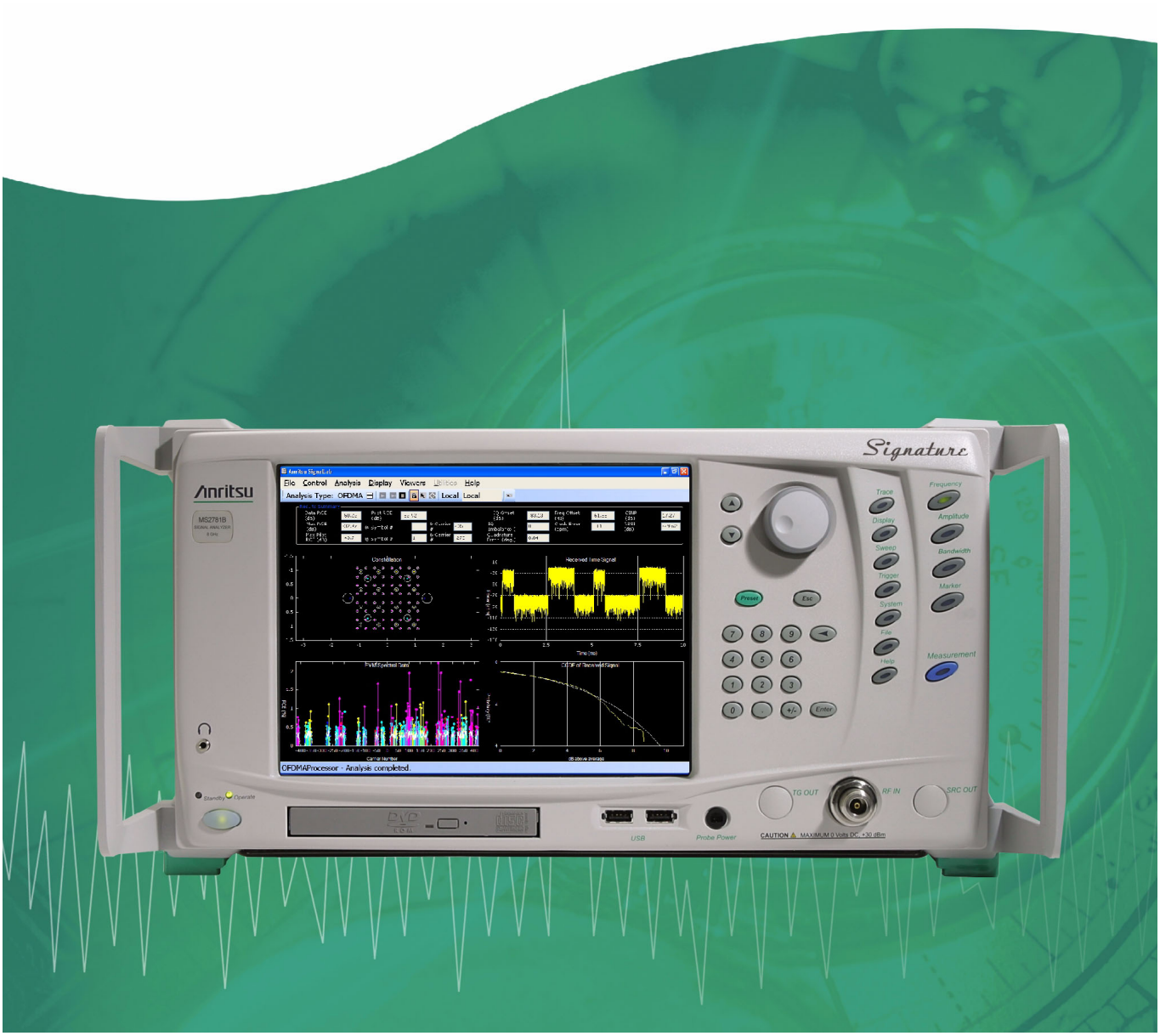
Signature™ Option 41
SignalLab WiMAX Analysis
Software User Guide



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Chapter 1 General Information

1-1 About this Guide

This software user guide provides general information and operating information for the MS278XB Option 41 Anritsu SignalLab application. Manual organization is shown in the table of contents.

Note: Before using the Anritsu SignalLab application, users should become familiar with Signature's general instrument operation and its user interface.

Associated Documentation

This guide is a supplement to the MS278XB's document set containing the following:

- Operation Manual Part Number: 10410-00273
- Programming Manual Part Number: 10410-00274

Conventions

Throughout this manual, the terms MS278XB and analyzer will be used interchangeably to refer to the instrument. The term DUT is used in place of device under test.

Path names may be used to represent the keystrokes and button presses for a desired action or procedure. The path name generally begins with a bold front panel key, keyboard key, or menu selection followed by additional menu selections, each separated by a vertical line (|). Front panel key names and menu selections are presented in the manual as they are on the system, that is in initial caps, all uppercase letters, or with symbols as appropriate.

Note: In cases where a sub-menu is automatically expanded by accessing the main menu, the path shows that sub-menu as part of the selection.

1-2 Software Description

The MS278XB Option 41 provides the Signature user with the tools needed to easily measure and graph the WiMAX performance of their DUT. This option is a Windows application that controls the Signature operation to provide a fully automated measurement engine.

The following sections provide information and instructions on using the MS278XB Option 41 Anritsu SignalLab application. They contain the following:

- Illustrations and diagrams of the data display area and data entry area that identifies the software controls and interfaces.
- Annotated diagram of the menu display showing where the current setup information is located.
- Annotated diagram of the data display showing where the current setup information and measurement data is displayed.
- Descriptions and procedures of measurements and measurement setups.

The Anritsu SignalLab application is also supported through Web Services for programmatic control.

1-3 Software Installation

The SignalLab application is designed to be installed on Signature. Either an MS278XA or MS278XB instrument with Signature software version 3.18 or higher is required.

To install the Signature Option 41 SignalLab application onto a Signature instrument, close all applications (including the Signature application), insert the installation CD, and follow the on-screen instructions. The installation program first copies the installation files to the Signature's hard disk. It then looks for the presence of specific versions of the Windows Installer, .NET framework, and MATLAB Component Runtime and installs these applications if not already present. The SignalLab application and SignalLabRemoteControl Web Service are then installed.

During the installation process, long periods of time up to five minutes may occur without any apparent feedback from the installation software. Do not interrupt the installation process as this is normal. When installation is complete, the software will display a message to reboot the system.

Note: If your Signature application software is **version 3.17** or older, please install the SignatureSystemControl Web Service from the following location after the SignalLab installation is complete:

C:\Signature_Option41\SignatureSystemControl

Click the batch file install_signaturesystemcontrol.bat. **Do not use Setup.exe**. If your Signature application software is **version 3.18** or higher, **do not** install the SignatureSystemControl Web Service as your system already has a more recent version.

Chapter 2 Application Overview

2-1 Introduction

This chapter provides an operational overview and descriptions of the graphical user interface (GUI) of the Anritsu SignalLab application. SignalLab is launched from the Signature application as described below in the Launching the Anritsu SignalLab Application section. SignalLab's GUI is displayed on the LCD touch screen and can be accessed through direct touch or with a pointing device such as a mouse. Once the application is running, you can access the measurement setup parameters and application controls found in the following sections:

- SignalLab Overview
- Analysis Properties Editor
- Transfer Wizard
- Transfer and Setting Panel

2-2 Operational Overview

The following steps provide a basic overview of how to set up Anritsu SignalLab for signal analysis:

1. Launch the Anritsu SignalLab Application.
2. Select the measurement analysis type (OFDMA or OFDM).
3. Select the desired measurements with the viewers (up to nine viewers can be simultaneously displayed).
4. Use the Properties Editor to configure SignalLab for the signal type being analyzed. The configuration can be entered through parameter lists and a graphical Segment Editor, and then applied to SignalLab.
5. For an OFDMA signal analysis, calculate the resulting waveform and apply the configuration to SignalLab. Once the waveform has been calculated, the Properties Editor can also simulate the signal through Graph Monitors.

After SignalLab has been configured and the settings applied, the measurement options can be changed by modifying the viewer properties. Configurations can also be saved and recalled using the Properties Editor. SignalLab can also interface with an MG3700 signal generator and transfer waveform data to the generator's memory for playback.

Launching the Anritsu SignalLab Application

The Anritsu SignalLab application measures the WiMAX performance of the signal that is within the currently set frequency range of the Signature instrument. Prior to launching the Anritsu SignalLab application, the DUT should be set up and connected to Signature's RF input. Signature should then be set up to measure the input signal by setting its center frequency, span, and reference level such that the signal is centered on the display and the signal peak is slightly below the reference level so as to avoid ADC overload.

The Anritsu SignalLab application is launched from Signature's main GUI from the following menu:

Front Panel | Measurement | Measurement Type: | WiMAX

When Anritsu SignalLab is launched, it looks for a file that contains the last known configuration. If this file is available, SignalLab defaults the initial viewer configuration to match the one used previously (below). If this is the first time that SignalLab has been launched after installation, SignalLab shows a list of the available viewers without any choice selected.

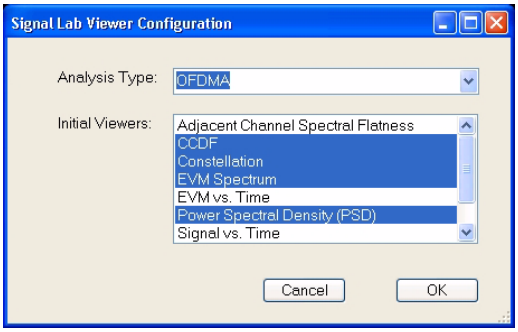


Figure 2-1. Anritsu SignalLab Viewer Configuration Dialog

The analysis type and up to nine initial viewers can be selected from SignalLab's Viewer Configuration dialog.

Note: The OK button is disabled until at least one viewer is selected. Selecting Cancel exits Anritsu SignalLab.

Analysis Types

The Analysis Type selection lists the following analysis types:

- **OFDMA**
- **OFDM**

An OFDM/OFDMA signal breaks the available signal bandwidth into a number of sub-carriers that carry modulated data symbols or known pilot sequences. The number of sub-carriers depends upon the FFT (Fast Fourier Transform) size. As an example, a 512 FFT system will use 512 sub-carriers. The modulated carriers are then passed through an IFFT (Inverse Fast Fourier Transform) block that converts this carrier block into time domain samples. The time domain block is referred to as an OFDM/OFDMA symbol depending upon the operating mode.

An OFDM/OFDMA transmission is essentially a series of OFDM/OFDMA symbols. An OFDM/OFDMA transmission can also be interpreted as a two dimensional matrix where the rows represent the sub-carriers and the columns represent the OFDM symbol numbers.

Note: The analysis type cannot be changed after SignalLab is launched. To change the analysis type, close SignalLab, launch the program again, and select the desired analysis type from the initial Viewer Configuration Dialog.

Measurement Types

The following measurements are supported by Anritsu SignalLab:

- CCDF
- Constellation
- EVM Spectral Data
- EVM Time Data
- Power Spectral Density (PSD)
- Signal vs. Time
- Spectral Flatness
- Adjacent Channel Spectral Flatness
- Summary Data for OFDM
- Summary Data for OFDMA

2-3 SignalLab Overview

After making the initial selections, Anritsu SignalLab starts a configuration routine and shows a status indicator on top of the main Anritsu SignalLab graphical user interface, as shown below:

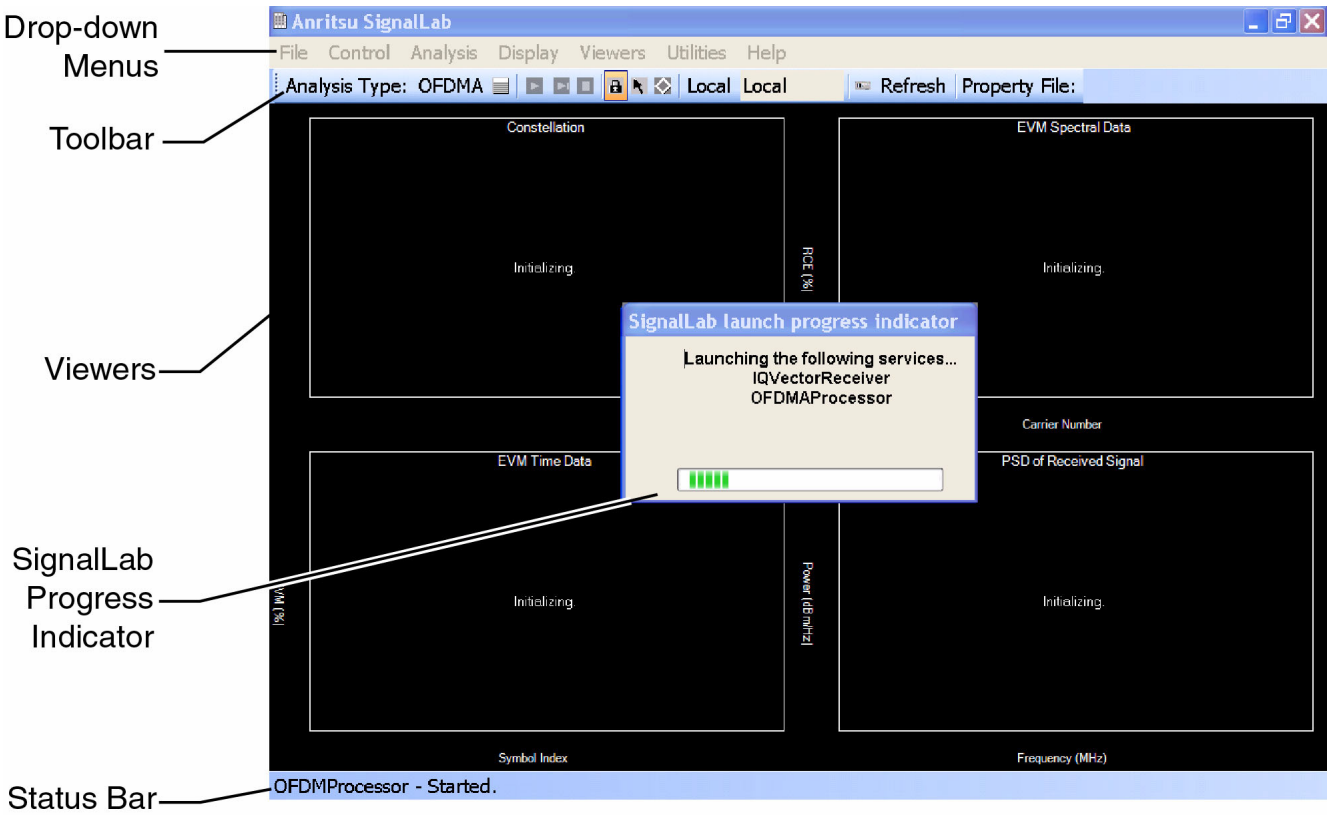


Figure 2-2. Main Anritsu SignalLab Display

Viewers appear on the screen in a grid layout with a maximum of a three-by-three display. The graphical user interface provides standard Windows operation through drop-down menus, toolbar controls, and pop-up dialogs that are initiated through mouse clicks or finger touches on the screen.

Note: On the Signature instrument, in the absence of a mouse, finger touches on the display are interpreted as left mouse clicks. There are no right mouse clicks possible with the touch screen. In SignalLab, a left mouse lock button is used to allow you to work productively at the Signature touch screen by disregarding finger touches or left mouse clicks.

The main elements of the graphical user interface are as follows:

- **Drop-down Menus:** Provide access to configuration and measurement dialogs.
- **Toolbar:** Provides quick access to configuration and measurement dialogs.
- **Viewers:** Displays measurement data.
- **Status Bar:** Shows the current status of the application.

Drop-down Menus

File Menu

The File menu contains the following items:

Figure 2-3. File Drop-down Menu

- **Recall SignalLab Properties:** Recalls a previous SignalLab measurement setup.
- **Save SignalLab Properties:** Saves the current SignalLab measurement setup to a *.slc file.
- **Exit:** Exits the SignalLab application and returns to Signature.

Control Menu

The Control menu contains the following items:

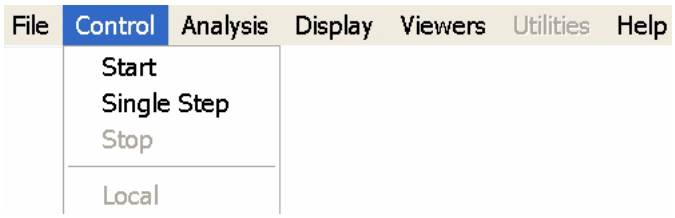


Figure 2-4. Control Drop-down Menu

- **Start:** Starts a continuous sweep.
- **Single Step:** Starts a single sweep and analysis.
- **Stop:** Stops the current sweep and analysis (available when the analysis is running).
- **Local:** Returns SignalLab to local control (available when SignalLab is in Remote mode).

Analysis Menu

The Analysis menu contains the following items:

Figure 2-5. Analysis Drop-down Menu

- **Properties...:** Opens the Properties Editor menu. See “Analysis Properties Editor” on page 2-18.
- **Refresh Signature Parameters:** Refreshes any instrument setup changes that were made to the Signature application. Changes in the Signature setup are not realized in SignalLab until this button is clicked.

Display Menu

The Display menu contains the following items:

Figure 2-6. Display Drop-down Menu

- **Layout...:** Opens the display layout dialog. The following display layout dialog allows you to decide the layout of the screen.

Note: This layout does not include Summary Data viewers, which are enabled or disabled directly by selecting Viewers | Show Result Summary from the drop-down menu bar.

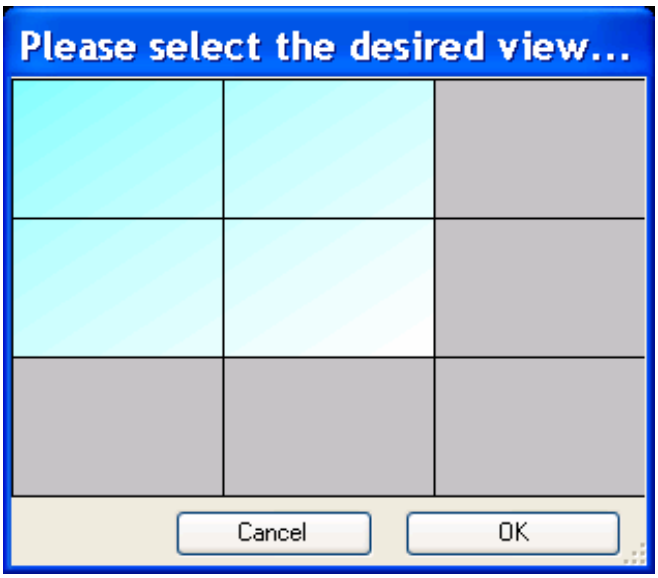


Figure 2-7. Display Layout

The display layout (and number of viewers) is selected by dragging over the desired grid area. The highlighted area represents the viewers and their layout. After the viewer layout has been selected, you can change the viewer's display. "Viewers" on page 2-9 describes the available viewers, "Viewer Properties" on page 2-16 provides information on how to change the viewer selection.

