?**

A. Yes. FCC staff confirmed that the inputs listed in the "User Adjustable Inputs" worksheet of the file cited by Mr. Dunkel are the HAI 5.0a default inputs.[10] They are *not* the FCC's inputs to the HCPM portion of its model. In some cases, such as SAI and fiber feeder investments, they are no longer even supported by proponents of the HAI model. The HCPM inputs are selected by the user before running the FCC's model. These inputs are in a different format than the HAI inputs for distribution and investment and are not included as inputs in the "User Adjustable Inputs" worksheet. The only FCC-specified input values listed in this worksheet are inputs related to the FCC model's switching, interoffice, and

8 The "Fiber Feeder Investment per foot" input values in the "FCC" column of Exhibit WLF-3 are weighted averages of the FCC's specified input values. The weighting is done to translate the FCC-specified values into Arizona-specific values that are compatible with the HAI 5.2a model.

9 User Manual, p. 6.

10 Telephone conversation with the FCC Staff, July 24, 2001.

expense modules.

Q. DID YOU REPLICATE THE FCC MODEL RUN THAT IS ON THE FCC'S WEBSITE?

A. Yes, I replicated the FCC's model run that produces the worksheet cited by Mr. Dunkel, "AZ Mountain Bell-Arizon_Default Scenario_WC.xls." The values for the feeder and distribution investment match the values from the FCC's Tenth Report and Order. They are not the values used in Mr. Dunkel's run of the HAI 5.2a model. For example, Table 1 compares the input values for SAI indoor investment from the FCC's Tenth Report and Order, the "Hcpm_current_inputs.xls" file created when I replicated the FCC model run, and Mr. Dunkel's run of HAI 5.2a. The values used by Mr. Dunkel for this input are actually the default values from HAI 5.0a, which is not supported by any party in this proceeding.

Table 1
Comparison of Input Values for SAI Indoor Investment ($)

Lines	FCC 10th Report and Order	WLF run of FCC model ("hcpm_current_inputs.xls")	Dunkel run of HAI 5.2a
50	220	220	98
100	333	333	148
200	665	665	296
400	1,331	1,331	592
600	1,996	1,996	888
900	2,770	2,770	1,232
1200	3,993	3,993	1,776
1800	5,539	5,539	2,464
2400	7,536	7,536	3,352
3600	11,079	11,079	4,928
5400	16,618	16,618	7,392
7200	21,708	21,708	9,656

Q. WHAT WERE THE RESULTS OF THESE RUNS OF THE FCC'S MODEL?

A. When I ran the "wire center" option, using the HCPM inputs file described above and attached as Exhibit WLF-5, the model produced the same output worksheet that is available on the FCC's website.

In addition, I viewed the results of the same run by density zone, rather than by wire center. Like the HAI 5.2a model presented by Mr. Denney in this proceeding, the FCC's model allows the user to display results by density zone or by wire center. As Mr. Denney describes, "the [HAI 5.2a] Model calculates per-unit UNE costs, network interconnection costs, and the cost of universal service. At the user's discretion, these results can be displayed by line density range, wire center, or individual customer location 'cluster.'"[11]

The run of the FCC model is meant to estimate the cost of providing basic local service for use in determining universal service funding. I agree with Mr. Denney that the FCC model is not designed to produce UNE costs.[12] The loop cost estimate from the "density zone" run of the HCPM/HAI, consistent with the FCC's specified input values, is $17.77.

Q. WOULD YOU PLEASE SUMMARIZE YOUR COMMENTS?

A. The FCC's HCPM User Manual states: "Users should be aware that there is no linkage between HAI inputs and HCPM input files. It is the responsibility of the

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[11] Denney Direct, p. 13.

[12] Denney Direct, p. 19.

user to make appropriate selections for each of the model components."[13] Rather than heed this warning, Mr. Dunkel selected inappropriate input values for the run that he presents in this proceeding. Many of the feeder and distribution input values that he portrays as FCC values are actually default values from the HAI 5.0a model, which is not supported by any party in this proceeding. As a result, Mr. Dunkel's run of the HAI model does not provide meaningful information for consideration in this proceeding.

Q. DOES THIS CONCLUDE YOUR SURREBUTTAL TESTIMONY?

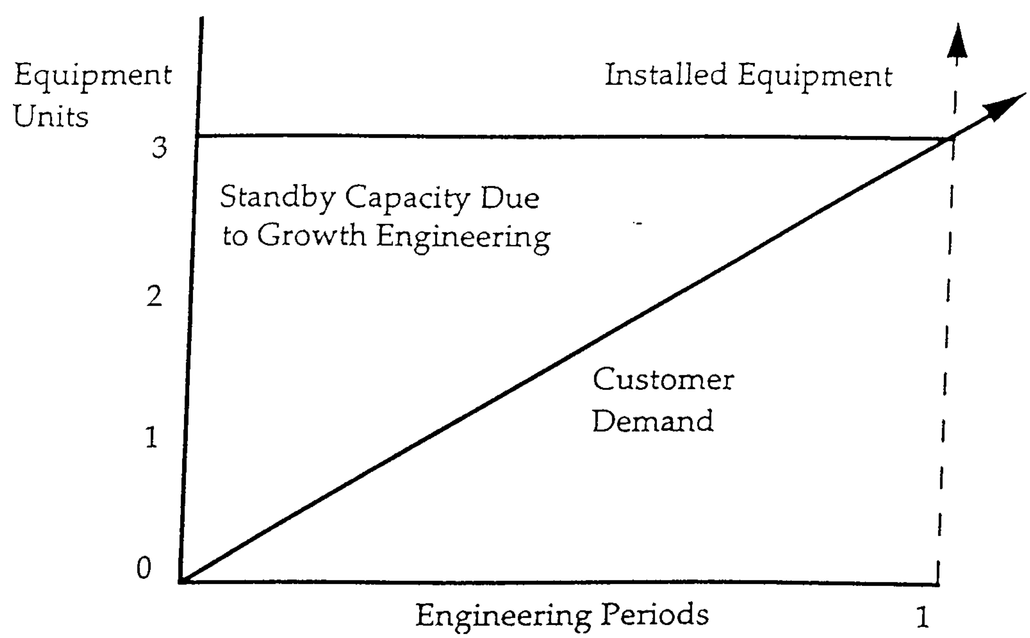
A. Yes.

[13] User Manual, p. 6.

Growth Engineering Standby

Standby capacity due to growth engineering is the amount of capacity periodically engineered into some switch components to assure that there is capacity available to provide service to users over a specified engineering period. This type of capacity occurs when the anticipated growth in customer demand necessitates installation of more than one piece of equipment (three, in the example below) per engineering period.

This is done primarily to minimize costs. If a switch is installed and capacity is added one unit at a time, only as demand occurs, the continual engineering and installation would create a great expense. Similarly, if switches are installed fully equipped to meet their maximum capacity, there initially may be enough standby capacity to last ten years. This would create a great initial expense.



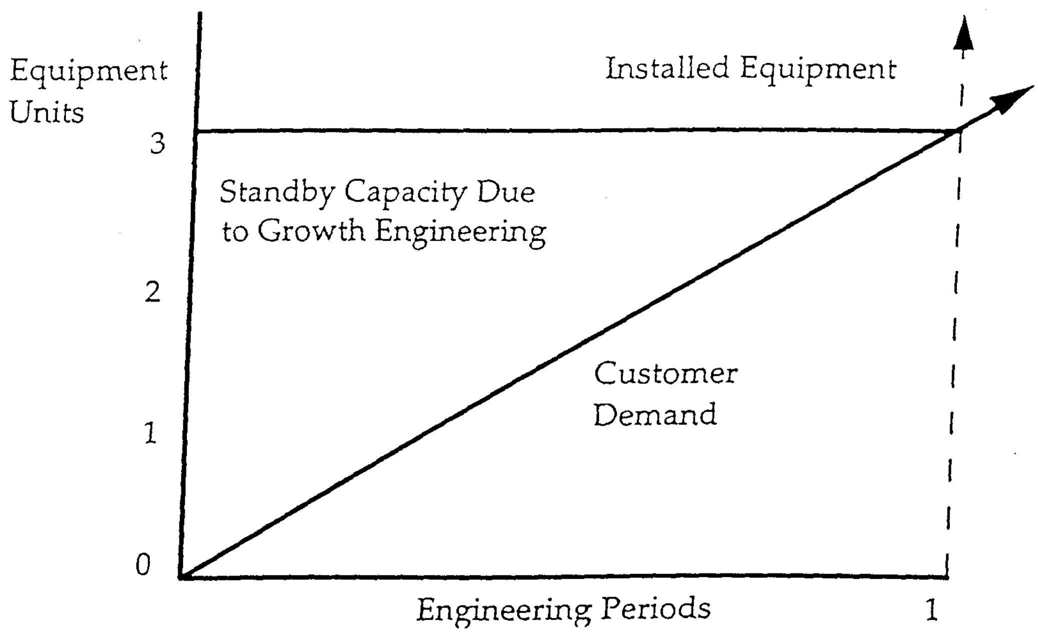
Standby capacity due to growth engineering is handled on an average basis by the Utilization Factor (UF) which will be discussed later.

Modularity Standby

Standby capacity due to modularity is the amount of standby capacity in some switch components due to one unit of equipment being installed with more capacity than can be used during one engineering period. This is sometimes referred to as "lumpiness" of investment and is a situation that occurs with switching equipment that is purchased in modules with large capacities.

Standby capacity due to modularity differs from standby capacity due to growth engineering in the number of units installed and the number of engineering periods. Modularity spare occurs when one unit, installed at the beginning of an engineering period, has more capacity than can be used during the engineering period. Standby capacity due to growth engineering is a result of more than one piece of equipment being installed at the beginning of an engineering period because one piece of equipment does not have enough capacity to last the entire period.

To see this difference visually, compare the graph showing Growth Standby to the graph below showing Modularity Standby.



Standby capacity due to modularity is also handled on an average basis by the Utilization Factor (UF) which will be discussed next.

BEFORE THE ARIZONA CORPORATION COMMISSION

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IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS.	]]]]]]	**DOCKET NO. T-00000A-00-0194 PHASE II**

TESTIMONY OF

TERESA K. MILLION

ON BEHALF OF

QWEST CORPORATION

MARCH 15, 2001

EXHIBIT
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Qwest 3

recurring TELRIC for UNEs in Arizona. These results should be used by the Commission to set recurring prices for UNEs and interconnection services.

C. ICM Modules

1. The Loop Module

Q. WILL YOU DESCRIBE THE ICM LOOP MODULE IN YOUR TESTIMONY?

A. No. Mr. Buckley provides a detailed description of the ICM Loop Module in his testimony.

2. The Switching Module

General Description

Q. PLEASE BRIEFLY DESCRIBE THE SWITCHING MODULE OF ICM THAT IS USED TO CALCULATE SWITCHING COSTS.

A. The Switching Module of the ICM calculates costs utilizing the Switching Cost Model (SCM) program, which is incorporated into the ICM. The purpose of SCM is to provide per-unit switching investments for various services, features and functions.

SCM contains four major modules. **SCM Core** calculates busy hour investments by switching function. SCM Core uses engineering information, along with the discounted vendor price for various equipment components, to develop a cost for each function performed by the switch. SCM Core produces costs for functions such as:

- Investment per analog line
- Investment per processor millisecond
- Investment per network CCS
- Investment per 3-port conference circuit

SCM Features develops unit investments for vertical features, such as custom calling services.[6] SCM Features uses SCM Core outputs, along with feature usage data, to calculate the cost of a feature, usually on an investment per line basis. For example, Three Way Calling investment is developed by using the SCM Core outputs for "Investment per Millisecond" and "Investment per 3 Port Conference Circuit CCS," along with usage data (e.g., average Three Way Calling busy hour CCS and calls) to derive the Three Way Calling investment per line.

SCM Calls develops the switching cost per line, and the switching cost for various types of calls:

- Line to line
- Line to trunk

[6] The costs for individual vertical features are included in one of the additional cost studies, and are not included in the ICM output. However, the investments are calculated in the SCM.

- Trunk to line
- Trunk to trunk

SCM Calls develops these costs on a per busy hour attempt and per busy hour conversation minute basis, utilizing SCM Core outputs along with data regarding how much of these outputs are consumed, for example, to set up a call.

The **SCM Usage** module converts busy hour unit investments from SCM Calls into an investment per call setup and per minute of use for various types of calls.

Q. WHAT ARE THE PRIMARY COST DRIVERS THAT IMPACT THE SCM RESULTS?

A. The primary cost drivers for switching equipment include:

- The price charged to Qwest by vendors such as Lucent Technologies
- The busy-hour demand per line and per trunk within a switch
- The number of lines served by the switch
- The trunk to line ratio required to meet the demand on the switch

Q. HOW IS THE DATA FROM THE SWITCHING MODULE USED IN THE ICM?

A. The Switching Module calculates switching investments for local switching, tandem switching, end office analog ports, and vertical features.[7] These investments are converted to monthly or per minute of use costs in the ICM Output Workbook.

[7] As noted earlier, the costs for individual vertical features are included in one of the additional cost studies, and are not included in the ICM output. However, the investments are calculated in the SCM.

Q. DOES THE QWEST ICM MANUAL CONTAIN A MORE DETAILED DESCRIPTION OF THE SWITCHING MODULE?

A. Yes.

Switching Module Inputs

Q. WHAT ARE THE KEY INPUTS TO THE SWITCHING MODULE?

A. The key inputs in the Switch Module of ICM are: the Growth Rate, the Administrative Fill Factor for Analog Lines, the Administrative Fill Factor for Integrated Digital Lines, the Administrative Fill Factor for Digital Trunks, and the Average Business Day Equivalents per Year. In addition, the user can make changes to the vendor discount rates that are applied in the ICM for Nortel, Ericsson and Lucent switches. Descriptions of these discounts are provided in the ICM User Manual.

Q. HOW DOES QWEST DETERMINE THE APPROPRIATE GROWTH RATE TO USE IN THE SWITCH MODULE?

A. The default growth rate input value is based on a five year forecast provided by Local Markets Forecasting using the Integrated Forecasting Tool. First, the forecasted growth in switched analog and integrated digital lines for 1999 through 2003 is determined. Next, this multi-year forecast is divided by 5 to derive an annual growth amount. The annual growth amount is then divided by the base-year demand (i.e., 1999) to determine the growth rate. The growth rate input value is 4.8984%.

Q. PLEASE EXPLAIN WHAT YOU MEAN BY A "FILL FACTOR."

A. "Fill" is an industry term for the assumed utilization to be placed on a piece of investment (e.g., loop plant or a switch) when determining the unit cost.

Q. HOW DOES QWEST DEVELOP THE RECOMMENDED DEFAULT ADMINISTRATIVE FILL FACTORS FOR ANALOG LINES, INTEGRATED DIGITAL LINES AND DIGITAL TRUNKS?

A. Administrative spare capacity for analog and digital lines is used to account for:

- Malfunctioning equipment (e.g., ports)
- Lines set aside for testing
- Lines used for administrative purposes (e.g., lines to Switching Control Center, Network Administration Center, etc.)
- Lines reserved for special events, e.g., once a year events such as state fairs (Wire center dependent)
- Lines set aside in case the line forecast is exceeded prior to a scheduled line growth job
- Churn of dedicated inside plant (lines that are disconnected but left in place for a limited time period awaiting a reconnect at the same location).

Based on an analysis of these various administrative needs, Qwest estimates that the administrative line fill factor for both analog and digital lines is 95%, or 5% administrative spare capacity.

Digital trunk spare capacity occurs because of the unused capacity due to the modularity of trunk ports. The term "modularity" refers to the minimum amount of capacity that must be added to meet the next increment of demand once current capacity reaches exhaustion. Thus, as each new trunk group is added to meet demand, a certain amount of spare capacity will exist until demand "catches up with" available capacity. The average number of trunks per trunk group is 64, of which Qwest estimates an average of 12 trunks (half of a DS1) will not be in use at any given time because of the effect of modularity. Accordingly, the administrative fill factor due to modularity equals 52 / 64, or 81%.

Q. HOW ARE THE VENDOR DISCOUNTS IN THE SWITCHING MODULE DETERMINED?

A. The vendor discounts are based on actual vendor contracts that Qwest has negotiated with switch vendors, such as Lucent, Ericsson and Nortel. The latest available vendor discounts are entered into the ICM as default values and are contained on pages marked "Vendor Proprietary" in Exhibit TKM-02.

3. Transport Module

General Description

Q. PLEASE DESCRIBE THE TRANSPORT MODULE.

A. The Transport Module is used to estimate the investment in transmission and channel termination equipment needed to provide transport between two switching offices. The Transport Module calculates dedicated and switched transport costs.

Q. WHAT IS INCLUDED IN THE TRANSMISSION (MILEAGE SENSITIVE) INVESTMENT?

A. The transmission investment includes the cost of fiber facilities and intermediate multiplexing equipment.

Q. WHAT IS INCLUDED IN THE TERMINATION (FIXED) INVESTMENT?

A. Channel termination investment includes the electronic equipment located at the switch location (where the route originates and terminates) that converts electronic signals into optical signals, as well as the equipment used to multiplex or de-multiplex a signal.

Q. WHAT DATA DOES THE TRANSPORT MODULE USE TO ESTIMATE TRANSPORT COSTS?

A. The Transport Module calculates costs using the following files and data:

- Point pair files – These files include all combinations of routes between any two wire centers in Arizona. This data includes originating and terminating wire centers and number of circuits connecting them.
- The SONET transport model contains three forward-looking transport configurations: point-to point, linear, and ring.

BEFORE THE ARIZONA CORPORATION COMMISSION

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IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS.	]]]]]]	DOCKET NO. T-00000A-00-0194 PHASE II

REBUTTAL TESTIMONY OF

TERESA K. MILLION

ON BEHALF OF

QWEST CORPORATION

JUNE 27, 2001

EXHIBIT
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Qwest 4

A. No. The 49 different rates for the handful of services identified by the brief descriptions does not cover the wide range of services proposed by Qwest in this proceeding. They do not provide Qwest with recovery of many non-recurring activities that it will provide to the CLECs. They do not address many of the services agreed upon in the SGAT workshops. These non-recurring elements have vague descriptions of the work being performed and will be impossible to implement accurately. In addition, for Qwest to attempt to develop systems and processes to administer, train, maintain, and bill these rates will be unique to Arizona and extremely inefficient, costly and impractical. From an implementation perspective, this structure and associated rates should not be considered as a reasonable proposal and should be rejected on this basis alone.

G. Testimony of Mr. Chandler

Q. WHAT ISSUES IN MR. CHANDLER'S TESTIMONY DO YOU ADDRESS?

A. I rebut Mr. Chandler's contention that Qwest's Unbundled Packet Switching ("UPS") cost study is not forward-looking and is inappropriate for applications used by current DSL subscribers.

Q. WHAT IS YOUR IMPRESSION OF MR. CHANDLER'S TESTIMONY ON QWEST'S UNBUNDLED PACKET SWITCHING OFFERING?

A. After reviewing Mr. Chandler's testimony, it is not entirely clear to me what he is suggesting, however, as best as I can tell his understanding of the UPS product is vastly different than what Qwest intended. He appears to be very confused. Mr. Chandler states that it is difficult for him to tell what service could be offered to end-users by UPS. (Chandler, page 3). As stated in its Third Report and Order and Fourth Further Notice of Proposed Rulemaking, CC Docket No. 96-98, released November 5, 1999,[8] the FCC required packet switching to be unbundled in certain circumstances. As explained in Ms. Brohl's testimony, those circumstances are limited, and serve as an exception to the FCC's decision to decline to unbundle packet switching. Key to that exception is Qwest's ability to offer remote collocation where it has remotely deployed DSLAMs. While I did not file a remote collocation cost study in this proceeding, Qwest offers such a product and is in the process of developing costs for it. Qwest intends to have space available for CLECs to remotely collocate their own DSLAMs in locations where Qwest has deployed them, obviating the need for the unbundled packet switching product.

Nevertheless, as described in Ms. Brohl's rebuttal testimony, the UPS service Qwest offers is Qwest's retail Remote DSL service unbundled and priced at TELRIC. Mr. Chandler states that he believes that the service offering is an inferior service that is not "always on" (Chandler testimony, page 3). As Qwest witness Mr. Craig explains, Mr. Chandler could not be more incorrect. Qwest's Remote DSL service is "always on". Mr. Craig disagrees with many of the

[8] At paragraph 313.

technical terms and explanations provided by Mr. Chandler. Mr. Craig's testimony provides clarity on how the terms are used and understood by Qwest. Mr. Chandler is also unclear about the bit rate used by Qwest in its retail Remote DSL service. Mr. Craig clarifies this issue. Finally, Mr. Chandler states his belief that the technology that Qwest plans, but has not yet fully deployed, is not "forward-looking" (Chandler testimony, page 2). As Mr. Craig explains, the technology that Qwest plans to deploy for its Remote DSL service is the latest and most advanced technology for this type of application. So new in fact, that vendors do not have these products established in their standard product offerings.

In my opinion, Mr. Chandler's testimony provides little useful information for decisions in this proceeding. As Qwest witnesses explain in simple and non-confusing words, the FCC requires Qwest to unbundle its retail Remote DSL offering in special circumstances. Qwest has met that requirement by offering its UPS service.

Q. MR. CHANDLER STATES AT PAGE 14 OF HIS TESTIMONY THAT COPPER FEEDER THAT CARRIES A T1 (DS1) DIGITAL SIGNAL IS OBSOLETE. IS HE CORRECT?

A. No. As I discussed above in my rebuttal of Mr. Weiss' testimony regarding DS1s, there are still valid reasons for deploying copper architectures to accommodate DS1 demand. In addition, as discussed Mr. Buckley's testimony, AT&T's own

HAI model assumes the use of copper feeder in the loop, as does the AT&T NRCM model which assumes 40% copper feeder.

H. Testimony of Mr. Denney

Q. WHAT ASPECT OF MR. DENNEY'S TESTIMONY DO YOU ADDRESS?

A. I will discuss Qwest's new proposal for deaveraging of the UNE loop based on Mr. Denney's criticism of the current proposal.

Q. WHAT DOES MR. DENNEY SAY IN HIS TESTIMONY ABOUT QWEST'S CURRENT DEAVERAGING PROPOSAL?

A. Mr. Denney agrees that the deaveraging proposals of Qwest and AT&T are similar in this proceeding. Both are proposing to only deaverage the loop at this time and both calculate loop cost at the wire center level and assign wire centers to deaveraged zones based on cost. However, Mr. Denney recommends the use of the HAI Model, version 5.2a, as the basis of the loop cost. Mr. Denney also criticizes Qwest for using effectively the same method that AT&T used in the prior deaveraging proceeding to establish its cost-based zones.

Q. DO YOU ADDRESS MR. DENNEY'S CLAIM THAT THE RESULTS FROM THE HAI MODEL FORM A BETTER BASIS FOR THE LOOP COST?

A. No. Qwest witnesses, Mr. Buckley and Dr. Fitzsimmons, focus on the HAI Model as the basis for loop costs. Their testimony rebuts the assumption in the HAI

BEFORE THE ARIZONA CORPORATION COMMISSION

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REBUTTAL TESTIMONY OF

GARRETT Y. FLEMING

QWEST CORPORATION

JUNE 27, 2001

EXHIBIT
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Qwest 5

A. No. As stated previously, I believe that the actual expenditures from receipts are a better gauge of costs than standardized price lists.

Q. HAVE YOU BEEN ABLE TO REVIEW THE CHANGES MADE BY MR. LATHROP TO QWEST'S COLLOCATION MODEL?

A. No. Qwest requested electronic copies of all model runs. (Interrogatory 2a) The file that we received was corrupt. The joint intervenors have not yet replaced the file. Qwest believes that the inability of the joint intervenors to provide a readable file removes from consideration any rates proposed by the joint intervenors until which time Qwest is given a readable copy and is allowed to comment on the file.

VII. HAI SWITCHING

Q. WHY IS THE HAI 5.2A INAPPROPRIATE FOR USE IN DETERMINING THE COST OF SWITCHING?

A. The HAI 5.2a switching costs do not meet a test of basic reasonability and are unreasonably below actual cost. This can be determined from a simple comparison test. Based on the Density Zone Report from the default run advocated by AT&T, the investment in the Digital Electronic Switching account (account 2212) from the ARMIS Inputs tab (of the HAI 5.2a results workbook) is $985,074,000. The USOA Detail tab (of the HAI 5.2a results workbook) reports that the total account 2212 investment computed by the HAI 5.2a is only $287,554,000. HAI 5.2a is intended to estimate TELRIC costs and, as such, the investment on the books may differ from the TELRIC based investments. However, estimating the investment to replace the same network to be less than 30% of the actual booked investment raises the red flag that there is something clearly wrong with the model.

The Digital Electronic Switching prices may have decreased over the last decade or so, but they have not come down by any percentage resembling the 70% that the HAI 5.2a implies. The Telephone Plant Indices (TPIs) developed by Joel Popkin and Associates show that the cost of digital switching has actually increased 6.7% from 1988 to 2000. Furthermore, much of the booked investment has been made in recent years in Arizona (almost one third of the lines in Arizona have been digital replacements of analog lines installed within the 4 year period ending December 2000). Therefore, the booked investment ought to be much closer to the current or forward-looking investment than HAI 5.2a estimates

Q. WHY ARE THE DIGITAL SWITCHING INVESTMENTS SO LOW IN HAI 5.2A?

A. Primarily because HAI 5.2a estimates its switching investments using the algorithm that the FCC ordered in its USF Inputs Order[8] (see 4.1.9 and 4.1.10 of the HAI Release 5.2a Input Portfolio documentation).

Q. WHAT IS WRONG WITH BASING THE SWITCHING COSTS ON THE FCC'S SWITCH INVESTMENT ALGORITHM?

A. The FCC's algorithm does not include the ongoing upgrade investments necessary to keep a switch technologically current once it is installed. Nor does it properly reflect the costs of those lines that need to be added to a switch as customer demand increases over the life of the switch. According to Appendix C of the FCC USF Inputs Order, this algorithm is a result of a regression analysis performed on data from depreciation rate reports filed by LECs for switches installed from 1983 to 1995 and upon similar data from LEC reports to the RUS. However, a large proportion (70 percent) of the nearly 3,600 observations were excluded from the study data so that only 1,085 observations were actually employed. The cause of most of the excluded observations was that the switches were installed more than three years prior to the reporting of their book-value costs. This adjustment was made by the FCC to reflect the cost associated with the purchase of a new switch. As a result, the investment associated with adding lines to existing switches and with upgrades to

[8] CC Docket 96-45 10th Report and Order released November 2, 1999.

existing switches is effectively – and intentionally - omitted. Generally little, if any, investment is made to add capacity to or upgrade a switch within 3 years of its initial installation. Also, the FCC data was not adjusted for certain accounting anomalies that would allow it to reflect a more complete view of switch cost.

Q. WHY IS IT INAPPROPRIATE TO EXCLUDE THESE INVESTMENTS?

A. Because any efficiently run telecommunications company faced with real world circumstances makes these prudent investments.

Q. WHY ARE THE INVESTMENTS ASSOCIATED WITH ADDING LINES TO AN EXISTING SWITCH EFFICIENT?

A. Once Qwest has invested in a given vendor's switch, it cannot add another vendor's lines to that switch. This is analogous to the razor company selling the razor and providing the only blades that fit the razor. Over the life of an initially installed switch many lines will need to be purchased to accommodate growth to that switch. This is a real and significant cost to Qwest, especially in Arizona where line growth is almost 5% per year. Assuming the average switch life of 10 years at 5% growth per year, a switch with 40,000 lines installed initially would have another 20,000 lines installed at the price per growth line (i.e., 40,000 lines x 5% x 10 years, assuming non-compounded growth).[9] Adding lines later does avoid the need to pay for unused excess capacity in the initial order.

Q. DOES HAI 5.2A INCLUDE THE COST OF ADDING LINES TO A SWITCH?

A: It doesn't include them entirely. It computes the unit switching costs – the Analog Line Port and the Per Switch Minute of Use (MOU) - assuming all lines are purchased at the lower initial price. This, it may be argued, is because HAI 5.2a is trying to determine the initial cost of a switch. However, per the Telecommunications Act of 1996, the providers of UNEs are entitled to recover their costs. Adding capacity (processor, memory, or lines) to a switch over its life is a legitimate cost of doing business. So clearly this is one reason that the HAI 5.2a inappropriately understates digital switching investments.

Q. ARE THE COSTS OF UPGRADING SWITCHES SIGNIFICANT?

A. Yes. In the 4 years ending in December of 2000, Qwest spent over $235 million upgrading its digital switches. This translates to $3.71 per line per

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[9] In other words, 33% of the lines installed over the life of a switch are purchased as growth lines. In Exhibit 10 a more sophisticated approach estimates this to be 28.4% of the lines. This is done by applying time value of money techniques to reflect that the growth lines will be purchased at a later date than the lines initially installed.

year. Again, assuming the average life of a switch is 10 years, this adds $37.10 per line to the HAI 5.2a's assumed per line investment of $87.

Q. **WHY SHOULD THESE UPGRADE COSTS BE INCLUDED IN THE TELRIC COSTS?**

A. These costs are a legitimate cost of doing business and are necessary. Upgrades are triggered by operating system software upgrades which in turn may require hardware upgrades, too. (For example, operating software upgrades require more memory hardware. Furthermore, after multiple upgrades, the memory capacity of the processor in the switch may be exceeded and the processors themselves will need to be replaced.) The trigger for these upgrades is often a regulatory or legislative mandate. Some examples over the last few years are: the Communications Assistance for Law Enforcement Act requirements that could only be met by upgrading to the 5E14 Generic operating software in its 5ESS switches, number pooling requirements – assigning blocks of telephone numbers to carriers in increments of 1,000 rather than 10,000 in order to conserve telephone numbers, international direct digit dialing expansion to 15 digits, inter-lata equal access implementation, and flexible automatic number identification (ANI) implementation to facilitate a 2 digit ANI code identifying payphone owners for carrier compensation purposes.

Even if one of these mandates doesn't come along for a few years, Qwest has learned that it is less costly to keep current with the vendor's operating software than to have to catch up when a mandate does come along. When CIC code software was mandated, for example, Qwest (U S WEST at the time) was four generics behind in its 5ESSs. In order to get the CIC code software, U S WEST was required to purchase all four upgrades at a higher cost than had it purchased them closer to the time they were released. Furthermore, by keeping relatively current on the operating software, Qwest is able to offer new features and functionality to its customers that would otherwise be unavailable.

Q. HOW DO YOU KNOW THAT THE HAI 5.2A IS NOT INCLUDING THE UPGRADE COSTS?

A. These costs are operating software upgrades and hardware upgrades. It has already been established that the FCC methodology used to estimate the switching investment in the HAI 5.2a was designed to eliminate upgrade costs. Furthermore, the operating software upgrades were expense items - not investment items. Therefore, the operating software upgrades were not included in the depreciation reports filed with the FCC because software that is expensed is not depreciated. Therefore, no operating software upgrades were included in the FCC switch study data.

Q. **YOU SAY THE OPERATING SOFTWARE UPGRADES WERE EXPENSE ITEMS. IS IT POSSIBLE TO INCLUDE THE SOFTWARE EXPENSE IN THE HAI 5.2A WITH AN EXPENSE FACTOR?**

A. Yes, it could. However, the HAI 5.2a expense calculations are based on year 2000 data. Beginning in 1999, Qwest began to capitalize the operating software upgrades. Therefore, unless the HAI sponsors made undocumented expense adjustments to include operating software upgrades, those expenses are not included in HAI 5.2a switch costs. I think it is safe to say that these costs are not included in the HAI 5.2a expenses.

Q. **ARE THERE OTHER PROBLEMS WITH THE HAI 5.2A'S USE OF THE FCC SWITCHING INVESTMENT ALGORITHM?**

A: Yes. The run of the HAI 5.2a which AT&T is advocating sets the "Analog Line Circuit Offset for DLC lines, per Line" equal to $30. In 4.1.7 of the HAI 5.2a Inputs Portfolio documentation, this input is described as "The reduction in per line switch investment resulting from the fact that line cards are not required in both the switch and remote terminal for DLC-served lines". The default value of $30, which is used in AT&T's

advocacy, is supported as being "Calculated in FCC Inputs Order". This is not correct. The FCC specifically rejected the use of this input.[10]

This offset of $30 per line is significant, especially when one considers that the per line cost in the FCC switch investment algorithm is only $87. Since the depreciation data upon which the switch costs were based already reflects the use of digital lines, we agree with the FCC that, if the switch investment algorithm is used, the offset should be set to zero.