Note: When adding additional viewers to the display, the type of viewer needs to be assigned before data will be displayed in the new viewers.

Viewers Menu

The Viewers menu contains the following items:

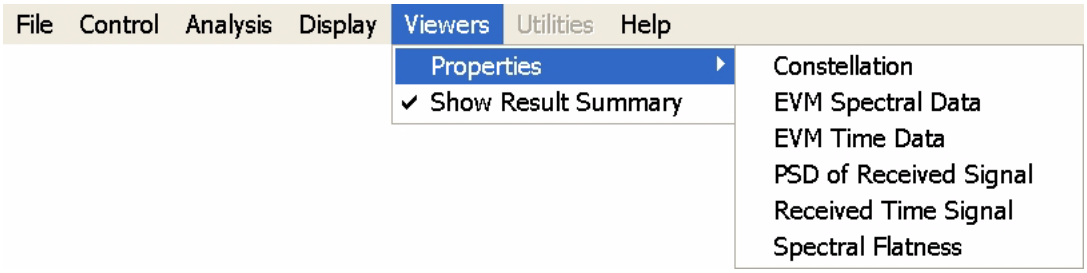


Figure 2-8. Viewers Drop-down Menu

- **Properties:** Opens the Viewers Properties dialog of the selected viewer. See "Viewer Properties" on page 2-16.
- **Show Result Summary:** Displays the result summary at the top of the viewers area.

Utilities Menu

The Utilities menu is not available in this release.

Help Menu

The Help menu contains the following items:

Figure 2-9. Help Drop-down Menu

- **Documentation...:** Opens the SignalLab online Help system.
- **Anritsu Web...:** Opens the Anritsu Web site.
- **About SignalLab...:** Opens the About SignalLab dialog.

Toolbar

The Anritsu SignalLab toolbar features the following buttons:

Table 2-1. SignalLab Toolbar

Button	Description
	**Properties Editor Button:** Opens the Properties Editor for configuring a signal analysis.
	**Run Button:** Starts a continuous sweep analysis. SignalLab sweeps the measurement, runs the data analysis, and updates the viewers continually without stopping.
	**Single Step Button:** Starts a single sweep analysis. SignalLab sweeps the measurement, runs the data analysis, updates the viewers just once, and then stops automatically.
	**Stop Button:** Stops the sweep after the current analysis and display update is complete.
	**Left Mouse Lock Button:** Allows for touching and clicking around the data viewers without causing any action. Left mouse clicks are ignored, but right mouse clicks continue to be functional.
	**Viewer Properties Button:** Allows left mouse clicks or finger touches over a data viewer to open the Viewer Properties dialog for editing the viewer properties.
	**Marker Button:** Allows left mouse clicks or finger touches over a marker to create new markers. Using the tool to drag a marker moves the marker to a new location.
	**Local Button:** Returns SignalLab to local operation if currently in remote operation.
	**Signature Button:** Halts the SignalLab analysis, minimizes SignalLab, and brings the Signature application back to local control. In order for changes to take affect in SignalLab, the Refresh button (below) must be clicked.
	**Refresh Button:** Refreshes any instrument setup changes that were made to the Signature application. Changes in the Signature setup are not realized in SignalLab until this button is clicked.

Viewers

Anritsu SignalLab can display a variety of measurements in its viewers as described below:

CCDF

A CCDF (Complementary Cumulative Distribution Function) curve is a plot of relative power levels versus probability. The x-axis represents dB above the average signal power and the y-axis represents the percent of time (probability) that the signal spends at or above the power level specified by the x-axis. SignalLab computes the CCDF curve after every acquisition based on the bursts that are currently included as part of the analysis.

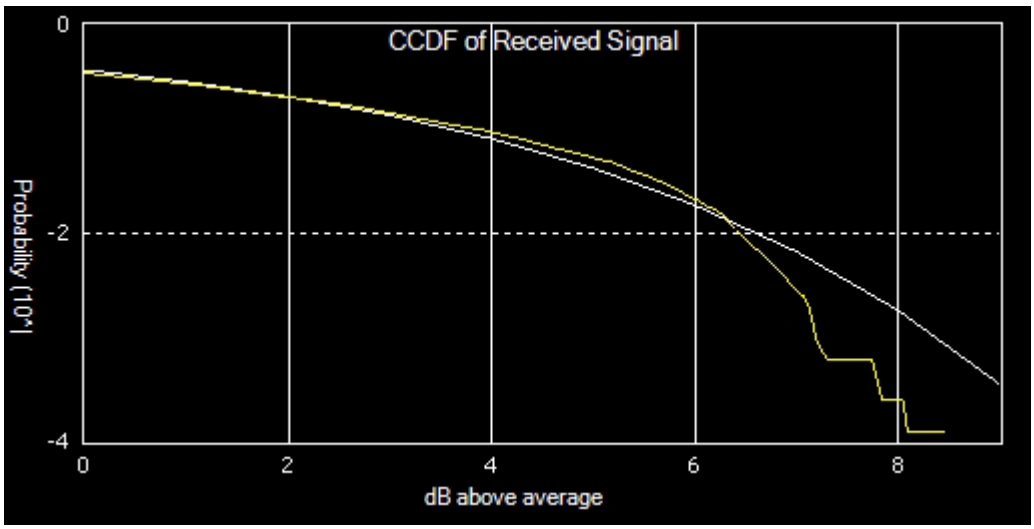


Figure 2-10. CCDF of Received Signal Viewer

Constellation

This graph is a two dimensional plot of the positions of the demodulated symbols carried by various carriers in an OFDM symbol. The plot represents a position in space as amplitude and phase. When the symbols are created at the transmitter, these are assigned a unique location on the constellation diagram. The demodulated symbols are expected to fall within a certain vectorial distance from this position. A constellation diagram allows you to quickly gauge the rough quality of a transmission. The constellation diagram also includes limit circles that provide an easy way to determine if the transmission is within the specifications as outlined by the IEEE 802.16 specification.

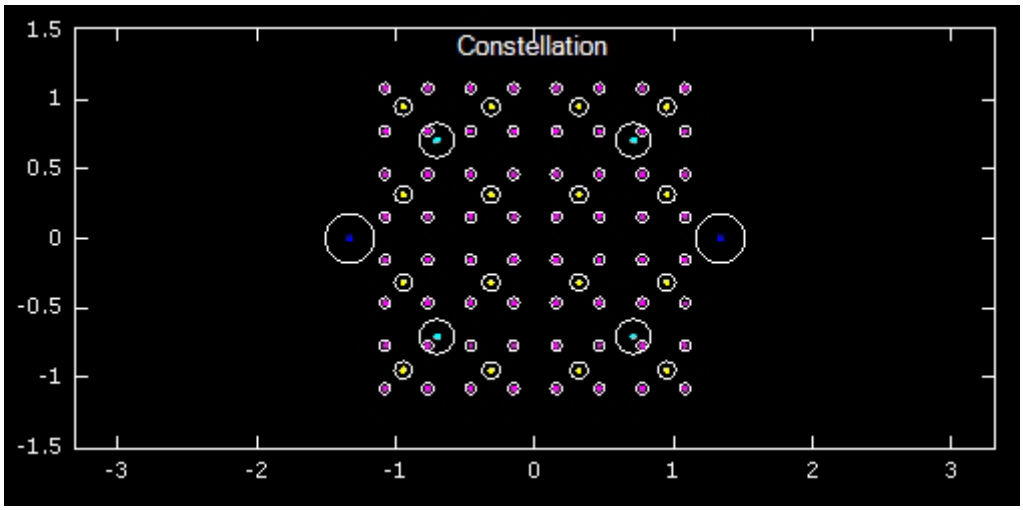


Figure 2-11. Constellation Viewer

Note: The same default color is used to represent the symbol data belonging to a particular burst on this graph as is used in the next two graphs (EVM Spectrum and EVM vs. Time Data). Since the three graphs can easily be seen simultaneously, this allows you to deduce information that will not be possible from just one graph.

EVM Spectral Data

This graph shows the variation of EVM/RCE (Error Vector Magnitude/Relative Constellation Error) as defined by the IEEE 802.16 specification as a function of the data/pilot sub-carriers that constitute the signal for all of the available OFDM/OFDMA symbols. The number of used carriers depends on the FFT size as well as the type of permutation used on the zone of interest.

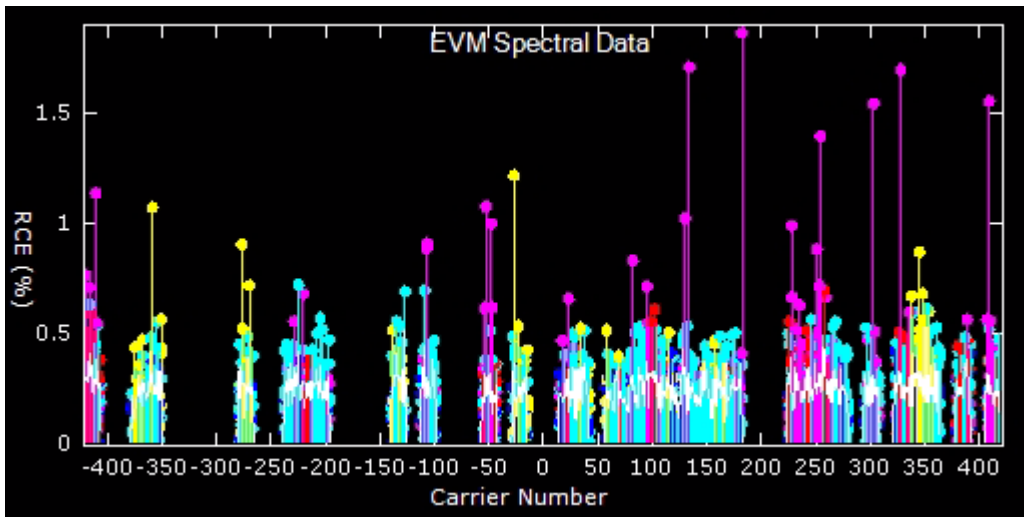


Figure 2-12. EVM Spectral Data Viewer

EVM Time Data

This graph offers another way to look at the EVM variation. This graph represents OFDM/OFDMA symbols on the x-axis and RCE/EVM on the y-axis. This allows the user to see the EVM changes that the system experiences as the transmission progresses from one symbol to the next.

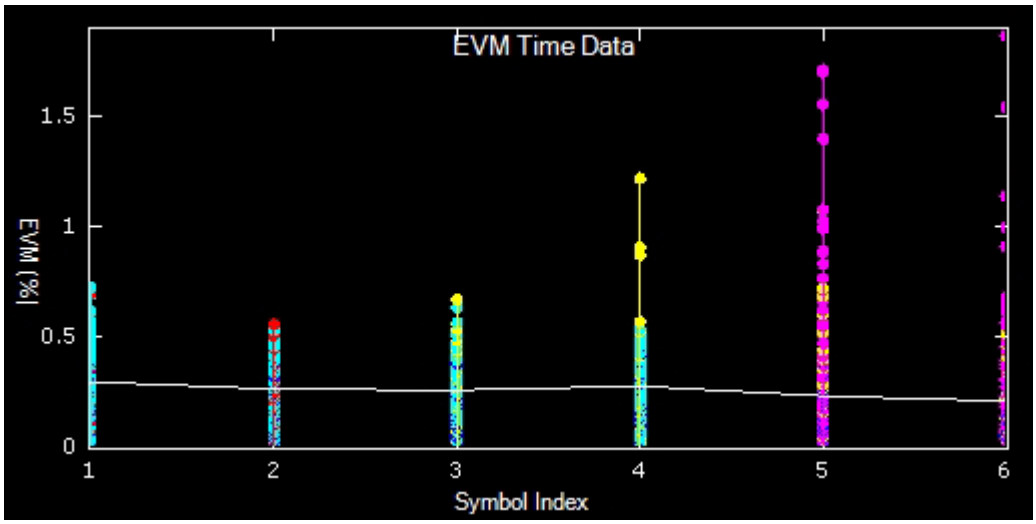


Figure 2-13. EVM Time Data Viewer

Power Spectral Density (PSD)

The PSD is of the Received Time Signal, which has a duration of two Frame Lengths from the trigger point. The graph shows the power distribution among various carriers within the signal. The graph also allows you to see how the signal energy drops at the outer edges of the signal bandwidth.

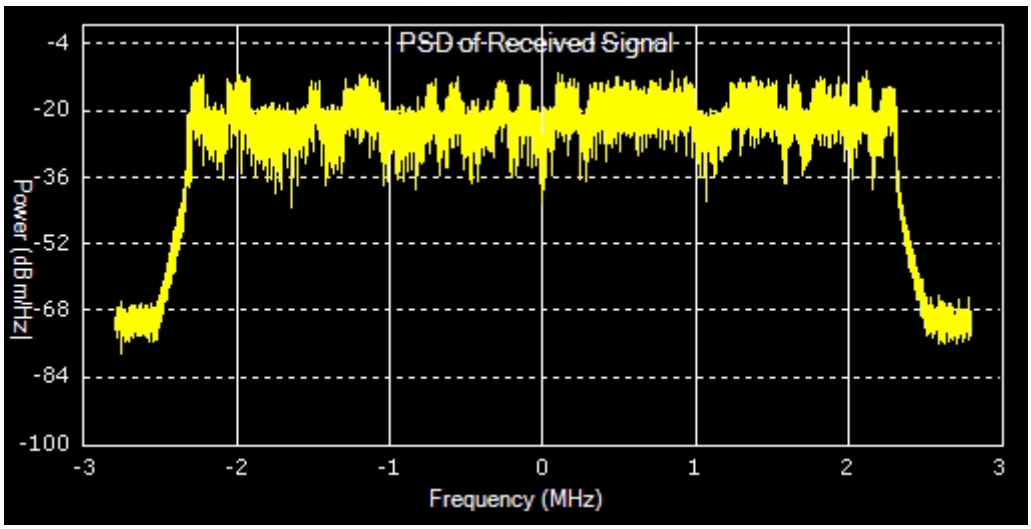


Figure 2-14. PSD of Received Signal Viewer

Signal vs. Time

This graph shows the signal power as a function of time. The x-axis represents time while the y-axis represents the power of the sampled signal. A point on the graph represents the signal power at that point in time.

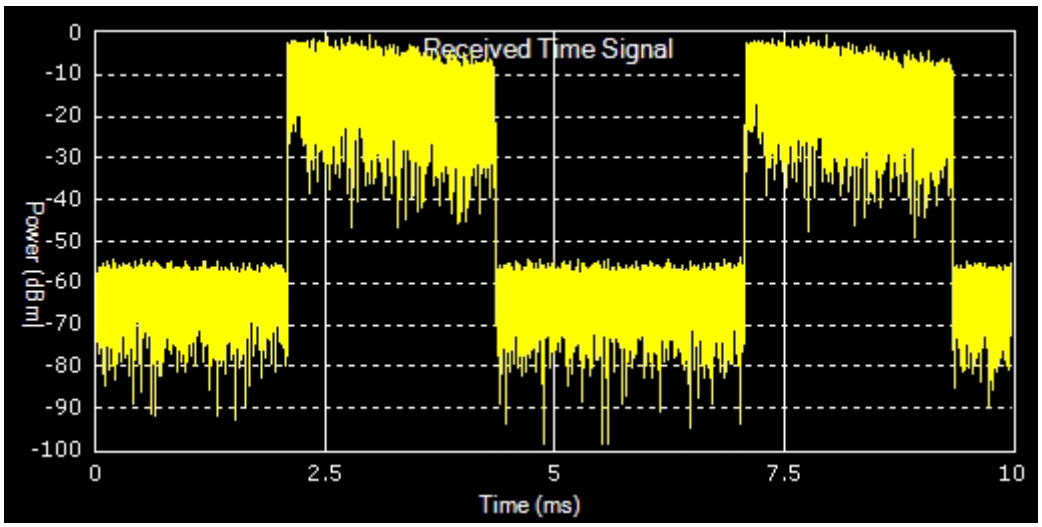


Figure 2-15. Received Time Signal Viewer

Spectral Flatness

This graph shows the power difference of individual carriers with respect to the average signal power. The x-axis represents the active carriers while the y-axis represents the power difference with respect to the average power.

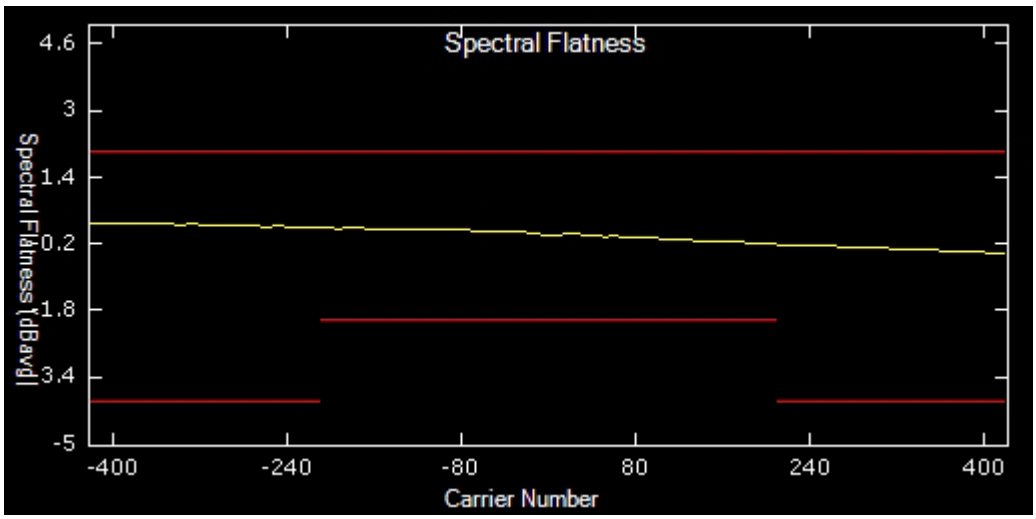


Figure 2-16. Spectral Flatness Viewer

Adjacent Channel Spectral Flatness

This graph represents the relative amplitude difference between adjacent carriers. The x-axis represents the number of adjacent carrier blocks (number of used carriers minus one) and the y-axis represents the absolute amplitude difference between adjacent carriers.

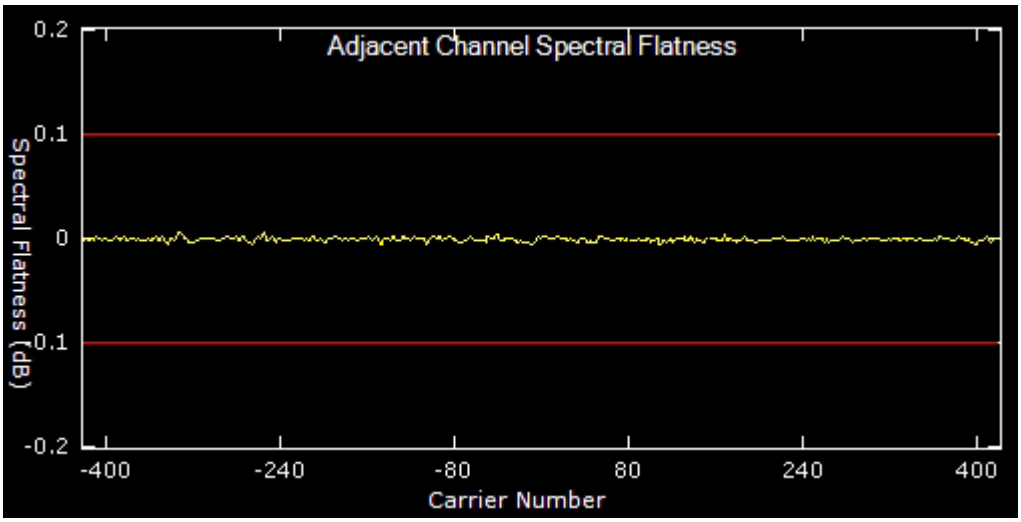


Figure 2-17. Adjacent Channel Spectral Flatness Viewer

Summary Data for OFDM

Summary data for OFDM offers numerical data as described below:

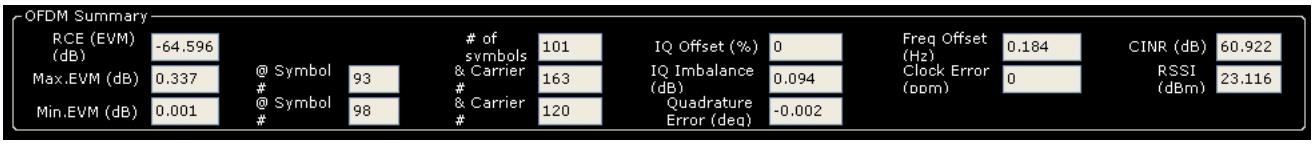


Figure 2-18. Summary Data for OFDM

- **RCE EVM (dB):** Overall RMS EVM
- **Max. EVM (dB) x.xx @ Symbol # & Carrier #:** Provides the location in terms of the OFDM symbol number and carrier number for the symbol with highest EVM
- **Min. EVM (dB) x.xx @ Symbol # & Carrier #:** Location in terms of the OFDM symbol number and carrier number for the symbol with lowest EVM
- **# of sym:** Number of symbols detected
- **IQ Offset (%), IQ Imbalance (dB), and Quadrature Error (deg):** Measure of the various IQ modulator section impairments
- **Freq Offset (Hz):** Carrier frequency offset in Hz
- **Clock Error (ppm):** Difference in the clock rate between the transmitter and the receiver
- **CINR (dB):** Carrier to interference and noise ratio in dB computed according to the definition in the IEEE 802.16 standard
- **RSSI (dBm):** Received Signal Strength Indicator in dBm computed according to the definition in the IEEE 802.16 standard

Summary Data for OFDMA

Summary data for OFDMA offers numerical data as described below:

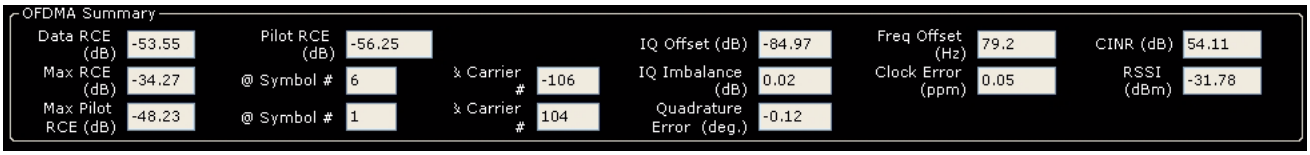


Figure 2-19. Summary Data for OFDMA

- **Data RCE (dB):** RMS RCE/EVM for the data symbols
- **Pilot RCE (dB):** RMS RCE/EVM for the pilot symbols
- **Max RCE (dB) x.xx @ Symbol # & Carrier #:** location in terms of the OFDMA symbol number and carrier number for the data symbol with the highest EVM
- **Max Pilot RCE (dB) x.xx @ Symbol # & Carrier #:** Location in terms of the OFDMA symbol number and carrier number for the pilot symbol with the highest EVM
- **IQ Offset (dB), IQ imbalance (dB), and Quadrature Error (deg.):** Measure of the various IQ modulator section impairments
- **Freq Offset (Hz):** Carrier frequency offset in Hz
- **Clock Error (ppm):** Difference in the clock rate between the transmitter and the receiver
- **CINR (dB):** Carrier to interference and noise ratio in dB computed according to the definition in the IEEE 802.16 standard
- **RSSI (dBm):** Received Signal Strength Indicator in dBm computed according to the definition in the IEEE 802.16 standard

Viewer Properties

The Viewer Properties dialog is selected via right clicking on a viewer or by selecting the Viewer Properties button from the toolbar, and then clicking on a viewer. This dialog allows you to select the type of viewer and to select a variety of graph properties as shown below:

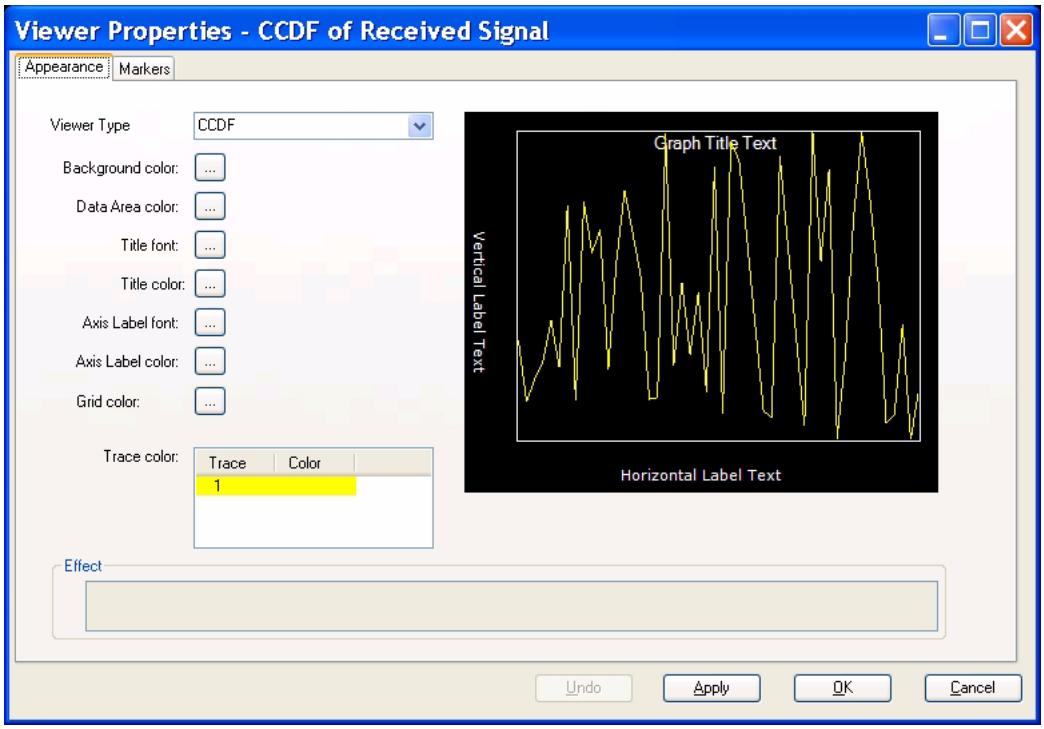


Figure 2-20. Viewer Properties Appearance Tab

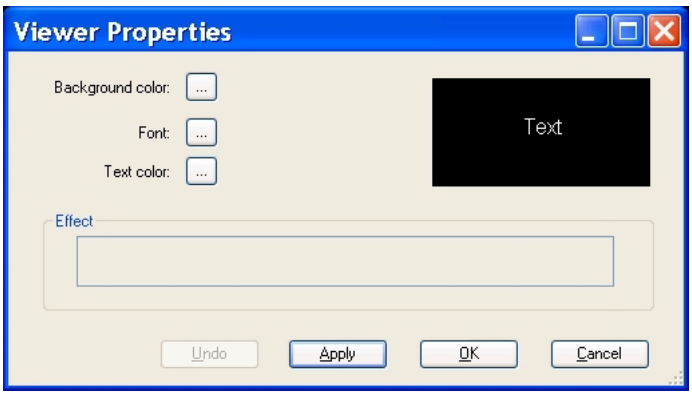


Figure 2-21. Summary Viewer Properties (displayed for summary viewers)

After making the desired selections, press the apply button to immediately apply the changes to the chosen viewer.

Note: Pressing the Apply button the first time enables the Undo button. There are multiple levels of Undo.

The Effect window provides a textual description of the function of the button that the cursor is currently over.

Marker Properties

Markers are small icons that are anchored to some aspect of the data. They tag that data and provide visual (and numerical) feedback about some elements of the data.

Adding Markers

Markers are created and placed by one of two methods:

1. With the Marker tool selected from the toolbar, left click or touch on the desired location for the marker. A marker then appears at the pointed location.
2. With the Properties tool selected from the toolbar, left click or touch on the data viewer. The Viewer Properties dialog (below) appears.

Note: Right mouse clicking on a viewer also opens the Viewer Properties dialog.

Press the "New Marker" button to add a new marker to the marker list.

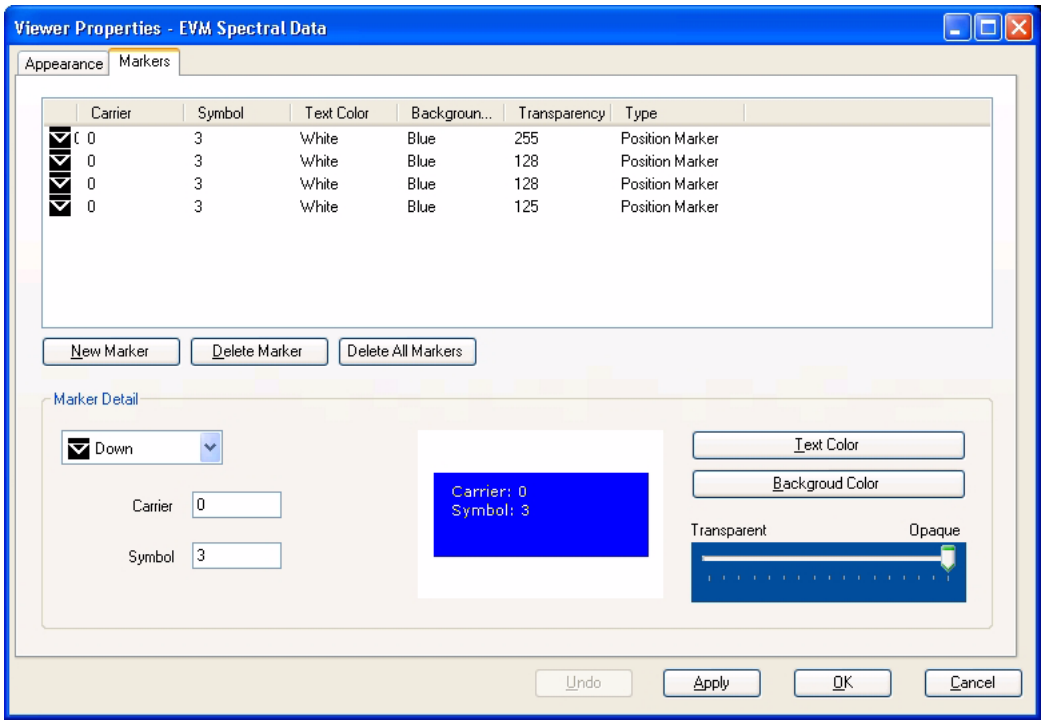


Figure 2-22. Viewer Properties Marker Tab

Editing Markers

To edit a new or existing marker, select the marker from the marker list. Then, in the Marker Detail area, select the marker's shape, adjust the marker transparency, and enter the marker value of where the marker should be placed. The new settings take affect when the "Apply" button is clicked.

Deleting Markers

Markers can be deleted by dragging them off of the screen or by opening the Viewer Properties dialog and deleting them using the "Delete Marker" button found on the Marker tab. Delete All Markers deletes all of the markers on the current viewer.

Status Bar

The Anritsu SignalLab status bar provides real-time status of what function the application is currently performing.

Figure 2-23. Anritsu SignalLab Status Bar

2-4 Analysis Properties Editor

Figure 2-24 shows SignalLab's Analysis Properties Editor.

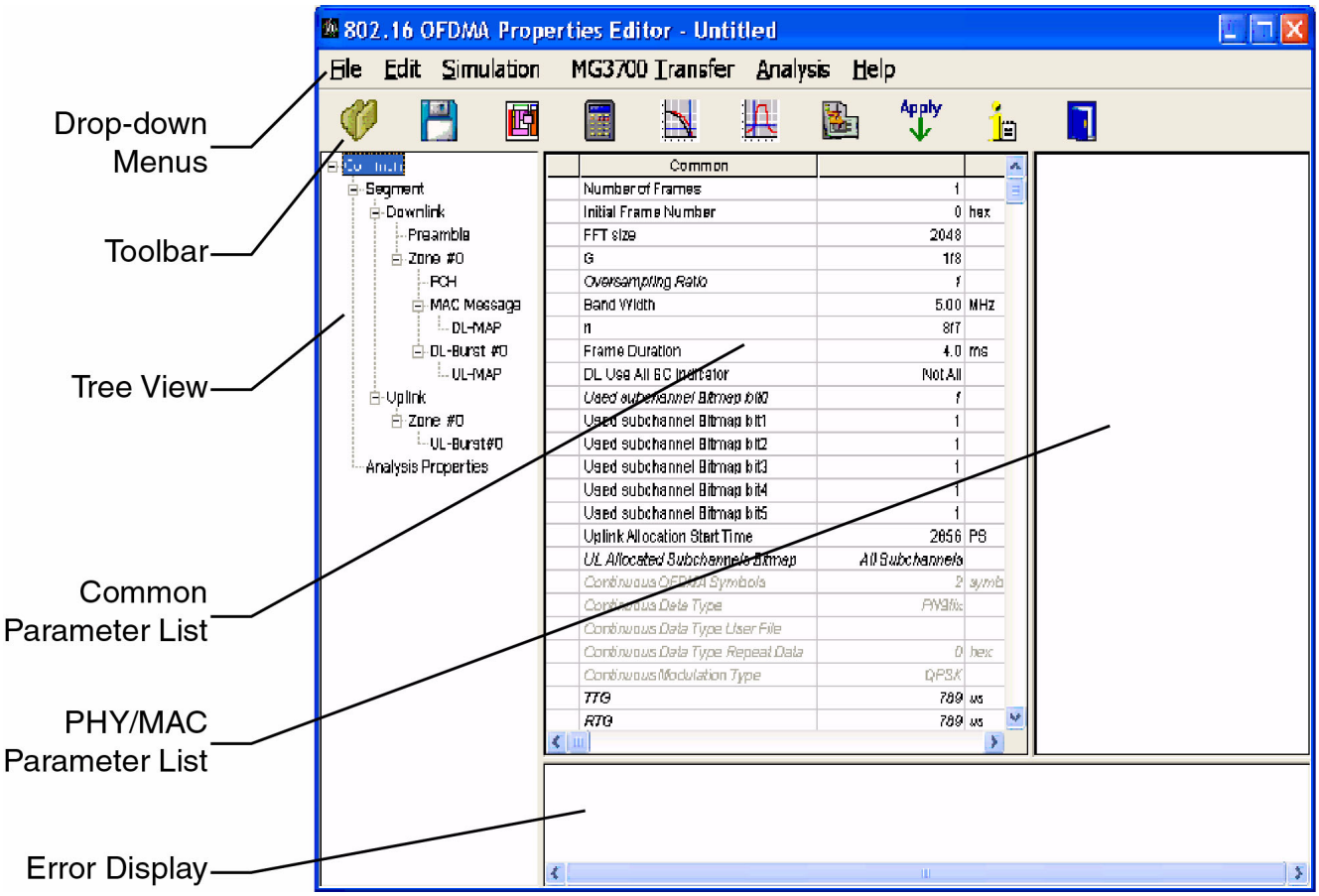


Figure 2-24. Properties Editor

The basic operations of the main screen are as follows:

- The window can be maximized, minimized, expanded, and reduced.
- For the fields of the tree view, common parameter list, PHY/MAC parameter list, and error display, splitting position can be changed by dragging their boundaries.
- The left-most symbol of each item in the tree view is "[-]" when the integrated items are open, or "[+]" when they are closed. The state can be changed by clicking on the symbol.
- The items in italic cannot be changed. These items are automatically set. The state of each item may change depending on the setting for other items.
- The grayed out items indicate the parameters not related to the generated waveforms in the current setting and cannot be changed. The state of each item may change depending on the setting for other items.

Drop-down Menus

File Menu

The File menu contains the following items:

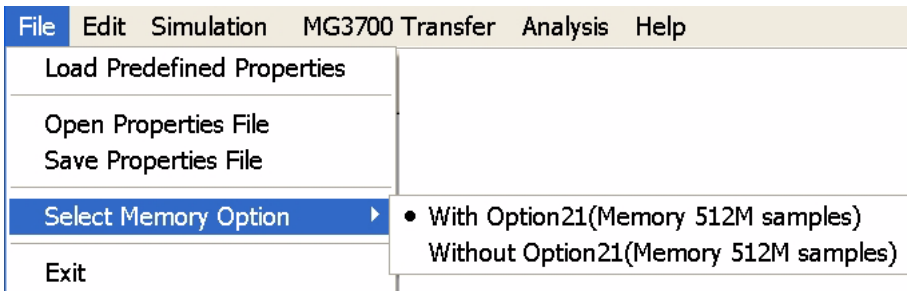


Figure 2-25. File Menu

- **Load Predefined Properties:** Loads factory generated parameter files or files that were pre-defined and saved by the Save Parameter File menu. These files can be used as starting point for creating your own files or for learning about the features of the product.
- **Open Properties File:** Loads a selected parameter file. When the parameter file is loaded, the settings from when it was saved are recovered.
- **Save Properties File:** Saves the current setting parameters to a file.
- **Select Memory Option:** Select whether to enable/disable the ARB memory expansion option 512Msamples for the MG3700A. Greater waveform patterns can be generated when "With Option21(Memory 512M samples)" is selected. If the ARB memory expansion option 512M samples is not installed in the MG3700A, the generated waveform pattern may not be able to be used. When "Without Option21(Memory 512M samples)" is selected, the parameter setting is restricted so that the size of the waveform pattern to be generated does not exceed 256M samples.
- **Exit:** Exits the Properties Editor.

Edit Menu

The Edit menu contains the following items (OFDMA only):

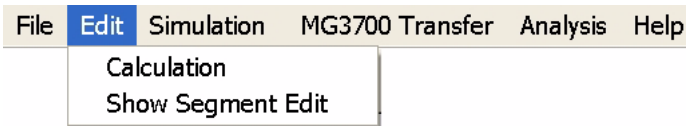


Figure 2-26. Edit Menu

- **Calculation:** Generates waveform patterns. See "Calculation" on page 2-32.
- **Show Segment Edit:** Displays the Segment Editor. See "Segment Editor" on page 2-27.