Q. IS THE HAI SWITCHING MODEL LOGIC DIFFICULT TO FOLLOW?

A. Yes. Though HAI may not be a black box, it is at least a gray box. It is a gray box because of its convoluted, undocumented algorithms. It is very difficult to track logic from cell to cell inside the model. For example, in the "wire center investment" tab of the "R52_switching_io.xls" spreadsheet, the autonomous switch investment per line is calculated as follows:

```
=IF(F2=0,0,IF(sw_type="A",B2/F2*VLOOKUP(F2/B2/line_fill,sw_inv
_tbl,IF(OR(BY2=8,BY2=1),2,8))+VLOOKUP(F2/B2/line_fill,sw_inv_t
bl,IF(OR(BY2=8,BY2=1),5,11))/line_fill-inputs!$C$24*((BE2)/C2-
inputs!$C$26)+(Z2*inputs!$C$97/2)*0,IF(AND(sw_type="H",B2>1),(
B2-1)/F2*VLOOKUP(F2*(1-
```

[10] Paragraph 325 of the order states: "In the Inputs Further Notice, we tentatively concluded that the "Analog Line Circuit Offset for Digital Lines" input should be set at zero. We now affirm that conclusion". Paragraph 327 of the order goes on to say: " The record contains no basis on which to quantify savings beyond those taken into consideration in developing the switch cost. We also note that the depreciation data used to determine the switch costs reflect the use of digital lines. The switch investment value will therefore reflect savings associated with digital lines."

1/B2)/B2/line_fill,sw_inv_tbl,IF(OR(BY2=8,BY2=1),2,8))+VLOOKUP
(F2*(1-
1/B2)/B2/line_fill,sw_inv_tbl,IF(OR(BY2=8,BY2=1),5,11))/line_fill-
inputs!$C$24*((BE2)/C2-
inputs!$C$26)+(Z2*inputs!$C$97/2)*0,0)))*sw_install_mult

It is difficult to determine if this calculation is even used in AT&T's advocacy, let alone what it means if it is.

Q. DESPITE THESE DIFFICULTIES, ARE THERE ANY OTHER PROBLEMS WITH THE HAI 5.2A'S USE OF THE FCC SWITCHING INVESTMENT ALGORITHM THAT YOU WERE ABLE TO IDENTIFY?

A. Yes. The HAI 5.2a appropriately divides the working lines by a fill factor before multiplying by the variable per line switch investment of $87. However, HAI 5.2a uses a fill factor of 94 percent. There are two reasons the use of a 94 percent fill factor is problematic. First, the DLC fill factor is significantly lower than this and does not appear to be reflected at all in this 94%. Based on Arizona actuals, the ratio of digital working lines to digital lines of capacity is 43%. The second reason the use of a 94 percent fill factor is problematic is that even if only the analog line fill were appropriate, 94% is much too high. Perhaps if this was only an administrative fill it would be reasonable. The HAI 5.2a model deceptively calls this input Switch Port Administrative Fill because it is close to the industry standard and Qwest's objective for administrative fill - about 95%. However, HAI 5.2a defines this fill as "the percent of lines in a switch that are assigned to subscribers compared to the total equipped lines in a switch" (see 4.1.4 of the HAI 5.2a Inputs Portfolio documentation). The overall fill , as the HAI 5.2a definition implies, is much lower because it must also reflect that enough switch capacity must be purchased to allow for growth (i.e., lines need to be available for new customers) in addition to the administrative lines. It should also be noted that the only place fill is taken into consideration in the switching algorithms within the HAI 5.2a is with this single fill factor. So, unless lines that are purchased in anticipation of providing timely service for future new customers are reflected in this fill, they are not accounted for at all in the HAI 5.2a.[11] The actual analog line fill for the state of Arizona is 80%.

Q. IS THIS OVERSTATED FILL A SIGNIFICANT UNDERSTATEMENT OF COST IN THE HAI 5.2A?

A. Yes. The HAI 5.2a divides the working lines by this 94% fill to get total lines of capacity. The HAI 5.2a estimates 2,959,791 switched working lines so, after dividing by 94% the model estimates that there are 3,148,714 lines of capacity which it then multiplies by $87 to get the variable switching investment of $273,938,103. If the actual analog line fill

[11] The fact that lines are installed in anticipation of growth is not accounted for by acknowledging that growth lines cost more than initial lines. Both need to be considered. Lines do cost more on average than initial lines and not all lines purchased, regardless of the price paid, will generate revenue. Thus, it is appropriate to take the average price per line – both growth lines and initial lines – and divide by the average fill to get the cost per revenue producing line. See Exhibit 9 lines 10 and 14.

of 80% were used, the cost would be $321,877,271 (2,959,791 lines / 80% fill * $87 per line of capacity). Thus, even without taking into consideration the lower digital line fill of 43%, the HAI 5.2a still understates the switch investment by $47,939,168.

Q. OTHER THAN THE SWITCHING INVESTMENTS THAT THE FCC SWITCH ALGORITHM NEGLECTS, ARE THERE OTHER LEGITIMATE SWITCHING COSTS THAT THE HAI 5.2A DOES NOT INCLUDE?

A. Yes. In addition to operating software, Qwest must also purchase application software. This is the software that enables the switch to provide vertical features. This software is not included in the switch investment algorithm because until 1992 it was expensed. At that time Qwest began capital leasing this software which resulted in booking it to account 2681.4 Intangible Capital. The other RBOCs continued to expense it. As such, there is no way the depreciation reports upon with the FCC's switch costs could have included this software.

Q. IS THIS SOFTWARE INCLUDED IN THE HAI 5.2A IN SOME OTHER WAY THAN THROUGH THE SWITCH INVESTMENTS?

A. Again, considering the gray box, the answer to this appears to be no. Intangible Capital is not included in the computation for depreciation/amortization, so these costs are not included in that calculation. Furthermore, amortization expense is not included in the expense factors in the HAI 5.2a.

Q. IS THIS SOFTWARE SIGNIFICANT.

A: Yes. In 1998 through 2000 Qwest spent over $78 million per year on application software. (This excludes amounts spent for wireless and Local Number Portability).[12] Based on the 17,379,681 working lines in Qwest switches, this translates into $4.53 per line per year. Again, assuming a 10 year life of a switch, this translates into another $45.30 per line that the HAI 5.2a does not include in its $87 per line investment.

Q. WHAT OTHER CONCERNS DO YOU HAVE WITH THE COMPUTATION OF THE END OFFICE SWITCH UNE COST PER MINUTE OF USE IN THE HAI 5.2A?

A. HAI does not use billable minutes of use as the denominator in its calculation of the end office switching cost per minute. The minutes used in the denominator are based on dial equipment minutes (DEMs). Originating DEMs are measured from the time the calling party picks up the phone. However, originating UNE minutes of use are not billed until the called party answers for intraLATA calls or until the trunk to the IXC is seized in the case of interLATA calls. The DEMs are 4.4% more than the billable minutes, which implies that the cost per minute should be 4.4% higher in HAI if the denominator were properly calculated. (See Exhibit 8).

Q. ARE THERE OTHER PROBLEMS WITH THE WAY THE HAI 5.2A TREATS SWITCHING RELATED COSTS?

A. Yes. The HAI 5.2a does not include many vertical feature related costs. These are the application software costs, SS7 costs and some feature hardware related costs. As discussed above, the applications software costs are not included in the HAI 5.2a..

Q. AREN'T FEATURE HARDWARE INVESTMENTS INCLUDED IN THE DEPRECIATION STUDIES UPON WHICH THE FCC SWITCH ALGORITHM IS BASED?

A. What is included in the FCC depreciation reports is not definitive. However, since the early 1990's, when those depreciation reports were filed with the FCC, input/output ports, recorded announcements and conference circuits have had to be added due to new features and increased demand for existing features. So clearly the FCC Switch Algorithm does not include these investments.

[12] LAMS reports, which detail the application software purchases made over the study period, were used to identify and exclude these costs.

Q. PLEASE SUMMARIZE WHAT ADJUSTMENTS WOULD HAVE TO BE MADE TO AT&T'S END OFFICE SWITCHING ADVOCACY TO ADDRESS YOUR CONCERNS?

A. Please refer to Exhibit 9. The "HAI as Filed" column shows approximately how HAI computes the AT&T advocated switching UNEs.[13] The "HAI Adjusted" column shows most of the adjustments that I have advocated above. Finally, the last column shows comparable values from Qwest's ICM model that I am advocating. In summary, if most of the appropriate adjustments I have discussed in this testimony are made to the HAI run that AT&T is advocating, the cost per minute is $.00221 versus. ICM's $.00260 and the cost per line port is $1.59 versus. ICM's $1.28 (see lines 37 and 41 of exhibit). The bottom of the exhibit shows the adjustment that needs to be included should the feature applications software be included in the per line UNE rate. This would increase the cost per port to $1.96.

Q. DO YOU HAVE ANY COMMENTS ON THE TANDEM COSTS IN THE HAI 5.2A?

A. Yes. The total investment in tandem switching is significantly understated. The HAI 5.2a estimates only 31,125 tandem trunks (sum of HAI 5.2A Density Zone Report, Investment Inputs tab, cells BU21, BW21

[13] Again, due to the gray box effect and AT&Ts inadequate response to Data Request No. 101, it is hard to precisely determine how HAI computes its switching costs. However, Line 19 – Total Investment Before Upgrades - is within 4% of the comparable value in HAI found in cell K6 of the EO Switching tab of the HAI 5.2a Density Zone Report.

and BY21). Exhibit 11 is a reasonability check showing that the number of tandem trunks should be more than three times this amount. This Exhibit 11oes not purport to be an actual trunk count, but is offered as a reasonable estimate to point out that the HAI 5.2a must have some significant errors and inconsistencies in the tandem trunk calculations. The calculations in the HAI 5.2a for tandem trunks are so cryptic they are very close to being a black box. Suffice it to say that the outcome of the calculations is ridiculously low.

The HAI 5.2a estimates the investment per tandem trunk to be $100. While this is a questionable value, it can be used to show how significantly the tandem costs are understated. Based in the 97,273 tandem trunks computed in the reasonability check above, and the 31,125 trunks upon which the HAI 5.2a computes its tandem investment, the HAI 5.2a is short 66,148 trunks. Multiplying by $100 per trunk gives a understatement of $6,614,800. The total investment in tandem switching in the HAI 5.2a is $3,999,023 (see cell K6 of Tand Switching tab of the HAI 5.2A Density Zone Report). This means that the tandem switching costs should have been $10,613,870 or 2.65 times what the HAI 5.2a computes.

VIII. MULTIPLE DWELLING UNITS

BEFORE THE ARIZONA CORPORATION COMMISSION

JIM IRVIN
COMMISSIONER
WILLIAM A. MUNDELL
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS	))))))	**DOCKET NO. T-00000A-00-0194 PHASE 2**

REBUTTAL TESTIMONY OF

JOSEPH CRAIG

ON BEHALF OF

QWEST CORPORATION

JUNE 27, 2001

EXHIBIT
Admitted
Qwest 6

REBUTTAL TESTIMONY OF JOSEPH CRAIG
INDEX OF TESTIMONY

IDENTIFICATION OF WITNESS

Q. PLEASE STATE YOUR NAME, JOB TITLE AND BUSINESS ADDRESS.

A. My name is Joseph Craig. I am employed by Qwest Corporation ("Qwest") as a Director, Technical Regulatory in the Local Network Organization. My business address is 700 W. Mineral, Littleton Colorado, 80120.

Q. PLEASE REVIEW YOUR WORK EXPERIENCE AND PRESENT RESPONSIBILITIES.

A. I have been in the telephone business since 1974. I began as a directory assistance operator for Mountain Bell. After about 2 ½ years in that position, I transferred into Network Operations and since that time have had network-related responsibilities. My introduction to network responsibilities began in the late 1970s when I had responsibility for installing and repairing telephone service. I had responsibility for installations and repairs until 1980 when I became a Central Office Technician assigned to the Denver South Switching and Control Center in Denver, Colorado.

As a Central Office Technician, I was responsible for switch alarm surveillance, switch maintenance and repair, trunk installation, line and routing translations, switch equipment installation and software upgrades. My responsibilities as a Central Office Technician provided me with detailed knowledge of engineering issues relating to trunking, routing and alarm surveillance in the switching network. I also worked closely with vendor equipment installers and acquired substantial knowledge about switching equipment, switch translations and the overall operation of the switching network.

In 1987, I accepted a three-year rotational assignment to Bellcore's training facility in Chicago, Illinois where I was a Switch Lab Manager. In that position, I was responsible for servicing switching equipment and modifying the equipment to update it with the latest features. My experience at the Bellcore training facility gave me the opportunity to work with switching experts from around the country and to learn about new switching technology and advanced switching repair techniques. I developed expertise in switch repair and recovery techniques, and the operations and functions of Signaling System 7 ("SS7"). While at Bellcore, I was selected for an award for exceptional performance called the Esteemed Member of Bellcore Staff.

In 1990, I returned to U S WEST working in Network Administration where I acquired additional experience in switching capacity and service measurements. After three years, I assumed responsibility for the Switching Control Center, where I managed the technicians who were responsible for monitoring the switching network for all of Colorado. In 1994, I was assigned to the SS7 Control Center, where I had responsibility for provisioning and maintaining the SS7 signaling network for the 14-state U S WEST region.

In 1997, I accepted a position in Network Planning, and became responsible for writing network plans for new switch services in the SS7 network. I also was responsible for monitoring these plans through the implementation phase. In 1998, I was honored as a recipient of Presidents Club for successfully implementing SS7 into the 911 network for the state of Minnesota.

In June 1999, I accepted a promotion to my current position in Technical Regulatory, Interconnection Planning. In my current position, I provide litigation support before federal and state commissions on issues relating to switching, SS7, trunking, and routing. As of June 30, 2000 I assumed the same job responsibilities for Qwest.

PURPOSE OF TESTIMONY

Q. HAVE YOU PREVIOUSLY FILED TESTIMONY IN THIS DOCKET?

A. No I have not.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to respond to issues raised in the direct testimony of Intervenor witness Richard Chandler regarding Unbundled Packet Switching.

I address these issues from a technical perspective.

UNBUNDLED PACKET SWITCHING

Q. ON PAGE 4, LINES 7 THROUGH 13 OF HIS DIRECT TESTIMONY, MR. CHANDLER DESCRIBES WHAT PACKET SWITCHING IS. IS THIS DESCRIPTION ACCURATE FOR THE QWEST PACKET SWITCHING PRODUCT?

A. No it is not. In fact, his description does not accurately define what packet switching is.

Q. WHAT IS PACKET SWITCHING?

A. From a technical perspective, packet switching is the technology, not the technique as Mr. Chandler claims, of sending data in packet form through a network to some remote location. Each data packet has a unique identification and carries its own destination address. Each packet is, therefore, independent of other packets. With packet switching, multiple packets traverse the network in a stream of packets that flow from the originating packet switch to the packet switch or node that is the destination. The packets sometimes travel by different routes, therefore making packet switching more efficient when compared to circuit switching.

Q. WHAT IS UNBUNDLED PACKET SWITCHING?

A. Unbundled Packet Switching ("UPS") is Qwests response to the FCC UNE Remand Order, FCC 99-238, to provide access to the Qwest packet switched network. The Qwest packet switched network is based on Asynchronous Transfer Mode ("ATM"), or a packet like switch, that is used to provide DSL Service offerings.

Q. WHAT IS A DSL SERVICE OFFERING?

A. Digital Subscriber Line ("DSL") Service offering involve the use of the frequencies of the copper wires other than the frequencies used for analog voice. This access to the frequencies other than voice, for example, Asymmetric Digital Subscriber Line ("ADSL") allows the customer to use their phone for voice conversation at the same time they are using their computer for various different purposes, including, for example Internet access.

Q. ON PAGE 4 OF HIS DIRECT TESTIMONY, MR. CHANDLER INCLUDES A FOOTNOTE, CLAIMING THAT DSL IS SYNONYMOUS WITH ADSL, AND EQUATES THIS WITH ALWAYS ON. IS THIS TRUE?

A. Definitely not. First, DSL technology has many different versions. Other versions of DSL include VDSL, HDSL, RADSL, IDSL and SDSL to name a few. Each version of DSL has unique characteristics, such as frequency, bit rate or speed, and require different modem equipment both at the users location and the remote device or node the user is connecting to. ADSL service is the most common type, and it can be provisioned over a customers existing copper line, or twisted pair, and is offered as a nailed up service, always on, or a dial-up service. ADSL, although originally developed by Telcordia, is now standardized by the American National Standards Institute ("ANSI") as T1.413.

Q. WHAT IS ALWAYS ON AND HOW DOES IT DIFFER FROM DIAL-UP?

A. Always on means the users DSL connection is provisioned in the Digital Subscriber Line Access Module ("DSLAM") to maintain a constant, or dynamic, virtual connection to the remote node, for example to an Internet Service Provider ("ISP"). In other words, the user is always connected to their ISP, and the only limiting factors relating to idle time are those that are under the control of the ISP. This means that after a period of idle time on the circuit, for example 10 minutes, the ISP may terminate the session. This requires the user to re-establish a new session with the ISP.

Dial-up means the user's DSL connection is provisioned in the DSLAM to a modem pool. This requires the user to dial-up their ISP, or make a connection to their ISP, each time the user initiates an ISP session. With dial-up DSL service, idle time is limited at the modem pool. This means that after a period of idle time on the circuit, for example 10 minutes, the modem at the modem pool will terminate the session, thus requiring the user to dial-up their ISP, or re-connect, before a new ISP session can be initiated. This choice of DSL is only offered to customers whose DSL service is provisioned in a central office DSLAM, not a remote terminal.

This means that Mr. Chandler's assertion that Qwest UPS is a dial-up offering is incorrect. Qwest's remote DSL unbundled offering is always on.

Q. IS DSL SERVICE QUALITY DETERMINED BY ALWAYS ON OR DIAL-UP COMPARISON AS MR. CHANDLER SUGGESTS ON PAGE 3, LINE 20 THROUGH PAGE 4, LINE 5?

A. No it is not. It appears that Mr. Chandler is confusing DSL service quality with customer choice. A choice by a customer to be provisioned to a modem pool as opposed to a virtual circuit is not a proper indicator of the quality of a DSL service.

It would be more appropriate to determine DSL quality of service by bit rate. This is because the loop quality and DSLAM limit combined is 7Mbps. However, the bit rate is dependent on the loop length and the quality of the copper. Bit rate is the speed that data is transferred. Mr. Chandler admits this on pages 8 and 9 of his testimony. Mr. Chandler goes to great lengths to describe Unspecified Bit Rate, and then suggests there are other bit rates that are available but that are not accurately identified in Qwest's testimony. The customer selects constant (256 Kbps, 512 Kbps, 768 Kbps, 1 Mbps, or 7 Mbps), variable (bit rate varies) or unspecified as a bit rate when they order DSL service. The bit rate is provisioned accordingly on the appropriate service the customer requested. Since DSLAMs are bit rate sensitive, this would be a better service measure of DSL rather than the customer choice of always on or dial-up. In fact, Mr. Chandler himself admits this on page 8, line 18 through page 9, line 8 of his testimony.

Qwest UPS offering supports DSL services with bit rates that are high enough to make DSL service high quality. Qwest offers the same bit rates with UPS as it does for its own DSL customers.

Q. ON PAGE 6, LINES 7 AND 8, MR. CHANDLER STATES "THERE ARE TWO GENERAL TYPES OF VIRTUAL CIRCUITS – SWITCHED AND PERMANENT". HE THEN CLAIMS THAT ATM CAN SUPPORT BOTH. IS HIS CLAIM CORRECT?

A. Mr. Chandler's statement that ATM can support both switched and permanent virtual circuits is not entirely correct. While ATM *technology* can support both, not all ATM deployed *networks* can support both. This is because ATM Forum implementation agreements are not widely adopted by ATM vendors and/or service providers.

Q. MR. CHANDLER DESCRIBES SWITCHED AND PERMANENT VIRTUAL CHANNELS ON PAGE 6, LINE 9 THROUGH PAGE 7, LINE 7, AND INCLUDES A FOOTNOTE THAT STATES "VIRTUAL CIRCUIT" AND "VIRTUAL CHANNEL" ARE INTERCHANGEABLE. IS THIS TRUE?

A. Definitely not. There is a difference between a virtual circuit and a virtual channel. A virtual channel is a single connection that allows the switching of different ATM cells in a virtual path to different destinations.

A virtual circuit is a voice or data communications link that is generally set up on a per call basis and disconnected when the call is ended. A virtual circuit is referred to as a logical, rather than a physical, path for a call. Virtual circuits can be permanent or switched.

Since Mr. Chandler compares packet switching to circuit switching, an analogy here would be to compare a DS1 to a DS0. Consider the DS1 the virtual channel, and the DS0 the virtual circuit.

Q. IS WHAT MR. CHANDLER DESCRIBES AT PAGE 6, LINE 9 OF HIS TESTIMONY MORE ACCURATELY CALLED A SWITCHED VIRTUAL CIRCUIT?

A. I believe so; however, his answer is not correct. Once again, Mr. Chandler appears to be confused. Simply, a switched virtual circuit is nothing more than a virtual circuit connection established across a network on an as needed basis and lasting only for the duration of the transfer. Mr. Chandler claims that "switched virtual circuits are generally not very useful for data transmission." Yet, switched virtual circuits are used extensively in X.25 networks and increasingly more so in Frame Relay networks. This is because switched virtual circuits provide automatic and dynamic network load balancing. In other words, switched virtual circuits are set up through signaling in consideration of the load on the network in order to establish the least congested paths and to achieve the lowest possible amount of delay in the transmission of data.

Q. WHAT IS A PERMANENT VIRTUAL CIRCUIT?

A. A permanent virtual circuit is "permanently" defined in routing tables in packet network switches or routers. The network path is fixed in program logic and is dependent on ATM capability. This is similar to Private Line service in the circuit switched network. Since this permanent virtual circuit uses a fixed logical channel over a physical network, the term circuit and channel are not interchangeable. It is "either or", not one in the same.

Q. DO PERMANENT OR SWITCHED VIRTUAL CIRCUITS HAVE ANY AFFECT ON ALWAYS ON OR DIAL-UP DSL SERVICE?

A. No, they do not. Permanent or switched virtual circuits have no affect on nailed up, always on, or dial-up DSL user connections.

Q. ON PAGE 15 OF HIS TESTIMONY, MR. CHANDLER CLAIMS THAT THE USE OF COPPER-BASED DLC TECHNOLOGY IN THE QWEST COST STUDY LEADS TO AN OVERSTATEMENT OF COSTS. IS THIS CLAIM ACCURATE?

A. No it is not. Mr. Chandler is suggesting that Qwest retrofit its existing Digital Loop Carrier ("DLC") systems with ADSL cards. Rather than retrofitting the existing DLC systems, Qwest has chosen to overlay the ADSL architecture. This architecture uses a separate cabinet and the associated electronics for the sole use of ADSL service. This additional cabinet is placed in the network on the customer side of the DLC system. This allows Qwest to offer UPS on lines that are provisioned for voice using an IDLC. In other words, Qwest's use of DLC does not impair requesting carriers access to Qwest UPS.

SUMMARY OF TESTIMONY

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. Qwest Unbundled Packet Switch service is in full compliance of the FCC's UNE Remand Order that ruled that Incumbent Local Exchange Carriers ("ILEC") must provide requesting carriers access to unbundled packet switching in situations where the ILEC has placed its DSLAM in a remote terminal. The ILEC is relieved of its unbundling obligation only if it permits a requesting carrier to collocate its DSLAM in the ILEC's remote terminal, on the same terms and conditions that apply to its own DSLAM.[1]

The study presented in this docket deals with the FCCs exception, not the remote collocation of a requesting carrier's DSLAM. The testimony of Mr. Chandler appears to reference DSL technology that is not yet generally available. Qwest cost studies model the latest technology available, based on the technology Qwest plans to deploy in its network. The network design and architecture on how this technology is deployed is Qwest's choice, not the choice of the requesting carriers.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes it does.

[1] FCC 99-238, ¶313

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION	)	
INTO QWEST CORPORATION'S	)	
COMPLIANCE WITH CERTAIN	)	DOCKET NO. T-00000A-00-0194
WHOLESALE PRICING REQUIREMENTS	)	PHASE II A
FOR UNBUNDLED NETWORK ELEMENTS	)	
AND RESALE DISCOUNTS	)	

SURREBUTTAL TESTIMONY OF

JOSEPH CRAIG

ON BEHALF OF

QWEST CORPORATION

OCTOBER 19, 2001

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tabbies
Admitted
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SURREBUTTAL TESTIMONY OF JOSEPH CRAIG
INDEX OF TESTIMONY

IDENTIFICATION OF WITNESS

Q. PLEASE STATE YOUR NAME, JOB TITLE AND BUSINESS ADDRESS.

A. My name is Joseph Craig. I am employed by Qwest Corporation ("Qwest") as a Director, Technical Regulatory in the Local Network Organization. My business address is 700 W. Mineral, Littleton Colorado, 80120.

PURPOSE OF TESTIMONY

Q. ARE YOU THE SAME JOSEPH CRAIG WHO FILED REBUTTAL TESTIMONY IN THIS DOCKET?

A. Yes I am.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I respond to rebuttal testimony of Richard Chandler, filed on behalf of AT&T and WorldCom regarding unbundled packet switching ("UPS"). My testimony responds to Mr. Chandler's incorrect assertions that Qwest has not clearly defined its UPS product and has used inaccurate technical terminology in describing this product.

UNBUNDLED PACKET SWITCHING

Q. IN HIS REBUTTAL TESTIMONY AT PAGE 10, MR. CHANDLER ASSERTS THAT QWEST HAS NOT ADEQUATELY DESCRIBED THE RATE ELEMENTS IT IS OFFERING FOR UNBUNDLED PACKET SWITCHING. IS HIS ASSERTION CORRECT?

A. No. The testimony Qwest has filed in this phase of the docket clearly defines Qwest's Unbundled Packet Switch ("UPS") product. In her direct testimony filed August 31, 2001, at pages 8-9, Kathryn Malone explains that UPS is comprised of: (1) transport facilities between a remote terminal Digital Subscriber Line Access Multiplexer ("DSLAM") and a Qwest central office; (2) DSLAM functionality that provides the capability and programming necessary for data feeds and routing virtual channels; and (3) the Asynchronous Transfer Mode ("ATM") electronics that are needed to generate the virtual channels, which are the temporary channels that UPS uses to route data packets from one location to another. Ms. Malone explains further at pages 9-10 of her direct testimony that Qwest's UPS product provides CLECs with access to the feeder portion of a loop and that there are multiple options available to CLECs to obtain access to the distribution portion of a loop.

In addition to this definition of UPS, at pages 11-12 of her direct testimony, Ms. Malone provides definitions of the specific rate elements that make up Qwest's UPS product. These elements are: (1) the unbundled packet switch customer channel; (2) remote DSLAM functionality at the remote terminal; and (3) the unbundled packet switch interface port at the DS1 or DS3 level. Qwest witness, Robert Brigham, also describes these rate elements in his direct testimony at pages 20-21.

The network components that go into these rate elements are identified in exhibit JPC-1, attached to my testimony, that depicts the network configuration for UPS.

Q. IN CONNECTION WITH HIS ASSERTION THAT QWEST HAS NOT AQEQUATELY DEFINED ITS UPS PRODUCT, MR. CHANDLER STATES AT PAGES 9-11 OF HIS REBUTTAL TESTIMONY THAT YOU HAVE USED IMPRECISE TERMINOLOGY IN DISCUSSING UPS. IS HE CORRECT?

A. No. This incorrect assertion by Mr. Chandler seems to be the result of the fact that he is confusing packet switching with xDSL service. For example, on page 11, line 1 of his rebuttal testimony, Mr. Chandler states that I am assuming that the terms constant bit rate, variable bit rate and unspecified bit rate “describe a user's options with respect to the line rate available with ADSL service." These terms, in fact, refer to bit rates, not line rates. Mr. Chandler asserts further that these terms "apply to ATM service and not ADSL." This assertion is clearly wrong. Mr. Chandler is overlooking the fact that with ADSL service, customers choose services that have different bit rates. Accordingly, the different types of bit rates that I refer to in my testimony are relevant to ADSL service. Finally, it should be noted that even though ATM itself can give an end-user virtually unlimited bit rates, the physical characteristics of the end user's loop can limit the bit rates that are actually available.

Q. ON PAGE 11, LINE 20 THROUGH PAGE 12, LINE 2, MR. CHANDLER IMPLIES THAT "COMMITTED BIT RATE" IS NOT A PROPER ATM TERM. IS THIS TRUE?

A. No, it is not. Committed bit rate is a term that has been defined by the ATM Forum, as are the terms variable bit rate-real time, variable bit rate-not real time and unspecified bit rate. Consistent with what Qwest is offering to its retail customers, Qwest is offering unspecified bit rate with its UPS product. Unspecified bit rate allows for the maximum utilization of the Qwest DSL network at the proposed UPS rate. However, as Mr. Chandler himself states is in the Qwest Technical Publication 77408, a CLEC may choose to offer a committed bit rate by providing their own DSLAM and virtual channel to their packet switch.

Q. ON PAGE 12, LINES 7 THROUGH 22 OF HIS REBUTTAL TESTIMONY, MR. CHANDLER ASSERTS THAT QWEST'S UPS PRODUCT DOES NOT ALLOW CLECS TO PROVIDE PACKETIZED VOICE TO CLEC CUSTOMERS REQUIRING THEM. IS THIS TRUE?

A. No. While Qwest has not offered a rate element for "packet voice over DSL," the same as voice over DSL, a CLEC is nevertheless free to offer this product on its own. The ability to provide packetized voice service is the function of the customer premises equipment ("CPE"), not the DSLAM or the ATM network.

Qwest provides the permanent virtual channel, or pipe, from an end-user to a CLEC's packet switch. This channel allows the CLEC to provide whatever "0"s and "1"s it desires, whether it is in the form of streaming video, voice over DSL or Voice over Internet Protocol. The important point is that Qwest's UPS product does not limit the products that a CLEC can offer. The type of CPE the CLECs provide at an end-user's premises causes any limitations.

Q. ON PAGE 14, LINES 11 THROUGH 22, MR. CHANDLER CLAIMS THAT QWEST'S USE OF AN OVERLAY TO PROVIDE ADSL, WHILE APPROPRIATE, IS NOT FORWARD-LOOKING. HOW DO YOU RESPOND TO MR. CHANDLER'S CLAIM?

A. He is incorrect. Copper-based DLC will continue to be used within the industry for the foreseeable future. Qwest and other ILECs have developed DSL technology for the copper distribution loop, and that technology remains appropriate for an efficient carrier using forward-looking technologies. It is not realistic to assume, as Mr. Chandler apparently does, that efficient carriers will cease using copper-based DLC; the technology is both prevalent and forward-looking.

In addition, the standards bodies (ANSI T1E1.4) are currently working on developing a technically sound standard regarding spectral compatibility between central office based services and services that are provisioned from a remote location. Qwest's use of an overlay to provide ADSL service took into consideration those distribution areas that were 15.5k ft. or longer from the central office to mitigate any spectrum compatibility issues. As Mr. Chandler knows, 15k ft. is the technical limit for central office based ADSL service.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes it does.

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS	))))))	**DOCKET NO. T-00000A-00-0194 PHASE II A**

EXHIBITS OF

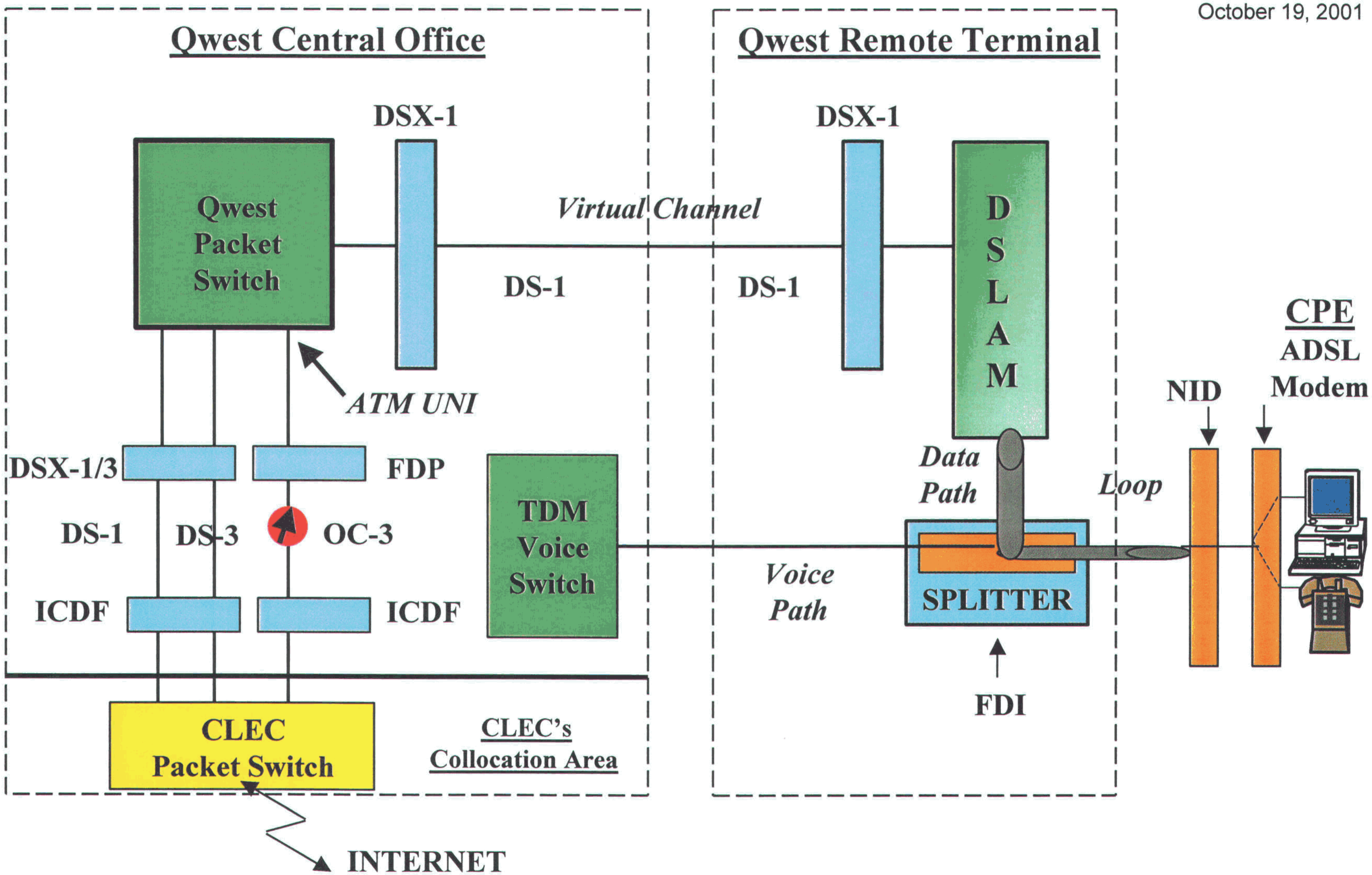
JOSEPH CRAIG

ON BEHALF OF

QWEST CORPORATION

OCTOBER 19, 2001

Arizona Corporation Commission
Docket No. T-00000A-00-0194
Qwest Corporation
Exhibit JPC-1
October 19, 2001



LEGEND

ADSL	Asymmetrical Digital Subscriber Loop
ATM	Asynchronous Transfer Mode
CPE	Customer Premise Equipment
CLEC	Competitive Local Exchange Carrier
DS-1/3	Digital Signal Level 1 or 3
DSL	Digital Subscriber Loop
DSLAM	DSL Access Multiplexer
DSX	DS Cross Connect Panel
FDI	Feeder Distribution Interface
FDP	Fiber Distribution Panel
ICDF	Interconnection Distribution Frame
NID	Network Interface Device
OC-3	Optical Carrier Level 3
UNI	User to Network Interface (ATM Forum)

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS	)	**DOCKET NO. T-00000A-00-0194 Phase II A**
	)	**AFFIDAVIT OF JOSEPH P. CRAIG**
STATE OF COLORADO	)	
COUNTY OF ARAPAHOE	)	

Joseph P. Craig, of lawful age being first duly sworn, deposes and states:

1. My name is Joseph P. Craig. I am Director – Technical Regulatory, Local Networks for Qwest Corporation in Littleton, Colorado. I have caused to be filed written surrebuttal testimony and exhibits in support of Qwest Corporation in Docket No. T-00000A-00-0194, Phase II A.

2. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge and belief.

Further affiant sayeth not.

Joseph P. Craig
Joseph P. Craig

SUBSCRIBED AND SWORN to before me this 3 day of October, 2001.

Donna C. Goldman
Notary Public residing at
Arapahoe, Colorado

My Commission Expires: 4/5/04

DONNA GOLDMAN
STATE OF COLORADO
NOTARY PUBLIC

BEFORE THE ARIZONA CORPORATION COMMISSION

IN THE MATTER OF THE PETITIONS OF:	
AMERICAN COMMUNICATIONS SERVICES, INC. AND AMERICAN COMMUNICATIONS SERVICES OF PIMA COUNTY, INC.;	DOCKET NO. U-3021-96-448 DOCKET NO. U-3245-96-448 DOCKET NO. E-1051-96-448
AT&T COMMUNICATIONS OF THE MOUNTAIN STATES, INC.;	DOCKET NO. U-2428-96-417 DOCKET NO. E-1051-96-417
MFS COMMUNICATIONS COMPANY, INC.;	DOCKET NO. U-2572-96-362 DOCKET NO. E-1051-96-362
TCG PHOENIX;	DOCKET NO. U-3016-96-402 DOCKET NO. E-1051-96-402
MCIMETRO ACCESS TRANSMISSION SERVICES, INC.;	DOCKET NO. U-3175-96-479 DOCKET NO. E-1051-96-479
BROOKS FIBER COMMUNICATIONS OF TUCSON, INC.;	DOCKET NO. U-3009-96-478 DOCKET NO. E-1051-96-478
SPRINT COMMUNICATIONS COMPANY, L.P.; and	DOCKET NO. U-2432-96-505 DOCKET NO. E-1051-96-505
GST TUCSON LIGHTWAVE, INC.	DOCKET NO. U-3155-96-527 DOCKET NO. E-1051-96-527
FOR ARBITRATION OF THE RATES, TERMS, AND CONDITIONS OF INTERCONNECTION WITH U S WEST COMMUNICATIONS, INC. PURSUANT TO § 252(b) OF THE TELECOMMUNICATIONS ACT OF 1996.	(Consolidated)

DIRECT TESTIMONY OF

STEPHEN E. SIWEK

ON BEHALF OF

AT&T COMMUNICATIONS OF THE MOUNTAIN STATES, INC.

OCTOBER 25, 1996

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HATFIELD MODEL TESTIMONY

EXHIBIT SES - 1

Model Description

Hatfield Model

Version 2.2, Release 2

Hatfield Associates, Inc.
International Telecommunications Consultants
737 29th Street, Suite 200
Boulder, Colorado 80303

September 4, 1996

reported expenses. Because total Network Operations expense is strongly line-dependent, the model computes this expense as a per-line additive value based on ARMIS-reported total Network Operations expense divided by the number of access lines, then deducting 30% of this quotient to produce a forward-looking estimate.[35]

(4) Non-network-related operating expenses and expense factors

The Expense Module assigns non-network related expenses to each density range based on its proportion to total expenses in each category. Each of these expenses is described below.

Variable support -- Historical variable support expenses for LECs are substantially higher than those of similar service industries operating in more competitive environments. Based on studies of these variable support expenses in competitive industries, such as the interexchange industry, the model applies a conservative 10% variable support factor to the total costs estimated for UNEs as well as basic local service.

General Support Equipment -- The module calculates investments for furniture, office equipment and general purpose computers. The Model uses actual 1995 company investments to determine the ratio of investments in the above categories to total investment. The ratio is then multiplied by the network investment estimated by the Model to produce the investment in general support equipment. The recurring costs of these items are then calculated in the same way as recurring costs for network investment.

(5) Revenues

Revenues are used to calculate the uncollectibles factor. This factor is a ratio of uncollectibles expense to adjusted net revenue. The module computes both retail and wholesale uncollectibles factors. The retail factor is applied to basic local telephone service monthly costs and the wholesale factor used in the calculation of UNE costs.

d) Outputs of the Expense Module

The Expense Module displays results in a series of reports which depict detailed investments and expenses for each UNE for each density range, summarized investments and expenses for all UNEs, unit costs by UNE and total

[35] Although forecasting forward-looking expenses is difficult, there is evidence that the 30% reduction from currently reported per-line Network Operations expense is conservative. Testimony before the California Public Utilities Commission (Testimony of R. L. Scholl, Universal Service Proxy Cost Models, April 17, 1996, p. 11) states that Pacific Bell's forward-looking Network Operations expenses are 55% less than current per-line values computed from Pacific Bell's 1994 ARMIS data.

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS	))))))	DOCKET NO. T-00000A-00-0194 PHASE II A

SURREBUTTAL TESTIMONY OF

ROBERT J. HUBBARD

ON BEHALF OF

QWEST CORPORATION

OCTOBER 19, 2001

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Admitted
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SURREBUTTAL TESTIMONY OF ROBERT J. HUBBARD

INDEX OF TESTIMONY

IDENTIFICATION OF WITNESS

Q. PLEASE STATE YOUR NAME, EMPLOYER AND BUSINESS ADDRESS.

A. My name is Robert J. Hubbard. I am employed by Qwest Corporation, as a Director in the Local Network Organization. My business address is 700 West Mineral, Littleton, Colorado 80120.

Q. BRIEFLY OUTLINE YOUR EMPLOYMENT BACKGROUND.

A. I am a Director of Technical Support in Qwest's Interconnection Strategies Group, the group responsible for the development of strategies to implement the unbundling of Qwest's network as required by the Telecommunications Act of 1996 ("the Act"). I provide technical support regarding unbundling issues to the Qwest Network and Public Policy departments.

I have over 33 years experience with two Regional Bell Operating Companies, Qwest and Indiana Bell Telephone Co, in their network departments. I worked for over 11 years at Indiana Bell and Qwest as a cable splicer and as a cable repairman involved in all aspects of splicing and repairing copper cables. At Qwest, I eventually moved from splicing and repairing into the engineering department as a design engineer for outside plant, designing copper and fiber facilities, and Analog and Digital Carrier Systems. I then went into the planning department as an outside plant planner, in which I planned for future jobs involving fiber cable placement and upgrades to the existing outside plant network. In 1997, I moved into my present job as a Director in the Interconnection Planning Department.

I have had substantial involvement in Qwest's preparation for line sharing. For example, I studied possible network architectures in advance of Qwest's response to the Federal Communication Commission's ("FCC") First Report and Order and Further Notice of Proposed Rulemaking in Docket No. 98-147 ("Line Sharing Order"). Also, in Minnesota, I participated in the technical trials -- both the Lab and Field Tests -- that were ordered by the Minnesota Commission last year. During both the Lab and Field Tests, I provided technical and engineering input, and evaluated the outcome of the tests.

PURPOSE OF TESTIMONY

Q. PLEASE DESCRIBE THE PURPOSE OF YOUR SURREBUTTAL TESTIMONY.

A. The purpose of my Surrebuttal Testimony is to address the Rebuttal Testimony of Sidney L. Morrison filed on behalf of WorldCom, Inc. regarding remote terminal collocation and "card at a time" collocation. Mr. Morrison's testimony indicates that card at a time collocation is, among other things, a cheap, technologically simple way to permit CLECs to provide Digital Subscriber Line ("DSL") technology to end-users and, therefore, should be ordered in this case. My testimony explains three points. First, card at a time collocation is technically limited and is not superior to remote terminal collocation, as Mr. Morrison would have this Commission believe. Second, the FCC has not ordered this type of collocation, and this Commission should not order it. Finally, I offer a different methodology to accomplish the same result.

REMOTE TERMINAL COLLOCATION

Q. MR. MORRISON CLAIMS THAT "THERE ARE NO TECHNICAL LIMITATIONS THAT PREVENT ILECS FROM ALLOWING CLECS TO PROVIDE ADVANCED SERVICES OVER DIGITAL LOOP CARRIER EQUIPMENT." IS THIS TRUE?

A. No it is not. First and foremost, not all Digital Loop Carrier ("DLC") systems are technically capable of providing DSL. For example, the widely used Subscriber Loop Carrier ("SLC")–96 cannot, contrary to Mr. Morrison's testimony, support DSL, since it is not technically feasible for CLECS to virtually collocate line cards with DLC and Digital Subscriber Line Access Multiplexer ("DSLAM") facilities. DLC and DSLAM line cards rely on control cards and trunk cards located within the same shelf of the remote terminal as the line cards. Using the DSLAM as an example, the line card performs modem functions, the control card maps virtual channels to individual line cards, and trunk cards aggregate virtual channels for transport back to an Asynchronous Transfer Mode ("ATM") switch. DLC and

DSLAM line cards are connected through integrated backplane wiring of the DLC or DSLAM shelves.

Consequently, there is no physical demarcation between the line card and other system elements without the DSLAM or DLC shelf. This makes isolation of a line card as a stand-alone network element technically impossible. Further, trouble isolation in this scenario is impossible, as there is no "test to" point without demarcation. For reasons I discuss later, it simply will not work to permit a CLEC to substitute its line card in a Qwest remote terminal or to insert a CLEC line card into an empty slot in the terminal. Further, many Qwest DLC systems are not currently configured to provide advanced services.

Q. DOES QWEST HAVE ANY DSL SERVICES PROVISIONED OVER A DLC IN ARIZONA?

A. No.

Q. MR. MORRISON SUGGESTS THAT IT IS A SIMPLE MATTER FOR QWEST TO CONVERT AN EXISTING DLC SYSTEM NOT CURRENTLY CONFIGURED FOR ADVANCED SERVICES INTO ONE THAT IS. IS IT AS SIMPLE AS MR. MORRISON SUGGESTS?

A. No. There are many issues that come into play, such as power, space, adding a new shelf, retrofitting an existing cabinet, the size of the existing pad, and accommodating rights-of-way. Conversion of existing DLC systems to permit the kind of collocation suggested by Mr. Morrison is not practical.

Q. WHAT WORK WOULD QWEST HAVE TO PERFORM TO PLACE AN ASDL DIGITAL LINE UNIT ("ADLU") INTO AN EXISTING LITESPAN?

A. First, it would be necessary to conduct an evaluation to determine if fiber facilities are available to the ATM switch. If no facilities were available, then Qwest would have to install them.

Next, Qwest would have to perform a card upgrade to increase the memory capacity of the DLC Central Processing Unit ("CPU"). After upgrading the memory, Qwest would have to buy and load the DLC operating software. After completing the software upgrade, it would be necessary to add two ATM Bank Control Unit ("ABCU") cards to the DLC to provide the fiber connection mentioned above from the DLC to the ATM switch. An ATM switch port would then be assigned, and the fiber would be connected to the ATM.

As this description shows, Mr. Morrison has oversimplified the process of converting an existing Next Generation Digital Loop Carrier ("NGDLC") to permit it to provide advanced services.

Q. AT PAGE 9, LINES 8 THROUGH 13 OF HIS REBUTTAL TESTIMONY, MR. MORRISON CLAIMS IT IS TECHNICALLY FEASIBLE TO VIRTUALLY COLLOCATE ADLU LINE CARDS WITHIN ANY NEXT GENERATION DIGITAL LOOP CARRIER SYSTEMS. IS THIS TRUE?

A. No it is not. ASDL Digital Line Unit ("ADLU") cards are vendor-specific and configured for a specific type of DLC system and network configuration. Today, the only vendor that provides a line card for NGDLC is Alcatel.

Q. HOW MUCH ALCATEL LITESPAN DOES QWEST HAVE DEPLOYED IN ARIZONA?

A. Currently, Qwest has deployed Alcatel's Litespan NGDLC to 1.69% of Arizona's total Qwest access lines. To put this into perspective, Qwest has deployed DLC to 27.56% of the total number of Qwest access lines in Arizona.

Q. MR. MORRISON ALSO CLAIMS THE ADLU COULD BE UNBUNDLED AS A STAND-ALONE NETWORK ELEMENT. IS THIS POSSIBLE?

A. No, it is not for several reasons. First, the ADLU does not even function as a stand-alone network element. The ADLU card provides voice/data combination functionality and limited routing capability. It does not function alone to permit service as a standard element. Further, the card will not function without power. Finally, the ADLU line card shares the CPU and transport platform of the DLC system.

Therefore, the ADLU is *not capable* of functioning as a stand-alone network element and should not be unbundled as a separate network element. Nor is the ADLU card a "plug and forget it" network element, as Mr. Morrison claims.

Q. IS THERE A PHYSICAL NETWORK DEMARCATION POINT IN THE ADLU LINE CARD?

A. No. The ADLU line card shares a common backplane with the DLC platform. This means the advanced services traveling through it are commingled with those of Qwest's for transport back to the central office.

Q. WITHOUT A DEMARCATION POINT, HOW WOULD A CLEC "PICK UP" ITS DATA TRAFFIC FROM QWEST?

A. The data is formed into packets at the DLC platform and transported back to an ATM switch. The CLEC would "pick up" packets at the ATM switch.

Q. WOULDN'T THIS AMOUNT TO UNBUNDLED PACKET SWITCHING, RATHER THAN VIRTUAL COLLOCATION AS MR. MORRISON SUGGESTS?

A. Yes, it appears that is what Mr. Morrison is suggesting. Qwest witnesses Kathy Malone and Joseph Craig address both the policy and technical issues of Unbundled Packet Switching.

Q. IS QWEST REQUIRED BY THE FCC TO UNBUNDLE DLC OR DSLAM PLATFORMS?

A. No, it is not. Qwest is required by the FCC to provide unbundled loops from its integrated digital loop carrier systems but not to unbundle the systems themselves. DSLAMs are part of the packet switch network and, as such, are subject to unbundled packet switching rules discussed by Ms. Malone and Mr. Craig. The FCC has not ordered the DSLAM platform itself to be unbundled.

Q. WHAT WOULD HAPPEN TO THE UTILIZATION OF THE DSLAM IF CARD AT A TIME REMOTE COLLOCATION WERE PERMITTED?

A. Qwest uses the Lucent Stinger DSLAM and copper-based transport. The DSLAM has 7 slots; however, one slot is used to provide the necessary transport functions. In the remaining 6 slots, the current configuration allows for 24 customer assignments per slot for a total of 144 customers.

Allowing card at a time remote collocation would essentially be a loss of 24 time slots or end-user terminations. From Qwest's perspective, this equates to the DSLAM being under-utilized by 17%, thus decreasing operating efficiencies. This means that Qwest revenues associated with these 24 terminations essentially disappears.

Therefore, providing card at a time remote collocation introduces additional uncertainty into an already expensive undertaking. The end result could well mean that remote DSLAM deployment would become too expensive for Qwest to provision.

Q. IS QWEST DEPLOYING ADVANCED SERVICES IN PLATFORMS OTHER THAN DLC?

A. Yes, in a Distribution Area ("DA") Hotel arrangement. DA Hotels are stand-alone remote structures located next to Feeder Distribution Interfaces ("FDI"), in which DSLAM equipment is placed.

Q. DOES THE DA HOTEL HAVE SPACE, POWER, HVAC TO ACCOMMODATE REMOTE COLLOCATION?

A. Yes.

Q. PLEASE DEFINE REMOTE COLLOCATION.

A. Remote Collocation is defined as the placement of CLEC equipment necessary to access UNEs within Qwest owned or leased Outside Plant ("OSP") structures. When building OSP structures, Qwest is obligated to consider CLEC demand for UNEs as part of the space requirement analysis. In addition, if Qwest chooses to deploy DSLAMs in a subloop, collocation space for similar CLEC equipment must be accommodated.

Remote Collocation is available at new and existing OSP structures wherever technically feasible. One example of an OSP structure is the Remote Terminal, which provides Qwest and CLECs with common access to space and power. Remote access to subloop network elements (e.g. subloop feeder, subloop distribution) is obtained at the FDI. CLEC requests to remotely collocate at other OSP structures will be considered on a case-by-case basis through the remote collocation process.

Q. PLEASE PROVIDE THE ASSUMPTIONS THAT ARE INVOLVED IN RT COLLOCATION.

The following assumptions form the basis for RT Collocation: Qwest currently offers Remote Collocation at existing sites and new DA Hotel sites. The DA Hotel OSP planning team provides participating CLECs with Qwest's proposed deployment of DSLAM Hotels, by wire center, at a Distribution Area ("DA") level. Following site disclosure, CLECs have 30 days to notify Qwest of their desire to participate in joint planned remote collocation. This will allow Qwest to correctly size the DSLAM Hotel to house equipment, provide for power consumption, and heat dissipation requirements. When CLECs do not participate in a DA Hotel Build, Qwest will add 15% to the size of the DSLAM Hotel and allow for increased terminations at the FDI. Upon completion of the build, the additional space will be offered on a first come, first serve basis (The Ameritech/SBC merger FCC 00-336, ¶ 34, requires SBC to make available 15% of a new OSP cabinet and 20% of a CEV/HUT to unaffiliated carriers).

When Qwest remotely deploys a DSLAM (at which an additional cabinet has not been installed next to the FDI), a DSLAM Hotel will be placed next to the FDI. CLECs are responsible for installing and maintaining their equipment at remote sites. Additional capacity in the OSP structure for non-forecasted growth will be allocated on a first come, first serve basis.

Q. PLEASE DESCRIBE THE RATE ELEMENTS INVOLVED IN REMOTE COLLOCATION.

A. The following rate elements are associated with Remote Collocation:

Non-Recurring Charges

- Space (per standard mounting unit)

Includes: cost of the cabinet, all work associated with placement of the cabinet, use of common equipment, and heat dissipation.

- FDI Terminations

Includes: initial work to provide the requested DS0 and DS1 terminations at the FDI.

Recurring Charges

- Power (in amps)

Includes: the on-going power consumption at the Remote Collocation site (this will be in five amp increments for DC, and in 120, 208, and 240 amp increments for AC).

- FDI Terminations

Includes: maintenance of the DS0 and DS1 cable between the FDI and the Remote Collocation site, and maintenance of the DS0 and DS1 terminations at the FDI.

SUMMARY OF TESTIMONY

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. The Arizona Staff in Docket No. T-00000A-97-0238, Final Report on Qwest's Compliance with Checklist Item No. 1 – Interconnection and Collocation, dated October 12, 2001, states at paragraph 395 of their recommendation:

"Nonetheless, Staff does not recommend that Qwest be required to go beyond current FCC rules. While CLECs would like to virtually collocate at remote terminals utilizing a 'card by card' basis, Staff does not recommend this approach since this is not currently done in the central office or required by the FCC. Staff believes any determination regarding 'card by card' collocation should come from the FCC."

In addition, the Arizona Staff and the ALJ in Docket No. T-00000A-97-0238, states in their recommended order on Emerging Services dated September 28, 2001 at paragraph 157: "Staff believes that the record is not sufficient to establish whether plug and play is a feasible option for collocation. Staff recommends that because the FCC is currently requesting comments on the feasibility of 'plug and play', this issue should be revisited after the FCC ruled." And, at paragraph 158: "We [ALJ] concur with Staff. We can not determine the feasibility of 'plug and play' at this time. We find that Qwest should file a revised SGAT provision after the FCC has made a final determination."

For these reasons and the other reasons I have described in this testimony, the Commission should reject card at a time collocation. Qwest offers Remote Collocation in which a CLEC is able to collocate its DSLAM equipment within a Qwest Remote Terminal.

Q. DOES THIS COMPLETE YOUR TESTIMONY?

A. Yes it does.

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS	)	DOCKET NO. T-00000A-00-0194 Phase II A AFFIDAVIT OF ROBERT J HUBBARD
STATE OF COLORADO	)	
COUNTY OF ARAPAHOE	)	

Robert J. Hubbard, of lawful age being first duly sworn, deposes and states:

1. My name is Robert J. Hubbard. I am Director – Technical Regulatory, Local Networks for Qwest Corporation in Littleton, Colorado. I have caused to be filed written surrebuttal testimony and exhibits in support of Qwest Corporation in Docket No. T-00000A-00-0194, Phase II A.

2. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge and belief.

Further affiant sayeth not.

Robert J Hubbard

Robert J. Hubbard

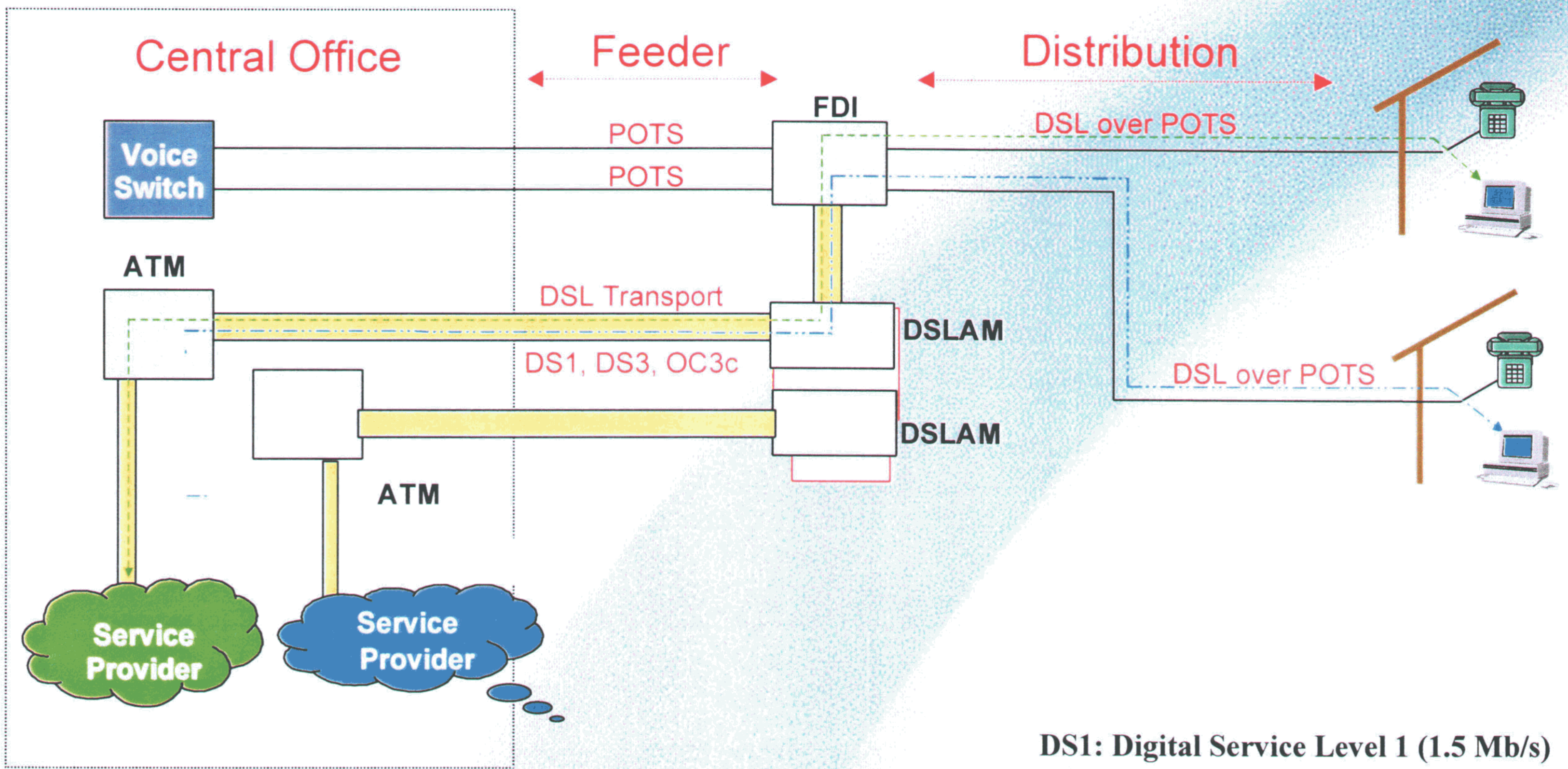
SUBSCRIBED AND SWORN to before me this 10 day of October, 2001.

Donna Goldman

Notary Public residing at
Arapahoe, Colorado

My Commission Expires: 4/5/04

DONNA GOLDMAN
STATE OF COLORADO
NOTARY PUBLIC



DS1: Digital Service Level 1 (1.5 Mb/s)
DS3: Digital Service Level 3 (45 Mb/s)
OC3c: Optical Level 3 Concatenated (155Mb/s)
VC: Virtual Channel
DSL: Digital Subscriber Line
POTS: Plain Old Telephone Service
FDI: Feeder Distribution Interface

DSLAM in a stand-alone cabinet.
Splitters are placed in a separate shelf

EXHIBIT
tabbies
Qwest 10

Qwest

BEFORE THE ARIZONA CORPORATION COMMISSION RECEIVED

2001 AUG 31 P 3: 35

AZ CORP COMMISSION
DOCUMENT CONTROL

WILLIAM A MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO]
QWEST CORPORATION'S COMPLIANCE]
WITH CERTAIN WHOLESALE PRICING]
REQUIREMENTS FOR UNBUNDLED]
NETWORK ELEMENTS AND RESALE]
DISCOUNTS.]

DOCKET NO. T-00000A-00-0194

Phase II-A

DIRECT TESTIMONY OF

KATHRYN MALONE

ON BEHALF OF

QWEST CORPORATION

August 31, 2001

EXHIBIT
Admitted
Qwest 11

Arizona Corporation Commission
Docket No. T-00000A-00-0194
Qwest Corporation
Direct Testimony of Kathryn Malone
August 31, 2001

TESTIMONY INDEX

I. EXECUTIVE SUMMARY

The purpose of my testimony is to present Qwest's product descriptions and pricing for Local Interconnection Service and certain unbundled network elements (UNEs). The prices established for Local Interconnection Service and unbundled elements will be set in this portion of the proceeding based on cost. The TELRIC cost of each element is presented in the testimony of Robert H. Brigham. The price that Qwest is proposing is the TELRIC cost for Local Interconnection Service and Unbundled Network Elements (UNEs). The pricing methodology is consistent with the Telecommunications Act, with FCC orders and with Arizona Corporation Commission Rules. I respectfully request this commission approve the pricing proposed in this docket.

II. IDENTIFICATION OF WITNESS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS AND POSITION WITH QWEST CORPORATION.

A. My name is Kathryn Malone, I am employed by Qwest Corporation (Qwest), f/k/a U S WEST Communications, Inc. as a Manager of Wholesale Advocacy in the Wholesale Markets organization. My business address is 1801 California St, Room 2360, Denver, Colorado 80202.

Q. PLEASE DESCRIBE YOUR WORK EXPERIENCE.

A. I began my career with Qwest (formerly U S West) in 1964 in the Denver Operator Services Department. In 1968, I joined the Network Facilities Department as a technical assistant. From 1968 to 1978, I held various positions responsible for coordination and design of Outside Plant Facilities. In 1978, I was promoted to Budget Manager and was responsible for preparation and forecasting of both the construction and maintenance budgets in Arizona, Colorado, Montana and Wyoming.

In May 1984, after the divestiture of the Bell System, I accepted a position in the Revenue Requirements Department. In that capacity, I was responsible for cost settlements with local exchange carriers. My responsibilities included analysis of cost separation studies. In January 1990, I was promoted to Senior Access Manager with responsibility for developing and negotiating contractual arrangements for toll access compensation with local exchange carriers. In March 1998, I accepted my current position of Manager - Wholesale Markets, and am responsible for certain issues surrounding interconnection and resale of products and services.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE ARIZONA CORPORATION COMMISSION?

A. Yes.

II. III. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to describe Local Interconnection Service (Local Traffic) and certain Qwest unbundled network elements (UNEs), along with their pricing elements, which include recurring and non-recurring charges as appropriate. Prices associated with local traffic and each UNE addressed in my testimony are included in Exhibit RHB-1, which is attached to the testimony of Robert H. Brigham. Specifically, I will describe the following elements:

- **Local Interconnection Service**
  - Call Termination
  - Tandem Switching
  - Tandem Transmission
- **Unbundled Network Elements**
  - Local Tandem Switching
  - Local Switching
  - Unbundled Packet Switching
  - Remote Terminal Collocation
  - Customized Routing

III. LOCAL INTERCONNECTION SERVICE

A. Local Traffic

Q. WHAT RATES ARE INCLUDED IN THE LOCAL TRAFFIC CATEGORY?

A. The following fixed and distance sensitive recurring charges apply to Local Traffic:

- End office call termination, per minute of use
- Tandem Switched Transport
  - Tandem Switching, per minute of use
  - Tandem Transmission, per minute of use
    - 0-8 miles
    - 8-25 miles
    - 25-50 miles
    - Over 50 miles

Q. WHAT IS THE END OFFICE CALL TERMINATION RATE ELEMENT?

A. The end office call termination rate element is a per minute of use charge for the use of the terminating end office switch to complete a local call.