Simulation Menu

The Simulation menu contains the following items (OFDMA only):

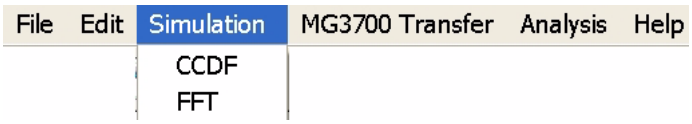


Figure 2-27. Simulation Menu

- **CCDF:** Displays the CCDF Graph Monitor. In this screen, the CCDF of the generated waveform pattern is displayed in a graph. See "CCDF Graph Monitor" on page 2-34.
- **FFT:** Displays the FFT Graph Monitor. In this screen, the FFT-processed spectrum of the generated waveform pattern is displayed in a graph. See "FFT Graph Monitor" on page 2-35.

MG3700 Transfer Menu

The MG3700 Transfer menu contains the following items:

Figure 2-28. Transfer Setting Menu

- **Transfer Setting Wizard:** Displays the Transfer Setting Wizard screen. In this screen, a series of operations including connection between PC and the MG3700, waveform pattern transferring to the MG3700 internal hard disk, waveform pattern loading from the hard disk to an arbitrary waveform memory, and playing the pattern from waveform memory are performed. See "Transfer Wizard" on page 2-36.
- **Transfer Panel:** Initially displays an MG3700 connection dialog. If connection to an MG3700 signal generator is established, opens the Transfer and Settings Panel. See "Transfer and Setting Panel" on page 2-38.

Analysis Menu

The Analysis menu contains the following item:

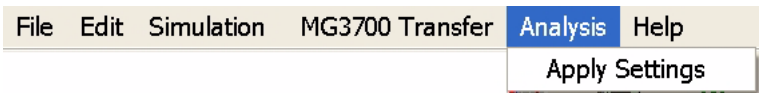


Figure 2-29. Transfer Setting Menu

- **Apply Settings:** Applies the current signal configuration to the SignalLab analysis.

Help Menu

The Help menu contains the following items:

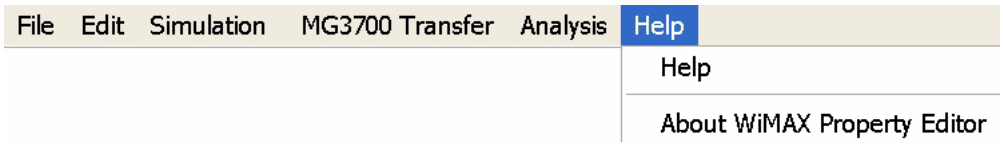


Figure 2-30. Transfer Setting Menu

- **Help:** Opens the properties editor Help dialog shown below:

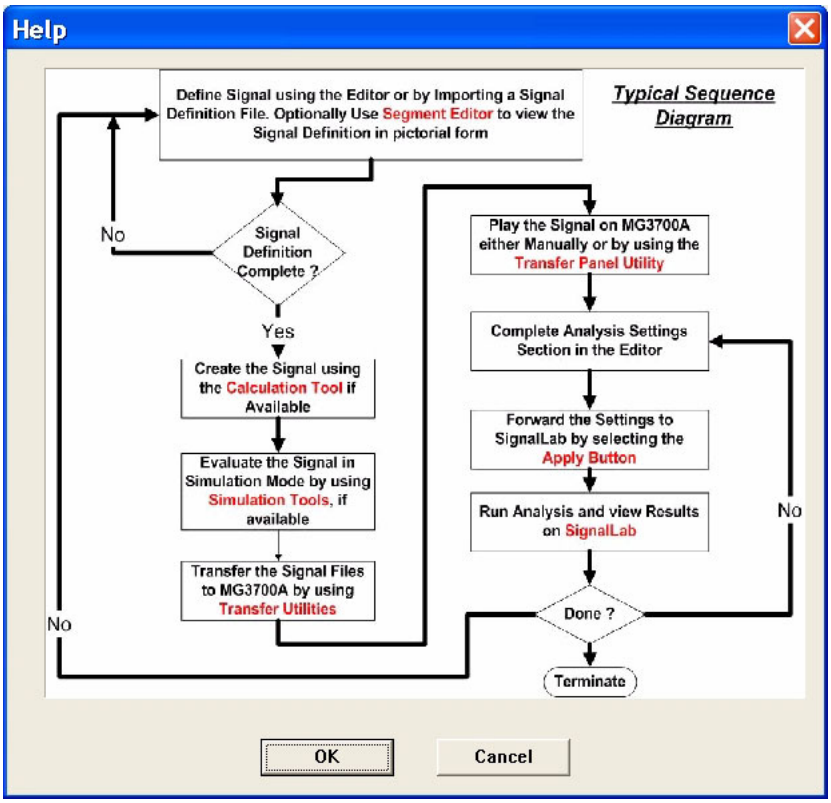


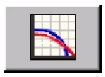
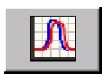
Figure 2-31.

- **About WiMAX Property Editor:** Opens an about dialog with information about the WiMAX Properties Editor.

Toolbar

The Properties Editor toolbar features the following buttons:

Table 2-2. Properties Editor Toolbar

Button	Function
	**Open File Button:** Loads a selected parameter file. When the parameter file is loaded, the settings from when it was saved are recovered.
	**Save Parameter File:** Saves the current setting parameters to a file.
	**Show Segment Edit Button:** Shows the OFDMA Segment Editor. See “Segment Editor” on page 2-27 for details on the Segment Editor.
	**Calculation Button:** Generates OFDMA waveform patterns. See “Calculation” on page 2-32.
	**CCDF Graph Monitor Button:** Displays the CCDF Graph Monitor for the OFDMA signal type. In this screen, the CCDF of the generated waveform pattern is displayed in a graph. See “CCDF Graph Monitor” on page 2-34.
	**FFT Graph Monitor Button:** Displays the FFT Graph Monitor for the OFDMA signal type. In this screen, the FFT-processed spectrum of the generated waveform pattern is displayed in a graph. See “FFT Graph Monitor” on page 2-35.
	**Transfer Setting Button:** Opens the Choose Transfer Application dialog to select between the Transfer Wizard or Transfer Panel applications available in SignalLab. See “Transfer and Setting Panel” on page 2-38 for more information.
	**Apply Button:** Applies the current configuration to the SignalLab analysis.
	**Information Button:** Opens an informational flow chart.
	**Exit Button:** Exits the Analysis Properties Editor.

Parameter Tree

Each signal analysis type features a unique parameter tree view described below.

OFDMA

The PHY/MAC parameter list shows the parameter list for the item selected in the tree view. The tree view displays the items that belong to the segment to be created in the hierarchal structure. Although Multi-Path is displayed under Segment, this function is not supported in the current version.

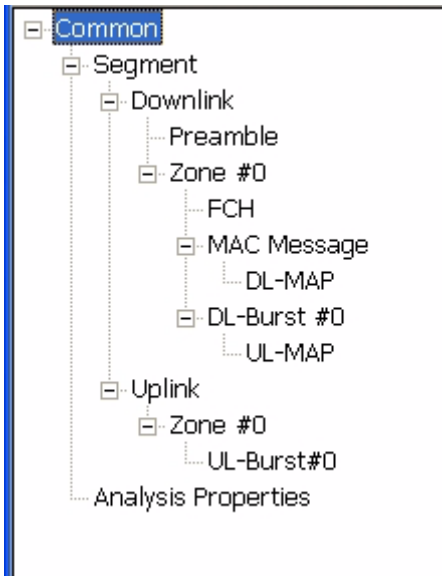


Figure 2-32. Typical OFDMA Tree View

Menu items that are related to the parameter item of focus are displayed in a pop-up menu by right-clicking on each parameter item. From the pop-up menu, items can be added or deleted. The pop-up menu functions are described below:

- **Add DCD:** Adds a DCD. This menu item can be selected only by right-clicking Downlink Burst. It cannot be selected if the DCD already exists in the tree.
- **Delete DCD:** Deletes a DCD. This menu item can be selected only by right-clicking DCD.
- **Add UCD:** Adds a UCD. This menu item can be selected only by right-clicking Downlink Burst. It cannot be selected if the UCD already exists in the tree.
- **Delete UCD:** Deletes a UCD. This menu item can be selected only by right-clicking UCD.
- **Add Downlink:** Adds a Downlink. This menu item can be selected only by right-clicking Segment. It cannot be selected if the Downlink already exists in the tree.
- **Delete Downlink:** Deletes a Downlink. This menu item can be selected only by right-clicking Downlink.
- **Add Uplink:** Adds an Uplink. This menu item can be selected only by right-clicking Segment. It cannot be selected if the Uplink already exists in the tree.
- **Delete Uplink:** Deletes an Uplink. This menu item can be selected only by right-clicking Uplink.
- **Add Preamble:** Adds a Preamble. This menu item can be selected only by right-clicking Downlink. It cannot be selected if the Preamble already exists in the tree.
- **Delete Preamble:** Deletes a Preamble. This menu item can be selected only by right-clicking Preamble.
- **Add FCH:** Adds an FCH at the beginning of a frame. This menu item can be selected only by right-clicking Zone#0 of Downlink. It cannot be selected if the FCH already exists in the tree.
- **Delete FCH:** Deletes an FCH. This menu item can be selected only by right-clicking FCH.
- **Add MAC Message:** Adds a MAC message to the Zone#0 of a Downlink. This menu item can be selected only by right-clicking Zone#0 of Downlink. It cannot be selected if the MAC Message already exists in the tree.

- **Delete MAC Message:** Deletes a MAC Message. This menu item can be selected only by right-clicking MAC Message.
- **Add Zone:** Adds a Zone. This menu item can be selected only by right-clicking Downlink or Uplink. The Permutation of the Zone immediately after the addition is PUSC. Up to eight Zones can be added for each of Uplink and Downlink.
- **Copy Zone:** Adds a copy of the selected Zone. The number of the added Zone is the smallest among the unused Zone numbers.
- **Delete Zone:** Deletes the selected Zone. Delete Zone cannot be selected for the Zone#0 of Downlink and Uplink.
- **Add Burst:** Adds a Burst to the selected Zone. This menu item can be selected only by right-clicking Zone. The number of the added Burst is the smallest among the unused Burst numbers in the same Zone. Up to 16 Bursts can be added to one Zone.
- **Copy Burst:** Adds a copy of the selected Burst. The number of the added Burst is the smallest among the unused Burst numbers.
- **Delete Burst:** Deletes the selected Burst. Note that Burst deletion is impossible if only one Burst is added to the Zone.
- **Add MAC PDU:** Adds a MAC PDU to the selected Burst. This menu item can be selected only by right-clicking Burst. The number of the added MAC PDU is the smallest among the unused MAC PDU numbers in the same Burst. Up to 32 MAC PDUs, including DCD and UCD, can be added to one Burst.
- **Delete MAC PDU:** Deletes the selected MAC PDU.
- **Copy MAC PDU:** Adds a copy of the selected MAC PDU. The number of the added MAC PDU is the smallest among the unused MAC PDU numbers in the same Burst.
- **Add DL-MAP:** This menu item can be selected only by right-clicking MAC Message. It cannot be selected if the DL-MAP already exists in the tree. The DL-MAP is added immediately after the FCH. If no FCH exists, it is added to the beginning of the frame.
- **Delete DL-MAP:** Deletes a DL-MAP. This menu item can be selected only by right-clicking DL-MAP.
- **Add UL-MAP:** Adds an UL-MAP. This menu item can be selected only by right-clicking Burst#0 of Zone#0 of Downlink. DL-MAP must exist in the MAC Message and DL-MAP Type must be set to Compressed DL-MAP before adding UL-MAP to MAC Message. It cannot be selected if the UL-MAP already exists in the tree view.
- **Delete UL-MAP:** Deletes an UL-MAP. This menu item can be selected only by right-clicking UL-MAP.

OFDM

The OFDM parameter list shows the parameter list for the item selected in the tree view. The tree view displays the items that belong to the segment to be created in the hierarchal structure.

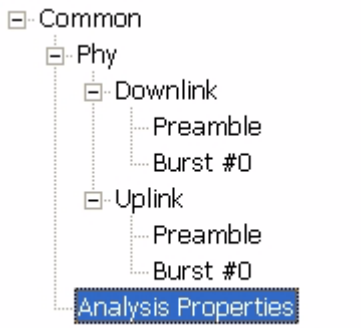


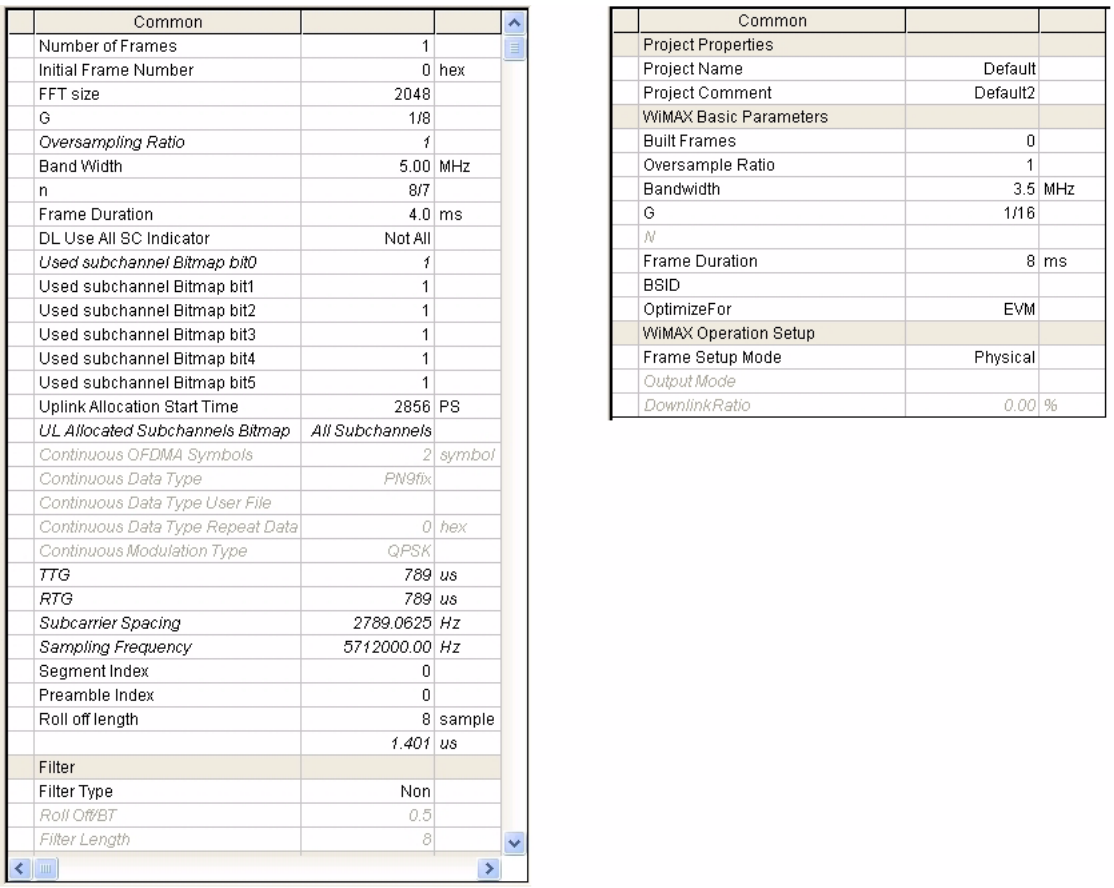
Figure 2-33. Typical OFDM Tree View

Menu items are displayed in a pop-up menu by right-clicking on each parameter item. From the pop-up menu, items can be added or deleted. The pop-up menu functions are described below:

- **Add Downlink:** Adds a Downlink. This menu item can be selected only by right-clicking Segment. It cannot be selected if the Downlink already exists in the tree.
- **Delete Downlink:** Deletes a Downlink. This menu item can be selected only by right-clicking Downlink.
- **Add Uplink:** Adds an Uplink. This menu item can be selected only by right-clicking Segment. It cannot be selected if the Uplink already exists in the tree.
- **Delete Uplink:** Deletes an Uplink. This menu item can be selected only by right-clicking Uplink.
- **Add Preamble:** Adds a Preamble. This menu item can be selected only by right-clicking Downlink. It cannot be selected if the Preamble already exists in the tree.
- **Delete Preamble:** Deletes a Preamble. This menu item can be selected only by right-clicking Preamble.
- **Add FCH:** Adds an FCH only at the beginning of a downlink frame. This menu item can be selected only by right-clicking Zone#0 of Downlink. It cannot be selected if the FCH already exists in the tree.
- **Delete FCH:** Deletes the FCH from the downlink frame.
- **Add Burst:** Adds a burst to either Uplink or Downlink.
- **Delete Burst:** Deletes a burst from either Uplink or Downlink.
- **Add GAP:** Adds a GAP Burst.
- **Add GAP:** Deletes the GAP Burst.

Parameter Lists

The parameter list in the right-most panel corresponds to the item that is currently selected in the parameter tree. The common parameter list is always shown in the center panel. Both the OFDMA and OFDM common parameter lists are shown below:



Common		
Number of Frames	1	
Initial Frame Number	0	hex
FFT size	2048	
G	1/8	
Oversampling Ratio	*1*	
Band Width	5.00	MHz
n	8/7	
Frame Duration	4.0	ms
DL Use All SC Indicator	Not All	
Used subchannel Bitmap bit0	*1*	
Used subchannel Bitmap bit1	1	
Used subchannel Bitmap bit2	1	
Used subchannel Bitmap bit3	1	
Used subchannel Bitmap bit4	1	
Used subchannel Bitmap bit5	1	
Uplink Allocation Start Time	2856	PS
UL Allocated Subchannels Bitmap	*All Subchannels*	
Continuous OFDMA Symbols	*2*	*symbol*
Continuous Data Type	*PN9fix*	
Continuous Data Type User File		
Continuous Data Type Repeat Data	*0*	*hex*
Continuous Modulation Type	*QPSK*	
TTG	*789*	*us*
RTG	*789*	*us*
Subcarrier Spacing	*2789.0625*	*Hz*
Sampling Frequency	*5712000.00*	*Hz*
Segment Index	0	
Preamble Index	0	
Roll off length	8	sample
	1.401	*us*
Filter		
Filter Type	Non	
Roll Off/BT	*0.5*	
Filter Length	*8*	

Common		
Project Properties		
Project Name	Default	
Project Comment	Default2	
WiMAX Basic Parameters		
Built Frames	0	
Oversample Ratio	1	
Bandwidth	3.5	MHz
G	1/16	
N		
Frame Duration	8	ms
BSID		
OptimizeFor	EVM	
WiMAX Operation Setup		
Frame Setup Mode	Physical	
Output Mode		
DownlinkRatio	*0.00*	%

OFDMA **OFDM**

Figure 2-34.

Parameters can be selected and changed with a double left mouse click (or double touch on the screen). This action opens a drop-down selection box with the available parameter values for fields that only accept a value from the parameter list. Other fields allow direct input of the value. The data is validated for correctness and feedback is provided on a pop-up menu if the data is invalid. See Appendix A, “OFDMA Parameter Reference” for information on the available OFDMA parameters and their settings. See Appendix B, “OFDM Parameter Reference” for information on the available OFDM parameters and their settings.