Q. WHAT IS THE TANDEM SWITCHING RATE ELEMENT?

A. The tandem switching rate element is a per minute of use charge for the use of a tandem switch in the event a call is routed through a local tandem switch for call completion.

Q. WHAT IS THE TANDEM TRANSMISSION RATE ELEMENT?

A. The tandem transmission rates include a fixed (non-distance sensitive) per minute of use charge and a per minute, per mile charge for the transmission of traffic from the tandem switch to the terminating end office switch for call completion.

IV. UNBUNDLED NETWORK ELEMENTS

A. Local Tandem Switching

Q. PLEASE DESCRIBE LOCAL TANDEM SWITCHING.

A. The local tandem switching element includes access to the facilities connecting the trunk distribution frames to the tandem switch and all functions of the switch itself, including those facilities that establish a temporary transmission path between two other switches. The local tandem switching elements also include the functions that are centralized in local tandem switches rather than end office switches, the routing of calls to operator services, and signaling conversion features. Local Tandem Switching is available pursuant to FCC rules.

Q. WHAT RECURRING CHARGES APPLY TO LOCAL TANDEM SWITCHING?

A. The recurring charges for local tandem switching include a DS1 Local Message Trunk Port and use of local tandem switching billed on an originating per minute of use basis. Please see Exhibit RHB-1 for the rate.

Q. WHAT NONRECURRING CHARGES APPLY TO LOCAL TANDEM SWITCHING?

A. A DS1 Trunk Port is a 4-wire DS1 trunk side switch port terminating at a DS1 demarcation point and incurs a non-recurring charge. Each DS1 Tandem Trunk Port includes a subset of 24 DS0 channels capable of supporting local message type traffic and incurs a non-recurring charge to establish both the first and each additional trunk group member. Please see Exhibit RHB-1 for the rate.

B. Local Switching

Q. PLEASE DESCRIBE LOCAL SWITCHING.

A. Access to unbundled switching encompasses line-side and trunk-side facilities, plus the features, functions and capabilities of the switch. The features, functions, and capabilities of the switch include the basic switching function, as well as the same basic capabilities that are available to Qwest's end-user customers. Unbundled local switching also includes access to all vertical features that the switch is capable of providing, as well as any technically feasible customized routing functions. Local Switching is available pursuant to FCC rules.

1. Line Side Ports

Q. PLEASE DESCRIBE A LINE SIDE PORT.

A. The analog line port is a two -wire interface on the line-side of the end office switch that is extended to the Main Distribution Frame (MDF). The analog line port includes vertical features.

Q. DOES QWEST PROPOSE A RECURRING CHARGE FOR AN ANALOG LINE SIDE PORT?

A. Yes. The recurring rates for the first analog line port and each additional analog line port are included in Exhibit RHB-1.

Q. DOES QWEST PROPOSE A NONRECURRING RATE FOR THE ANALOG LINE SIDE PORT?

A. Yes. Qwest proposes a nonrecurring rate for the first analog line side port and each additional analog line side port as listed in Exhibit RHB-1.

Q. PLEASE DESCRIBE A DIGITAL LINE PORT (SUPPORTING BRI ISDN).

A. Basic Rate Interface Integrated Services Digital Network (BRI-ISDN) is a digital architecture that provides integrated voice and data capability (2-wire). A BRI ISDN Port is a Digital 2B+D (2 Bearer Channels for voice or data and 1 Delta Channel for signaling and D Channel Packet) line-side switch connection with BRI ISDN voice and data basic elements. A BRI ISDN Port does not offer B Channel Packet service capabilities.

Q. DOES QWEST PROPOSE A RECURRING RATE FOR A DIGITAL LINE PORT?

A. Yes. The recurring rate is listed in Exhibit RHB-1.

Q. DOES QWEST PROPOSE NONRECURRING CHARGES FOR A DIGITAL LINE-SIDE PORT?

A. Yes. Qwest proposes nonrecurring charges for the first port and each additional port. The nonrecurring charges are included in Exhibit RHB-1.

2. Vertical Features

Q. PLEASE DESCRIBE VERTICAL FEATURES.

A. Vertical features are software attributes on end office switches.

Q. IS QWEST PROPOSING VERTICAL FEATURES IN THIS DOCKET?

A. Yes. Qwest is proposing a list of vertical features that are available to CLECs that purchase a line side port.

Q. DO THE INDIVIDUAL FEATURES PROPOSED BY QWEST HAVE A RECURRING CHARGE?

A. No. The unbundled line port includes the vertical switch features in its cost.

Q. DO THE INDIVIDUAL FEATURES PROPOSED BY QWEST HAVE NONRECURRING CHARGES?

A. Certain vertical switch features have a specific non-recurring charge. Please see Exhibit RHB-1 for the features list and corresponding nonrecurring charges. These nonrecurring charges recover the cost of additional work necessary to activate specific vertical switch features.

Q. PLEASE DESCRIBE THE NONRECURRING VERTICAL FEATURE SUBSEQUENT ORDER CHARGE?

A. A nonrecurring subsequent order charge applies when a CLEC orders additional vertical features to an existing port. The rate is listed in Exhibit RHB-1.

3. Trunk Ports

Q. WHAT TYPES OF TRUNK PORTS DOES QWEST OFFER?

A. Qwest offers the following types of trunk ports:

DS1 Local Message Trunk Port. A DS1 Trunk Port is a DS1 trunk side switch port that is extended to the trunk main distribution frame and is connected to the demarcation point through an Interconnection Tie Pair (ITP). Each DS1 Trunk Port includes a subset of 24 DS0 channels capable of supporting local message type traffic.

Unbundled DS1 PRI ISDN Trunk Port (Supporting DID/DOD/PBX). A DS1 Trunk Port is a DS1 trunk-side switch port terminated at a DSX1 or equivalent. Each DS1 Trunk Port includes a subset of 24 DS0 channels capable of supporting DID/DOD/PBX type traffic.

The DS0 analog trunk port connects the CLEC to a metallic interface at the common ICDF in a Qwest central office. The interfaces support a 2-wire or a 4-wire transmission.

Q. DOES QWEST PROPOSE RECURRING CHARGES FOR TRUNK PORTS?

A. Yes. Qwest proposes recurring charges for trunk ports as listed in Exhibit RHB-1.

Q. DOES QWEST PROPOSE NONRECURRING CHARGES FOR TRUNK PORTS?

A. Yes. Qwest proposes the nonrecurring charges for trunk ports as listed in Exhibit RHB-1. There is a nonrecurring charge for the digital trunk port, as well as non-recurring charges for the establishment of the first and each additional message trunk group member associated with the digital trunk port.

C. Unbundled Packet Switching

Q. PLEASE DESCRIBE UNBUNDLED PACKET SWITCHING ("UPS").

A. Unbundled Packet Switching provides the functionality of delivering packet data units via a virtual channel between a CLEC demarcation point and the Remote Terminal Digital Subscriber Line Access Multiplexer (DSLAM). Unbundled Packet Switching includes transport facilities between the DSLAM and the Qwest central office, DSLAM functionality and the ATM electronics necessary to generate a virtual channel.[1]

[1] In the UNE Remand Order, the FCC defined the functionality of the packet switching unbundled network element. In the Matter of Implementation of the Local Competition Provision of the Telecommunications Act of

Q. PLEASE EXPLAIN WHAT A VIRTUAL CHANNEL AND DSLAM FUNCTIONALITY ARE.

A. A virtual channel is a non-permanent channel that is set up to route data from one location to another (rather than a dedicated permanent channel that can be used by only one entity). In the case of packet switching, the channel is set up in advance of the routing of the packets and is in place throughout the transmission of the packets. This creates the virtual path over which all packets for this particular transmission will go. Once the packets are transmitted, the path is released.[2] DSLAM functionality provides the capability and programming that allows for both up-stream and down-stream data feeds and is responsible for routing the virtual channel to the appropriate place.

Q. DOES UNBUNDLED PACKET SWITCHING PROVIDE A CLEC WITH ACCESS TO THE DISTRIBUTION PORTION OF THE LOOP?

A. No. UPS only covers the feeder portion of the loop - from the CLEC demarcation point in the central office out through, and including, the Feeder Distribution Interface (FDI).

1996; Third Report and Order and Fourth Further Notice of Proposed Rulemaking, CC 96-98, FCC 99-238 ¶302 (rel. Nov. 5, 1999) (UNE Remand Order). The FCC stated:

> In packet-switched networks, messages between network users are divided into units, commonly referred to as packets, frames, or cells. These individual units are then routed between network users. The switches that provide this routing function are "packet switches," and the function of routing individual units based on address or other routing information contained in the units is "packet switching."

[2] In footnote 592 of the UNE Remand Order, the FCC noted that:

> With packet switching, the packet switches place data units on inter-switch trunks only when there are active communications between network users. When users are not sending each other messages or packets, no bandwidth is used on the trunks between the packet switches.

Q. WHAT OPTIONS DOES A CLEC HAVE FOR PURCHASING ACCESS TO THE DISTRIBUTION PORTION OF THE LOOP?

A. A CLEC may choose from the following three distribution loop options when requesting unbundled packet switching:

- A CLEC can purchase the distribution subloop and is able to provide both voice and data services to the end-user customer.
- Another CLEC (CLEC2) can purchase the entire UNE loop via UNE-P, and the CLEC purchasing UPS (CLEC1) can purchase distribution from CLEC2.
- For loops over which Qwest provides voice service, a CLEC can line-share, but only over the distribution subloop.

Q. DOES QWEST HAVE AN OBLIGATION TO OFFER UNBUNDLED PACKET SWITCHING?

A. Yes, but only in a limited circumstance.

Q. PLEASE DESCRIBE THE CIRCUMSTANCE IN WHICH QWEST HAS AN OBLIGATION TO OFFER UNBUNDLED PACKET SWITCHING.

A. Qwest is obligated to offer unbundled packet switching when the following four conditions exist:

- Qwest has deployed digital loop carrier systems ("DLC");
- There are no spare copper loops available capable of supporting xDSL services;
- Qwest has placed a DSLAM for its own use in a remote Qwest premises but has not permitted the CLEC to collocate its own DSLAM at the same remote Qwest premises; and
- Qwest has deployed packet switching capability for its own use.

Q. WHAT AUTHORITY DOES QWEST RELY UPON FOR ITS ASSERTION THAT ACCESS TO UNBUNDLED PACKET SWITCHING IS REQUIRED ONLY IN A LIMITED CIRCUMSTANCE?

A. In its UNE Remand Order, the FCC found "one limited exception to [its] decision to decline to unbundle packet switching." [3] The FCC then laid out its criteria: where the ILEC has deployed digital loop carrier (DLC) systems, no spare copper facilities are available, and the incumbent has placed its DSLAM in a remote terminal. The FCC went on to find that the ILEC will not be required to offer access to unbundled packet switching "if it permits a requesting carrier to collocate its DSLAM in the incumbent's remote terminal, on the same terms and conditions that apply to its own DSLAM."[4]

Q. PLEASE DESCRIBE THE RATE ELEMENTS AND ASSOCIATED CHARGES THAT QWEST PROPOSES FOR PACKET SWITCHING.

A. Qwest proposes a recurring rate for the following rate elements:

(1) Unbundled Packet Switch Customer Channel. This rate element provides the costs of the remotely deployed DSLAM and the virtual channel from the DSLAM to the CLEC demarcation point in the central office containing the Qwest ATM switch at an uncommitted bit rate. The CLEC demarcation point is between the Intermediate Connecting Distribution Frame (ICDF) and the Digital Cross Connect (DSX).

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3 UNE Remand Order ¶313.
4 Id.

(2) Remote DSLAM functionality at the remote terminal. In order to utilize this element, the CLEC would need to provide its own feeder plant via its own facilities or an unbundled sub-loop feeder element.

(3) Unbundled Packet Switch Interface Port at DS1 or DS3 level. This element provides the port that the CLEC utilizes to connect to its own ATM switching network to its customers who are served via the UPS customer channels.

Qwest proposes a non-recurring charge for the three distribution loop options I described earlier in my testimony. The proposed recurring rates and non-recurring charges may be found in Exhibit RHB-1, which is attached to Mr. Brigham's direct testimony.

D. Remote Terminal Collocation

Q. PLEASE DESCRIBE REMOTE TERMINAL COLLOCATION.

A. Remote Terminal Collocation provides space in available remote cabinets on a Standard Mounting Unit (SMU) level. The space includes access to AC/DC power, heat dissipation and access to Feeder Distribution Interface (FDI) terminations.

Q. DOES QWEST PROPOSE A RECURRING RATE FOR REMOTE TERMINAL COLLOCATION?

A. Yes. The recurring rates include maintenance costs associated with the equipment, plus a small portion of the power pedestal. The recurring FDI terminations rate includes the maintenance costs associated with this equipment. The recurring rates are listed in Exhibit RHB-1.

Q. DOES QWEST PROPOSE A NONRECCURING RATE FOR REMOTE TERMINAL COLLOCATION?

A. Yes. Qwest proposes a nonrecurring Collocation Space rate for the cost of the cabinet space, the cost of the cabinet and all of the work and materials associated with placement of the cabinet and providing access to power. The nonrecurring Feeder Distribution Interface (FDI) Terminations rate is per 25 pair and includes the costs associated with augmenting the FDI to provide terminations. The nonrecurring rates are listed in Exhibit RHB-1.

E. Customized Routing

Q. PLEASE DESCRIBE CUSTOMIZED ROUTING?

A. Customized Routing permits a CLEC to designate a particular outgoing trunk that will carry certain classes of traffic originating from the CLEC's end-users. Customized routing enables the CLEC to direct particular classes of calls to specific outgoing trunks that will permit the CLEC to provide its own interoffice facilities or select among other providers of interoffice facilities, operator services and directory assistance. Customized routing is a software function of a switch. Customized routing may be ordered as an application with Resale or Unbundled Local Switching.

Q. WHAT CHARGES DOES QWEST PROPOSE FOR CUSTOMIZED ROUTING?

A. Custom Routing applications are unique to each CLEC; however, Qwest proposes that it assess nonrecurring charges based on the elements listed below.

- Development of Custom Line Class Code – Directory Assistance or Operator Services Routing Only,
- Line Class Code Installation per Switch – Directory Assistance or Operator Services

Routing Only and

- All Other Custom Routing.

References to the three Customized Routing nonrecurring charges are included in Exhibit RHB-1.

V. CONCLUSION

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION INTO QWEST CORPORATION'S COMPLIANCE WITH CERTAIN WHOLESALE PRICING REQUIREMENTS FOR UNBUNDLED NETWORK ELEMENTS AND RESALE DISCOUNTS	)	DOCKET NO. T-00000A-00-0194 Phase II A
STATE OF COLORADO	)	AFFIDAVIT OF KATHRYN MALONE
COUNTY OF DENVER	)	

Kathryn Malone, of lawful age being first duly sworn, deposes and states:

1. My name is Kathryn Malone. I am Manager–Wholesale Markets of Qwest Corporation in Denver, Colorado. I have caused to be filed written testimony and exhibits in support of Qwest Corporation in Docket No. T-00000A-00-0194, Phase II A.

2. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge and belief.

Further affiant sayeth not.

Kathryn Malone

SUBSCRIBED AND SWORN to before me this 23rd day of August, 2001.

Candace A. Mowers
Notary Public residing at
Denver, Colorado

My Commission Expires: Candace A. Mowers My Commission Expires April 13, 2002

EXHIBIT
Admitted WorldCom 1

ARIZONA RATES

Arizona Corporation Commission
Docket No. T-00000A-00-0194
Phase II-A, Qwest Corporation
Direct Testimony
Exhibit RHB-1

	Recurring Fixed	Recurring	Non- Recurring	Cost Study I.D. #
7.0 Interconnection				
7.6 Local Traffic				
7.6.1 End office call termination, per minute of use		$0.002143		5206
7.6.2 Tandem Switched Transport				
7.6.2.1 Tandem Switching, per Minute of Use		$0.001589		5206
7.6.2.2 Tandem Transmission, per Minute of Use, all Mileage Bands				
0 to 8 Miles	$0.000456	$0.0000428		5206
8 to 25 Miles	$0.000465	$0.0000212		5206
25 to 50 Miles	$0.000448	$0.0000109		5206
Over 50 Miles	$0.000433	$0.0000039		5206
		Recurring	**Nonrecurring**	
8.0 Collocation				
8.8 Remote Collocation				
Space (per Standard Mounting Unit)		$1.35	$868.13	5635
FDI Terminations (per binder group [25-PR])		$0.82	$558.99	5635
9.0 Unbundled Network Elements (UNEs)				
9.11 Local Switching				
9.11.1 Analog Line Side Port, First Port		$2.45	$145.57	5206/5207 5541/5542
9.11.2 Analog Line Side Port, Each Additional		$2.45	$95.75	5206/5207 5541/5542
9.11.3 Local Usage, Per Minute of Use		$0.002599		5206
9.11.4 Vertical Features				
10XXX Direct Dialed Blocking		$0.00		
Account Codes - per system		$0.00	$80.01	5207
Attendant Access Line - per station line		$0.00	$1.16	5207
Audible Message Waiting		$0.00	$1.01	5207
Authorization Codes - per system		$0.00	$239.29	5207
Auto Callback		$0.00		
Automatic Line		$0.00	$0.34	5207
Automatic Route Selection - Common Equip. per system		$0.00	$2,099.56	5207
Blocking of pay per call services		$0.00		
Bridging		$0.00		
Call Drop		$0.00	$0.34	5207
Call Exclusion - Automatic		$0.00	$1.01	5207
Call Exclusion - Manual		$0.00	$0.67	5207
Call Forward Don't Answer - All Calls		$0.00		
Call Forwarding Incoming Only		$0.00		
Call Forwarding Intra Group Only		$0.00		
Call Forwarding Variable Remote		$0.00		
Call Forwarding: Busy Line (Expanded)		$0.00		
Call Forwarding: Busy Line (External)		$0.00		
Call Forwarding: Busy Line (External) Don't Answer		$0.00		
Call Forwarding: Busy Line (Overflow)		$0.00		
Call Forwarding: Busy Line (Overflow) Don't Answer		$0.00		
Call Forwarding: Busy Line (Programmable)		$0.00		
Call Forwarding: Busy Line/Don't Answer Programmable Svc. Establishment			$15.66	5207
CF DON'T ANSWER/CF BUSY CUSTOMER PROGRAMMABLE - PER LINE			$1.01	5207
Call Forwarding: Busy Line/Don't Answer (Expanded)		$0.00	$37.92	5207
Call Forwarding: Don't Answer		$0.00	$37.92	5207
Call Forwarding: Don't Answer (Expanded)		$0.00		
Call Forwarding: Don't Answer (Programmable)		$0.00		
Call Forwarding: Variable		$0.00		
Call Forwarding: Variable - no call complete option		$0.00		
Call Hold		$0.00		

	Recurring Fixed	Recurring	Non-Recurring	Cost Study I.D. #
Call Hold/3-Way/Call Transfer		$0.00		
Call Park (Basic - Store & Retrieve)		$0.00		
Call Pickup		$0.00		
Call Transfer		$0.00		
Call Waiting Dial Originating		$0.00		
Call Waiting Indication - per timing state		$0.00	$1.01	5207
Call Waiting Originating		$0.00		
Call Waiting Terminating - All Calls		$0.00		
Call Waiting Terminating - Incoming Only		$0.00		
Call Waiting/ Cancel Call Waiting		$0.00		
CENTREX COMMON EQUIPMENT			$1,206.23	5207
Centrex Management System (CMS)		$0.00		
Centrex Plus DID numbers per number		$0.00		
Centrex Plus to Centrex Plus		$0.00		
Centrex Plus to IC Carrier		$0.00		
Centrex Plus to PBX/Key Blocked		$0.00		
Centrex Plus to PBX/Key Non-Blocked		$0.00		
CFBL - All Calls		$0.00		
CFBL - Incoming Only		$0.00	$37.92	5207
CFDA Incoming Only		$0.00	$37.92	5207
CLASS - Anonymous Call Rejection		$0.00		
CLASS - Call Trace		$2.39		5297
CLASS - Call Waiting ID		$0.00		
CLASS - Calling Name & Number		$0.00		
CLASS - Calling Number Delivery		$0.00		
CLASS - Calling Number Delivery - Blocking		$0.00		
CLASS - Continuous Redial		$0.00	$1.26	5207
CLASS - Last Call Return		$0.00	$1.27	5207
CLASS - Priority Calling		$0.00	$1.20	5207
CLASS - Selective Call Forwarding		$0.00	$1.26	5207
CLASS - Selective Call Rejection		$0.00	$1.20	5207
Common Equipment per 1.544 Mbps facility (DS1)		$0.00		
Conference Calling - Meet Me		$0.00	$42.47	5207
Conference Calling - Preset		$0.00	$42.47	5207
Custom Ringing First Line (Short/Long/Short)		$0.00		
Custom Ringing First Line (Short/Short)		$0.00		
Custom Ringing First Line (Short/Short/Long)		$0.00		
Custom Ringing Second Line (Short/Long/Short)		$0.00		
Custom Ringing Second Line (Short/Short)		$0.00		
Custom Ringing Second Line (Short/Short/Long)		$0.00		
Custom Ringing Third Line (Short/Long/Short)		$0.00		
Custom Ringing Third Line (Short/Short)		$0.00		
Custom Ringing Third Line (Short/Short/Long)		$0.00		
Data Call Protection (DMS 100)		$0.00		
Dir Sta Sel/Busy Lamp Fld per arrangement		$0.00	$0.34	5207
Directed Call Pickup with Barge-in		$0.00	$20.16	5207
Directed Call Pickup without Barge-in		$0.00	$20.16	5207
Distinctive Ring/Distinctive Call Waiting		$0.00	$40.31	5207
Distinctive Ringing		$0.00		
EBS - Set Interface - per station line		$0.00		
Executive Busy Override		$0.00		
Expensive Route Warning Tone- per system		$0.00	$71.91	5207
Facility Restriction Level - per system		$0.00	$44.24	5207
Feature Display		$0.00		
Group Intercom		$0.00	$0.46	5207
Hot Line - per line		$0.00	$1.01	5207
Hunting: Multiposition Circular Hunting		$0.00		
Hunting: Multiposition Hunt Queuing		$0.00	$38.59	5207
Hunting: Multiposition Series Hunting		$0.00		
Hunting: Multiposition with Announcement in Queue		$0.00	$38.59	5207
Hunting: Multiposition with Music in Queue		$0.00	$40.75	5207
Incoming Calls Barred		$0.00		
International Direct Dial Blocking		$0.00		
ISDN Short Hunt		$0.00	$1.70	5207
Line Side Answer Supervision		$0.00		
Loudspeaker Paging - per trunk group		$0.00	$176.53	5207
Make Busy Arrangements - per group		$0.00	$0.67	5207
Make Busy Arrangements - per line		$0.00	$0.67	5207

	Recurring Fixed	Recurring	Non-Recurring	Cost Study I.D. #
Message Center - per main station line		$0.00	$0.34	5207
Message Waiting Indication Audible/Visual		$0.00		
Message Waiting Visual		$0.00	$0.34	5207
Music On Hold - per system		$0.00	$23.13	5207
Network Speed Call		$0.00		
Night Service Arrangement		$0.00		
Outgoing Calls Barred		$0.00		
Outgoing Trunk Queuing		$0.00		
Privacy Release		$0.00	$0.47	5207
Query Time		$0.00	$0.34	5207
Speed Calling 1 Digit Controller		$0.00		
Speed Calling 1 Digit User		$0.00		
Speed Calling 1# List Individual		$0.00		
Speed Calling 2 Digit Controller		$0.00		
Speed Calling 2 Digit User		$0.00		
Speed Calling 2# List Individual		$0.00		
Speed Calling 30 Number		$0.00		
Speed Calling 8 Number		$0.00		
Station Camp-On Service - per main station		$0.00	$0.34	5207
Station Dial Conferencing (6 Way)		$0.00		
Station Message Detail Recording (SMDR)		$0.00		
Three Way Calling		$0.00		
Time and Date Display		$0.00		
Time of Day Control for ARS - per system		$0.00	$125.82	5207
Time of Day NCOS Update		$0.00	$0.54	5207
Time of Day Routing - per line		$0.00	$0.52	5207
Toll Restriction Service		$0.00		
Trunk Answer Any Station		$0.00		
Trunk Verification from Designated Station		$0.00	$0.39	5207
UCD in hunt group - per line		$0.00	$0.67	5207
UCD with Music After Delay		$0.00		
CMS - SYSTEM ESTABLISHMENT - INITIAL INSTALLATION			$971.60	5207
CMS - SYSTEM ESTABLISHMENT - SUBSEQUENT INSTALLATION			$485.80	5207
CMS - PACKET CONTROL CAPABILITY, PER SYSTEM			$485.80	5207
SMDR-P - SERVICE ESTABLISHMENT CHARGE, INITIAL INSTALLATION			$339.30	5207
SMDR-P - ARCHIVED DATA			$177.29	5207
9.11.5 Subsequent Order Charge			$13.57	5207
9.11.6 Digital Line Side Port (Supporting BRI ISDN)				
First Port		$10.56	$219.37	5206/5207
Each Additional Port		$10.56	$219.37	5206/5207
9.11.7 Digital Trunk Ports				
DS1 Local Message Trunk Port		$56.98		5206
Message Trunk Group, First Trunk		$15.78	$209.14	5207
Message Trunk Group, Each Additional		$15.78	$50.84	5207
DS1 PRI ISDN Trunk Port		$228.78	$648.55	5206/5207
DS1 / DID Trunk Port		$3.38	$212.74	5206/5207
9.11.8 DS0 Analog Trunk Port				
First Port			$123.11	5207
Each Additional			$28.57	5207
9.12 Customized Routing				
9.12.1 Development of Custom Line Class Code – Directory Assistance or Operator Services Routing Only			$315.87	5611
9.12.2 Installation Charge, per Switch Directory Assistance or Operator Service Routing Only			$231.38	5611
9.12.3 All Other Custom Routing			ICB	
9.24 Unbundled Packet Switching				

Arizona Corporation Commission
Docket No. T-00000A-00-0194
Phase II-A, Qwest Corporation
Direct Testimony
Exhibit RHB-1

	Recurring Fixed	Recurring	Non- Recurring	Cost Study I.D. #
9.24.1 Unbundled Packet Switch Customer Channel		$23.39		5646
DSLAM Functionality		$20.28		5646
9.24.2 Customer Channel and Shared Distribution Loop			$60.14	5299
Customer Channel and Unbundled Distribution Subloop			$127.17	5299
Customer Channel and CLEC Provided Loop			60.14	5299
9.24.3 Unbundled Packet Switch Port				
DS1 Interface		$135.05	$227.50	5646/5300
DS3 Interface		$208.02	$227.50	5646/5300

Qwest

EXHIBIT
Admitted
WorldCom 2

EXECUTIVE SUMMARY

ARIZONA

CUSTOM ROUTING

NONRECURRING ELEMENTS

Study ID # 5611

2001
Nonrecurring Cost Study

August, 2001

Market Services & Economic Analysis
MSEA

Market Services And Economic Analysis Organization

Table of Contents

A. PURPOSE, SCOPE, AND APPLICATION

This study estimates forward-looking nonrecurring total element long run incremental costs Qwest will incur to provide Custom Routing. Nonrecurring costs represent the one-time costs that are incurred in order to establish and disconnect the service. The study identifies the costs for various work activities involved in providing the service. The study results represent fully allocated 2001 costs and may be used for pricing and other management decisions.

B. DESCRIPTION OF SERVICE

CUSTOM ROUTING

Custom Routing will combine End Office (EO) Switching with dedicated trunks to allow Co-Providers the ability to request specific traffic routing direction by class of service via a unique Line Class Code (LCC). Capacity constraints vary from switch to switch. Each Co-Provider request will require a unique Line Class Code (LCC), to be established and deployed in the EO Switch or tandem the Co-Provider has specified.

Custom Routing can be requested for Operator Services and Directory Assistance trunking.
Custom Routing is provisioned using Line Class Codes to route the traffic over specific trunk groups.

Custom Routing has the following trunking requirements:

1. Dedicated Local Directory Assistance (DA) trunks directed to a CLEC Local DA platform.

2. Dedicated DA Local Trunks directed to a CLEC Local Electronic DA Platform.

3. Dedicated DA Local Trunks directed to the Qwest DA Platform. CLEC Branding is purchased through Qwest Operator Services.

4. Dedicated Full Feature Operator Local Trunks to allow Local Operator Services Call (0+, 0-) dialed by a CLEC end user customer to be directed to a CLEC Local Operator Services Platform (Standard Operator Services protocols of 0+ or 0- will be supported where technically feasible).

5. Dedicated Full Feature Operator Local Trunks to allow Local Operator Services calls (0+, 0-) dialed by a CLEC end user customer to be directed to a Qwest Local Operator Services platform. CLEC branding is purchased from Qwest Operator Services.

The nonrecurring elements are:
Operator, Directory Assistance Development Per Line Class Code
Operator, Directory Assistance Installation Per Switch

C. STUDY METHODOLOGY

The Nonrecurring Cost Program (NRC) performs mechanized cost calculations associated with the one time labor expense resulting from a customer request for service. Inputs to the calculations include: labor time, probability of occurrence, labor rate, and expense factors. Formatting commands performed by the program generate Total Element Long Run Increment Cost (TELRIC) results.

Following is a description of the required data inputs:

Time Estimates:
The time estimate is the average amount of time required to perform a particular work function. Time estimates are obtained from subject matter experts who represent the groups doing the work.

Probabilities:
A probability is the percentage of time Qwest performs a particular work function in the provision of a particular service offering. Probabilities are developed from reports and from the input of Subject Matter Experts.

Labor Rates:
Directly assigned labor rates are based on expense data from the general ledger journal file (Service Order Processing/Other) and from the incurred expenses of Account 6534 (Plant) and 6535 (Engineering). The directly assigned labor rates consist of costs that can be attributed to the function being performed and are forward looking based on the wage and salary index, the percent change in the post-retirement benefits, and the Consumer Price Index. Components that make up labor rates include: basic wages and salaries, supervision and support, benefits, and other miscellaneous costs.

Expense Factors:
The program applies expense factors to the direct cost. The factors include Commercial Marketing, Network Support, Directly Attributable, and Common.

Once the service provisioning process has been identified, the appropriate times, Probabilities, and labor rate/work group identifies are formatted into NRC Program input data sheets. The process specific input files are then inserted into the NRC Program. The program user selects run options on a menu, and the NRC program then accesses the appropriate input from the NRC program workbook spreadsheets to calculate cost results.

The cost calculations consist of Labor Time times Probability of Occurrence times Labor Rate equals Direct Cost. Added to the Direct cost are appropriate Expense Factors that calculate and display **Total Direct (TELRIC)** Total Element Long Run Incremental Cost, **Direct *plus* Network Support, Direct *plus* Network Support *plus* Attributable**, and **Fully Allocated Costs**. (See *Section D, Description of Total Element Long Run Incremental Costs* for detailed description of the various cost levels).

D. DESCRIPTION OF TOTAL ELEMENT LONG RUN INCREMENTAL COSTS

Qwest Communications uses an incremental method to estimate product and service costs. It provides a measurement of costs over a period of time long enough to fully adjust to change output (e.g., size of facilities, levels of investment) to optimally accommodate this change. This methodology is forward looking in nature (i.e., it uses the latest technology costs or replacement costs). Since this incremental methodology is forward looking, it does *not* measure historic investment decisions of the corporation.

The QWEST incremental format disaggregates the cost results on a unitized basis into the components shown below:

Total Service Long Run Incremental Cost (TSLRIC) -- Total Service Long Run Incremental cost is the forward-looking cost avoided (or added) by discontinuing (or offering) an entire service or group of services in the most efficient manner, holding constant the production of all other services produced by the firm. This cost is often referred to in economic terms as the *direct* cost.

Shared Cost (SC) -- The cost associated with the provision of multiple services (service family). This cost is not volume sensitive and is eliminated only if the entire service family is discontinued.

Total Service Long Run Incremental Costs plus Shared Costs (TSLRIC + SC) -- The total Service Long Run Incremental Costs for a service plus the Shared Costs of a family of services.