Error Display

The error display area shows error messages that result from inappropriate parameter settings.

2-5 Segment Editor

The Segment Editor (available for OFDMA signal types only) is selected from the Edit menu or the Show Segment Edit toolbar button on the Analysis Properties Editor. The Segment Editor displays the assignment of subchannels and OFDMA symbols to the Zones and Bursts contained in the current signal definition. The vertical axis of the Segment Editor indicates subchannels and the horizontal axis displays the OFDMA symbols.

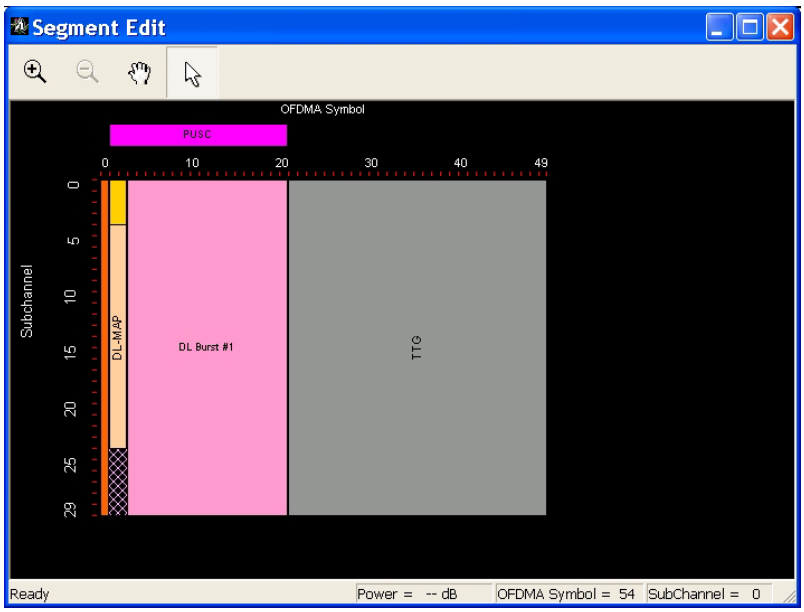


Figure 2-35. Segment Editor

Toolbar

The Segment Editor toolbar features the following buttons:

Table 2-3. Segment Editor Toolbar

Button	Description
	**Scale Up Button:** Click on the Segment Editor screen when this button is selected (depressed) to magnify the Segment Editor screen view.
	**Scale Down Button:** Click on the Segment Editor screen when this button is selected (depressed) to reduce the Segment Editor screen view.
	**Hand Button:** When the Segment Editor view is magnified and the outside part of the figure is hidden out of the window, select this button and then click and drag a part on the Segment Edit screen to move (scroll) the display position in the window. The cursor changes to a four-way arrow cursor when this button is selected (depressed).
	**Select Button:** Select this button to edit the Zones and Bursts displayed in the Segment Editor screen. The cursor changes to an arrow cursor when this button is selected (depressed).

Selecting and Editing Areas

This section describes how to select and change an area, such as Zone and Burst.

To select a Zone or Burst area, select the Select Tool button and then click on the target area. When an area is selected, the four sides of the area become white broken lines (Figure 2-36). If a Zone area is selected, a square is displayed on the center of the left and right sides of the area. If a Burst area is selected, a square is displayed on the center of the four sides of the area.

Figure 2-36. Example of Area Selection (DL-Burst is selected)

When the area to be selected is hidden behind another area, as shown in Figure 2-37 (a part of the DL Burst #1 area is hidden behind the light-blue-shaded part of the DL Burst #0 area), right-click on the area in front of the target area to display the pop-up menu (Figure 2-38).

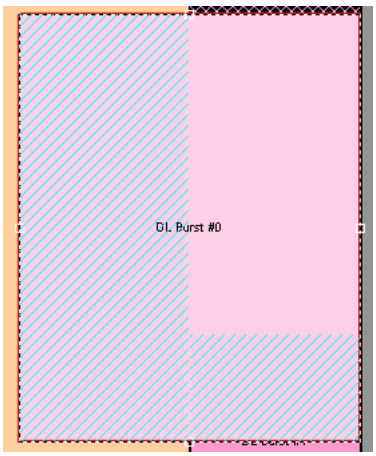


Figure 2-37. Example of Overlapping Areas

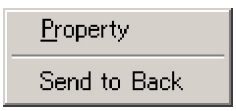


Figure 2-38. Pop-up Menu

Then select “Send to Back” from the pop-up menu to move the covering area to the back of the target area (Figure 2-39). If the target area is placed behind several areas, repeat this operation until the target area moves to the front of the other areas. When the target area comes to the front, click the area to select it.

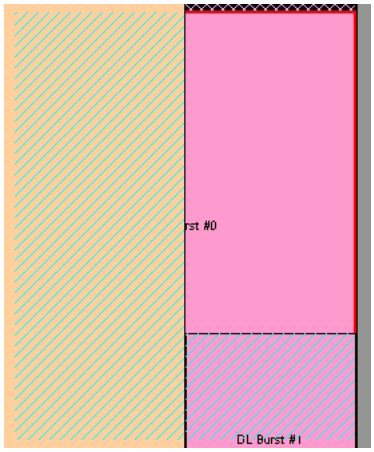


Figure 2-39. After Executing Send to Back

To change the position of a Zone or Burst area, click the target area to change it to the selected state, and then drag it to move the position.

The size of a Zone or Burst area can be changed. First, click the target area to change it to the selected state, and then click and drag a square that is displayed on the center of each side of the selected area (Figure 2-36) to change the area size.

When a Zone area is selected, the number of OFDMA symbols for the Zone can be changed by dragging a square on the center of the left or right side of the area. When a Burst area is selected, the size of the Burst area can be changed in the OFDMA symbol direction (horizontal) by dragging a square on the center of the left or right side of the area, and the size of the Burst area can be changed in the subchannel direction (vertical) by dragging a square on the center of top or bottom side of the area.

Displaying Area Information

The information of an area can be displayed in the Segment Editor by clicking the target area and leaving the cursor on the area for short time. The information of the selected area will then be displayed in a pop-up dialog. The information of an area can also be displayed from the pop-up menu. Right-click the target area to display the pop-up menu, and then select "Property." Figure 2-40 and Figure 2-41 show an information display example for a Zone area and Burst area, respectively. When an area other than the Zone or Burst is selected, the area name is displayed.

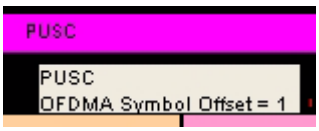


Figure 2-40. Example of Zone Area Information Display

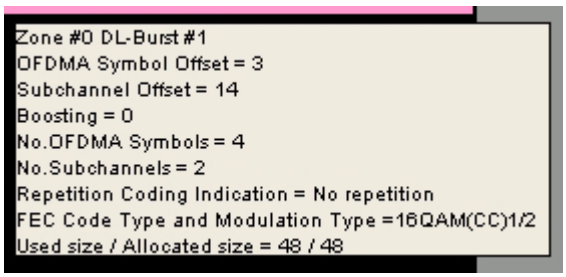


Figure 2-41. Example of Burst Area Information Display

Output Level

The average signal level may fluctuate in each of the OFDMA symbols because the number of subcarriers and the subcarrier amplitude used may vary among the OFDMA symbols in the Mobile WiMAX OFDMA signals. The Analysis Properties Editor generates waveform patterns with the waveform pattern amplitude such that signals are output with the power set for the RF output level of the MG3700A while OFDMA symbols with highest average power are being output.

The figure below illustrates the power/symbol in relation to the MG3700A RF output power level.

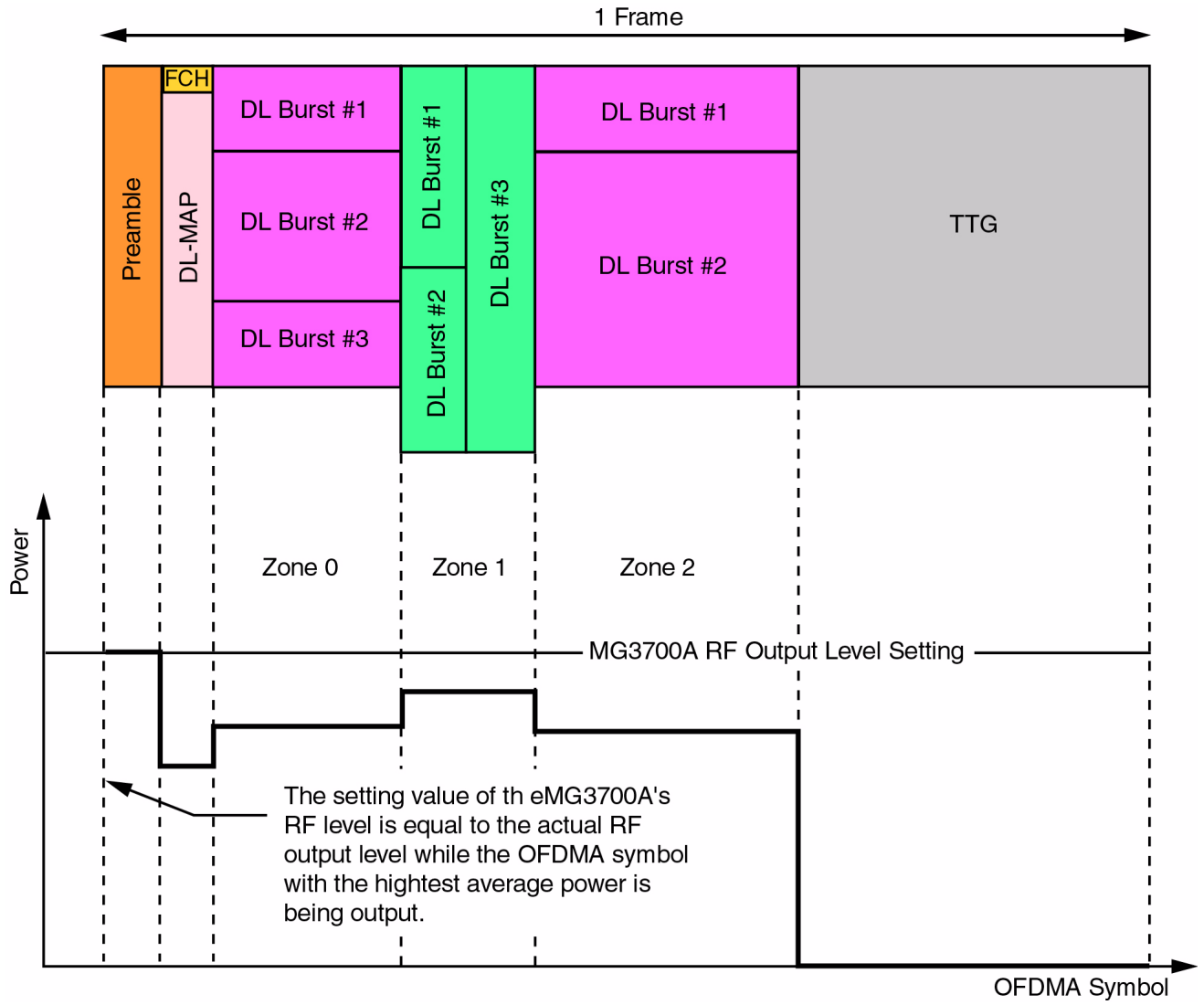


Figure 2-42. Power Per Symbol and MG3700A's RF Output Level

2-6 Calculation

Calculation is available only for the OFDMA signal type and is selected from the Edit menu or from the Calculation toolbar button on the Analysis Properties Editor. When Calculation is selected, a series of dialogs are displayed as described in the following sections.

Export File Dialog

The Export File dialog is displayed before generating the waveform pattern. In this dialog, the output destination folder, package name, file name, and comment for the waveform pattern to be generated can be specified.

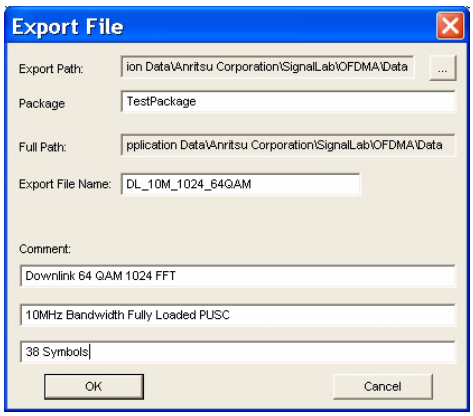


Figure 2-43. Export File Dialog

When the output destination folder selection button is clicked, the Browse for Folder dialog shown below is displayed. Select the output destination folder. If the folder is not specified, the generated waveform patterns are output to the following folder: C:\Documents and Settings\UserName\Local Settings\Application Data\Anritsu Corporation\SignalLab\OFDMA\Data

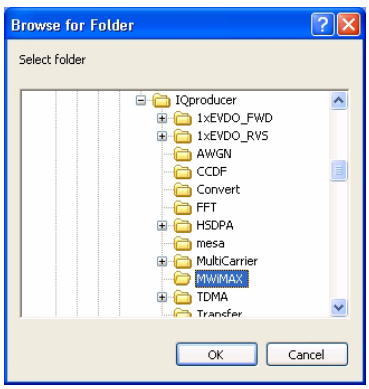


Figure 2-44. Folder Selection Dialog

Only 1-byte alphanumeric characters and the following symbols can be used for a file name:

```
! % & ( ) + = ‘ { } _ - ^ @ [ ]
```

When the waveform pattern output destination folder, package name, file name, and comment are set, click the OK button on the Export File dialog. The Calculation screen is displayed and waveform pattern generation starts.

Note: The output destination folder, package name, and file name must be set to start waveform pattern generation.

Calculation Dialog

The Calculation dialog shown below is displayed while a waveform pattern is being generated. On this dialog, the progress bar is displayed indicating the progress of the waveform pattern generation. The generation of the waveform pattern can be stopped by clicking Cancel. In this case, the display returns to the Analysis Properties Editor main display.

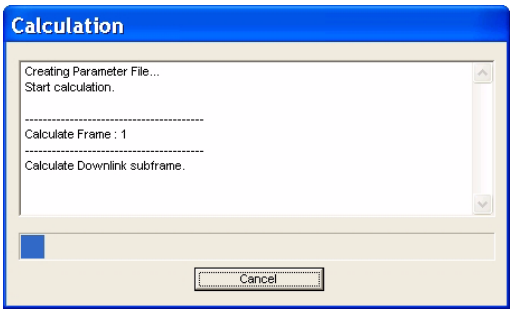


Figure 2-45. Calculation Dialog

When the waveform pattern generation is complete, the generation process in the Calculation dialog displays "Calculation Completed." The Cancel button changes to OK, as shown below:

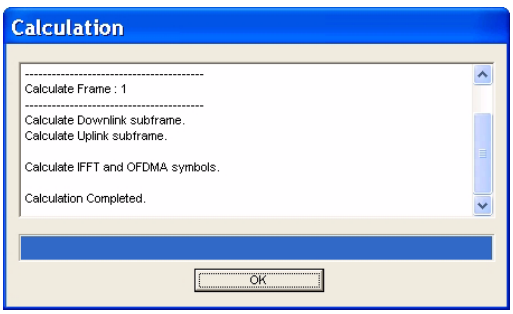


Figure 2-46. Calculation Dialog (when waveform generation is complete)

Press OK to return to the Analysis Properties Editor main display.

2-7 Simulation

Simulation is only available when the OFDMA signal analysis type is selected in SignalLab and after a waveform pattern is generated as described in Section 2-6. For a procedure on generating a waveform pattern, refer to Section 3-4. Simulation offers a CCDF Graph Monitor and an FFT Graph Monitor.

CCDF Graph Monitor

The Complementary Cumulative Distribution Function (CCDF) of a waveform pattern generated by a signal generation application can be displayed. In a CCDF graph, the signal peak power/average power is displayed on the x-axis; the cumulative probability that the peak power/average power of the signal is equal to or less than the value on the x-axis is displayed on the y-axis. The distribution of peak powers of various modulation signals can be displayed. This is useful for estimating the output waveform distortion characteristics when a generated signal is output from the MG3700A into a power amplifier or other device.

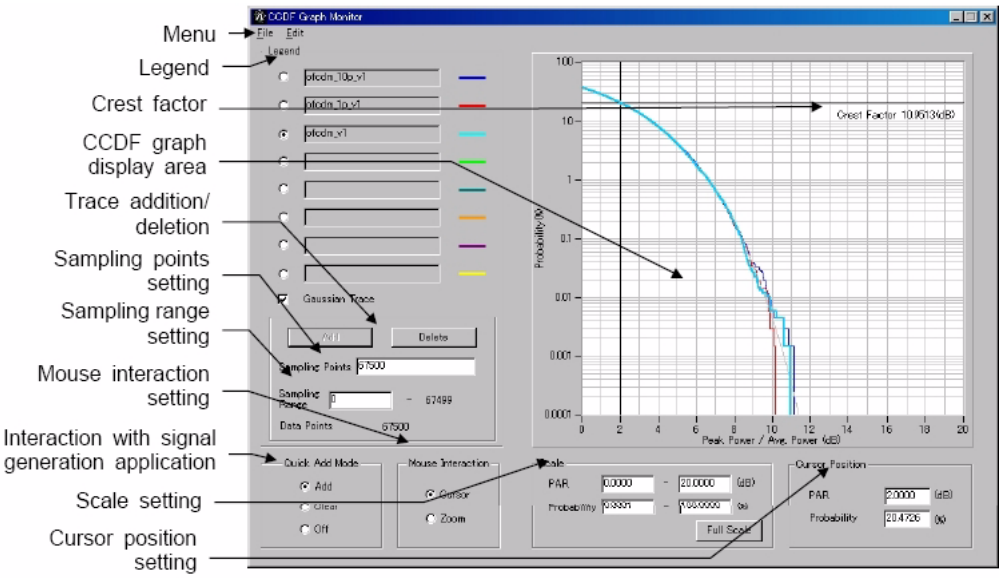


Figure 2-47. CCDF Graph Monitor

Description of items in the CCDF Graph Monitor:

- **Menu:** The menu lets you add a trace, print the graph, copy the screen, save the graph data to a CSV file format, and close the CCDF graph monitor.
- **Legend:** Displays the file name of the added traces and allows selection of a trace to be added or deleted.
- **CCDF graph display area:** An CCDF graph is displayed in this area. Cursor move and graph zoom-in/-out can be executed.
- **Crest Factor:** Displays the ratio between the peak value and RMS value of the selected trace.
- **Add or Delete (trace addition/deletion):** Traces selected in the legend can be added or deleted with these controls.
- **Sampling Points:** Sets the number of sampling points for the selected trace.
- **Sampling Range:** Sets the sampling range for the selected trace.
- **Cursor Position:** Set the cursor position in the CCDF graph display by entering a value in either the PAR or Probability text box.
- **Quick Add Mode (interaction with signal generation application):** The Quick Add Mode is not functional in this release.
- **Scale setting:** Sets the scale of the x- and y-axes in the CCDF graph display area.
- **Mouse Interaction:** Sets the mouse operation in the CCDF graph display area to either the cursor move function or the zoom-in/-out function.