Total Element Long Run Incremental Cost (TELRIC) -- Total Element Long Run Incremental cost, as defined by the Federal Communications Commission, is the sum of the forward-looking direct cost incurred in the production of a network element (as opposed to an entire service), attributed costs considered as shared under TSLRIC terminology and selected administrative costs considered as common under TSLRIC terminology.

Common Cost (CC)

For TSLRIC purposes, common costs are the current cost incurred for the benefit of the enterprise as a whole. This cost does not vary with the provision of a service or a service family. These costs are sometimes referred to as *general overhead costs*. The Common Cost added to the TSLRIC + SC produces a **Fully Allocated Cost (FAC)** as required by commission rules.

For TELRIC purposes, common costs are the current cost incurred for the benefit of the enterprise as a whole, after those costs that vary with the provisioning of individual network elements are removed. The costs removed from common for TELRIC
purposes are included in TELRIC itself. **Total Element Long Run Incremental Cost plus TELRIC common costs (TELRIC + CC)** form the basis for pricing of Interconnection network elements. TELRIC + CC is the equivalent of fully allocated cost as the term is applied to network elements.

D. DESCRIPTION OF TOTAL ELEMENT LONG RUN INCREMENTAL COSTS (Cont'd)

Typically, the costs identified by these cost categories include capital costs for depreciation, return, and income taxes. TSLRIC also includes ongoing operating costs for: maintenance expense, assignable administration expense, product management expense, pre sales expense, sales compensation expense, expensed right to use fees, ad Valorem taxes and business fees.

E. STUDY ASSUMPTIONS

The cost factors used in this study are based on Prescribed Lives.

F. STUDY SUMMARY

Study Summary

Study Name	Custom Routing - Arizona	
Study Requester	*Christine Spahn/Candace Mowers*	
Type of Study	*Total Element Long Run Incremental Costs (TELRIC)*	
Study ID	*# 5611*	
Study Applications	*Pricing Decisions and Tariff Support*	
Completion Date		
Cost Analyst	*Dan Deffley*	
Cost Models Used	**Model**	**Version/Release Date**
	ENRC	*ENRC 214*
Cost Factors Used	**Factor**	**Effective Date**
	Directly Assigned	*06/01*
	Directly Attributable	*06/01*
	Common	*06/01*
Cost of Money	*9.61%*	*06/01*
Major Cost Drivers	*Labor Times, Labor Rates and associated weightings.*	

G. NONRECURRING COST SUMMARY

CUSTOM ROUTING

Arizona
2001

Total Direct Costs and Common Costs

Cost Element	Direct +	Directly Assn =	Total Direct +	Directly Attrib =	TELRIC +	Common =	TELRIC + Common
CUSTOM ROUTING- OPERATOR, DA DEVELOPMENT PER LCC	$227.88 +	$10.83 =	$238.71 +	$63.49 =	$302.20 +	$13.66 =	$315.87
CUSTOM ROUTING- OPERATOR, DA INSTALLATION PER SWITCH	$166.93 +	$7.94 =	$174.86 +	$46.51 =	$221.37 +	$10.01 =	$231.38

Direct - Direct Costs

Directly Assn - Direct Assigned Costs

Total Direct - Direct Costs + Directly Assigned Costs

Direct Attr - Directly Attributed Costs

TELRIC - Total Element Long Run Incremental Costs

NONRECURRING COST SUMMARY

CUSTOM ROUTING

Arizona
2001

Total Direct Costs and Common Costs

Cost Element	Direct +	Directly Assn =	Total Direct +	Directly Attrib =	TELRIC +	Common =	TELRIC + Common	Detail Page Ref
CUSTOM ROUTING- OPERATOR, DA DEVELOPMENT PER LCC	$227.88 +	$10.83 =	$238.71 +	$63.49 =	$302.20 +	$13.66 =	$315.87	Pages 1-2
CUSTOM ROUTING- OPERATOR, DA INSTALLATION PER SWITCH	$166.93 +	$7.94 =	$174.86 +	$46.51 =	$221.37 +	$10.01 =	$231.38	Pages 3-4

Direct - Direct Costs
Directly Assn - Direct Assigned Costs
Total Direct - Direct Costs + Directly Assigned Costs
Direct Attr - Directly Attributed Costs
TELRIC - Total Element Long Run Incremental Costs

NONRECURRING COST DETAIL SUMMARY

Study Name: CUSTOM ROUTING
Study Year: 2001
Analyst: Deffley
Product Group: Interconnection

ENRC Version: 2.14
Date: 08/21/01

State: Arizona

Work Item	Time Minutes	Prob #1	Prob #2	Prob #3	Prob #4	Applied Time (Minutes)	Labor /Hour	Cost
A	B	C	D	E	F	G B * (C Thru F)	H	I H * (G/60)
CUSTOM ROUTING- OPERATOR, DA DEVELOPMENT PER LCC								
ADD								
-ACCOUNT MANAGER								
ISSUE FORMS/TECH SUPPORT	120	1.000				120.00	$56.97	$113.94
Subtotal - ACCOUNT MANAGER						120.00		$113.94
-CT TECHNICAL SUPPORT								
PROVISION FORMS	120	1.000				120.00	$56.97	$113.94
Subtotal - CT TECHNICAL SUPPORT						120.00		$113.94
Total For Service:						240.00		$227.88

NONRECURRING COST DETAIL SUMMARY

Study Name: CUSTOM ROUTING
Study Year: 2001
Analyst: Deffley
Product Group: Interconnection

State: Arizona

ENRC Version: 2.14
Date: 08/21/01

Work Item	Time Minutes	Prob #1	Prob #2	Prob #3	Prob #4	Applied Time (Minutes)	Labor /Hour	Cost
A	B	C	D	E	F	G	H	I
						B * (C Thru F)		H * (G/60)

CUSTOM ROUTING- OPERATOR, DA DEVELOPMENT PER LCC (con't)

		Cost Calculation		Cost Factor	Cost
		B	C	D	E
47	Direct Cost				$227.88
48					
49					
50					
51					
52	***Directly Assigned***				
53	Product Management Expense	D53*E47		0.034281	$7.81
54	Sales Expense	D54*E47		0.011333	$2.58
55	Product Advertising Expense	D55*E47		0.000000	$0.00
56	Business Fees (Other Operating Taxes)	D56*Sum(E47:E55)		0.001848	$0.44
57	***Directly Assigned Costs***	Sum(E47:E56)			$10.83
58					
59	***Total Direct Costs***	E47+E57			$238.71
60					
61	***Directly Attributed***				
62	Network Operations	D62*E59		0.050289	$12.00
63	Network Support Assets	D63*E59		0.015375	$3.67
64	General Support Assets	D64*E59		0.080638	$19.25
65	General Purpose Computers	D65*E59		0.036437	$8.70
66	Uncollectible	D66*E59		0.001017	$0.24
67	Accounting & Finance Expense	D67*E59		0.009035	$2.16
68	Human Resources Expense	D68*E59		0.008723	$2.08
69	Information Management Expense	D69*E59		0.061932	$14.78
70	Intangibles	D70*E59		0.002516	$0.60
71	***Directly Attributed Costs***	Sum(E62:E70)			$63.49
72					
73	***TELRIC***	E62+E71			$302.20
74					
75	***Common***				
76	Executive Expense	D76*E73		0.006949	$2.10
77	Planning Expense	D77*E73		0.000598	$0.18
78	External Relations Expense	D78*E73		0.009812	$2.97
79	Legal Expense	D79*E73		0.006427	$1.94
80	Other Procurement Expense	D80*E73		0.002432	$0.73
81	Research & Development Expense	D81*E73		0.000037	$0.01
82	Other General and Admin Expense	D82*E73		0.018952	$5.73
83	***Common Costs***	Sum(E76:E82)			$13.66
84					
85	***TELRIC + Common Costs***	E73+E83			$315.87

NONRECURRING COST DETAIL SUMMARY

Study Name: CUSTOM ROUTING
Study Year: 2001
Analyst: Deffley
Product Group: Interconnection
State: Arizona

ENRC Version: 2.14
Date: 08/21/01

Work Item A	Time Minutes B	Prob #1 C	Prob #2 D	Prob #3 E	Prob #4 F	Applied Time (Minutes) G B * (C Thru F)	Labor /Hour H	Cost I H * (G/60)
CUSTOM ROUTING- OPERATOR, DA INSTALLATION PER SWITCH								
ADD								
-ACCOUNT MANAGER								
ISSUE FORMS/COMPLEX TRANS	30	1.000				30.00	$56.97	$28.49
Subtotal - ACCOUNT MANAGER						30.00		$28.49
-COMPLEX TRANSLATIONS								
Probability weightings are the percent by switch type.								
PROV/TEST LCC DMS100	240	0.340				81.60	$41.45	$56.37
PROV/TEST LCC 5E,DMS10	180	0.660				118.80	$41.45	$82.07
Subtotal - COMPLEX TRANSLATIONS						200.40		$138.44
Total For Service:						230.40		$166.93

NONRECURRING COST DETAIL SUMMARY

Study Name: CUSTOM ROUTING
Study Year: 2001
Analyst: Deffley
Product Group: Interconnection

ENRC Version: 2.14
Date: 08/21/01

State: Arizona

Work Item	Time Minutes	Prob #1	Prob #2	Prob #3	Prob #4	Applied Time (Minutes)	Labor /Hour	Cost
A	B	C	D	E	F	G	H	I
						B * (C Thru F)		H * (G/60)

CUSTOM ROUTING- OPERATOR, DA INSTALLATION PER SWITCH (con't)

		Cost Calculation		Cost Factor	Cost
		B	C	D	E
137	**Direct Cost**				$166.93
138					
139					
140					
141					
142	***Directly Assigned***				
143	Product Management Expense	D143*E137		0.034281	$5.72
144	Sales Expense	D144*E137		0.011333	$1.89
145	Product Advertising Expense	D145*E137		0.000000	$0.00
146	Business Fees (Other Operating Taxes)	D146*Sum(E137:E145)		0.001848	$0.32
147	***Directly Assigned Costs***	Sum(E137:E146)			$7.94
148					
149	***Total Direct Costs***	E137+E147			$174.86
150					
151	***Directly Attributed***				
152	Network Operations	D152*E149		0.050289	$8.79
153	Network Support Assets	D153*E149		0.015375	$2.69
154	General Support Assets	D154*E149		0.080638	$14.10
155	General Purpose Computers	D155*E149		0.036437	$6.37
156	Uncollectible	D156*E149		0.001017	$0.18
157	Accounting & Finance Expense	D157*E149		0.009035	$1.58
158	Human Resources Expense	D158*E149		0.008723	$1.53
159	Information Management Expense	D159*E149		0.061932	$10.83
160	Intangibles	D160*E149		0.002516	$0.44
161	***Directly Attributed Costs***	Sum(E152:E160)			$46.51
162					
163	***TELRIC***	E152+E161			$221.37
164					
165	***Common***				
166	Executive Expense	D166*E163		0.006949	$1.54
167	Planning Expense	D167*E163		0.000598	$0.13
168	External Relations Expense	D168*E163		0.009812	$2.17
169	Legal Expense	D169*E163		0.006427	$1.42
170	Other Procurement Expense	D170*E163		0.002432	$0.54
171	Research & Development Expense	D171*E163		0.000037	$0.01
172	Other General and Admin Expense	D172*E163		0.018952	$4.20
173	***Common Costs***	Sum(E166:E172)			$10.01
174					
175	***TELRIC + Common Costs***	E163+E173			$231.38

EXHIBIT
Admitted
WorldCom 3

Qwest.

Collocation: Remote Terminal

ARIZONA
AUGUST 2001

Study ID: 5635

QWEST CORPORATION
Policy and Law

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Executive Summary

A. PURPOSE, SCOPE, AND APPLICATION

The purpose of this study is to determine the expenses and recurring costs that will be incurred by Qwest to provide Remote Terminal Collocation for customers.

This study develops Qwest average costs. Costs are based on a per unit basis depending upon which element is being requested.

B. DESCRIPTION OF SERVICE

Remote Terminal Collocation offers space in available remote cabinets eliminating the distance constraints on DSL providers. The space rate element is unitized on a Standard Mounting Unit (SMU) level and includes access to AC/DC power, heat dissipation and terminations to the Feeder Distribution Interface (FDI). The FDI termination rate element is per 25-pairs and includes the termination blocks and cables.

Cost Elements

- **Space** (per standard mounting unit; 1.75 vertical inches)
This non-recurring rate is associated with the cabinet space and includes the cost of the cabinet and all of the work and materials associated with placement of the cabinet. The recurring rate associated with the Space recovers the maintenance of the materials and equipment associated the cabinet along with a portion of the costs required for the power pedestal.

- **Feeder Distribution Interface (FDI) Terminations** (per 25 pair)
This non-recurring rate includes all costs associated with initial FDI upgrade work required to provide the terminations requested at the FDI. The recurring rate associated with the FDI recovers the maintenance of the cable between the FDI and the Remote Collocation cabinet, as well as, the maintenance of the terminations at the FDI. These charges will apply for both DS0 and DS1.

C. STUDY METHODOLOGY

The costs were developed from material, engineering and installation labor costs provided by Subject Matter Experts (SME's) in Central Office Engineering and Outside Plant Engineering.

Monthly maintenance costs were developed by taking the element-specific expense and applying the account code specific maintenance factor.

The investments/expenses from the above items were then entered into the WCP (Wholesale Cost Program) model, developed and used within Qwest.

D. DESCRIPTION OF LONG RUN INCREMENTAL COSTS

Long Run Incremental Cost (LRIC) is the method Qwest uses to estimate product and service costs. It provides a measurement of costs over a period of time long enough to fully adjust to changes of output (including changes in the size of facilities, levels of investment, etc.) in order to optimally accommodate this change. This methodology is forward looking in nature (i.e. LRIC uses the latest technology costs or replacement costs.) Since LRIC is forward looking, it does *not* measure historic investment decisions of the corporation.

The Qwest LRIC format disaggregates the cost results on a unitized basis into the components shown below:

Total Service Long Run Incremental Cost (TSLRIC) --Total Service Long Run Incremental Cost is the forward looking cost avoided (or added) by discontinuing (or offering) an entire service or group of services in the most efficient manner, holding constant the production of all other services produced by the firm. This cost is often referred to in economic terms as direct cost.

Shared Cost (SC)-- The cost associated with the provision of multiple services (service family). This cost is not volume sensitive and is eliminated only if the entire service family is discontinued.

Total Service Long Run Incremental Costs plus Shared Costs (TSLRIC+SC)--The Total Service Long Run Incremental Costs for a service plus the Shared Costs of a family of services.

Total Element Long Run Incremental Cost (TELRIC) -- Total Element Long Run Incremental Cost, as defined by the Federal Communications Commission, is the sum of the forward looking direct cost incurred in the production of a network element (as opposed to an entire service), attributed costs considered as shared cost under TSLRIC terminology and selected administrative costs considered as common under TSLRIC terminology.

Common Cost (CC)

For **TSLRIC** purposes, common costs are the current cost incurred for the benefit of the enterprise as a whole. This cost does not vary with the provision of a service or a service family. These costs are sometimes referred to as *general overhead costs.* The Common Cost added to the TSLRIC + SC produces a **Fully Allocated Cost (FAC)** as required by Commission rules.

For **TELRIC** purposes, common costs are the current cost incurred for the benefit of the enterprise as a whole, after those cost that vary with the provisioning of individual network elements are removed. The costs removed from common for TELRIC purposes are included in the TELRIC itself. **Total Long Run Incremental Cost plus TELRIC common costs (TELRIC + CC)** form the basis for pricing Interconnection network elements. TELRIC + CC is the equivalent of fully allocated cost as the term is applied to network elements.

Typically, the cost identified by these cost categories include capital costs for depreciation, return, and income taxes. TSLRIC also includes ongoing operating costs for: administration expense, product management expense, pre sales expense, and business fees.

E. STUDY ASSUMPTIONS

1. All cost are forward looking.
2. See "Inputs" worksheet for a summary of the assumptions.

Collocation: Remote Terminal

Remote Terminal Collocation: Arizona

Rate Summary*

	NRC	RC
Space (per Standard Mounting Unit)	$ 868.13	$ 1.35
FDI Terminations (per binder group (25-PR))	$ 558.99	$ 0.82
Power (see Collocation rates)		

*** Costs Not Included:**

Shelf Cost
Element Management System (EMS)
Remote Test Access Unit
Technician time to re-jumper the FDI through DA Hotel.

Collocation: Remote Terminal

Study Name	*Remote Terminal Collocation*	
Study Requester		
Type of Study	*TELRIC*	
Study ID	*5635*	
Cost Factor Group	*Interconnection*	
Study Applications		
Completion Date	*August 28, 2001*	
Cost Analyst		
Study Review	**Reviewer**	**Date**
		August 28, 2001
Models Used	**Model**	**Version**
	Wholesale Cost Program	*2.07*
	Cost Factor Databases	*00AZ03E*
Cost Factors Used	**Factor**	**Effective Date**
	Capital Recovery	*05/01*
	Maintenance	*01/01*
	Ad Valorem	*01/01*
	COE Land & Bldg	*01/01*
	Directly Assigned Factors	*05/01*
	Directly Attributable Factors	*05/01*
	Common	*05/01*
	Cost Of Money	*9.608%*
Inflation		
Major Cost Drivers		

Collocation: Remote Terminal

Study Information

Study Information	Value
Filing Month	AUGUST
Filing Year	2001
State	AZ
State Full Name	ARIZONA
Run Date	8/28/2001
Factor Vintage	*00AZ03E*
Study ID	5635

Configuration Quantities

Configuration Quantities	Value	Unit
Vendor 1 Cost		
Max Port Usage	3.0	Cards
Additional Cabinet Cost: Pad Mounting Bracket	$ 136.00	Dollars
Additional Cabinet Cost: 2-Protector Blocks for DS1 Terms	$ 522.00	Dollars
Between Cabinets		
Distance Between Cabinets (feet)	35	Feet
Cable Length Between Cabinets (feet)	50	Feet
Total Number Copper Pairs Between Cabinets	400	Pairs
Total Number of DS1s Between Cabinets	50	Pairs
Total Number of 4" Duct Between Cabinets {Copper}	3	Each
Total Number of Set of 2, 2" Innerduct Between Cabinets {Fiber}	1	Set
FDI Specific:		
Number of Additional Termination Blocks	8	Each
Number of Terminations per Block	25	Each

Weightings

Weightings	Value	Source
FDI Augment Utilization Fill Factor	70%	
Weighting for Telephony	50%	
Weighting for Packet Switching	85%	
Weighting for Remote Terminal (Whole.)	15%	
Weighting for Remote Terminal Collo w/Telephony	25.0%	
Architecture Weightings		
Vendor 1 Architecture	88%	
Vendor 2 Architecture	12%	
Percent of Time Power Ped Required	90%	
Standard Mounting Unit	1.75	
Cabinet Type 1 (23")	23.00	
Cabinet Type 2 (40")	40.00	
Space Utilization Factor	33%	

Collocation Model

Collocation Model	Value	
Power Maint Expense Adj	*0.004362*	G. Investment Factors

Factors

Factors	Value
WCP Version	*2.07*
Cost of Money	*9.61%*
Capital Recovery	*05/01*
Maintenance	*01/01*
Ad Valorem	*01/01*
Power	*01/01*
Sales Tax	*01/01*
Interest During Construction	*01/01*

Collocation: Remote Terminal

COE Land & Bldg	01/01
Directly Assigned Factors	05/01
Directly Attributable Factors	05/01
Common	05/01
Vintage	00AZ03E
Investment Loadings	
Power	0.038300
Sales Tax	0.000000
Interest During Construction	0.010400
COE Land And Building Investment	
Building	0.040800
Land	0.003500
Investment Based Monthly Direct Costs	
Depreciation	0.108162
Cost Of Money	0.042094
Income Tax Expense	0.017396
Maintenance	0.021897
Ad Valorem Tax	0.013621
COE Land And Building Cost	
COE Building	0.187155
COE Land	0.190332
Directly Assigned	
Product Management Expense	0.034281
Sales Expense	0.011333
Product Advertising Expense	0.000000
Business Fees (Other Operating Taxes)	0.001848
Directly Attributed	
Network Operations	0.050289
Network Support Assets	0.015375
General Support Assets	0.080638
General Purpose Computers	0.036437
Uncollectible	0.001017
Accounting & Finance Expense	0.009035
Human Resources Expense	0.008723
Information Management Expense	0.061932
Intangibles	0.002516
State Prescribed Directly Attributed	0.000000
Common	
Executive Expense	0.006949
Planning Expense	0.000598
External Relations Expense	0.009812
Legal Expense	0.006427
Other Procurement Expense	0.002432
Research & Development Expense	0.000037
Other General and Admin Expense	0.018952
State Prescribed Common	0.000000

Collocation: Remote Terminal

Remote Terminal Collocation

JPR Assumption Summary

Configuration Quantities

Weightings

			Conversion SMUs
FDI Augment Utilization Fill Factor	70%		
Weighting for Packet Switching	85%		
Weighting for Remote Terminal (Whole.)	15%		
Weighting for Remote Terminal Collo w/Telephony	25%		
Architecture Weightings			
Vendor 1 Architecture	88%		
Vendor 2 Architecture	12%		
Percent of Time Power Ped Required	90%		
Standard Mounting Unit	1.75		
Cabinet Type 1 (23")	23	→	13
Cabinet Type 2 (40")	40	→	23
Space Utilization Factor	33%		

Cost Summary

	Loaded Cost	Usage Weighting	SMU Quantity	Utilization Factor	Total
FDI Augment (per block - 25 terminations)					
Non-Recurring (per 25 terminations, 1 of 8 blocks)	$ 1,990.60	0.125	*n/a*	70%	$ 355.46
Recurring	$ 2.91	0.125	*n/a*	70%	$ 0.52
DA Cabling					
Non-Recurring (per 25-pair, 25 of 400-pair)	$ 2,279.45	0.0625	*n/a*	70%	$ 203.52
Recurring	$ 3.33	0.0625	*n/a*	70%	$ 0.30

	NRC	RC
Total FDI Terminations (per binder group (25-pair))	$ 558.99	$ 0.82

DA Hotel Calculations

	Loaded Cost	Usage Weighting	SMU Quantity	Utilization Factor	Total per SMU
DA Hotel: Vendor A					
Total Non-Recurring	$ 3,416.59	88%	13	33%	$ 700.84
Total Recurring	$ 5.38	88%	13	33%	$ 1.10
DA Hotel: Vendor B					
Total Non-Recurring	$ 10,580.96	12%	23	33%	$ 167.29
Total Recurring	$ 15.46	12%	23	33%	$ 0.24

	NRC	RC
Total Weighted DA Hotel (per Standard Mounting Unit (SMU))	$ 868.13	$ 1.35

Collocation: Remote Terminal

Remote Terminal Collocation

Configuration Summary

FDI Augment

	FRC	RC	NRC	Cost	Wtg	Total Cost
Total Weighted FDI Cost	45		x	$ 1,436.11	100.00%	$ **1,436.11**

DA Cabling

	FRC	RC	NRC	Cost	Wtg	Total Cost
Total Weighted DA Hotel Cabling	4/45		x	$ 1,644.50	100.00%	$ **1,644.50**

DA Hotel: Vendor A

Material

	FRC	RC	NRC	Cost	Wtg	Total Cost
Cabinet: DA Overlay	257		x	$ 8,875.97	15.00%	$ 1,331.40
Additional Cabinet Cost: Pad Mounting Bracket	257		x	$ 136.00	7.50%	$ 10.20
Additional Cabinet Cost: 2-Protector Blocks for DS1 Terms	45		x	$ 522.00	50.00%	$ 261.00
Installation: Generic Remote DSL Pad	4		x	$ 1,952.08	7.50%	$ 146.41
Exempt Material	4		x	$ 454.66	7.50%	$ 34.10
Juicebox Power Pedestal 100-30 Pad	257		x	$ 2,028.35	6.75%	$ 136.91
Juicebox Power Pedestal 100-30 Pad	257	x		$ 2,028.35	0.75%	$ 15.21
Remote Ankor Frame for 52E	257		x	$ 147.23	7.50%	$ 11.04

Total Material Costs $ 1,946.27

Engineering

Engineering Costs Associated with:

	FRC	RC	NRC	Cost	Wtg	Total Cost
Cabinet: DA Overlay	257		x	$ 329.95	7.50%	$ 24.75
Installation: Generic Remote DSL Pad	4		x	$ 106.00	7.50%	$ 7.95
Juicebox Power Pedestal 100-30 Pad	257		x	$ 53.00	6.75%	$ 3.58
Juicebox Power Pedestal 100-30 Pad	257	x		$ 53.00	0.75%	$ 0.40
Commercial Power: Electrician Cnct AC to Cab (Cntrctr)	257		x	$ 300.00	7.50%	$ 22.50

Total Engineering Costs $ 59.17

Splicing

Splicing Costs Associated with:

	FRC	RC	NRC	Cost	Wtg	Total Cost
Cabinet: DA Overlay (splice time)	257		x	$ 4.62	7.50%	$ 0.35
Cabinet: DA Overlay	257		x	$ 119.26	7.50%	$ 8.94
Exempt Material	257		x	$ 31.21	7.50%	$ 2.34
Splice Setup: Site Setup for Splice Activity	45		x	$ 89.00	7.50%	$ 6.68
Exempt Material	45		x	$ 23.29	7.50%	$ 1.75

Total Splicing Costs $ 20.05

Collocation: Remote Terminal

Remote Terminal Collocation

Installation

Installation Costs Associated with:

Cabinet: DA Overlay	257		x		$ 26.17	7.50%	$ 1.96
Installation Hourly Costs	257		x		$ -	7.50%	$ -
Juicebox Power Pedestal 100-30 Pad {T&T}	257		x		$ 42.03	6.75%	$ 2.84
Juicebox Power Pedestal 100-30 Pad {T&T}	257	x			$ 42.03	0.75%	$ 0.32
Commercial Power: Electrician Cnct AC to Cab (Cntrctr)	257		x		$ 1,700.00	7.50%	$ 127.50
Remote Ankor Frame for 52E	257		x		$ 84.06	7.50%	$ 6.30
Placing Cabinet: Less than 1000 Pounds (Cntrctr)	257		x		$ 334.65	7.50%	$ 25.10
Placement: Power Pedestal (Cntrctr)	257		x		$ 75.51	6.75%	$ 5.10

Total Installation Costs $ 169.11

Right-Of-Way

Right of Way for Privately Owned Locations	45		x		$ 3,710.00	7.500%	$ 278.25
Right of Way for Publicly Owned Locations	45		x		$ 106.00	7.500%	$ 7.95

Total Right-Of-Way Costs $ 286.20

Total Cost, DA Hotel: Vendor A **$ 2,480.81**

DA Hotel: Vendor A Weighted Expense by FRC

FRC	Total
4C	$ 188.46
45C	$ 555.62
257C	$ 1,720.81
	$ 2,464.88

DA Hotel: Vendor A Weighted Investment by FRC

FRC	Total
4C	$ -
45C	$ -
257C	$ 15.93
	$ 15.93

Collocation: Remote Terminal

Remote Terminal Collocation

DA Hotel: Vendor B

		RC	NRC		Cost	Wtg	Total Cost
Material							
Cost per USAM Shelf	257		x		$ 24,086.53	25%	$ 6,021.63
Placement: Up to 6" Concrete to Forms for Cabinet Base	257		x		$ 2,695.44	13%	$ 336.93
Juicebox Power Pedestal 100-30 Pad	257		x		$ 2,028.35	13%	$ 253.54
Total Material Costs							$ 6,612.11
Engineering							
Engineering Costs Associated with:							
Cost per USAM Shelf	257		x		$ 530.00	13%	$ 66.25
Juicebox Power Pedestal 100-30 Pad	257		x		$ 53.00	13%	$ 6.63
Commercial Power: Electrician Cnct AC to Cab (Cntrctr)	257		x		$ 300.00	13%	$ 37.50
Total Engineering Costs							$ 110.38
Splicing							
Splicing Costs Associated with:							
Splicing: Copper Pairs for Buried Cable - Extra Splices	45		x		$ 477.04	13%	$ 59.63
Exempt Material	45		x		$ 124.82	13%	$ 15.60
Splice Setup: Site Setup for Splice Activity	45		x		$ 89.00	13%	$ 11.13
Exempt Material	45		x		$ 23.29	13%	$ 2.91
Trip Charge for Qwest to and from Urban Work Location	257		x		$ 267.00	13%	$ 33.38
Total Splicing Costs							$ 122.64
Installation							
Installation Costs Associated with:							
Commons: USAM RT DSL Optical Commons {T&T}	257		x		$ 42.03	13%	$ 5.25
Juicebox Power Pedestal 100-30 Pad {T&T}	257		x		$ 42.03	13%	$ 5.25
Commercial Power: Electrician Cnct AC to Cab (Cntrctr)	257		x		$ 1,700.00	13%	$ 212.50
Placing Cabinet: 1000 Pounds or More	257		x		$ 446.17	13%	$ 55.77
Placement: Ground Grid	257		x		$ 186.00	13%	$ 23.25
Placement: Power Pedestal (Cntrctr)	257		x		$ 75.51	13%	$ 9.44
Total Installation Costs							$ 311.47
Right-Of-Way							
Right of Way for Privately Owned Locations	45		x		$ 3,710.00	13%	$ 463.75
Right of Way for Publicly Owned Locations	45		x		$ 106.00	13%	$ 13.25
Total Right-Of-Way Costs							$ 477.00
Total Cost, DA Hotel: Vendor B							**$ 7,633.59**

DA Hotel: Vendor B Expense by FRC

FRC	Total
45C	$ 566.27
257C	$ 7,067.32
	$ 7,633.59

Collocation: Remote Terminal

FDI Augment

FDI Assumption Summary

Configuration Quantities

FDI Specific:

	Amt	Unit
Number of Additional Termination Blocks	8	Each
Number of Terminations per Block	25	Each

Use Existing FDI

	FRC	Qty	Unit	Qty	Unit	Unit Cost	Amount	
Material								
New Termination Blocks								
Block: SAI 25-Pair Block	45			8	*Each*	$ 117.11	$ 936.88	
Total Material Costs								$ 936.88
Engineering								
Engineering Costs Associated with:								
Block: SAI 25-Pair Block	45	8	*Each*	1	*Hour(s)*	$ 53.00	$ 424.00	
Total Engineering Costs								$ 424.00
Splicing								
Splicing Costs Associated with:								
Block: SAI 25-Pair Block {8*25=200}	45	200	*Pair*	0.007	*Hour(s)*	$ 44.50	$ 59.63	
Exempt Material {8*25=200}	45	200	*Pair*	0.007	*Each*	$ 11.64	$ 15.60	
Total Splicing Costs								$ 75.23
								FDI Total
Total Cost, Use Existing FDI								**$ 1,436.11**

FDI Augment Expense by FRC

FRC	Total
45C	$ 1,436.11
	$ 1,436.11

Collocation: Remote Terminal

DA Hotel Cabling

{Cable placement for new DA Hotel & splicing at FDI only.}

DA Hotel Cabling Assumptions

Configuration Quantities

Between Cabinets

	Amt	Unit
Distance Between Cabinets (feet)	35	Feet
Cable Length Between Cabinets (feet)	50	Feet
Total Number Copper Pairs Between Cabinets	400	Pairs
Total Number of DS1s Between Cabinets	50	Pairs
Total Number of 4" Duct Between Cabinets {Copper}	3	Each
Total Number of Set of 2, 2" Innerduct Between Cabinets {Fiber}	1	Set