FFT Graph Monitor

The Fast Fourier Transform (FFT) calculation results for a waveform pattern can be displayed in a graph. The Blackman-Harris window function is used for this display.

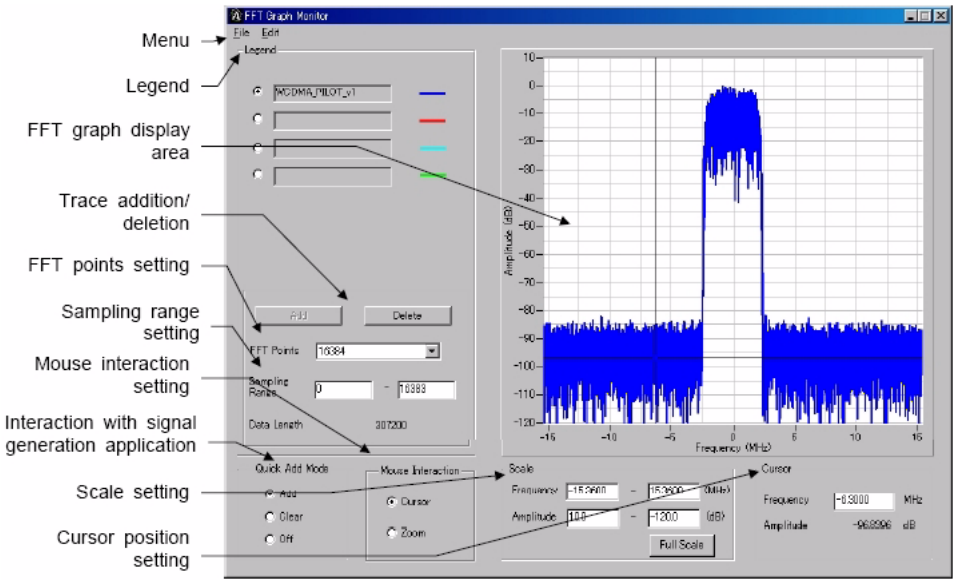


Figure 2-48. FFT Graph Display and Controls

Description of items in FFT Graph Monitor:

- **Menu:** The menu lets you add a trace, print the graph, copy the screen, save the graph data to a CSV file format, and close the FFT Graph Monitor.
- **Legend:** Displays the file name of the added traces and allows selection of a trace to be added or deleted.
- **FFT graph display area:** An FFT graph is displayed in this area. Cursor move and graph zoom-in/-out can be executed.
- **Add or Delete (trace addition/deletion):** Traces selected in the legend can be added or deleted with these controls.
- **FFT Points:** Sets the number of points of the x-axis in the FFT graph display area.
- **Cursor Position:** Set the cursor position in the FFT graph display area by entering a value in the Frequency text box.
- **Quick Add Mode (interaction with signal generation application):** The Quick Add Mode is not functional in this release.
- **Scale setting:** Sets the scale of the x- and y-axes in the FFT graph display area.
- **Mouse Interaction:** Sets the mouse operation in the FFT graph display area to either the cursor move function or the zoom-in/-out function.

2-8 Transfer Wizard

The Transfer Wizard is typically launched from the Transfer Setting button on the Analysis Properties Editor. This opens the Choose Transfer Application dialog shown below:

Figure 2-49. Choose Transfer Application Dialog

After selecting Run Transfer Wizard and pressing OK, the following dialog box appears prompting you for the IP address of the MG3700.

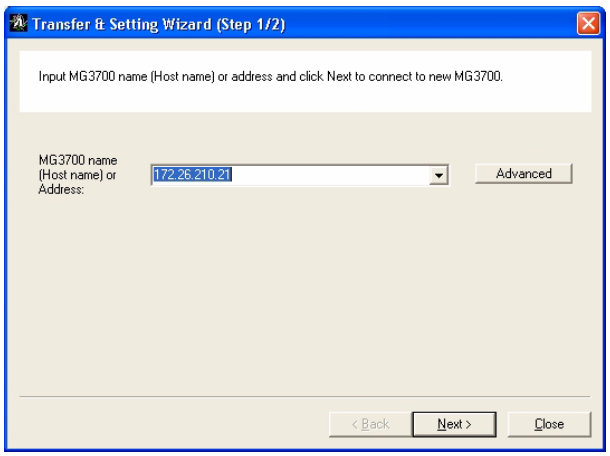


Figure 2-50. Transfer and Setting Wizard (Step 1 of 2)

If the Transfer Wizard successfully connects to the MG3700, the following screen is displayed.

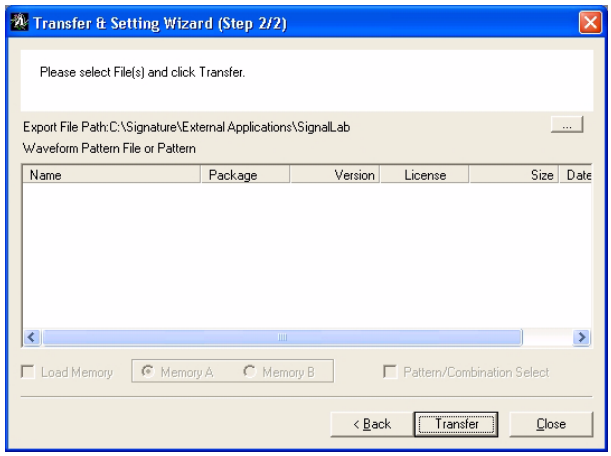


Figure 2-51. Transfer and Setting Wizard (Step 2 of 2)

From this screen, browse to the desired waveform data file, and then select the choices at the bottom of the dialog box to decide which memory bank to load the waveform file into. Also, select to run the pattern by checking Pattern/Combination Select, and then click Transfer.

2-9 Transfer and Setting Panel

The Transfer and Setting Panel is launched from the Transfer Setting button on the Analysis Properties Editor toolbar. This opens the Choose Transfer Application dialog. The following dialog box appears after selecting Run Transfer Panel from the Choose Transfer Application dialog, prompting you for the IP address of the MG3700 signal generator:

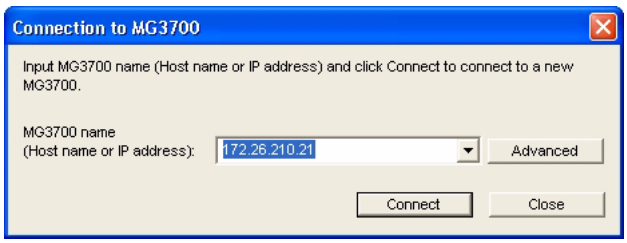


Figure 2-52. Transfer and Setting Panel

Once this information is provided and the Connect button is clicked, SignalLab connects to the signal generator. Selecting Close makes the Transfer & Setting Panel shown below to become active.

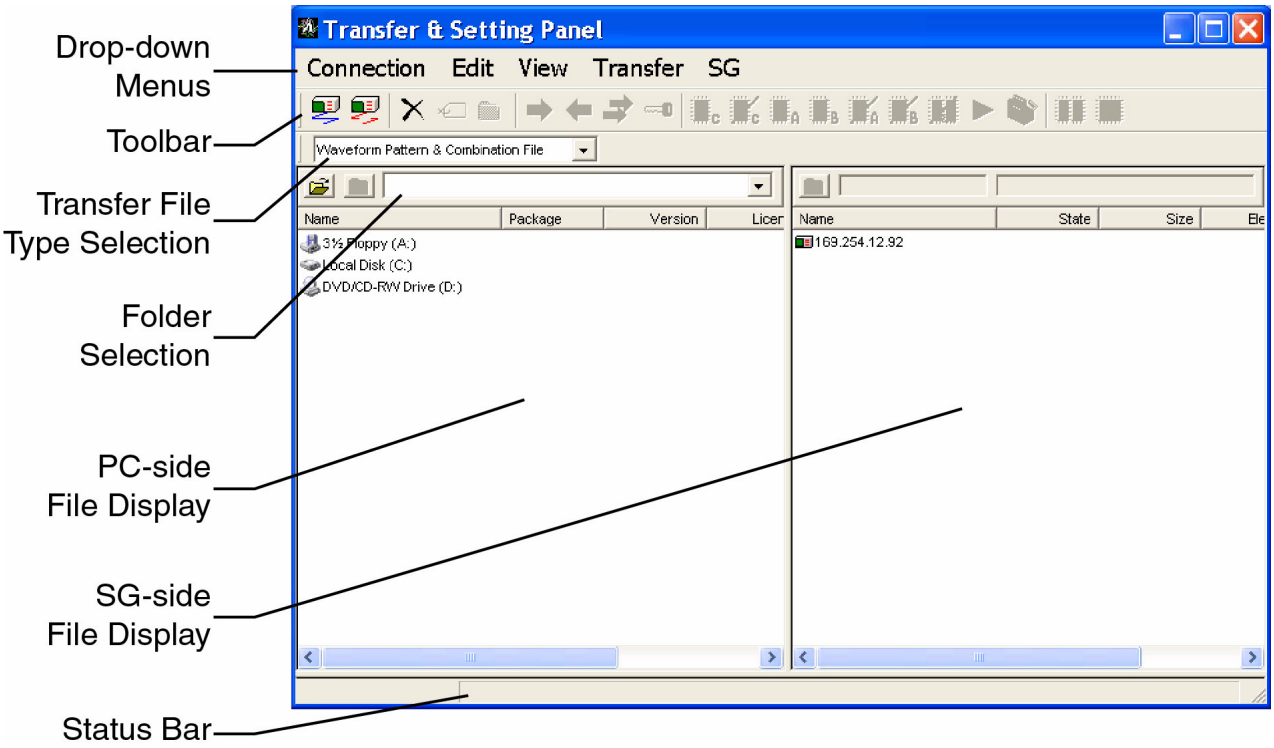


Figure 2-53. Transfer & Setting Panel Screen

The Transfer & Setting Panel main screen consists of drop-down menus, a tool bar, transfer file type selection box, folder selection box, PC-side file display area, SG-side file display area, logs, and status bar.

Right-clicking in the PC-/SG-side file display area opens a pop-up menu.

The following are descriptions of the items in the Transfer & Setting Panel:

- **Drop-down Menus:** Connection/disconnection to the network, termination of Transfer & Setting, deletion of files/folders in the PC side, creation of new folders, updating of file information, file transfer, and loading to memory can be executed
- **Toolbar:** Equivalent functions with various items in the drop-down menus.
- **Transfer File Type Selection:** Selects the type of the file to be transferred via FTP.
- **Folder Selection:** Selects a transfer source/destination folder in the PC.
- **PC-side File Display:** Displays the information of the folders and files in the PC.
- **SG-side File Display:** Displays the information of the folders and files stored in the internal hard disk of the MG3700A.
- **Status Bar:** Displays the free space and total space of the internal hard disk and waveform memories A and B of the current MG3700A mainframe. Nothing is displayed when several MG3700A mainframe units are selected.

Drop-down Menus

Connection Menu

The Connection menu contains the following items:

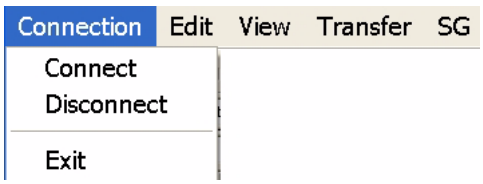


Figure 2-54. Connection Menu

- **Connect:** Connects with the MG3700A mainframe. The Connection dialog box is displayed when this item is selected. The contents of the connected MG3700A are displayed in the SG-side file display area.
- **Disconnect:** Disconnects the connection with the MG3700A currently connected. The Disconnection dialog box is displayed when this item is selected.
- **Exit:** Closes the Transfer & Setting Panel screen.

Edit Menu

The Edit menu contains the following items:

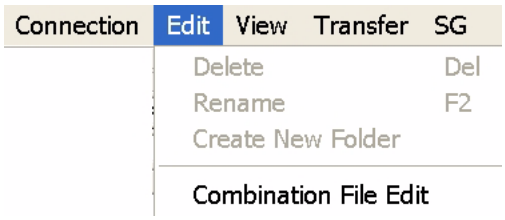


Figure 2-55. Edit Menu

- **Delete:** Opens the Delete dialog for deleting a file/folder selected in the PC-side file display area or a file selected in the SG-side file display area.

  When a PC-side or SG-side file is selected for deletion, the Delete dialog shown below is displayed.

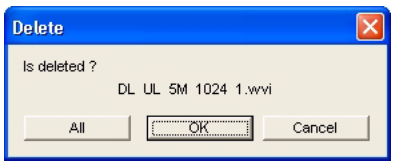


Figure 2-56. Delete Dialog (when deleting a combination file)

- **All:** Deletes all the selected files.
- **OK:** Deletes the selected file. The dialog box appears for each file for confirmation.
- **Cancel:** Cancels the deletion of the selected files.

When a combination file is selected for deletion, the Delete dialog shown below is displayed.

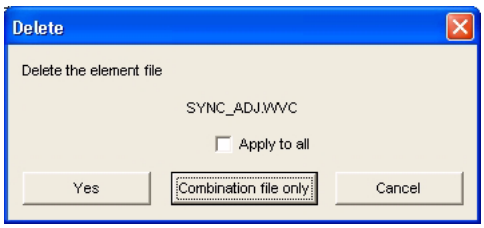


Figure 2-57. Delete Dialog

- **Apply to all checkbox:** The deleting operation will apply to all the selected combination files when this checkbox is selected.
- **Yes:** Also deletes the files that are selected by the selected combination file.
- **Combination file only:** Deletes only the selected combination file.
- **Cancel:** Cancels the deletion of the selected combination file and the corresponding files.

- **Rename:** Change the name of a file/folder in the PC. The name change dialog box is displayed when this item is selected.
- **Create New Folder:** Creates a new folder in the folder currently displayed in the PC-side file display area. The folder name input dialog box is displayed when this item is selected.
- **Combination File Edit:** Opens the Combination File Edit dialog. See “Combination File Edit Dialog” on page 2-54 for more information.

View Menu

The View menu contains the following items:

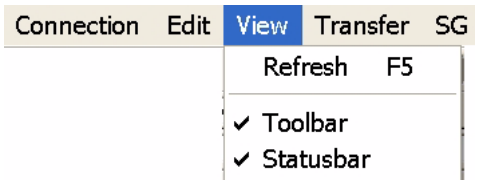


Figure 2-58. View Menu

- **Refresh:** Updates the contents currently displayed in the PC-side file display area and SG-side file display area to the latest information.
- **Toolbar:** Toggles tool bar display/non-display. The tool bar is displayed in the Transfer & Setting Panel screen when a checkmark (v) is added on the left.
- **Status bar:** Toggles status bar display/non-display. The status bar is displayed in the Transfer & Setting Panel screen when a checkmark (v) is added on the left.

Transfer Menu

The Transfer menu contains the following items:

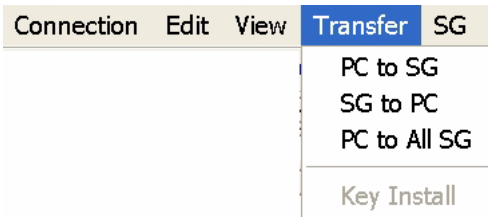


Figure 2-59. Transfer Menu

- **PC to SG:** Transfers files such as waveform pattern selected in the PC-side file display area to the internal hard disk of the MG3700A selected in the SG-side file display area. The transfer destination folder is determined depending on the file type and the package name specified in the waveform pattern. When multiple folders are selected in the PC-side file display area, pressing this button transfers all waveform patterns and combination files in the selected folders. During combination file transfer, all waveform patterns in the folder (excluding subfolders) selected in the combination file are transferred at the same time.
- **SG to PC:** Transfers files selected in the SG-side file display area to the folder selected in the PC-side file display area.
- **PC to All SG:** Transfers files such as waveform pattern selected in the PC-side file display area to the internal hard disks of all the connected MG3700A mainframe units in the SG-side file display area. The transfer destination folder is determined depending on the file type and the package name specified in the waveform pattern.
- **Key Install:** Transfers the license file to install it. When license file installation is completed, the license file in the internal hard disk of the MG3700A is deleted. This function is enabled when an authentication file (extension: .key) is selected in the PC-side file display area after specifying “Waveform Package License File” in the transfer file type selection box.

SG Menu

The SG menu contains the following items:

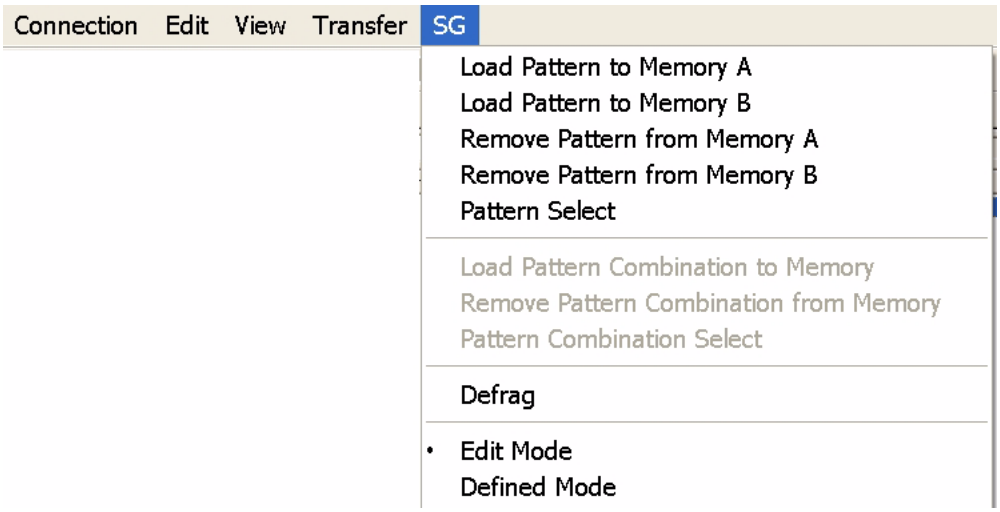


Figure 2-60. SG Menu

- **Load Pattern to Memory A:** Loads the waveform patterns selected in the SG-side file display area to the waveform memory A of the MG3700A.
- **Load Pattern to Memory B:** Loads the waveform patterns selected in the SG-side file display area to the waveform memory B of the MG3700A.
- **Remove Pattern from Memory A:** Removes the waveform patterns selected in the SG-side file display area from the waveform memory A of the MG3700A.
- **Remove Pattern from Memory B:** Removes the waveform patterns selected in the SG-side file display area from the waveform memory B of the MG3700A.
- **Pattern Select, Pattern Combination Select:** Selects a waveform pattern or combination file loaded into the waveform memory A or B in the SG-side file display area as an output waveform pattern. A combination file can only be selected in the Defined mode. The selected waveform pattern or combination file is output from the MG3700A when either of the following conditions is met:
  - When [IQ Source] is [Int] and both [RF Output] and [MOD On/Off] are [On]
    The waveform pattern is output from the RF output.
  - When [IQ Source] is [Int] and [I/Q Output] is [On]
    The waveform pattern is output from the IQ output.
- **Load Pattern Combination to Memory:** Loads the waveform patterns selected in the combination file that is selected in the SG-side file display area to the waveform memory A or B of the MG3700A.
- **Remove Pattern Combination from Memory:** Removes the waveform patterns selected in the combination file that is selected in the SG-side file display area from the waveform memory A or B of the MG3700A.
- **Defrag:** Executes a defragmentation of the waveform memories A and B of the selected MG3700A (re-allocation of files in each memory). Note, however, that defrag is not operated when there is no need to execute defrag or when several MG3700A units are selected.
- **Edit Mode / Defined Mode:** Toggles the waveform pattern output mode for the MG3700A. In the Defined Mode, one of the patterns or combination files loaded in the waveform memory A or B is selected as an output waveform pattern. In the Edit Mode, one output waveform pattern is selected from each waveform memory, and the selected two output waveform patterns are added to be output.

Toolbar

The toolbar provides many of the same functionality as items in the drop-down menus as follows:

Table 2-4. Transfer and Setting Panel Toolbar

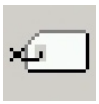
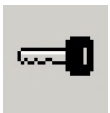
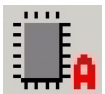
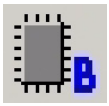
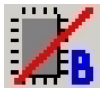
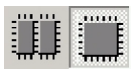
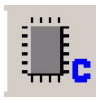
Button	Description
	**Connect Button:** Connects with the MG3700A mainframe. The Connection dialog box is displayed when this item is selected. The contents of the connected MG3700A are displayed in the SG-side file display area.
	**Disconnect Button:** Disconnects the connection with the MG3700A currently connected. The Disconnection dialog box is displayed when this item is selected.
	**Delete Button:** Deletes a file/folder selected in the PC-side file display area or a file selected in the SG-side file display area.
	**Rename Button:** Change the name of a file/folder in the PC. The name change dialog box is displayed when this item is selected.
	**Create New Folder Button:** Creates a new folder in the folder currently displayed in the PC-side file display area. The folder name input dialog box is displayed when this item is selected.
	**PC to SG Button:** Transfers files such as waveform pattern selected in the PC-side file display area to the internal hard disk of the MG3700A selected in the SG-side file display area.
	**SG to PC Button:** Transfers files selected in the SG-side file display area to the folder selected in the PC-side file display area.
	**PC to All SG Button:** Transfers files such as waveform pattern selected in the PC-side file display area to the internal hard disks of all the connected MG3700A mainframe units in the SG-side file display area.
	**Key Install Button:** Transfers the license file to install it.
	**Load Pattern to Memory A Button:** Loads the waveform patterns selected in the SG-side file display area to the waveform memory A of the MG3700A.

Table 2-4. Transfer and Setting Panel Toolbar

Button	Description
	**Load Pattern to Memory B Button:** Loads the waveform patterns selected in the SG-side file display area to the waveform memory B of the MG3700A.
	**Remove Pattern from Memory A Button:** Removes the waveform patterns selected in the SG-side file display area from the waveform memory A of the MG3700A.
	**Remove Pattern from Memory B Button:** Removes the waveform patterns selected in the SG-side file display area from the waveform memory B of the MG3700A.
	**Pattern Select, Pattern Combination Select Button:** Selects a waveform pattern or combination file loaded into the waveform memory A or B in the SG-side file display area as an output waveform pattern. A combination file can only be selected in the Defined mode.
	**Defrag Button:** Executes defrag for the waveform memories A and B of the selected MG3700A (reallocation of files in each memory). Note, however, that defrag is not operated when there is no need to execute defrag or when several MG3700A units are selected.
	**Edit Mode / Defined Mode Button:** Toggles the waveform pattern output mode for the MG3700A.
	**Load Pattern Combination to Memory Button:** Loads the waveform patterns selected in the combination file that is selected in the SG-side file display area to the waveform memory A or B of the MG3700A.
	**Remove Pattern Combination from Memory Button:** Removes the waveform patterns selected in the combination file that is selected in the SG-side file display area from the waveform memory A or B of the MG3700A.
	**Clear Memory Button:** Removes all the waveform patterns loaded into the waveform memories A and B. If a waveform pattern with the same name already exists in the memory, the overwrite confirmation dialog is displayed with the following options: **Yes:** The waveform pattern is loaded in the target memory overwriting the existing waveform pattern in the memory. **No:** The waveform pattern is not loaded, and the subsequent memory load processing is executed as required. **Cancel:** The waveform pattern is not loaded, and the subsequent memory load processing is cancelled.
	**Cancel Button:** The waveform pattern is not loaded, and the subsequent memory load processing is cancelled.

Folder Selection

Select a folder to be displayed in the PC-side file display area with the following selection box:

Figure 2-61. Selecting a Folder

This screen contains a folder selection button, folder move button, and the current folder selection.

- **Folder selection button:** When this button is clicked, the Browse for Folder dialog box is displayed for selecting a folder.

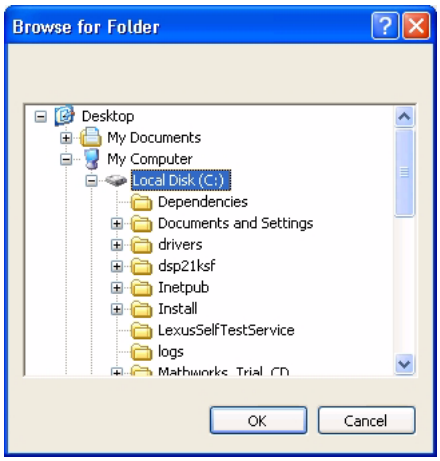


Figure 2-62. Browse for Folder Dialog

- **Folder move up button:** When this button is clicked, the contents of the previous directory are displayed. When this button is clicked in the root directory, the drives connected to the PC are displayed in a list.
- **Current folder box:** The currently selected folder is displayed in this box. Also, the displayed folder can be changed by entering the folder and path name from the keyboard directly. If the entered folder does not exist, an error message appears and the contents of the folder before the change are restored. Click the down button on the right to display a drop-down list, where up to 9 of the last folders are displayed.

Transfer File Type Selection

Select the type of the files to be transferred via FTP from the drop-down list.

Figure 2-63. Selecting Transfer File Type

The following items can be selected from the drop-down list:

- Waveform Pattern & Combination File
- Waveform Package License File
- All File

When Waveform Pattern File or Waveform Package License File is selected, only the corresponding files that can be transferred are displayed in the PC-/SG-side file display areas. When All File is selected, all of the files are displayed.

SG-side File Display Area

The MG3700A units that are currently connected as well as the files corresponding to the file type selected in the transfer file type selection box are displayed in the SG-side file display area on the right field of the Transfer & Setting Panel main display.

Figure 2-64. SG-side File Display Area

The following contents are displayed in the SG-side file display area:

- MG3700A units currently connected: The host names or IP addresses of the MG3700A units currently connected are displayed.
- Folders and files in the internal hard disk of the MG3700A: Double-clicking an IP address associated with an MG3700A displays the folders and files (only files that have the extension of the specified file type) stored in its internal hard disk.
- Information specific to each file type
- Pop-up menu: Right-clicking in the SG-side file display area opens a pop-up menu.

Details of the contents in the SG-side file display area are described below for each transfer file type:

Waveform Pattern and Combination File

The following is displayed when Waveform Pattern & Combination File is selected for the transfer file type.

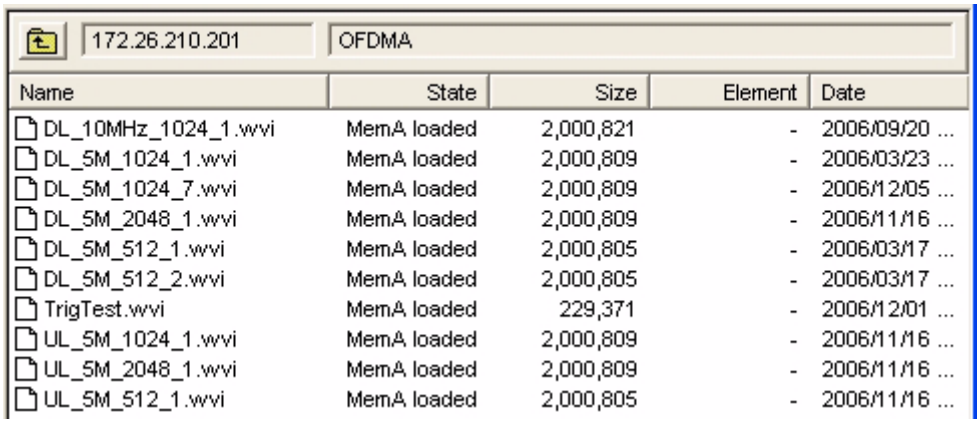


Figure 2-65. SG-side file display area when Waveform Pattern & Combination File

Information for the displayed files:

- Name: Displays the names of the waveform pattern files (waveform information files only).
- State: Displays the waveform pattern or pattern combination file loading status to an arbitrary waveform memory. “A” indicates that the waveform pattern/combination file is loaded to the arbitrary waveform memory A and “B” indicates loading to the arbitrary waveform memory B. “A/B” indicates that the waveform pattern/combination file is loaded to both the arbitrary waveform memories A and B. “Mem loaded” indicates that the waveform pattern/combination file is loaded to the waveform memory A or B and “Selected” indicates that it is selected for output.
- Size: Displays the total size of the waveform information file and waveform data file in bytes.
- Element: Displays the number of waveform patterns selected in the combination file stored on the MG3700A hard disk. For example, when four of the five waveform patterns used in a combination file are stored in the hard disk, “4/5” is displayed.
- Date: Displays the latest file creation date between the waveform information file and waveform data file of the waveform pattern. For a combination file, its file creation date is displayed (no comparison is made).

When a waveform pattern is loaded to both memories A and B and is selected as an output waveform pattern, then it is output according to the waveform pattern output mode as follows:

- Defined Mode: The waveform pattern is output from memory B.
- Edit Mode: The waveform pattern is output from both memories A and B.

Waveform Package License File Transfer

The following is displayed when Waveform Package License File is selected for the transfer file type:

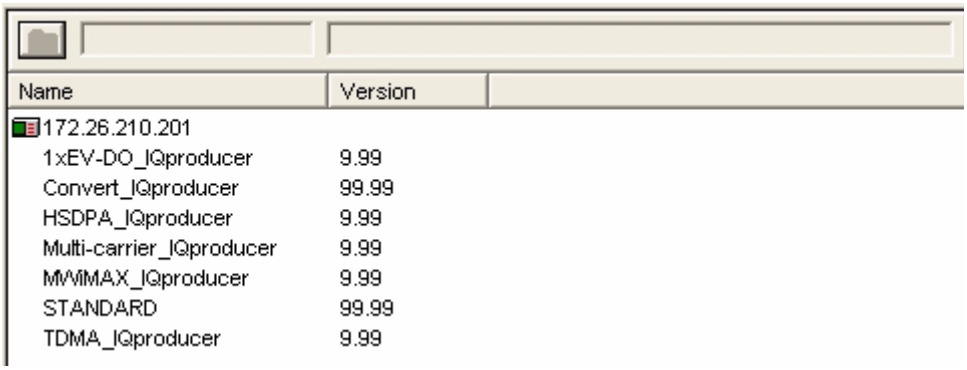


Figure 2-66. SG-side file display area when Waveform Package License

Information for the displayed files:

- Name: Displays the names of licenses installed in the MG3700A.
- Version: Displays the versions of licenses installed in the MG3700A.

All File Transfer Types

The following is displayed when All File is selected for the transfer file type and an IP address associated with an MG3700A is double-clicked:

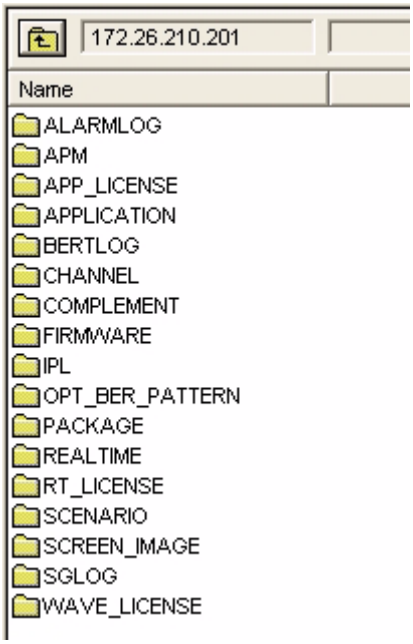


Figure 2-67. SG-side File Display Area when All File is Selected

The following files are stored in each folder:

- ALARM LOG: Alarm indication log file
- AMPCOMPLEMENT: Not used
- APM: Saved parameter file
- APP_LICENSE: Not used
- APPLICATION: Not used
- ATTCOMPLEMENT: Complement data for attenuator
- BERTLOG: BERT log file
- CHANNEL: Channel table file
- FIRMWARE: MG3700A firmware file
- IPL: MG3700A IPL (Initial Program Loader) file
- PACKAGE: Waveform pattern
- REALTIME: Not used
- REFCOMPLEMENT: MG3700A reference level complement value
- RT_LICENSE: Not used
- SCENARIO: Scenario file
- SCREEN_IMAGE: Bitmap image file of screen copy
- SGLOG: MG3700A log file
- WAVE_LICENSE: Waveform pattern license file

Information for the displayed files:

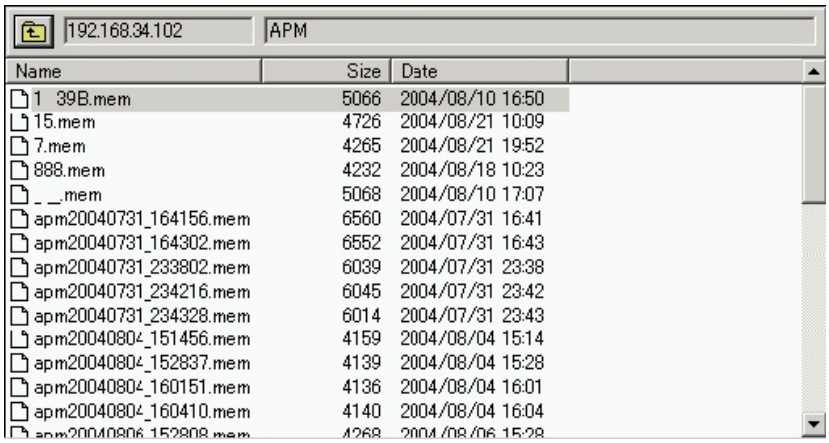


Figure 2-68. SG-side File Display Area when All File is Selected

- Name: Displays the file names.
- Size: Displays the file sizes.
- Date: Displays the file creation dates.

Selection in SG-side File Display Area

Each file in the SG-side file display area can be selected by a left mouse click. Two or more files can be selected by holding down the Ctrl key and a left mouse click (additional selection) and by holding down the Shift key and a left mouse click (range selection). When downloading files to the MG3700A, select a file in the PC-side file display area and select an MG3700A unit as the transfer destination in the SG-side file display area. File uploading to the PC is possible when an MG3700A unit or a file in it is selected.

PC-side File Display Area

The contents of the folder currently selected are listed in the PC-side file display area on the left field of the Transfer & Setting Panel main display. The files and their information are displayed corresponding to the file type selected in the transfer file type selection box. The contents in the PC-side file display area are displayed as follows:

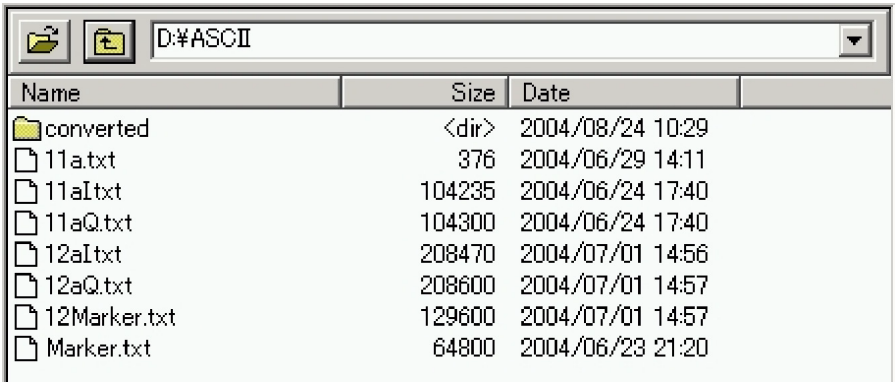


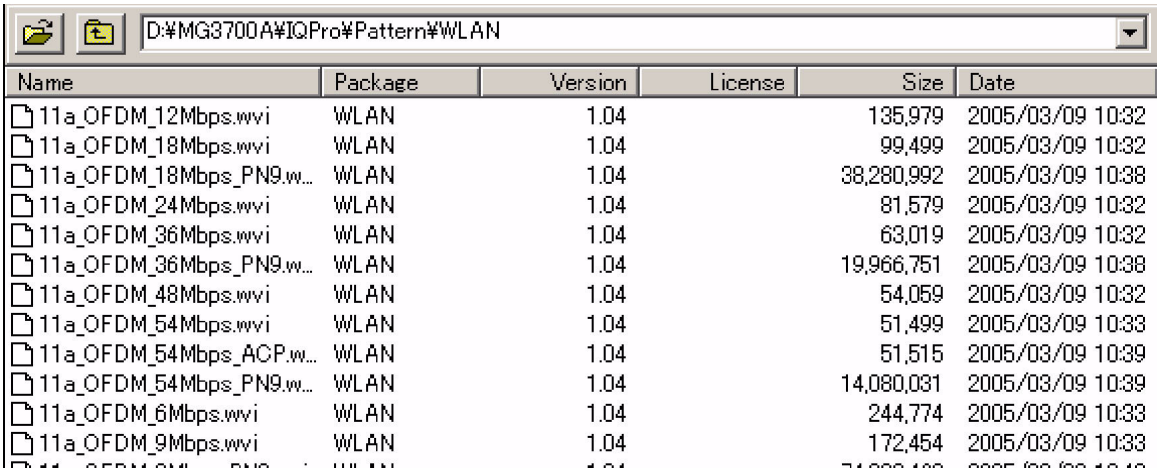
Figure 2-69. PC-side File Display Area

- Only the files that have the extension of the specified file type are displayed.
- The information according to each transfer file type is displayed in the list column units.
- A folder is displayed with its name and created date, and <dir> is displayed for the Size column. The other columns are left blank.
- Right-clicking in the PC-side file display area opens the pop-up menu.
- If an incomplete transfer is made with the file (such as with a waveform pattern) that consists of several files without having the data file set as an information file, that file is not displayed. When “All File” is selected in the transfer file type selection box, all of the files are displayed.