DA Hotel Cabling Calculations

Material	FRC	Qty	Unit	Qty	Unit	Unit Cost	Amount	
Cabling								
Copper Cable Buried: 24 Gauge, 400-Pair	45			50	*Sheath Feet*	$ 2.75	$ 137.61	
Copper Cable Buried: 24 Gauge, 50-Pair	45			50	*Sheath Feet*	$ 0.44	$ 22.19	
Conduit: 4" PVC-Type Conduit - 1 Duct Buried	4	3	*Each*	35	*Feet*	$ 0.85	$ 89.12	
Innerduct: 2, 1-1/4" Innerduct Buried	4	1	*Set*	35	*Feet*	$ 0.73	$ 25.61	
Total Material Costs								$ 274.53
Engineering								
Engineering Costs Associated with:								
Design Work Package	45			8.0	*Hour(s)*	$ 53.00	$ 424.00	
Copper Cable Buried: 24 Gauge, 400-Pair	45	50	*Sheath Feet*	0.0112	*Hour(s)*	$ 53.00	$ 29.68	
Copper Cable Buried: 24 Gauge, 50-Pair	45	50	*Sheath Feet*	0.0074	*Hour(s)*	$ 53.00	$ 19.61	
Conduit: 4" PVC-Type Conduit - 1 Duct Buried {3*35=105}	4	105	*Sheath Feet*	0.0032	*Hour(s)*	$ 53.00	$ 17.81	
Innerduct: 2, 1-1/4" Innerduct Buried {1*35=35}	4	35	*Sheath Feet*	0.013	*Hour(s)*	$ 53.00	$ 24.12	
Total Engineering Costs								$ 515.21
Splicing								
Splicing Costs Associated with:								
Copper Cable Buried: 24 Gauge, 400-Pair {2*400=800}	45	800	*Pair*	0.0067	*Hour(s)*	$ 44.50	$ 238.52	
Exempt Material {2*400=800}	45	800	*Pair*	0.0067	*Each*	$ 11.64	$ 62.41	
Splice Setup: Site Setup for Splice Activity	45	1	*Each*	2	*Hour(s)*	$ 44.50	$ 89.00	
Exempt Material	45	1	*Each*	2	*Each*	$ 11.64	$ 23.29	
Copper Cable Buried: 24 Gauge, 50-Pair {2*50=100}	45	100	*Pair*	0.0067	*Hour(s)*	$ 44.50	$ 29.82	
Exempt Material {2*50=100}	45	100	*Pair*	0.0067	*Each*	$ 11.64	$ 7.80	
Splice Setup: Site Setup for Splice Activity	45	1	*Each*	2	*Hour(s)*	$ 44.50	$ 89.00	
Exempt Material	45	1	*Each*	2	*Each*	$ 11.64	$ 23.29	
Total Splicing Costs								$ 563.13

Collocation: Remote Terminal

DA Hotel Cabling

{Cable placement for new DA Hotel & splicing at FDI only.}

Installation

Costs Associated with:

Single Direct Buried Duct	45	1	*Each*	35	*Feet*	$ 3.04	$ 106.30
Each Additional Duct Placed in Trench	4	4	*Each*	35	*Feet*	$ 0.40	$ 55.36
Exempt Material {4*35=140}	4	140	*Each*	0.0079	*Each*	$ 11.64	$ 12.88
Copper Cable Buried: 24 Gauge, 400-Pair	45	2	*Each*	50	*Sheath Feet*	100	
Pulling Cable into Conduit (Line Costs)	45	2	*Each*	50	*Feet*	$ 0.90	$ 90.12
Line Hourly Costs	45	100	*Each*	0.0010	*Hour(s)*	$ 48.55	$ 4.86
Exempt Material	45	100	*Each*	0.0190	*Each*	$ 11.64	$ 22.12

Total Installation Costs	$ 291.64

Total Cost, DA Hotel Cabling	**$ 1,644.50**

DA Hotel Cabling Expense by FRC

FRC	Total
4C	$ 224.89
45C	$ 1,419.61
	$ 1,644.50

Collocation: Remote Terminal

DA Hotel: Vendor A

FDI Assumption Summary

Configuration Quantities

Vendor 1 Cost

	Amt	Unit
Max Port Usage	3	Cards
Additional Cabinet Cost: Pad Mounting Bracket	$ 136.00	Dollars
Additional Cabinet Cost: 2-Protector Blocks for DS1 Terms	$ 522.00	Dollars

DA Hotel: Vendor A Calculations

Material

DA Hotel

	FRC	Qty	Unit	Qty	Unit	Unit Cost	Amount
Cabinet: DA Overlay	257			3	per Card	$ 2,958.66	$ 8,875.97
Additional Cabinet Cost: Pad Mounting Bracket	257			1	Each	$ 136.00	$ 136.00
Additional Cabinet Cost: 2-Protector Blocks for DS1 Terms	45			1	Each	$ 522.00	$ 522.00
Installation: Generic Remote DSL Pad	4			1	Each	$ 1,952.08	$ 1,952.08
Exempt Material	4	1	Each	39.0461	Each	$ 11.64	$ 454.66
Juicebox Power Pedestal 100-30 Pad	257			1	Each	$ 2,028.35	$ 2,028.35
Remote Ankor Frame for 52E	257			1	Each	$ 147.23	$ 147.23

Total Material Costs $ 14,116.29

Engineering

Engineering Costs Associated with:

	FRC	Qty	Unit	Qty	Unit	Unit Cost	Amount
Cabinet: DA Overlay	257	3	per Card	2.075134168	Hour(s)	$ 53.00	$ 329.95
Installation: Generic Remote DSL Pad	4	1	Each	2	Hour(s)	$ 53.00	$ 106.00
Juicebox Power Pedestal 100-30 Pad	257	1	Each	1	Hour(s)	$ 53.00	$ 53.00
Commercial Power: Electrician Cnct AC to Cab (Cntrctr)	257			1	Each	$ 300.00	$ 300.00
Remote Ankor Frame for 52E	257	1	Each	0	Hour(s)	$ 53.00	$ -

Total Engineering Costs $ 788.95

Splicing

(Cables placed & priced on DA Hotel Cabling tab.)

Splicing Costs Associated with:

	FRC	Qty	Unit	Qty	Unit	Unit Cost	Amount
Cabinet: DA Overlay (splice time)	257	3	per Card	0.034571735	Hour(s)	$ 44.50	$ 4.62
Cabinet: DA Overlay	257	400	Pair	0.0067	Hour(s)	$ 44.50	$ 119.26
Exempt Material	257	400	Pair	0.0067	Each	$ 11.64	$ 31.21
Splice Setup: Site Setup for Splice Activity	45	1	Each	2	Hour(s)	$ 44.50	$ 89.00
Exempt Material	45	1	Each	2	Each	$ 11.64	$ 23.29

Total Splicing Costs $ 267.37

Installation

Costs Associated with:

	FRC	Qty	Unit	Qty	Unit	Unit Cost	Amount
Cabinet: DA Overlay (T&T)	257	3	per Card	0.208	Hour(s)	$ 42.03	$ 26.17
Installation Hourly Costs	257	3	per Card	-	Hour(s)	$ 42.03	$ -
Juicebox Power Pedestal 100-30 Pad (T&T)	257			1.000	Hour(s)	$ 42.03	$ 42.03
Commercial Power: Electrician Cnct AC to Cab (Cntrctr)	257			1.000	Each	$ 1,700.00	$ 1,700.00
Remote Ankor Frame for 52E	257			2.000	Each	$ 42.03	$ 84.06
Placing Cabinet: Less than 1000 Pounds (Cntrctr)	257			1.000	Each	$ 334.65	$ 334.65
Placement: Power Pedestal (Cntrctr)	257			1.000	Each	$ 75.51	$ 75.51

Total Installation Costs $ 2,262.42

Right-Of-Way

Costs Associated with:

	FRC	Qty	Unit	Qty	Unit	Unit Cost	Amount
Right of Way for Privately Owned Locations	45			3.5	Each	$ 1,060.00	$ 3,710.00
Right of Way for Publicly Owned Locations	45			1	Each	$ 106.00	$ 106.00

Total Right-Of-Way Costs $ 3,816.00

Total Cost, DA Hotel: Vendor A **$ 21,251.02**

Collocation: Remote Terminal

DA Hotel: Vendor A

DA Hotel: Vendor A Costs by FRC

FRC		Total
4C	$	2,512.74
45C	$	4,450.29
257	$	14,288.00
	$	21,251.02

Collocation: Remote Terminal

DA Hotel: Vendor B

DA Hotel: Vendor B Calculations

Material	FRC	Qty	Unit	Qty	Unit	Unit Cost	Amount	
DA Hotel								
Large Cabinet Equipped with 12 USAM Shelves	257			1	Each	$ 34,201.84		
Large Cabinet Equipped with 8 USAM Shelves	257			(1)	Each	$ 30,830.07		
Cost per USAM Shelf	257			1			$ 24,086.53	
Placement: Up to 6" Concrete to Forms for Cabinet Base	257			160	Square Feet	$ 16.85	$ 2,695.44	
Juicebox Power Pedestal 100-30 Pad	257			1	Each	$ 2,028.35	$ 2,028.35	
Total Material Costs								$ 28,810.32
Engineering								
Engineering Costs Associated with:								
Large Cabinet Equipped with 12 USAM Shelves	257	1	Each	10	Hour(s)	$ 53.00	$ 530.00	
Juicebox Power Pedestal 100-30 Pad	257	1	Each	1	Hour(s)	$ 53.00	$ 53.00	
Commercial Power: Electrician Cnct AC to Cab (Cntrctr)	257			1	Each	$ 300.00	$ 300.00	
Total Engineering Costs								$ 883.00
Splicing *(Cables placed & priced on DA Hotel Cabling tab.)*								
Splicing Costs Associated with:								
Splicing: Copper Pairs for Buried Cable - Extra Splices	45	1,600	Pair	0.0067	Hour(s)	$ 44.50	$ 477.04	
Exempt Material	45	1,600	Pair	0.0067	Each	$ 11.64	$ 124.82	
Splice Setup: Site Setup for Splice Activity	45	1	Each	2	Hour(s)	$ 44.50	$ 89.00	
Exempt Material	45	1	Each	2	Each	$ 11.64	$ 23.29	
Trip Charge for Qwest to and from Urban Work Location	257	6	Each	1.0000	Hour(s)	$ 44.50	$ 267.00	
Total Splicing Costs								$ 981.15
Installation								
Installation Costs Associated with:								
Large Cabinet Equipped with 12 USAM Shelves {T&T}	257	1	Each	1	Hour(s)	$ 42.03	$ 42.03	
Juicebox Power Pedestal 100-30 Pad {T&T}	257	1	Each	1.0	Hour(s)	$ 42.03	$ 42.03	
Commercial Power: Electrician Cnct AC to Cab (Cntrctr)	257			1	Each	$ 1,700.00	$ 1,700.00	
Placing Cabinet: 1000 Pounds or More	257			1	Each	$ 446.17	$ 446.17	
Placement: Ground Grid	257			1	Each	$ 186.00	$ 186.00	
Placement: Power Pedestal (Cntrctr)	257			1	Each	$ 75.51	$ 75.51	
Total Installation Costs								$ 2,491.74
Right-Of-Way								
Costs Associated with:								
Right of Way for Privately Owned Locations	45			3.5	Each	$ 1,060.00	$ 3,710.00	
Right of Way for Publicly Owned Locations	45			1	Each	$ 106.00	$ 106.00	
Total Right-Of-Way Costs								$ 3,816.00
Total Cost, DA Hotel: Vendor B								**$ 36,982.21**

Collocation: Remote Terminal

DA Hotel: Vendor B

DA Hotel: Vendor B Costs by FRC

FRC		Total
45C	$	4,530.15
257C	$	32,452.06
	$	36,982.21

Collocation: Remote Terminal

WCP Recurring

	Factor Value	Vendor A DA Hotel Investment
257C Investment		$ 15.93
COE Land And Building Investment		
Building	0.040800	0.64975
Land	0.003500	0.05574
Investment With COE Land And Bldg		16.63085
Investment Based Monthly Direct Costs		
Depreciation	0.108162	0.14354
Cost Of Money	0.042094	0.05586
Income Tax Expense	0.017396	0.02309
Maintenance	0.021897	0.02906
Ad Valorem Tax	0.013621	0.01808
Investment Based Monthly Direct Costs		0.26963
COE Land And Building Cost		
COE Building	0.187155	0.01013
COE Land	0.190332	0.00088
COE Land And Building Monthly Costs		0.01102
Total Investment Based Monthly Costs		0.28065
Directly Assigned		
Product Management Expense	0.034281	0.00962
Sales Expense	0.011333	0.00318
Product Advertising Expense	0.000000	0.00000
Business Fees (Other Operating Tax	0.001848	0.00054
Directly Assigned Costs		0.01334
Total Direct Costs		0.29399
Directly Attributed		
Network Operations	0.050289	0.01478
Network Support Assets	0.015375	0.00452
General Support Assets	0.080638	0.02371
General Purpose Computers	0.036437	0.01071
Uncollectible	0.001017	0.00030
Accounting & Finance Expense	0.009035	0.00266
Human Resources Expense	0.008723	0.00256
Information Management Expense	0.061932	0.01821
Intangibles	0.002516	0.00074
Directly Attributed Costs		0.07819
TELRIC		0.37218
Common		
Executive Expense	0.006949	0.00259
Planning Expense	0.000598	0.00022
External Relations Expense	0.009812	0.00365
Legal Expense	0.006427	0.00239
Other Procurement Expense	0.002432	0.00091
Research & Development Expense	0.000037	0.00001
Other General and Admin Expense	0.018952	0.00705
Common Costs		0.01683
TELRIC + Common Costs		0.38901

Collocation: Remote Terminal

WCP Maintenance

	Factor Value	FDI Augment Total	DA Hotel Cabling Total	Vendor A DA Hotel Total	Vendor B DA Hotel Total
Investment		$ 1,436.11	$ 1,644.50	$ 2,464.88	$ 7,633.59
Investment Based Costs					
Maintenance	0.017535	$2.10	$2.40	$3.60	$11.15
Directly Assigned					
Product Management Expense	0.034281	$0.07194	$0.08238	$0.12347	$0.38238
Sales Expense	0.011333	$0.02378	$0.02723	$0.04082	$0.12641
Product Advertising Expense	0.000000	$0.00000	$0.00000	$0.00000	$0.00000
Business Fees (Other Operating Taxe	0.001848	$0.00405	$0.00464	$0.00696	$0.02155
Directly Assigned Costs		$0.09977	$0.11425	$0.17125	$0.53035
Total Direct Costs		$2.19825	$2.51722	$3.77297	$11.68467
Directly Attributed					
Network Operations	0.050289	$0.11055	$0.12659	$0.18974	$0.58761
Network Support Assets	0.015375	$0.03380	$0.03870	$0.05801	$0.17965
General Support Assets	0.080638	$0.17726	$0.20298	$0.30425	$0.94223
General Purpose Computers	0.036437	$0.08010	$0.09172	$0.13748	$0.42575
Uncollectible	0.001017	$0.00224	$0.00256	$0.00384	$0.01188
Accounting & Finance Expense	0.009035	$0.01986	$0.02274	$0.03409	$0.10557
Human Resources Expense	0.008723	$0.01918	$0.02196	$0.03291	$0.10193
Information Management Expense	0.061932	$0.13614	$0.15590	$0.23367	$0.72366
Intangibles	0.002516	$0.00553	$0.00633	$0.00949	$0.02940
Directly Attributed Costs		$0.58465	$0.66948	$1.00347	$3.10768
TELRIC		$2.78290	$3.18670	$4.77644	$14.79235
Common					
Executive Expense	0.006949	$0.01934	$0.02214	$0.03319	$0.10279
Planning Expense	0.000598	$0.00166	$0.00191	$0.00286	$0.00885
External Relations Expense	0.009812	$0.02731	$0.03127	$0.04687	$0.14514
Legal Expense	0.006427	$0.01789	$0.02048	$0.03070	$0.09507
Other Procurement Expense	0.002432	$0.00677	$0.00775	$0.01162	$0.03597
Research & Development Expense	0.000037	$0.00010	$0.00012	$0.00018	$0.00055
Other General and Admin Expense	0.018952	$0.05274	$0.06039	$0.09052	$0.28034
Common Costs		$0.12581	$0.14406	$0.21593	$0.66872
TELRIC + Common Costs		$2.90870	$3.33077	$4.99237	$15.46107

Collocation: Remote Terminal

WCP Non-Recurring

	Factor Value	FDI Augment Expense	DA Hotel Cabling Expense	Vendor A DA Hotel Expense	Vendor B DA Hotel Expense
Expense		$ 1,436.11	$ 1,644.50	$ 2,464.88	$ 7,633.59
Directly Assigned					
Product Management Expense	0.034281	$ 49.23	$ 56.38	$ 84.50	$ 261.69
Sales Expense	0.011333	$ 16.28	$ 18.64	$ 27.93	$ 86.51
Product Advertising Expense	0.000000	$ -	$ -	$ -	$ -
Business Fees (Other Operating Taxe	0.001848	$ 2.77	$ 3.18	$ 4.76	$ 14.75
Directly Assigned Costs		$ 68.28	$ 78.19	$ 117.20	$ 362.95
Total Direct Monthly Costs		$ 1,504.39	$ 1,722.69	$ 2,582.08	$ 7,996.54
Directly Attributed					
Network Operations	0.050289	$ 75.65	$ 86.63	$ 129.85	$ 402.14
Network Support Assets	0.015375	$ 23.13	$ 26.49	$ 39.70	$ 122.95
General Support Assets	0.080638	$ 121.31	$ 138.91	$ 208.21	$ 644.83
General Purpose Computers	0.036437	$ 54.82	$ 62.77	$ 94.08	$ 291.37
Uncollectible	0.001017	$ 1.53	$ 1.75	$ 2.63	$ 8.13
Accounting & Finance Expense	0.009035	$ 13.59	$ 15.56	$ 23.33	$ 72.25
Human Resources Expense	0.008723	$ 13.12	$ 15.03	$ 22.52	$ 69.75
Information Management Expense	0.061932	$ 93.17	$ 106.69	$ 159.91	$ 495.24
Intangibles	0.002516	$ 3.79	$ 4.33	$ 6.50	$ 20.12
State Prescribed Directly Attributed	0.000000	$0.00	$0.00	$0.00	$0.00
Directly Attributed Costs		$ 400.11	$ 458.17	$ 686.73	$ 2,126.78
TELRIC		$ 1,904.51	$ 2,180.86	$ 3,268.81	$ 10,123.32
Common					
Executive Expense	0.006949	$ 13.23	$ 15.15	$ 22.71	$ 70.35
Planning Expense	0.000598	$ 1.14	$ 1.30	$ 1.95	$ 6.05
External Relations Expense	0.009812	$ 18.69	$ 21.40	$ 32.07	$ 99.33
Legal Expense	0.006427	$ 12.24	$ 14.02	$ 21.01	$ 65.06
Other Procurement Expense	0.002432	$ 4.63	$ 5.30	$ 7.95	$ 24.62
Research & Development Expense	0.000037	$ 0.07	$ 0.08	$ 0.12	$ 0.37
Other General and Admin Expense	0.018952	$ 36.09	$ 41.33	$ 61.95	$ 191.86
State Prescribed Common	0.000000	$0.00	$0.00	$0.00	$0.00
Common Costs		$ 86.10	$ 98.59	$ 147.77	$ 457.64
TELRIC + Common Costs		$ 1,990.60	$ 2,279.45	$ 3,416.59	$ 10,580.96

PAGES 23 THRU 25 ARE CONFIDENTIAL

BEFORE THE ARIZONA CORPORATION COMMISSION

EXHIBIT
Admitted
WorldCom 4

WILLIAM A. MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF INVESTIGATION	)	
INTO QWEST CORPORATION'S	)	
COMPLIANCE WITH CERTAIN	)	DOCKET NO. T-00000A-00-0194
WHOLESALE PRICING REQUIREMENTS	)	PHASE II
FOR UNBUNDLED NETWORK ELEMENTS	)	
AND RESALE DISCOUNTS	)	

EXHIBIT OF

MAUREEN ARNOLD

JUNE 27, 2001

		Recurring	Non- Recurring	Witness
6.0 Resale				
6.1 Wholesale Discount Rates				
6.1.1 Basic Exchange Residence	4.19%			Gude
6.1.2 Basic Exchange Business	9.41%			Gude
6.1.3 Toll	23.96%			Gude
6.1.4 Listings, CO Features and Informational Services	41.51%			Gude
6.1.5 Private Line	6.44%			Gude
6.1.6 Packaged/Special Services	10.46%			Gude
6.1.7 Proposed Operator Services/DA	7.00%			Gude
6.2 Customer Transfer Charge (CTC)				
6.2.1 CTC for POTS Service, Mechanized				
First			$0.68	Brotherson
Each Additional			$0.14	Brotherson
6.2.2 CTC for POTS Service, Manual				
First			$16.28	Brotherson
Each Additional			$2.71	Brotherson
6.2.3 CTC for Private Line Transport Service				
First			$41.05	Brotherson
Each Additional			$41.05	Brotherson
6.2.4 CTC for Advanced Communications Services, per circuit			$51.57	Brotherson
7.0 Interconnection				
7.1 Entrance Facilities				
7.1.1 DS1		$86.70	$219.79	Kennedy
7.1.2 DS3		$458.43	$416.07	Kennedy
7.2 LIS EICT				
7.2.1 EICT				
Per DS1		$0.00	$0.00	Kennedy
Per DS3		$0.00	$0.00	Kennedy
	Recurring Fixed	**Recurring Per Mile**	**Nonrecurring**	
7.3 Direct Trunked Transport				
7.3.1 DS1 Over 0 to 8 Miles	$31.14	$1.45		Kennedy
DS1 Over 8 to 25 Miles	$31.40	$1.18		Kennedy
DS1 Over 25 to 50 Miles	$31.87	$2.14		Kennedy
DS1 Over 50 Miles	$31.83	$1.12		Kennedy
7.3.2 DS3 Over 0 to 8 Miles	$197.32	$61.17		Kennedy
DS3 Over 8 to 25 Miles	$200.35	$18.78		Kennedy
DS3 Over 25 to 50 Miles	$184.41	$23.73		Kennedy
DS3 Over 50 Miles	$194.79	$16.34		Kennedy
		Recurring	**Nonrecurring**	
7.4 Multiplexing				
7.4.1 DS3 to DS1		$232.15		Kennedy
DS3 to DS1, Per Subsequent Channel			$268.62	Kennedy
7.5 Trunk Nonrecurring Charges				
7.5.1 DS1 Interface, First Trunk			$355.22	Kennedy
7.5.2 DS1 Interface, Each Additional Trunk			$5.93	Kennedy
7.5.3 DS3 Interface, First Trunk			$362.03	Kennedy
7.5.4 DS3 Interface, Each Additional Trunk			$12.75	Kennedy
7.6 Local Traffic				
7.6.1 End office call termination, per minute of use		$0.002143		Kennedy
7.6.2 Tandem Switched Transport				
7.6.2.1 Tandem Switching, per Minute of Use		$0.001589		Kennedy
	Recurring Fixed	**Recurring Per Mile**	**Nonrecurring**	
7.6.2.2 Tandem Transmission, per Minute of Use, All Mileage Bands				
0 to 8 Miles	$0.000456	$0.0000428		
8 to 25 Miles	$0.000465	$0.0000212		

		Recurring	Non- Recurring	Witness
25 to 508 Miles	$0.000448	$0.0000109		
Over 50 Miles	$0.000433	$0.0000039		
		Recurring	Nonrecurring	
7.7 Miscellaneous Charges				
7.7.1 Cancellation Charge (LIS Trunks)	Qwest's Arizona Switched Access Tariff Section 5.2.3 + LIS NRC			Kennedy
7.7.2 Expedite Charge (LIS Trunks)	Qwest's Arizona Switched Access Tariff Section 5.2.2 + LIS NRC			Kennedy
7.7.3 Construction Charges		ICB	ICB	Kennedy
7.8 Transit Traffic				
7.8.1 Exchange Service (EAS/Local) Transit	See Tandem Switching and Tandem Transmission Rates Above			
	9	Miles		
7.8.2 IntraLATA Toll	Qwest's Arizona Switched Access Tariff			
	9	Miles		
7.8.3 Jointly Provided Switched Access	Qwest's Arizona Switched Access Tariff			
7.8.4 Category 11 Mechanized Record Charge, per Record		$0.001827		Kennedy
8.0 Collocation				
8.1 All Collocation				
8.1.1 Collocation Entrance Facility, per fiber pair				
Standard Shared per Fiber		$16.01	$627.99	Kennedy
Cross Connect per Fiber		$16.17	$735.39	Kennedy
Express per Cable		$276.84	$9,198.71	Kennedy
8.1.2 Cable Splicing				
Fiber - Per set-up			$476.82	Kennedy
Per fiber spliced			$38.12	Kennedy
8.1.3 -48 Volt DC Power Usage, per Ampere, per Month				
Power Plant		$10.94		Kennedy
Power Usage Less Than 60 Amps, per Amp		$3.70		Kennedy
Power Usage More Than 60 Amps, per Amp		$7.41		Kennedy
8.1.4 AC Power Feed (backup)				
8.1.4.1 AC Power Feed – per Amp, per Month				
120 V		$19.03		Kennedy
208 V, Single Phase		$32.98		Kennedy
208 V, Three Phase		$57.06		Kennedy
240 V, Single Phase		$38.06		Kennedy
240 V, Three Phase		$65.84		Kennedy
480 V, Three Phase		$131.68		Kennedy
8.1.4.2 AC Power Cable – per Foot				
20 Amp, Single Phase		$0.0117	$8.02	Kennedy
20 Amp, Three Phase		$0.0145	$9.94	Kennedy
30 Amp, Single Phase		$0.0126	$8.64	Kennedy
30 Amp, Three Phase		$0.0173	$11.87	Kennedy
40 Amp, Single Phase		$0.0149	$10.16	Kennedy
40 Amp, Three Phase		$0.0204	$13.99	Kennedy
50 Amp, Single Phase		$0.0176	$12.06	Kennedy
50 Amp, Three Phase		$0.0246	$16.84	Kennedy
60 Amp, Single Phase		$0.0199	$13.63	Kennedy
60 Amp, Three Phase		$0.0283	$19.38	Kennedy
100 Amp, Single Phase		$0.0247	$16.88	Kennedy
100 Amp, Three Phase		$0.0385	$26.36	Kennedy
8.1.5 Inspector Labor, per half hour				
Regular Hours Rate			$32.03	
After Hours Rate, minimum 3 hours			$41.25	
8.1.6 Collocation Terminations				
8.1.6.1 DS0				
Cable Placement per 100 pair Block		$0.48	$244.42	Kennedy
Cable Placement per Termination		$0.01	$4.59	Kennedy
Cable per 100 Pair Block		$0.62	$314.40	Kennedy

			Recurring	Non- Recurring	Witness
	Cable per Termination		$0.01	$4.31	Kennedy
	Blocks per 100 Pair Block		$1.08	$548.18	Kennedy
	Blocks per Termination		$0.01	$7.51	Kennedy
	Block Placement Per 100 Pair Block		$0.50	$253.50	Kennedy
	Block Placement per Termination		$0.01	$3.47	Kennedy
8.1.6.2	DS1				
	Cable Placement per 28 DS1s		$0.59	$406.52	Kennedy
	Cable Placement per Termination		$0.06	$43.71	Kennedy
	Cable per 28 DS1s		$0.53	$362.96	Kennedy
	Cable per Termination		$0.06	$39.03	Kennedy
	Panel per 28 DS1s		$0.61	$414.16	Kennedy
	Panel per Termination		$0.07	$50.00	Kennedy
	Panel Placement per 28 DS1s		$0.13	$86.74	Kennedy
	Panel Placement per Termination		$0.01	$9.33	Kennedy
8.1.6.3	DS3				
	Cable Placement per Termination		$0.24	$165.51	Kennedy
	Cable per Termination		$0.34	$234.38	Kennedy
	Connector per Termination		$0.35	$241.50	Kennedy
	Connector Placement per Termination		$0.04	$24.92	Kennedy
8.1.7	Security				
	Access Card per Employee		$0.86		Kennedy
	Card Access per employee, per Office		$7.90		Kennedy
	Central Office Security Infrastructure		ICB	ICB	Kennedy
8.1.8	Central Office Clock Synchronization				
	Synchronization -- Composite Clock, per Port		$7.42		Kennedy
8.1.9	Space Availability Report, Per Office			$335.01	Kennedy
8.2 Virtual Collocation					
8.2.1	Quote Preparation Fee			$4,399.84	Kennedy
8.2.2	Maintenance Labor, per half hour				
	Regular Hours Rate			$28.10	Kennedy
	After Hours Rate			$37.60	Kennedy
8.2.3	Training Labor, per half hour				
	Regular Hours Rate			$28.10	Kennedy
8.2.4	Equipment Bay -recurring, per shelf		$3.61		Kennedy
8.2.5	Engineering Labor, per half hour				
	Regular Hours Rate			$32.03	Kennedy
	After Hours Rate			$41.25	Kennedy
8.2.6	Installation Labor, per Half Hour				
	Regular Hours Rate			$30.31	Kennedy
	After Hours Rate			$39.13	Kennedy
8.2.7	Floor Space Lease, per Square Foot		$3.69		Kennedy
8.2.8	-48 Volt DC Power Cables				
	20A Power Feed, Per Feed		$8.11	$5,552.65	Kennedy
	30A Power Feed, Per Feed		$9.27	$6,343.97	Kennedy
	40A Power Feed, Per Feed		$11.31	$7,739.80	Kennedy
	60A Power Feed, Per Feed		$14.11	$9,655.97	Kennedy
8.3 Cageless Physical Collocation					
8.3.1	Quote Preaparation Fee			$4,399.84	Kennedy
8.3.2	Space Construction				
	Bays and 1 - 40A Power Feed - 90 Day		$43.77	$29,953.55	Kennedy
	Adjustment for 20A Initial Power Feed		($3.20)	($2,187.15)	Kennedy
	Adjustment for 30A Initial Power Feed		($2.04)	($1,395.83)	Kennedy
	Adjustment for 60A Initial Power Feed		$2.80	$1,916.17	Kennedy

			Recurring	Non- Recurring	Witness
	Adjustment for Each Additional Bay		$4.44	$3,038.06	Kennedy
	Each Additional 20A Power Feed		$8.11	$5,552.65	Kennedy
	Each Additional 30A Power Feed		$9.27	$6,343.97	Kennedy
	Each Additional 40A Power Feed		$11.31	$7.739.80	Kennedy
	Each Additional 60A Power Feed		$14.11	$9,655.97	Kennedy
8.3.3	Floor Space Lease, per Square Foot		$3.69		Kennedy
8.4	**Caged Physical Collocation**				
8.4.1	Quote Preparation Fee			$4,783.90	Kennedy
8.4.2	Space Construction				
	Cage- Up to 100 Sq. Ft and 1 - 60A Power Feed		$75.84	$51,901.16	Kennedy
	Cage - 101- 200 Sq. Ft and 1 - 60A Power Feed		$78.70	$53.858.34	Kennedy
	Cage- 201- 300 Sq. Ft. and 1 - 60A Power Feed		$80.92	$55,380.28	Kennedy
	Cage- 301- 400 Sq. Ft. and 1- 60A Power Feed		$83.71	$57,287.56	Kennedy
	Adjustment for 20A Initial Power Feed		($12.39)	($8,481.43)	Kennedy
	Adjustment for 30A Initial Power Feed		($11.28)	($7,721.61)	Kennedy
	Adjustment for 40A Initial Power Feed		($8.96)	($6,133.10)	Kennedy
	Adjustment for 100A Initial Power Feed		$13.72	$9,389.08	Kennedy
	Adjustment for 200A Initial Power Feed		$43.80	$29,974.50	Kennedy
	Adjustment for 300A Initial Power Feed		$80.36	$54,995.90	Kennedy
	Adjustment for 400A Initial Power Feed		$123.60	$84,587.92	Kennedy
	Each Additional 20A Power Feed		$10.24	$7,004.36	Kennedy
	Each Additional 30A Power Feed		$11.35	$7,764.18	Kennedy
	Each Additional 40A Power Feed		$13.67	$9,352.68	Kennedy
	Each Additional 60A Power Feed		$22.63	$15,485.78	Kennedy
	Each Additional 100A Power Feed		$36.35	$24,874.87	Kennedy
	Each Additional 200A Power Feed		$66.43	$45,460.29	Kennedy
	Each Additional 300A Power Feed		$102.99	$70,481.68	Kennedy
	Each Additional 400A Power Feed		$146.23	$100,073.71	Kennedy
8.4.3	Floor Space Lease, per Square Foot		$3.69		Kennedy
8.4.4	Grounding				
	2/0 AWG - per foot		$0.02	$12.65	Kennedy
	1/0 AWG - per foot		$0.03	$21.05	Kennedy
	4/0 AWG - per foot		$0.03	$23.92	Kennedy
	350 kcmil - per foot		$0.05	$33.18	Kennedy
	500 kcmil - per foot		$0.05	$36.97	Kennedy
	750 kcmil – per foot		$0.08	$56.65	Kennedy
8.5	**CLEC to CLEC**				
8.5.1	Flat Charge (Design Engineering & Installation – No			$791.63	Kennedy
8.5.2	Cable Racking, Per Foot				
	DS0		$0.17261		Kennedy
	DS1		$0.18290		Kennedy
	DS3		$0.15906		Kennedy
8.5.3	Virtual Connections (Connections only No cables)				
	DS0 (Per 100 Connections)			$224.01	Kennedy
	DS1 (Per 28 Connections)			$102.17	Kennedy
	DS3 (Per 1 Connection)			$8.84	Kennedy
8.5.4	Cable Hole (if Applicable)			$442.49	Kennedy
8.5.5	CLEC to CLEC Cross Connection			$256.37	Kennedy
8.6	**ICDF Collocation**			ICB	Kennedy
8.7	**Adjacent and Adjacent Remote Collocation**			ICB	Kennedy
8.8	**Remote Collocation**		Under Development		Kennedy
8.9	**Space Optioning**		Under Development		Kennedy

		Recurring	Non- Recurring	Witness
9.0 Unbundled Network Elements (UNEs)				
9.1 Interconnection Tie Pairs (ITP) – Per Termination				
DS0		$0.48		Kennedy
DS1		$1.52		Kennedy
DS3		$15.33		Kennedy
9.2 Unbundled Loops				
9.2.1 Analog Loops				
9.2.1.1 2-Wire Voice Grade	See Installation options, Section 9.2.4			
Zone 1		$16.89		Kennedy
Zone 2		$22.57		Kennedy
Zone 3		$34.34		Kennedy
9.2.1.1.1 Unbundled Loop Grooming (2-wire)		$1.59		Kennedy
9.2.1.2 4-Wire Voice Grade	See Installation options, Section 9.2.4			
Zone 1		$33.76		Kennedy
Zone 2		$45.12		Kennedy
Zone 3		$68.66		Kennedy
9.2.1.2.1 Unbundled Loop Grooming (4-wire)		$3.64		Kennedy
9.2.2 Non-loaded Loops				
9.2.2.1 2-wire Non-loaded Loop	See Installation options, Sections 9.2.4 and See also Section 9.2.2.3			
Zone 1		$16.89		Kennedy
Zone 2		$22.57		Kennedy
Zone 3		$34.34		Kennedy
9.2.2.2 4-wire Non-loaded Loop	See Installation options, Sections 9.2.4 and See also Section 9.2.2.3			
Zone 1		$33.76		Kennedy
Zone 2		$45.12		Kennedy
Zone 3		$68.66		Kennedy
9.2.2.3 Cable Unloading/Bridge Tap Removal			$652.83	Kennedy
9.2.3 Digital Capable Loops				
9.2.3.1 Basic Rate ISDN / xDSL -I Capable / ADSL Compatible Loops	See Installation options, Sections 9.2.4 and See also Section 9.2.2.3			
Zone 1		$16.89		Kennedy
Zone 2		$22.57		Kennedy
Zone 3		$34.34		Kennedy
9.2.3.2 DS1 Capable Loop	See Installation options, Sections 9.2.5			
Zone 1		$84.48		Kennedy
Zone 2		$84.57		Kennedy
Zone 3		$91.39		Kennedy
9.2.3.3 DS3 Capable Loop	See Installation options, Sections 9.2.6			
Zone 1		$897.72		Kennedy
Zone 2		$899.73		Kennedy
Zone 3		$1,053.66		Kennedy
9.2.3.4 2-Wire Extension Technology		$4.13		Kennedy
9.2.3.4.1 Unbundled Loop Grooming- 2-wire Extension Technology		$1.60		Kennedy
9.2.4 Loop Installation Charges for 2 and 4 wire analog, 2 and 4 wire non-loaded, ADSL Compatible, ISDN BRI Capable and xDSL - I Capable Loops where conditioning is not required.	See related monthly recurring charges in Sections 9.2.1 – 9.2.3 above. (If conditioning is required, charges may apply as specified in Section 9.2.2.3 above).			
9.2.4.1 Basic Installation				
First			$88.29	Kennedy
Each Additional			$76.07	Kennedy

		Recurring	Non- Recurring	Witness
9.2.4.2 Basic Installation with Performance Testing				
First Loop			$192.29	Kennedy
Each Additional			$137.97	Kennedy
9.2.4.3 Coordinated Installation with Cooperative Testing				
First Loop			$232.25	Kennedy
Each Additional			$137.97	Kennedy
9.2.4.4 Coordinated Installation without Cooperative Testing				
First Loop			$95.38	Kennedy
Each Additional			$83.16	Kennedy
9.2.4.5 Basic Install with Cooperative Testing				
First Loop			$192.29	Kennedy
Each Additional			$137.97	Kennedy
9.2.5 DS1 Loop Installation Charges	See related monthly recurring charges in Sections 9.2.1 – 9.2.3 above.			
9.2.5.1 Basic Installation				
First Loop			$144.15	Kennedy
Each Additional			$110.79	Kennedy
9.2.5.2 Basic Installation with Performance Testing				
First Loop			$278.18	Kennedy
Each Additional			$203.72	Kennedy
9.2.5.3 Coordinated Installation with Cooperative				
First Loop			$318.14	Kennedy
Each Additional			$203.72	Kennedy
9.2.5.4 Coordinated Installation without Cooperative Testing				
First Loop			$153.26	Kennedy
Each Additional			$119.90	Kennedy
9.2.5.5 Basic Install With Cooperative Testing				
First Loop			$278.18	Kennedy
Each Additional			$203.72	Kennedy
9.2.6 DS3 Loop Installation Charges	See related monthly recurring charges in Sections 9.2.1 – 9.2.3 above.			
9.2.6.1 Basic Installation				
First Loop			$144.15	Kennedy
Each Additional			$110.79	Kennedy
9.2.6.2 Basic Installation with Performance Testing				
First Loop			$278.18	Kennedy
Each Additional			$203.72	Kennedy
9.2.6.3 Coordinated Installation with Cooperative				
First Loop			$318.14	Kennedy
Each Additional			$203.72	Kennedy
9.2.6.4 Coordinated Installation without Cooperative Testing				
First Loop			$153.26	Kennedy
Each Additional			$119.90	Kennedy
9.2.6.5 Basic Install With Cooperative Testing				
First Loop			$278.18	Kennedy
Each Additional			$203.72	Kennedy
9.3 Subloop				
9.3.1 2-Wire Analog & Non Loaded Distribution Loop			$121.43	Kennedy
Zone 1		$12.12		Kennedy

			Recurring	Non- Recurring	Witness
	Zone 2		$17.33		Kennedy
	Zone 3		$29.72		Kennedy
					Kennedy
9.3.2	Each Addl 2 -Wire Analog & Non Loaded Distribution Loop			$55.50	Kennedy
9.3.3	Intrabuilding Cable Loop, Per Pair		$1.19		Kennedy
9.3.4	DS1 Capable Feeder Loop				
	First Loop			$293.36	Kennedy
	Each Additional			$219.50	Kennedy
	Zone 1		$72.62		Kennedy
	Zone 2		$72.71		Kennedy
	Zone 3		$79.53		Kennedy
9.3.5	Field Connection Point				
	Feasibility Fee/Quote Preparation Fee			$1,638.81	Kennedy
	Construction Fee			ICB	Kennedy
9.4 Line Sharing					
9.4.1	Shared Loop, per Loop		$5.00	$37.71	Brohl
9.4.2	OSS - Per Line - Per Month		$2.68		Albersheim
9.4.3	Reclassification Charge			ICB	Brohl
9.4.4	Splitter Shelf Charge		$4.77	$537.89	Brohl
9.4.5	Splitter TIE Cable Connections				
	Splitter in the Common Area--Data to 410 block		$5.82	$3,189.86	Brohl
	Splitter in the Common Area—Data direct to CLEC		$6.11	$3,347.79	Brohl
	Splitter on the IDF—Data to 410 block		$1.85	$1,015.26	Brohl
	Splitter on the IDF—Data direct to CLEC		$3.47	$1,900.90	Brohl
	Splitter on the MDF—Data to 410 block		$1.91	$1,044.37	Brohl
	Splitter on the MDF—Data direct to CLEC		$4.09	$2,242.86	Brohl
9.4.6	Engineering			$1,280.21	Brohl
9.5 Network Interface Device (NID)			$1.39	$68.79	Kennedy
		Recurring Fixed	**Recurring Per Mile**	**Nonrecurring**	
9.6 Unbundled Dedicated Interoffice Transport (UDIT)					
9.6.1	DS0 UDIT			$307.95	Kennedy
	DS0 Over 0 to 8 Miles	$19.27	$0.13		Kennedy
	DS0 Over 8 to 25 Miles	$19.29	$0.12		Kennedy
	DS0 Over 25 to 50 Miles	$19.33	$0.12		Kennedy
	DS0 Over 50 Miles	$19.28	$0.06		Kennedy
9.6.2	DS1 UDIT			$352.92	Kennedy
	DS1 Over 0 to 8 Miles	$31.14	$1.45		Kennedy
	DS1 Over 8 to 25 Miles	$31.40	$1.18		Kennedy
	DS1 Over 25 to 50 Miles	$31.87	$2.14		Kennedy
	DS1 Over 50 Miles	$31.83	$1.12		Kennedy
9.6.3	DS3 UDIT			$352.92	Kennedy
	DS3 Over 0 to 8 Miles	$197.32	$61.17		Kennedy
	DS3 Over 8 to 25 Miles	$200.35	$18.78		Kennedy
	DS3 Over 25 to 50 Miles	$184.41	$23.73		Kennedy
	DS3 Over 50 Miles	$194.79	$16.34		Kennedy
9.6.4	OC-3 UDIT			$352.92	Kennedy
	OC-3 Over 0 to 8 Miles	$655.37	$205.64		Kennedy
	OC-3 Over 8 to 25 Miles	$660.44	$66.12		Kennedy
	OC-3 Over 25 to 50 Miles	$633.02	$86.07		Kennedy
	OC-3 Over 50 Miles	$650.60	$60.95		Kennedy
9.6.5	OC-12 UDIT			$352.92	Kennedy
	OC-12 Over 0 to 8 Miles	$1,837.87	$97.75		Kennedy
	OC-12 Over 8 to 25 Miles	$1,837.87	$94.58		Kennedy
	OC-12 Over 25 to 50 Miles	$1,837.87	$106.76		Kennedy
	OC-12 Over 50 Miles	$1,837.87	$122.10		Kennedy

		Recurring	Non- Recurring	Witness
		Recurring	Nonrecurring	
9.6.6 DS0 UDIT Low Side Performance		$11.52		Kennedy
9.6.7 Multiplexing				
DS3 to DS1		$232.15	$2,569.47	Kennedy
DS1 to DS0, High Side		$210.68	$273.68	Kennedy
DS1 to DS0, Low Side		$7.35	$239.83	Kennedy
9.6.8 Extended Unbundled Dedicated Interoffice Transport				
DS1 E-UDIT		$55.78	$411.42	Kennedy
DS3 E-UDIT		$317.26	$411.42	Kennedy
OC-3 E-UDIT		$692.68	$411.42	Kennedy
OC-12 E-UDIT		$1,301.75	$411.42	Kennedy
9.6.9 UDIT Rearrangement				
DS0 Single Office			$219.07	Kennedy
DS0 Dual Office			$176.26	Kennedy
High Capacity Single Office			$266.02	Kennedy
High Capacity Dual Office			$238.39	Kennedy
9.7 Unbundled Dark Fiber (UDF)				
9.7.1 Single Strand Increments		Under Development		
9.7.2 Initial Records Inquiry (IRI)				
Simple			$159.49	Kennedy
Complex			$203.37	Kennedy
9.7.3 Field Verification and Quote Preparation (FVQP)			$1,485.33	
				Kennedy
9.7.4 Field Verification		Under Development		Kennedy
9.7.5 UDF-IOF Charges				
Order Charge per 1st Pair or Strand/Route/Order			$563.63	Kennedy
Order Charge ea. Addl. Pair or Strand /Same Route			$271.89	Kennedy
Termination, Fixed Per Pair./Office		$6.77		Kennedy
Fiber Transport, per Mile / Pair		$83.07		Kennedy
Fiber Cross-Connect Per Pair		$4.03	$21.56	Kennedy
9.7.6 UDF-Loop Charges				
Order Charge per 1st Pair or Strand /Route/Order			$563.63	Kennedy
Order Charge each. Addl. Pair or Strand/Same Route			$271.89	Kennedy
Termination, Fixed Per Pair/Office		$7.01		Kennedy
Termination, Fixed Per Pair/Prem		$6.42		Kennedy
Fiber Loop, per Route/Per Pair		$110.86		Kennedy
Fiber Cross-Connect Per Pair		$4.03	$21.56	Kennedy
9.7.7 Extended Unbundled Dark Fiber (E-UDF)				
Order Charge per 1st Pair or Strand /Route/Order			$563.63	Kennedy
Order Charge each. Addl. Pair or Strand/Same Route			$271.89	Kennedy
Termination, Fixed Per Pair/Office		$7.01		Kennedy
Termination, Fixed Per Pair/Prem		$6.42		Kennedy
Fiber Transport, per Route/Per Pair		$110.86		Kennedy
Fiber Cross-Connect Per Pair		$4.03	$21.56	Kennedy
9.8 Shared Transport, per minute of use		$0.0015190		Brohl
9.9 Unbundled Customer Controlled Rearrangement Element (UCCRE)				
9.9.1 DS1 Port		ICB	ICB	Brohl
9.9.2 DS3 Port		ICB	ICB	Brohl
9.9.3 Dial Up Access		ICB		Brohl
9.9.4 Attendant Access		ICB		Brohl
9.9.5 Virtual Ports			ICB	Brohl
9.10 Local Tandem Switching				
9.10.1 DS1 Local Message Trunk Port - Per Order		$56.98	$220.95	Brohl
9.10.2 DS1 Trunk Group – First Trunk - Per Order			$211.06	Brohl

		Recurring	Non- Recurring	Witness
9.10.3 DS1 Trunk Group – Each Additional Trunk - Per Order			$24.29	Brohl
9.10.4 Per Minute of Use		$0.002376		Brohl
9.11 Local Switching				
9.11.1 Analog Line Side Port, First Port		$1.28	$145.57	Brohl
9.11.2 Analog Line Side Port, Each Additional		$1.28	$95.75	Brohl
9.11.3 Local Usage, Per Minute of Use		$0.002599		Brohl
9.11.4 Vertical Features				
10XXX Direct Dialed Blocking		$0.08		Brohl
Account Codes - per system		$7.27	$80.01	Brohl
Attendant Access Line - per station line		$0.08	$1.16	Brohl
Audible Message Waiting		$0.13	$1.01	Brohl
Authorization Codes - per system		$3.13	$239.29	Brohl
Auto Callback		$0.08		Brohl
Automatic Line		$0.07	$0.34	Brohl
Automatic Route Selection - Common Equip. per system		$2.12	$2,099.56	Brohl
Blocking of pay per call services		$0.10		Brohl
Bridging		$0.08		Brohl
Call Drop		$0.07	$0.34	Brohl
Call Exclusion - Automatic		$0.07	$1.01	Brohl
Call Exclusion - Manual		$0.07	$0.67	Brohl
Call Forward Don't Answer - All Calls		$0.13		Brohl
Call Forwarding Incoming Only		$0.08		Brohl
Call Forwarding Intra Group Only		$0.08		Brohl
Call Forwarding Variable Remote		$0.11		Brohl
Call Forwarding: Busy Line (Expanded)		$0.09		Brohl
Call Forwarding: Busy Line (External)		$0.09		Brohl
Call Forwarding: Busy Line (External) Don't Answer		$0.15		Brohl
Call Forwarding: Busy Line (Overflow)		$0.09		Brohl
Call Forwarding: Busy Line (Overflow) Don't Answer		$0.15		Brohl
Call Forwarding: Busy Line (Programmable)		$0.10		Brohl
Call Forwarding: Busy Line/Don't Answer Programmable Svc. Establishment			$15.66	Brohl
CF DON'T ANSWER/CF BUSY CUSTOMER PROGRAMMABLE - PER LINE			$1.01	Brohl
Call Forwarding: Busy Line/Don't Answer (Expanded)		$0.15	$37.92	Brohl
Call Forwarding: Don't Answer		$0.13	$37.92	Brohl
Call Forwarding: Don't Answer (Expanded)		$0.13		Brohl
Call Forwarding: Don't Answer (Programmable)		$0.13		Brohl
Call Forwarding: Variable		$0.10		Brohl
Call Forwarding: Variable - no call complete option		$0.10		Brohl
Call Hold		$0.08		Brohl
Call Hold/3-Way/Call Transfer		$0.32		Brohl
Call Park (Basic - Store & Retrieve)		$0.09		Brohl
Call Pickup		$0.08		Brohl
Call Transfer		$0.32		Brohl
Call Waiting Dial Originating		$0.08		Brohl
Call Waiting Indication - per timing state		$0.46	$1.01	Brohl
Call Waiting Originating		$0.09		Brohl
Call Waiting Terminating - All Calls		$0.11		Brohl
Call Waiting Terminating - Incoming Only		$0.11		Brohl
Call Waiting/ Cancel Call Waiting		$0.14		Brohl
CENTREX COMMON EQUIPMENT			$1,206.23	Brohl
Centrex Management System (CMS)		$0.60		Brohl
Centrex Plus DID numbers per number		$0.11		Brohl
Centrex Plus to Centrex Plus		$5.28		Brohl
Centrex Plus to IC Carrier		$5.28		Brohl
Centrex Plus to PBX/Key Blocked		$5.28		Brohl
Centrex Plus to PBX/Key Non-Blocked		$5.28		Brohl
CFBL - All Calls		$0.09		Brohl
CFBL - Incoming Only		$0.09	$37.92	Brohl
CFDA Incoming Only		$0.08	$37.92	Brohl
CLASS - Anonymous Call Rejection		$0.33		Brohl
CLASS - Call Trace		$2.39		Brohl

		Recurring	Non- Recurring	Witness
CLASS - Call Waiting ID		$0.10		Brohl
CLASS - Calling Name & Number		$0.41		Brohl
CLASS - Calling Number Delivery		$0.10		Brohl
CLASS - Calling Number Delivery - Blocking		$0.34		Brohl
CLASS - Continuous Redial		$0.23	$1.26	Brohl
CLASS - Last Call Return		$0.10	$1.27	Brohl
CLASS - Priority Calling		$0.19	$1.20	Brohl
CLASS - Selective Call Forwarding		$0.16	$1.26	Brohl
CLASS - Selective Call Rejection		$0.23	$1.20	Brohl
Common Equipment per 1.544 Mbps facility (DS1)		$58.01		Brohl
Conference Calling - Meet Me		$14.03	$42.47	Brohl
Conference Calling - Preset		$10.27	$42.47	Brohl
Custom Ringing First Line (Short/Long/Short)		$0.09		Brohl
Custom Ringing First Line (Short/Short)		$0.09		Brohl
Custom Ringing First Line (Short/Short/Long)		$0.09		Brohl
Custom Ringing Second Line (Short/Long/Short)		$0.09		Brohl
Custom Ringing Second Line (Short/Short)		$0.09		Brohl
Custom Ringing Second Line (Short/Short/Long)		$0.09		Brohl
Custom Ringing Third Line (Short/Long/Short)		$0.08		Brohl
Custom Ringing Third Line (Short/Short)		$0.08		Brohl
Custom Ringing Third Line (Short/Short/Long)		$0.08		Brohl
Data Call Protection (DMS 100)		$0.07		Brohl
Dir Sta Sel/Busy Lamp Fld per arrangement		$1.76	$0.34	Brohl
Directed Call Pickup with Barge-in		$0.18	$20.16	Brohl
Directed Call Pickup without Barge-in		$0.10	$20.16	Brohl
Distinctive Ring/Distinctive Call Waiting		$0.09	$40.31	Brohl
Distinctive Ringing		$0.09		Brohl
EBS - Set Interface - per station line		$1.39		Brohl
Executive Busy Override		$0.08		Brohl
Expensive Route Warning Tone- per system		$0.07	$71.91	Brohl
Facility Restriction Level - per system		$0.07	$44.24	Brohl
Feature Display		$0.08		Brohl
Group Intercom		$0.15	$0.46	Brohl
Hot Line - per line		$0.13	$1.01	Brohl
Hunting: Multiposition Circular Hunting		$0.26		Brohl
Hunting: Multiposition Hunt Queuing		$0.22	$38.59	Brohl
Hunting: Multiposition Series Hunting		$0.26		Brohl
Hunting: Multiposition with Announcement in Queue		$3.08	$38.59	Brohl
Hunting: Multiposition with Music in Queue		$1.10	$40.75	Brohl
Incoming Calls Barred		$0.08		Brohl
International Direct Dial Blocking		$0.08		Brohl
ISDN Short Hunt		$0.56	$1.70	Brohl
Line Side Answer Supervision		$0.09		Brohl
Loudspeaker Paging - per trunk group		$21.11	$176.53	Brohl
Make Busy Arrangements - per group		$0.35	$0.67	Brohl
Make Busy Arrangements - per line		$0.14	$0.67	Brohl
Message Center - per main station line		$0.07	$0.34	Brohl
Message Waiting Indication Audible/Visual		$0.13		Brohl
Message Waiting Visual		$0.13	$0.34	Brohl
Music On Hold - per system		$21.99	$23.13	Brohl
Network Speed Call		$0.08		Brohl
Night Service Arrangement		$0.08		Brohl
Outgoing Calls Barred		$0.08		Brohl
Outgoing Trunk Queuing		$0.13		Brohl
Privacy Release		$0.08	$0.47	Brohl
Query Time		$0.24	$0.34	Brohl
Speed Calling 1 Digit Controller		$0.08		Brohl
Speed Calling 1 Digit User		$0.08		Brohl
Speed Calling 1# List Individual		$0.08		Brohl
Speed Calling 2 Digit Controller		$0.08		Brohl
Speed Calling 2 Digit User		$0.08		Brohl
Speed Calling 2# List Individual		$0.08		Brohl
Speed Calling 30 Number		$0.08		Brohl
Speed Calling 8 Number		$0.08		Brohl
Station Camp-On Service - per main station		$8.18	$0.34	Brohl
Station Dial Conferencing (6 Way)		$1.64		Brohl
Station Message Detail Recording (SMDR)		$0.18		Brohl
Three Way Calling		$0.32		Brohl

		Recurring	Non- Recurring	Witness
Time and Date Display		$0.18		Brohl
Time of Day Control for ARS - per system		$0.07	$125.82	Brohl
Time of Day NCOS Update		$0.08	$0.54	Brohl
Time of Day Routing - per line		$0.13	$0.52	Brohl
Toll Restriction Service		$0.08		Brohl
Trunk Answer Any Station		$0.08		Brohl
Trunk Verification from Designated Station		$0.07	$0.39	Brohl
UCD in hunt group - per line		$7.92	$0.67	Brohl
UCD with Music After Delay		$5.24		Brohl
CMS - SYSTEM ESTABLISHMENT - INITIAL INSTALLATION			$971.60	Brohl
CMS - SYSTEM ESTABLISHMENT - SUBSEQUENT INSTALLATION			$485.80	Brohl
CMS - PACKET CONTROL CAPABILITY, PER SYSTEM			$485.80	Brohl
SMDR-P - SERVICE ESTABLISHMENT CHARGE, INITIAL INSTALLATION			$339.30	Brohl
SMDR-P - ARCHIVED DATA			$177.29	Brohl
9.11.5 Subsequent Order Charge			$13.57	Brohl
9.11.6 Digital Line Side Port (Supporting BRI ISDN)				
First Port		$10.56	$219.37	Brohl
Each Additional Port		$10.56	$219.37	Brohl
9.11.7 Digital Trunk Ports				
DS1 Local Message Trunk Port		$56.98		Brohl
Message Trunk Group, First Trunk			$209.14	Brohl
Message Trunk Group, Each Additional			$50.84	Brohl
DS1 PRI ISDN Trunk Port		$228.78	$648.55	Brohl
DS1 / DID Trunk Port		$3.38	$212.74	Brohl
9.11.8 DS0 Analog Trunk Port				
First Port		$15.78	$123.11	Brohl
Each Additional		$15.78	$28.57	Brohl
9.12 Customized Routing				
9.12.1 Development of Custom Line Class Code – Directory Assistance or Operator Services Routing Only			ICB	Brohl
9.12.2 Installation Charge, per Switch Directory Assistance or Operator Service Routing Only			ICB	Brohl
9.12.3 All Other Custom Routing		ICB	ICB	Brohl
9.13 Common Channel Signaling/SS7				
9.13.1 CCSAC STP Port		$249.69	$440.28	Brohl
9.13.2 CCSAC Options Activation Charge				
9.13.2.1 Basic Translations				
First Activation, per Order			$115.34	Brohl
Each Additional Activation, per Order			$9.58	Brohl
9.13.2.2 CCSAC Options Database Translations				
First Activation per Order			$134.49	Brohl
Each additional Activation per Order			$57.45	Brohl
9.13.3 Signal Formulation, ISUP, Per Call Set-Up Request		$0.0020272		Brohl
9.13.4 Signal Transport, ISUP, Per Call Set-Up Request		$0.0013148		Brohl
9.13.5 Signal Transport, TCAP, per Data Request		$0.0002914		Brohl
9.13.6 Signal Switching, ISUP, Per Call Set-Up Request		$0.0009192		Brohl
9.13.7 Signal Switching, TCAP, Per Data Request		$0.0005754		Brohl
9.14 Advanced Intelligent Network (AIN)				
9.14.1 AIN Customized Services (ACS)			ICB	Brohl
9.14.2 AIN Platform Access (APA)		ICB	ICB	Brohl
9.14.3 AIN Query Processing, per Query		ICB		Brohl
9.15 Line Information Database (LIDB)				
9.15.1 LIDB Storage			No Charge	Brohl
9.15.2 Line Validation Administration System Access (LVAS)			ICB	Brohl

		Recurring	Non- Recurring	Witness
9.15.2.1 LIDB Line Record Initial Load				
9.15.2.1.1 Up to 20,000 Line Records			$2,601.00	Brohl
9.15.2.1.2 Over 20,000 Line Records			ICB	Brohl
9.15.2.2 Mechanized Service Account Update, per Addition or Update Processed			ICB	Brohl
9.15.2.3 Individual Line Record Audit			ICB	Brohl
9.15.2.4 Account Group Audit			ICB	Brohl
9.15.2.5 Expedited Request Charge for Manual Updates			ICB	Brohl
9.15.3 LIDB Query Service, per Query		$0.0009435	See 9.13.2.2	Brohl
9.15.4 Fraud Alert Notification, per Alert		No Charge		Brohl
9.16 8XX Database Query Service				
9.16.1 Basic Query, per Query		$0.02007675	See 9.13.2.2	Brohl
9.16.2 POTS Translation		$0.00000165		Brohl
9.16.3 Call Handling & Destination Feature		$0.00000055		Brohl
9.17 ICNAM, Per Query		$0.000836	See 9.13.2.2	Brohl
9.18 Construction Charges		ICB	ICB	Kennedy
9.19 Miscellaneous Charges				
*** Per 1/2 hour or fraction thereof**				
* Additional Engineering – Basic			$31.84	Kennedy
* Additional Engineering – Overtime			$39.38	Kennedy
* Additional Labor Installation – Overtime			$9.05	Kennedy
* Additional Labor Installation – Premium			$18.10	Kennedy
* Additional Labor Other – Basic			$27.75	Kennedy
* Additional Labor Other – Overtime			$37.06	Kennedy
* Additional Labor Other – Premium			$46.39	Kennedy
* Testing and Maintenance – Basic			$29.48	Kennedy
* Testing and Maintenance – Overtime			$39.38	Kennedy
* Testing and Maintenance – Premium			$49.28	Kennedy
* Maintenance of Service – Basic			$27.75	Kennedy
* Maintenance of Service – Overtime			$37.06	Kennedy
* Maintenance of Service – Premium			$46.39	Kennedy
* Additional COOP Acceptance Testing – Basic			$29.48	Kennedy
* Additional COOP Acceptance Testing – Overtime			$39.38	Kennedy
* Additional COOP Acceptance Testing – Premium			$49.28	Kennedy
* NonScheduled COOP Testing - Basic			$29.48	Kennedy
* NonScheduled COOP Testing – Overtime			$39.38	Kennedy
* NonScheduled COOP Testing – Premium			$49.28	Kennedy
* NonScheduled Manual Testing – Basic			$29.48	Kennedy
* NonScheduled Manual Testing – Overtime			$39.38	Kennedy
* NonScheduled Manual Testing – Premium			$49.28	Kennedy
* Cooperative Scheduled Testing - Loss			$0.08	Kennedy
* Cooperative Scheduled Testing - C Message Noise			$0.08	Kennedy
* Cooperative Scheduled Testing - Balance			$0.33	Kennedy
* Cooperative Scheduled Testing - Gain Slope			$0.08	Kennedy
* Cooperative Scheduled Testing - C Notched Noise			$0.08	Kennedy
* Manual Scheduled Testing - Loss			$0.17	Kennedy
* Manual Scheduled Testing -C- Message Noise			$0.17	Kennedy
* Manual Scheduled Testing - Balance			$0.67	Kennedy
* Manual Scheduled Testing - Gain Slope			$0.17	Kennedy
* Manual Scheduled Testing - C Notched Noise			$0.17	Kennedy
Additional Dispatch			$84.60	Kennedy
Date Change			$10.40	Kennedy
Design Change			$74.10	Kennedy
Expedite Charge			ICB	Kennedy
Cancellation Charge			ICB	Kennedy
9.20 Channel Regeneration				
DS1 Regeneration		$1.97	$480.53	Kennedy
DS3 Regeneration		$6.09	$1,817.89	Kennedy
9.21 Reserved for future use.				
9.22 Reserved for future use.				

		Recurring	Non- Recurring	Witness
9.23 UNE Combinations				
9.23.1 UNE-P Conversion Non-Recurring Charges				
9.23.1.1 UNE-P POTS, CENTREX, PAL, PBX,				
First			$0.68	Brohl
Each Additional			$0.14	Brohl
9.23.1.2 UNE-P POTS, CENTREX, PAL, PBX, Manual				
First			$16.28	Brohl
Each Additional			$2.71	Brohl
9.23.1.3 UNE-P PBX DID				
First			$20.70	Brohl
Each Additional			$3.13	Brohl
9.23.1.4 UNE-P ISDN BRI				
First			$15.15	Brohl
Each Additional			$3.13	Brohl
9.23.1.5 UNE-P ISDN PRI, DSS per DS1 Facility			$51.22	Brohl
9.23.1.6 UNE-P ISDN PRI, DSS Trunk				
First			$18.85	Brohl
Each Additional			$3.13	Brohl
9.23.2 UNE-P New Connection Non-Recurring Charges				
9.23.2.1 UNE-P POTS Mechanized				
First			$55.56	Brohl
Each Additional			$15.94	Brohl
9.23.2.2 UNE-P POTS Manual				
First			$82.49	Brohl
Each Additional			$18.52	Brohl
9.23.3 UNE-Combination Private Line				
DS0/DS1/DS3/OCN/Integrated T-1 Existing Service			$41.05	Kennedy
9.23.4 Enhanced Extended Loop (EEL)				
9.23.4.1 EEL Link				
DS0			$250.19	Kennedy
Zone 1		$18.96		Kennedy
Zone 2		$34.94		Kennedy
Zone 3		$56.53		Kennedy
Each Additional			$218.81	Kennedy
DS1			$308.19	Kennedy
Zone 1		$84.48		Kennedy
Zone 2		$84.57		Kennedy
Zone 3		$91.39		Kennedy
Each Additional			$262.31	Kennedy
DS3			$332.66	Kennedy
Zone 1		$897.72		Kennedy
Zone 2		$899.73		Kennedy
Zone 3		$1,053.66		Kennedy
Each Additional			$286.78	Kennedy

	Recurring Fixed	Recurring Per Mile	Nonrecurring	
9.23.4.2 EEL Transport				
DS0			$307.95	Kennedy
DS0 Over 0 to 8 Miles	$19.27	$0.13		Kennedy
DS0 Over 8 to 25 Miles	$19.29	$0.12		Kennedy
DS0 Over 25 to 50 Miles	$19.33	$0.12		Kennedy
DS0 Over 50 Miles	$19.28	$0.06		Kennedy
DS1			$352.92	Kennedy
DS1 Over 0 to 8 Miles	$31.14	$1.45		Kennedy

		Recurring	Non- Recurring	Witness
DS1 Over 8 to 25 Miles	$31.40	$1.18		Kennedy
DS1 Over 25 to 50 Miles	$31.87	$2.14		Kennedy
DS1 Over 50 Miles	$31.83	$1.12		Kennedy
DS3			$352.92	Kennedy
DS3 Over 0 to 8 Miles	$197.32	$61.17		Kennedy
DS3 Over 8 to 25 Miles	$200.35	$18.78		Kennedy
DS3 Over 25 to 50 Miles	$184.41	$23.73		Kennedy
DS3 Over 50 Miles	$194.79	$16.34		Kennedy
		Recurring	Nonrecurring	
9.23.4.3 Multiplexing				
DS3 to DS1		$232.15	$268.62	Kennedy
DS1 to DS0		$210.68	$268.62	Kennedy
9.23.4.4 DS0 Channel Performance				
DS0 Low Side Channelization		$11.52		Kennedy
DS1/DS0 MUX, Low Side Channelization		$7.35	$239.83	Kennedy
9.23.4.5 Concentration Capability		ICB		Kennedy
9.24 Unbundled Packet Switching				
9.24.1 Unbundled Packet Switch Customer Channel		$23.45		Kennedy
DSLAM		$20.29		Kennedy
9.24.2 Customer Channel and Shared Distribution Loop			$60.14	Kennedy
Customer Channel and Unbundled Distribution Subloop			$127.17	Kennedy
Customer Channel and CLEC Provided Loop			60.14	Kennedy
9.24.3 Unbundled Packet Switch Port				
DS1 Interface		$208.02	$227.50	Kennedy
DS3 Interface		$135.05	$227.50	Kennedy
10.0 Ancillary Services				Brotherson
10.1 Local Number Portability	See FCC Tariff #1 Section 20.3.1 & 20.3.3			
10.1.1 LNP Queries				
10.1.2 LNP Managed Cuts			$27.31	6
Standard Managed Cuts per person per 1/2 Hr.			$35.43	6
Overtime Managed Cuts per person per 1/2 Hr.			$43.49	6
Premium Managed Cuts per person per 1/2 Hr.				
10.2 911/E911		No Charge		2
10.3 White Pages Directory Listings, Facility Based Providers				
10.3.1 Primary Listing		No Charge		2
10.3.2 Premium/Privacy Listings		General Exchange Tariff Rate, less wholesale discount		
10.4 Directory Assistance, Facility Based Providers				
10.4.1 Local Directory Assistance, Per Call		$0.34		2
10.4.2 National Directory Assistance, per Call		$0.385		2
10.4.3 Call Branding, Set- Up and Recording			$10,500.00	2
10.4.4 Loading Brand /Per Switch			$175.00	2
10.4.5 Call Completion Link, per call		$0.085		
10.5 Directory Assistance List Information				
10.5.1 Initial Database Load, per Listing		$0.025		2
10.5.2 Reload of Database, per Listing		$0.02		2
10.5.3 Daily Updates, per Listing		$0.025		2
10.5.4 One-time Set-Up Fee, per Hour			$82.22	2
10.5.5 Media Charges for File Delivery				
10.5.5.1 Electronic Transmission		$0.001		2

		Recurring	Non- Recurring	Witness
10.5.5.2 Tapes (charges only apply if this is selected as		$30.00		
10.5.5.3 Shipping Charges (for tape delivery)			ICB	3
10.6 Toll and Assistance Operator Services, Facility Based Providers,				
10.6.1 **Option A** – Per Message				
Operator Handled Calling Card		$1.45		2
Machine Handled Calling Card		$0.60		2
Station Call		$1.50		2
Person Call		$3.50		2
Connect to Directory Assistance		$0.75		2
Busy Line Verify, per Call		$0.72		
Busy Line Interrupt		$0.87		
Operator Assistance, per Call		$0.87		2
10.6.2 **Option B** – Per Operator Work Second and Computer Handled Calls				
Operator Handled, per Operator Work Second		$0.181		2
Machine Handled, per Call		$0.25		2
10.6.3 Call Branding, Set-Up & Recording			$10,500.00	2
10.6.4 Loading Brand/Per Switch			$175.00	2
10.7 Access to Poles, Ducts, Conduits and Rights of Way				
10.7.1 Pole Inquiry Fee, per Mile			$322.99	Kennedy
10.7.2 Innerduct Inquiry Fee, per Mile			$388.25	Kennedy
10.7.3 ROW Inquiry Fee			$143.49	Kennedy
10.7.4 ROW Doc Prep Fee			$143.49	Kennedy
10.7.5 Field Verification Fee, per Pole			$35.87	Kennedy
10.7.6 Field Verification Fee, per Manhole			$466.34	Kennedy
10.7.7 Planner Verification, Per Manhole			$16.00	Kennedy
10.7.8 Manhole Verification Inspector Per Manhole			$286.98	Kennedy
10.7.9 Manhole Make-Ready Inspector, per Manhole			$430.47	Kennedy
10.7.10 Pole Attachment Fee, per Foot, per Year		$4.28		Kennedy
10.7.11 Innerduct Occupancy Fee, per Foot, per Year		$0.36		Kennedy
10.7.12 Access Agreement Consideration			$10.00	Kennedy
12.0 Operational Support Systems				
12.1 Daily Usage Record File, per Record		$0.000746		Brohl
12.2 Trouble Isolation Charge			Section 13, Qwest's Arizona Exchange and Network Services Catalog	
17.0 Bona Fide Request Process				
17.1 Processing Fee			$2,410.58	Kennedy

NOTES:

[1] Reserved for future use
[2] Market-based rates not proposed in Arizona Cost Docket (Consolidated Arbitration).
[3] ICB, Individual Case Basis pricing.
[4] Reserved for future use

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM MUNDELL
CHAIRMAN
JIM IRVIN
COMMISSIONER
MARC SPITZER
COMMISSIONER

IN THE MATTER OF THE INVESTIGATION INTO	)
QWEST CORPORATION'S COMPLIANCE	) DOCKET NO. T-00000A-00-0194
WITH CERTAIN WHOLESALE PRICING	) Phase II -- A
REQUIREMENTS FOR UNBUNDLED	)
NETWORK ELEMENTS AND RESALE	)
DISCOUNTS	)

REBUTTAL TESTIMONY

OF

SIDNEY L MORRISON

ON BEHALF OF WORLDCOM, INC.

September 27, 2001

EXHIBIT
Admitted
WorldCom5

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INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS FOR THE RECORD.

A. My name is Sidney L Morrison. My business address is 10176 Savannah Sparrow Way, Highlands Ranch, Colorado 80129.

Q. PLEASE SUMMARIZE YOUR PROFESSIONAL EXPERIENCE.

A. I began my telecommunications career in 1966 in Charlotte, North Carolina as a cable helper for Southern Bell Telephone and Telegraph. Southern Bell was an incumbent local exchange carrier managing numerous exchanges throughout North Carolina. My duties involved splicing underground, buried and aerial cable. I also worked as a switching technician and special services technician.

Beginning in August of 1970, I transferred to Mountain Bell in Denver, Colorado as a central office technician. In 1972, I was promoted to supervise main distributing frame operations. My duties included supervising the installation of POTS, Special Services, Central Office area cuts, main distribution frame replacements and many other projects. In 1980 and 1981 I performed time studies for service provisioning on approximately 75 of Mountain Bell MDF operations. These time studies included a component for jumper running activities on each of these frames. From 1983 until 1986, I was the switching control center and main distributing frame subject matter expert for US West. From 1986 until 1993, I was responsible for the US West AMA teleprocessing organization for the fourteen state region.

In 1993, I retired from US West (Mountain Bell) and began contract engineering work and consulting. In 1995 I took an assignment in Kuala Lumpur, Malaysia as a contractor/consultant with a team of specialists to build a CLEC network consisting of a GSM service, fixed wire service, cable television service and data service integrated into the same transport backbone. I had a number of responsibilities in Malaysia the largest of which was organizing and implementing a field operations group, responsible for the installation and maintenance of all services.

I returned from Malaysia in June of 1997 and worked for approximately two years as an OSP/COE engineer, and trained new engineers for US West collocation efforts.

In May 1999, I accepted a job in Switzerland building a new CLEC network (diAx telecommunications). My responsibilities involved the establishment of operational support systems ("OSSs") to support all wireless, wireline, and data services offered by diAx. I also provided consulting services in the establishment of the first diAx Internet Provider Operations Center.

In December 2000, I returned from Switzerland and began working for QSI as Senior Consultant. I provide telecommunications companies with engineering advice and counsel for direct network planning, management and cost-of-service support. My specific areas of expertise include network engineering, facility planning, project management, business system applications, incremental cost research and issues related to the provision of unbundled network elements, including local loops.

Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND.

A. I completed two years of course work in electrical engineering at Central Piedmont Community College in Charlotte, North Carolina. I also completed four years of course work in business administration at Regis University in Denver, Colorado.

I. INTRODUCTION AND PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of this testimony is to discuss problems with remote terminal collocation (RT collocation) and show that the rates for RT collocation are improperly developed, excessive and risk excluding competitive local exchange carriers ("CLECS") from the market place.

Q. ON WHOSE BEHALF IS THIS TESTIMONY BEING PRESENTED?

A. This testimony is being presented on behalf of WorldCom, Inc.

II. SUMMARY OF FINDINGS AND RECOMMENDATIONS

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS AND STATE YOUR RECOMMENDATIONS.

A. Remote terminal (RT) collocation is an expensive and perhaps exclusionary method of collocation. High RT collocation costs will effectively restrict the choices of consumers shopping for the best values in advanced communications services. Qwest's proposal for RT collocation will reduce competitive alternatives. As such, alternative collocation methods for RTs must be implemented. My recommendation is to unbundle additional network elements. This is the most cost effective method of RT collocation and it provides equal collocation capability for competitors without prohibitively high investments. Unbundling network elements effectively places the CLEC on a level playing field with the incumbent local exchange carrier ("ILEC"). Unbundling these network elements also allows the CLECs to virtually collocate ADLU cards in ILEC RT located DSLAM equipment. This will allow for the maximum penetration of advanced services to all consumers in Arizona.

III. REMOTE TERMINAL COLLOCATION

Q. PLEASE DESCRIBE REMOTE TERMINAL COLLOCATION.

A. RT collocation offers space in remote cabinets thereby eliminating the central office to customer facility distance constraints on Digital Subscriber Line (DSL) providers.[1] Field electronics are located in the RTs for use by collocators to access DSL customers. The RT collocation requires access to AC/DC power, heat dissipation and terminations to the Feeder Distribution Interface (FDI).

Q. WHAT ARE THE ADVANTAGES OF REMOTE TERMINAL COLLOCATION?

A. Remote terminal collocation provides access to a layer of customers that is not accessible from the central office. These DSL customers are typically beyond the restrictive 18Kft. "boundary" of the central office.[2] By having access to customers at RT locations the CLEC has access to the same universe of customers available to the ILEC.

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[1] DSL technologies are transmission technologies used on circuits that run between the central office and a customer's premises. Historically xDSL technologies have been provided on loops that are exclusively copper. New DSL network technology can be deployed on hybrid loops that are fiber optic from the central office to a field location utilizing remote terminal technology and then copper cable pairs to the customer premise.

[2] As discussed later in this testimony, new technologies are addressing this technological limitation – distance from the central office -- on the availability of xDSL services.

Q. WHAT ARE THE DISADVANTAGES OF REMOTE TERMINAL COLLOCATION?

A. Early indications are that collocating at a Qwest RT, or adjacent to a Qwest RT, will be nearly as expensive (if not more) than collocating in a Qwest central office. The reason for this is that fewer customers are available from the RT as compared to the central office. Also high-density equipment is available for use in central office environments making this the most cost effective collocation method. Central office collocated equipment also has the added advantage of access to a greater universe of outside plant facilities and consequently customers, making central office equipment more efficient in delivering service. Additionally support in the form of AC/DC power, HVAC and security for collocation are more efficiently available in the central office environment. The greatest disadvantage with RT collocation is the potential lack of space at the RT.

Q. WHY IS THE LACK OF SPACE THE GREATEST DISADVANTAGE TO THE CLEC IN REMOTE TERMINAL COLLOCATION?

A. When space is not available in the RT cabinet, or even adjacent to it, the ILEC refuses the CLEC access to the RT for collocation. The additional expenses and time associated with gaining new space (or expanding an existing structure) further reduces the likelihood that this type of network will provide any immediate, or sustainable competitive advanced services alternative for the majority of residential or small business customers. The end result is that the CLEC is denied access to all of the customers accessible through the RT and FDI configuration.

Refusing to allow a CLEC to collocate at the RT ultimately means the CLEC is denied the ability to compete in the area served by the RT. The CLEC is consequently relegated to the position of a second-class competitor being denied access to customers by the ILECs, because of unavailability of space at the RT with no cost effective alternative available. At the same time, the ILEC and its competitive affiliates have access to the loop network without competitors.

Q. ARE THERE ANY TECHNICAL SOLUTIONS THAT WOULD MAKE THE CLEC A VIABLE COMPETITOR IN CASES SUCH AS THE ONE YOU DESCRIBED ABOVE?

A. Yes, Qwest should be required to unbundle network transport elements.

Q. TO WHAT NETWORK TRANSPORT ELEMENTS ARE YOU REFERRING?

A. There are no technical limitations that prevent ILECs from allowing CLECs to provide advanced services over digital loop carrier ("DLC") equipment.[3]

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[3] A digital loop carrier ("DLC") system allows a company to replace the end-to-end copper circuit that historically comprised a telephone access line (or a "loop") with a combination of high-capacity fiber optic feeder cable and copper distribution cable. The DLC system itself is generally comprised of some form of electronic equipment in the central office (generally referred to as a "central office terminal" or "COT") that connects the fiber optic feeder cable to an accompanying electronic device in the field wherein the fiber optic feeder cable and copper distribution cable meet (generally referred to as a "remote digital terminal" or an "RDT").

Much of this equipment is designed to provide voice, data, and combined voice/data products over a single network platform for use by ILEC data affiliates and retail customers. This same platform should provide similar functionality for CLECs.

Q. HOW WOULD UNBUNDLING NETWORK TRANSPORT ELEMENTS SUCH AS THE DLC BE ACCOMPLISHED?

A. It is technically feasible for the ILEC to allow CLECs to virtually collocate line cards within Next Generation Digital Loop Carrier ("NGDLC") remote terminals.[4] For example, it is possible to collocate the Litespan 2000 ADLU[5] card, which can provide both voice and data services over a shared copper loop extending from the remote terminal to a customer's premises. The inherent DSL capabilities of the ADLU card in this respect negate the need for ILEC to collocate a bulky and expensive DSLAM within the RT enclosure (or in an adjacent structure). Further, the ADLU card (or similar types of cards with unique service features) is in many ways the intelligence focal point of the service being provided. By programming the card and the RT to accommodate new, innovative services, CLECs can differentiate their products from those produced by the ILEC. Further, the cost savings associated with using the inherent

[4] The use of NGDLC devices allows Qwest to push fiber optic facilities closer to its customer's homes or businesses which should allow more customers to avail themselves of high-speed, packet switched digital services and enhance the speed and quality that customers can expect from those services.

[5] "ADLU" stands for "ADSL Digital Line Unit." These units can perform both the line splitting and DSLAM functionalities.

functionality of the ADLU card in this respect are substantial. Accessing such functionality is technically feasible as evidenced by the fact that both the Illinois and Texas commissions have required SBC to make such access available.[6]

Q. CAN YOU BE MORE SPECIFIC ON THE TECHNICAL FEASIBILITY OF COLLOCATING LINE CARDS IN QWEST'S RT?

A. Yes. It is technically feasible for Qwest to permit WorldCom or any other CLEC to specify, at each individual remote terminal, the line card(s) to be placed in the DLC equipment for use in providing service to the CLEC's customers. The following line card options are all technically feasible:

1. CLEC specifies the type and quantity of the line card(s) that ILEC will obtain, own, and install in the DLC system located in an ILEC remote terminal;

2. CLEC obtains the desired line card(s) and transfers ownership of the card(s) to the ILEC (for a nominal fee). ILEC then installs the card(s) in the DLC system located in a remote terminal. Upon request of CLEC, ILEC removes the card(s), return the card(s) to CLEC, and transfer ownership of the card(s) to CLEC for the nominal fee; or

3. CLEC obtains, owns and installs the line card(s) in the DLC system located in an ILEC's remote terminal.

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[6] See (1) *Arbitration Award*, Docket Nos. 22168 & 22469, *Petition of IP Communications Corporation to Establish Expedited Public Utility Commission of Texas Oversight Concerning Line Sharing Issues*, *Petition of Covad Communications Company and Rhythms Links, Inc. against Southwestern Bell Telephone Company for Post –Interconnection Dispute Resolution and Arbitartion under the Telecommunications Act of 1996 Regarding Rates, Terms, Conditions and Related Arrangements for Line Sharing* (hereafter "*Texas Line Sharing Order*"), (2) *Order*, Docket No. 00-0393, *Proposed Implementation of High Frequency Portion of Loop (HFPL)/Line Sharing Service (Tariffs filed April 21, 2000)*, released March 14, 2001.

It is also technically feasible, and advisable, for Qwest to promptly provide to CLECs copies, both paper and electronic, of all technical specifications and network architecture data relevant to the development by any potential vendor of plug-in DLC line cards that will support the CLEC's high bandwidth services. In general, this Commission should encourage an open development platform wherein Qwest and CLECs alike are able to design, engineer and provision multiple services using the enormous capabilities of the NGDLC architecture. This type of open platform will speed advanced services competition to Arizona customers and will provide a wide array of advanced services innovation.

Finally, it is technically feasible and advisable for Qwest to provide the CLECs with 6 months advance notification of software upgrades of, at a minimum, Qwest's: COTs, remote terminals, ATM switch/OCD, DLC equipment, and CPE. In addition, if Qwest chooses to upgrade any of the above software, then it is technically feasible and advisable, indeed practical, for Qwest to ensure with its vendor, backward compatibility for at least 12 months after the upgrade is installed. Again, these are all fundamental building blocks of an open NGDLC architecture capable of providing the large benefits possible to customers and the marketplace alike.

Q. HOW WILL UNBUNDLING NETWORK ELEMENTS, BY THE USE OF COLLOCATED LINE CARDS, BENEFIT THE CLECs?

A. Allowing CLECs to collocate their own line cards will not only favorably impact the economic viability of competition for advanced services by reducing the barriers to entry erected by enormous stand-alone collocation costs, it will also spark innovation in the provision of high-capacity services. Allowing carriers to collocate line cards with different capabilities than that perhaps chosen by Qwest will provide customers with real choices for new and different types of service.

Q. EARLIER IN YOUR TESTIMONY YOU STATED THAT THE QWEST RATES FOR RT COLLOCATION ARE IMPROPERLY DEVELOPED, AND EXCESSIVE. WOULD YOU PLEASE ELABORATE ON THIS STATEMENT?

A. Yes. In a review of the cost study for RT Collocation, Qwest makes the following statement on the space cost element:

- **Space** (per standard mounting unit; 1.75 vertical inches)
- This non-recurring rate is associated with the cabinet space and includes the cost of the cabinet and all of the work and materials associated with placement of the cabinet. The recurring rate associated with the Space recovers the maintenance of the materials and equipment associated with the cabinet along with a portion of the costs required for the power pedestal.

Essentially what Qwest is attempting to do is to recover its investment up front in a non-recurring charge rather than through reasonable monthly recurring charges. Moreover, what Qwest seeks to recover in its monthly recurring rate – maintenance -- should be recovered through the maintenance portion of an annual charge factor that is applied to the investment and then recovered on a monthly basis with the remainder of the investment.

Q. CAN YOU DRAW ANY COMPARISONS BETWEEN THE RATE STRUCTURE PROPOSAL FOR RT COLLOCATION AND ANY OTHER UNES?

A. Yes, I can. If Qwest were to apply the same methodology to switch ports, loops, or a square foot of central office collocation floor space, then competitors would be asked to pay up front for the entire loop, port or square foot. In other words, a competitor might have to pay several hundred dollars for each loop and then pay for maintenance as they go. This methodology, whether applied to RT collocation space, loops, or ports, has one stifling effect, that being an enormous getting started financial barrier for competitors that indeed may be insurmountable. Yet another drawback to the rate structure proposed by Qwest pertains to customer churn. Under Qwest's proposed structure the competitor pays a very large up front non-recurring charge. If after paying this charge the competitor should somehow lose the customer, the competitor is stuck with RT collocation space that it may no longer need, yet that competitor has paid a huge up front charge that it cannot recoup.

Q. DO YOU HAVE ANY RECOMMENDATIONS FOR THE COMMISSION ON THIS ISSUE?

A. Yes. The Commission should require Qwest to offer RT collocation space on an unbundled basis, and the rate for that offering should be determined on a monthly recurring basis, rather than predominately on a non-recurring basis.

Q. ALTHOUGH YOU DISAGREE WITH THE APPLICATION OF THE RT COLLOCATION CHARGE, HAVE YOU HAD AN OPPORTUNITY TO SCRUTINIZE THE COST DEVELOPMENT OF THIS CHARGE IN THE QWEST COST STUDIES?

A. Yes, I have and from that review I have discovered three primary concerns. First, once Qwest develops its RT collocation investment, it applies factors to recover directly assigned, directly attributable, and common costs. Qwest directly assigns product management, sales, and business fees to the RT collocation investment. Together these loadings add nearly $1,000.00 to the RT collocation investment. Mr. Tim Gates in his testimony explores in depth why these loadings are inappropriate.

Second, in developing the RT collocation non-recurring cost, Qwest uses costs from two vendors and then weights them together. One vendor is substantially more expensive than the other (even after one considers that the SMU capacities are different). Section 51.505 (b) (1) of the FCC rules require that the TELRIC of an element should be measured based on the use of the most efficient telecommunications technology currently available and the lowest cost network configuration. This principle should be applied to the Qwest RT collocation cost study.

Third, once Qwest has developed its fully loaded and weighted investment for RT collocation equipment, it applies a very low utilization rate or fill factor to that investment. No support exists for this utilization rate in the cost study, rather it is simply a hard coded number. Qwest should be required to substantiate why such an extremely low utilization level is appropriate, or in the alternative a more appropriate utilization level should be applied.

Q. HAVE YOU RERUN THE QWEST RT COLLOCATION COST STUDY TO REPROPOSE A NEW RATE?

A. No, I have not for two reasons. First, the rate structure whereby Qwest seeks to recover all of its investment up front from competitors complicates the study. Hence, additional changes beyond simple inputs will be necessary. Second, since many of the inputs have no corresponding support (e.g. the fill factors used) there is limited basis other than my personal experience to rely upon for certain input changes at this time. I believe the appropriate path to follow is to first determine the appropriate rate structure with respect to how RT collocation costs should be recovered and then second to take that structure and appropriately construct and develop costs.

Q. HAVE YOU REVIEWED THE RT COLLOCATION COST STUDY FOR THE FEEDER DISTRIBUTION INTERFACE (FDI) TERMINATION COSTS?

A. Yes, I have. In most respects this portion of the RT collocation cost study suffers from the same shortcomings as the standard mounting unit space portion of the study. As such, the Commission should require Qwest to modify its rate structure as I discussed above and then provide updated and complete cost support the new rates.

Q. .DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
Chairman
JAMES M. IRVIN
Commissioner
MARC SPITZER
Commissioner

IN THE MATTER OF INVESTIGATION	)	
INTO QWEST CORPORATION'S	)	
COMPLICANCE WITH CERTAIN WHOLESLE	)	**Docket No. T-00000-A-00-0194**
PRICING REQUIREMENTS FOR UNBUNDLED	)	**PHASE II – A**
NETWORK ELEMENTS AND RESALE	)	
DISCOUNTS	)	

AFFIDAVIT OF SIDNEY L MORRISON

STATE OF	**: COLORADO**
SS	**: 241-68-2631**
COUNTY OF	**: DOUGLAS**

Sidney L Morrison, of lawful age being first duly sworn, deposes and states:

1. My name is Sidney L Morrison. I am a Senior Consultant for QSI Consulting Inc. I have caused to be filed written testimony and exhibits in support of WorldCom, Inc. in Docket No: T-00000A-00-0194, Phase II A.

2. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge and belief.

Further, Affiant sayeth not.

Sidney L Morrison

Sidney L Morrison

SWORN AND SUBSCRIBED to before me this 9th day of October, 2001.

Heather Walstrom

Notary Public

HEATHER WALSTROM NOTARY PUBLIC STATE OF COLORADO

My Commission expires:

My Commission Expires 05-03-05
9205 S. Broadway
Highlands Ranch, CO 80129

1209305.1

EXHIBIT
Admitted
WorldCom 6

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
Chairman
JAMES M. IRVIN
Commissioner
MARC SPITZER
Commissioner

IN THE MATTER OF INVESTIGATION	)	
INTO QWEST CORPORATION'S	)	
COMPLICANCE WITH CERTAIN WHOLESLE	)	Docket No. T-00000-A-00-0194
PRICING REQUIREMENTS FOR UNBUNDLED	)	PHASE II – A
NETWORK ELEMENTS AND RESALE	)	
DISCOUNTS	)	

REBUTTAL TESTIMONY OF
EDWARD J. CAPUTO
ON BEHALF OF WORLDCOM

SEPTEMBER 27, 2001

1209036.1

INTRODUCTION AND PROFESSIONAL EXPERIENCE

Q. Please state your name, title and business address.

A. My name is Edward J. Caputo. I am Director of Operator and Directory Services for WorldCom. My business address is 601 South 12th Street, Arlington, Virginia 22202.

Q. What is your educational background?

A. I attended the University of Maryland in College Park, Maryland, and earned a Bachelor of Science degree in Business Management. I am a candidate for a Master's degree in Telecommunications Management at George Washington University in Washington, D.C.

Q. Would you please provide a brief description of your professional experience?

A. I have held management positions in the telecommunications field for the last 11 years. Prior to that, I held management positions in the Information Technology and Finance field. I have had management responsibilities at WorldCom and its predecessor entity, MCI, since 1990 in the area of Operator and Directory Services.

PURPOSE OF TESTIMONY

Q. What is the purpose of your testimony?

A. The purpose of this testimony is to respond to Qwest's testimony and cost studies relating to custom routing.

Q. Have you reviewed Qwest's prefiled direct testimony and the cost study related to custom routing?

A. Yes. Specifically, I have reviewed the August 31, 2001 testimony of Ms. Malone and Mr. Brigham and Qwest cost study #5611 entitled "Custom Routing – Non-recurring Elements" (the "Cost Study").

Q. What comments do you have about the custom routing testimony and cost study?

A. I have concerns about four issues: the description of the service, the inclusion of certain marketing and sales expenses, the inclusion of certain allegedly Directly Attributable Expenses and the inclusion of certain allegedly Common Costs.

Q. What is your concern with the definition of the service?

A. On page 23 of his August 31, 2001 testimony, Mr. Brigham states that Custom Routing combines End Office (EO) switching with dedicated trunks to allow CLECs the ability to request specific traffic routing direction by class of service via a unique Line Class Code. (LCC). Mr. Brigham is mistaken in his characterization that dedicated trunks must be employed in order for Qwest to provide Custom Routing. Dedicated trunks are not required. WorldCom wishes to route its' Operator Services and Directory Assistance traffic to existing, shared access, Feature Group D trunks between the Qwest and MCI Long Distance networks. As the carrier requesting customized routing, WorldCom is entitled to designate the particular outgoing trunks associated with unbundled switching provided by the incumbent that will carry certain classes of traffic originating from the requesting provider's customers.[1] This will allow WorldCom to provide Operator Services and Directory Assistance to its' customers using its' own operators.

In Section B, Description Of Service on page 3 of the Cost Study, Qwest again states that Custom Routing will combine End Office (EO) switching with dedicated trunks to allow Co Providers the ability to request specific traffic routing direction by class of service via a unique Line Class Code. (LCC). This definition suffers from the same defect described above relating to Mr. Brigham's testimony.

Q. Please describe your concerns about the inclusion of certain marketing and sales expenses.

A. In Section C of the Cost Study, Study Methodology on page 4 under the sub heading Expense Factors, Qwest lists "Commercial Marketing" as one of the factors included in the Cost Study. WorldCom does not believe that this factor is justifiable. WorldCom is not aware of any marketing related activities that Qwest has performed with respect to the development or sale of custom routing associated with unbundled switching. WorldCom has not been contacted by Qwest and been informed that custom routing is available, nor has Qwest provided WorldCom with any collateral marketing materials such as brochures or descriptions for this service. In fact, Qwest has made no serious effort to even

[1] Footnote 867 to paragraph 441 FCC Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, CC Docket No. 96-98, Third Report and Order and Fourth Further Notice of Proposed Rulemaking, FCC 99-238, 1999.

provide custom routing. Any and all expense factors associated with Qwest's "marketing" of this service should be eliminated.

In addition, in Section G of the Cost Study, Nonrecuring Cost Detail Summary, Custom Routing – Operator, DA Development Per LCC on page 3 of 5, ENRC Version 2.14, Date 8/21/01, line 54, Qwest lists "Sales Expense" as a Directly Assigned item. Qwest also lists "Sales Expense" as a Directly Assigned item in Section G, Nonrecuring Cost Detail Summary, Custom Routing – Operator, DA Installation Per Switch on page 5 of 5, ENRC Version 2.14, Date 8/21/01, line 144. WorldCom objects to the inclusion of any and all expense factors associated with Qwest's "sales" of this service. Qwest is not performing any sales activity associated with this function.

Q. Please describe your concerns with the inclusion of certain Directly Attributed costs.

A. In Section G of the Cost Study, Nonrecuring Cost Detail Summary, Custom Routing – Operator, DA Development Per LCC on page 3 of 5, ENRC Version 2.14, Date 8/21/01, lines 63 through 70, Qwest lists Network Support Assets, General Support Assets, General Purpose Computers, Uncollectibles, Accounting and Finance Expense, Human Resource Expense, Information Management Expense and Intangibles as Directly Attributed Costs. In addition, in Section G, Nonrecuring Cost Detail Summary, Custom Routing – Operator, DA Installation Per Switch on page 5 of 5, ENRC Version 2.14, Date 8/21/01, lines 154 through 160, Qwest again lists the same items as Directly Attributable to Custom Routing. WorldCom objects to the inclusions of these costs without a further explanation of what these costs are and demonstrable evidence of how these costs are Directly Attributable to Custom Routing.

Q. Please describe your concerns with the inclusion of certain Common Costs.

A. In Section G of the Cost Study, Nonrecuring Cost Detail Summary, Custom Routing – Operator, DA Development Per LCC on page 3 of 5, ENRC Version 2.14, Date 8/21/01, lines 76 through 82, Qwest lists Executive Expense, Planning Expense, External Relations Expense, Legal Expense, Other Procurement Expense, Research and Development Expense and Other General Administrative Expense as Common Costs. In Section G, Nonrecuring Cost Detail Summary, Custom Routing – Operator, DA Installation Per Switch on page 5 of 5, ENRC Version 2.14, Date 8/21/01, lines 166 through 172, Qwest again lists these same items as Common Costs. WorldCom objects to the inclusions of these costs without a further explanation of what these costs are and demonstrable evidence of how these costs are Common to Custom Routing.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE ARIZONA CORPORATION COMMISSION

WILLIAM A. MUNDELL
Chairman
JAMES M. IRVIN
Commissioner
MARC SPITZER
Commissioner

IN THE MATTER OF INVESTIGATION) INTO QWEST CORPORATION'S) COMPLICANCE WITH CERTAIN WHOLESLE) PRICING REQUIREMENTS FOR UNBUNDLED) NETWORK ELEMENTS AND RESALE) DISCOUNTS)	Docket No. T-00000-A-00-0194 PHASE II – A

AFFIDAVIT OF EDWARD J. CAPUTO

STATE OF VIRGINIA :
: ss:
CITY ~~COUNTY~~ OF ALEXANDRIA :

Edward J. Caputo, of lawful age being first duly sworn, deposes and states:

1. My name is Edward J. Caputo. I am the Director of Operator and Directory Services for WorldCom, Inc. I have caused to be filed written testimony and exhibits in support of WorldCom, Inc. in Docket No: T-00000A-00-0194, Phase II A.

2. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my knowledge and belief.

Further, Affiant sayeth not.

Edward J. Caputo

SWORN AND SUBSCRIBED to before me this 27th day of September, 2001.

Virginia J Taylor
Notary Public

My Commission expires:

Virginia J. Taylor
NOTARY PUBLIC
Commonwealth of Virginia
My Commission Expires 4/30/05

1209305.1