Details of the contents in the PC-side file display area are described below for each transfer file type:

Waveform Pattern & Combination File

The following is displayed when Waveform Pattern & Combination File is selected for the transfer file type:



Name	Package	Version	License	Size	Date
11a_OFDM_12Mbps.wvi	WLAN	1.04		135,979	2005/03/09 10:32
11a_OFDM_18Mbps.wvi	WLAN	1.04		99,499	2005/03/09 10:32
11a_OFDM_18Mbps_PN9.w...	WLAN	1.04		38,280,992	2005/03/09 10:38
11a_OFDM_24Mbps.wvi	WLAN	1.04		81,579	2005/03/09 10:32
11a_OFDM_36Mbps.wvi	WLAN	1.04		63,019	2005/03/09 10:32
11a_OFDM_36Mbps_PN9.w...	WLAN	1.04		19,966,751	2005/03/09 10:38
11a_OFDM_48Mbps.wvi	WLAN	1.04		54,059	2005/03/09 10:32
11a_OFDM_54Mbps.wvi	WLAN	1.04		51,499	2005/03/09 10:33
11a_OFDM_54Mbps_ACP.w...	WLAN	1.04		51,515	2005/03/09 10:39
11a_OFDM_54Mbps_PN9.w...	WLAN	1.04		14,080,031	2005/03/09 10:39
11a_OFDM_6Mbps.wvi	WLAN	1.04		244,774	2005/03/09 10:33
11a_OFDM_9Mbps.wvi	WLAN	1.04		172,454	2005/03/09 10:33

Figure 2-70. PC-side File Display Area when Waveform Pattern & Combination File is Selected

Information for the displayed files:

- Name: Displays the names of the waveform pattern files (waveform information files only).
- Package: Displays the names of the packages described in the information files.
- Version: Displays the versions of waveform patterns.
- License: “O” is displayed when the waveform pattern license is installed to the MG3700A unit that is selected on the SG-side file display area. A waveform pattern for which “O” is not displayed cannot be used even if it is transferred to the MG3700A.
- Size: Displays the total size of the information file and files specified by the information file.
- Date: Displays the latest file creation date between the waveform information file and waveform data file of the waveform pattern. Transfer date/time to the MG3700A is used as the file creation date.

Waveform Package License File Transfer

The following is displayed when Waveform Package License File is selected for the transfer file type:

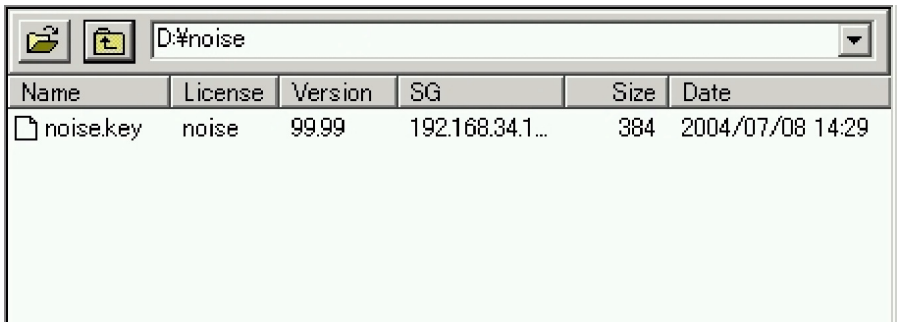


Figure 2-71. PC-side File Display Area when Waveform Package License File is Selected

Information for the displayed files:

- Name: Displays the file names.
- Package/License Name: Displays the license names of the files. For waveform pattern authentication files, the package names are displayed and the column character strings are changed.
- Version: Displays the versions of licenses.
- SG: Displays the host name or IP address (used at connection) of the MG3700A that is the authentication target.
- Size: Displays the license file sizes.
- Date: Displays the file dates.

All File Transfer Types

The following is displayed when All File is selected for the transfer file type:

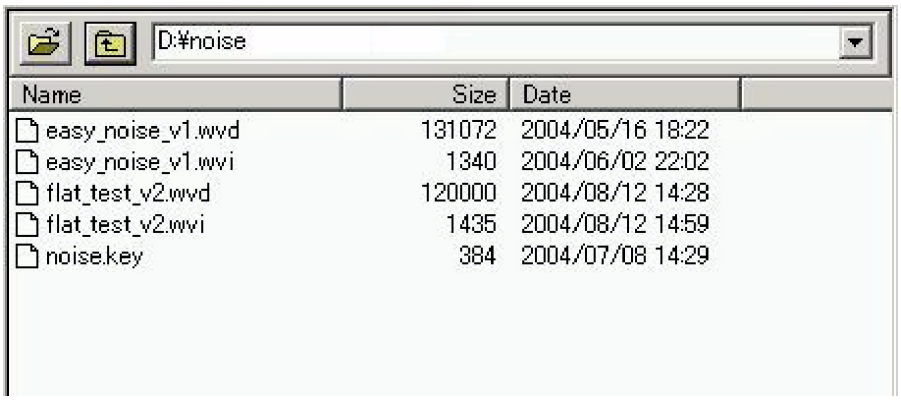


Figure 2-72. PC-side File Display Area when All File is Selected

- Information for the displayed files:
- Name: Displays the file names.
- Size: Displays the file sizes.
- Date: Displays the file creation dates.

Selection in PC-side File Display Area

Each file in the PC-side file display area can be selected by a click. Two or more files can be selected by holding down the Ctrl key and a left mouse click (additional selection) and by holding down the Shift key and a left mouse click (range selection). Files that can be downloaded are those actually selected in the PC-side file display area only. The MG3700A specified as the transfer destination must be selected at this time.

Combination File Edit Dialog

The Combination File Edit dialog lets you configure a combination of files to run and set various parameters as described below:

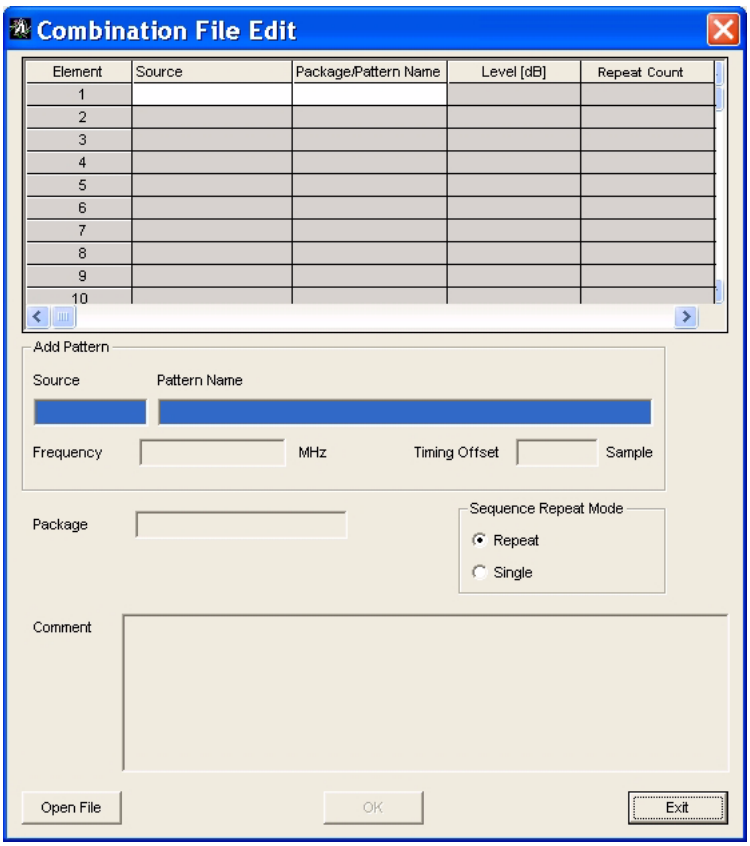


Figure 2-73. Combination File Edit Dialog

- Source/Package: When a pattern is selected, this field displays whether the selected pattern belongs to the PC or SG. When an existing combination file is opened, this field displays the package name of the storage destination in the MG3700A.
- Pattern: Selects up to 200 waveform patterns to be used in memory A. A waveform pattern whose size exceeds the capacity of memory A cannot be selected. The following two waveform pattern selection methods are available:
  - Double-click a wvi file on the PC- or SG-side in the Transfer & Setting Panel screen.
  - Right-click on the selected element to open the pop-up menu. Select “Open wvi File” to select a file (wvi files on the SG-side cannot be selected).

- Level [dB]: When Add Pattern is not selected, sets the relative level ratio of each element to the set RF level value of the MG3700A in dB units. The setting range is from –80 dB to 0 dB, with a resolution of 0.01 dB.

  When Add Pattern is selected, sets the level ratio for Add Pattern. The total power, of the Add Pattern and the Element with the maximum level ratio set, is the RF output power of the MG3700A. The setting range when Add Pattern is selected is from –80 dB to +80 dB, but the set values for all elements must be within ±80 dB. The setting resolution is 0.01 dB.

  When AWGN is selected for Add Pattern, set the level by a power ratio within the system bandwidth that is determined depending on the communication system. In this event, it is required to set necessary parameters such as the AWGN sampling rate for the desired signal used by the element, in order to obtain correct outputs.
- Repeat Count: Set the repetition count for each waveform pattern. The setting range is from 0 to 65535. When 0 is input, this sets infinity. When infinity is set, the same waveform pattern is repeatedly output until any screen/remote operation is performed or Pattern Trigger is input.
- Add Pattern (memory B pattern) selection: Select the waveform pattern to be used in memory B. Note that a waveform pattern whose size exceeds the capacity of memory B cannot be selected. The waveform pattern selection method is the same as that shown in "Pattern" above.
- Frequency Offset: Set the output frequency offset for the waveform pattern selected as an element. The setting range is as follows:
  - Fs: Sampling Rate
  - BW: The maximum modulation bandwidth of the selected element (defined in the wvi file of each pattern.)
  - n: The maximum integer within the range such that Fs * 2n does not exceed 160 MHz.
  - When Fs ≤ 20 MHz: Maximum frequency offset = (0.8 * Fs – BW)/2
  - When Fs > 20 MHz: Maximum frequency offset = (0.8 * Fs * n – BW)/2
- Timing Offset: Set the differential delay from the top of the Element1 pattern to the start of the Add pattern output. The setting unit is one waveform pattern sample.
  Setting range: 0 to "Element1 sample count - 1"
- Package: Set the package name to be stored during transfer to the MG3700A.
- Sequence Repeat Mode: When set to Repeat: When the waveform pattern of the last element registered in the list is output for the number of times set in Repeat Count, the sequence processing returns to the waveform pattern of the first element and is executed repeatedly. When set to Single: End of Sequence (signal with RF output OFF) is automatically added to the last element registered in the list. When the waveform pattern of the last element is output for the number of times set in Repeat Count, an End of Sequence (signal with RF output OFF) waveform pattern is selected, and the sequence processing ends without outputting any RF signals. Up to 199 elements can be set, excluding End of Sequence.
- Comment: Input comments that are displayed when selecting the combination file on the MG3700A. The input range is up to 7 lines × 82 rows.
- Open File: Open an existing combination file. Editing of a combination file opened by this function is possible, including the replacement of a waveform pattern of an element, and so on. Note that, for the waveform pattern selected when a combination file is opened by this function, the store destination folder name at transfer to the MG3700A is displayed in "Source/Package" on the Combination File Edit screen because its store source is unknown.
- OK: Starts the combination file creation. A series of dialogs prompts you to export the new combination file with a folder path and file name.
- Exit: Cancels the settings and closes the Combination File Edit screen.

Transfer and Settings Panel Status Bar

The status bar displays the following information of the MG3700A currently selected:

Figure 2-74. Transfer and Pattern Panel Status Bar

- Free space and total space of the internal hard disk
- Free space and total space of the waveform memories A and B

Note: Nothing is displayed in the status bar when several MG3700A mainframe units are selected.

Disconnection Dialog

The Disconnection from MG3700 dialog is accessed from the Transfer and Setting Panel toolbar.

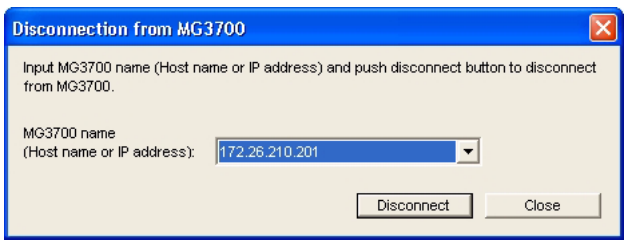


Figure 2-75. Disconnection Dialog

The IP addresses and host names of the MG3700A units currently connected are displayed in the pull-down list. Select the MG3700A unit to be disconnected from this list, then click the Disconnect button to disconnect the selected MG3700A. The Disconnection screen remains displayed even after disconnection. Click the Close button to close the Disconnection dialog.

Chapter 3 Operation

3-1 Introduction

This chapter provides information on how to set up Anritsu SignalLab for WiMAX measurements. It is assumed that you have a basic understanding of spectrum analyzer measurements and that the MS278XB front panel and menu structure are familiar to you. Refer to the MS278XB's operating manual for a description of the instrument's menus and their structure. Once you are familiar with the instrument, you should be able to easily follow the information found in the following sections of this chapter:

- Launching the Anritsu SignalLab Application
- Configuring a Signal Analysis
- Creating a Waveform File for the MG3700
- Displaying Graphs
- Transferring Waveform Data to a MG3700
- Triggering SignalLab and the MG3700

3-2 Launching the Anritsu SignalLab Application

The Anritsu SignalLab application measures the WiMAX performance of the signal that is within the currently set frequency range of the Signature instrument. Prior to launching the Anritsu SignalLab application, the DUT should be set up and connected to Signature's RF input. Signature should then be set up to measure the input signal by setting its center frequency, span, and reference level such that the signal is centered on the display and the signal peak is slightly below the reference level so as to avoid ADC overload.

The Anritsu SignalLab application is launched from Signature's main GUI from the following menus:

Front Panel | Measurement | Measurement Type: | WiMAX

When Anritsu SignalLab is launched, it looks for a file that contains the last known configuration. If this file is available, SignalLab defaults the initial viewer configuration to match the one used previously (below). If this is the first time that SignalLab has been launched after installation, SignalLab shows a list of the available viewers without any choice selected.

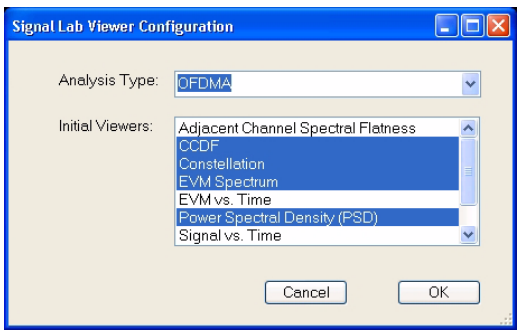


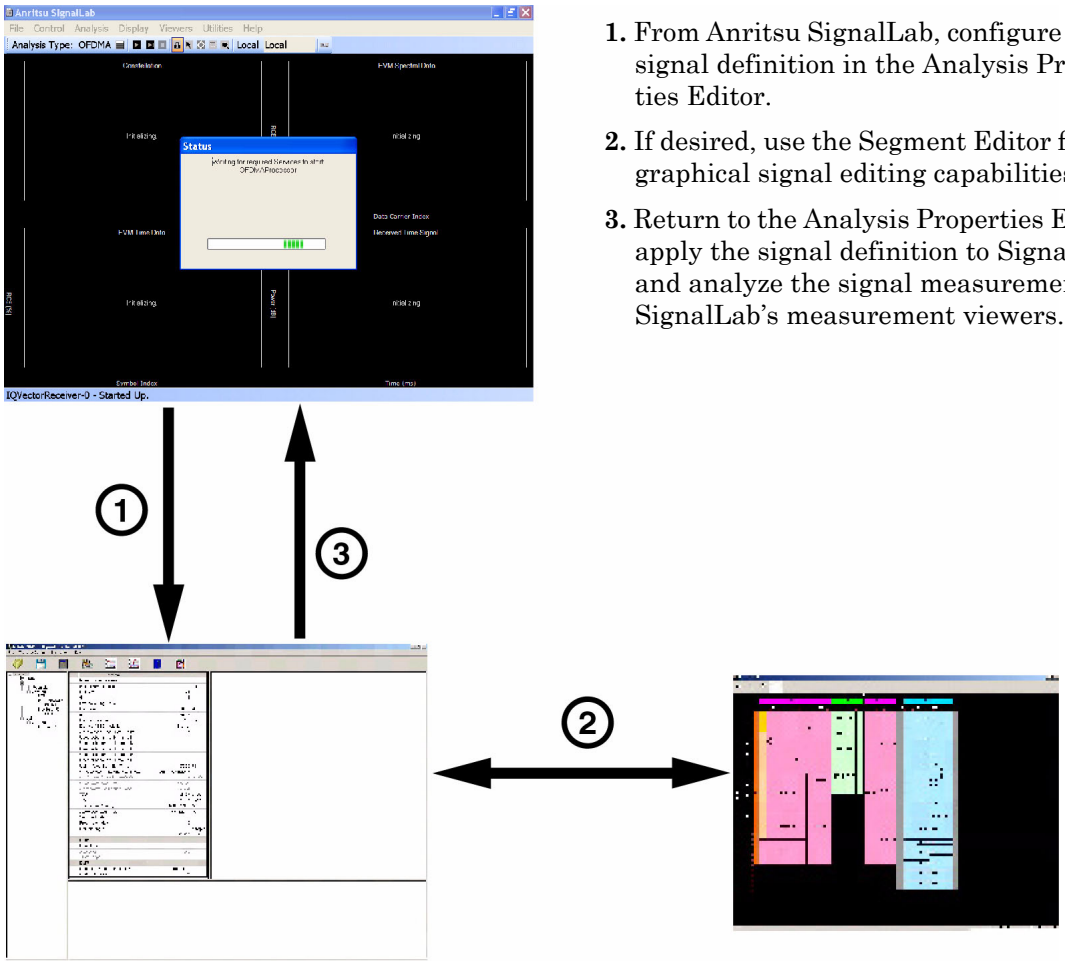
Figure 3-1. Anritsu SignalLab Viewer Configuration Dialog

The analysis type and initial viewers can be selected from this dialog.

Note: The OK button is disabled until at least one viewer is selected. Selecting Cancel exits Anritsu SignalLab.

Signal Analysis Workflow

Figure 3-2 shows the transitions from Anritsu SignalLab once the application is first started. The process flows as indicated in the step-by-step procedure outlined in the figure.



1. From Anritsu SignalLab, configure the signal definition in the Analysis Properties Editor.
2. If desired, use the Segment Editor for graphical signal editing capabilities.
3. Return to the Analysis Properties Editor, apply the signal definition to SignalLab, and analyze the signal measurements in SignalLab's measurement viewers.

Figure 3-2. SignalLab Analysis Overview

3-3 Configuring a Signal Analysis

This section describes two methods of creating a configuration file for an OFDMA signal analysis in SignalLab. The first method uses the Analysis Properties Editor, the second method uses the Segment Editor.

Creating an Analysis Configuration File with the Properties Editor

In this example, a configuration file is created for signal analysis of a 64 QAM, 1024 FFT, 10 MHz bandwidth, fully loaded PUSC segment with PN sequence data of over 20 symbols.

1. Open the OFDMA Properties Editor by either clicking on the Properties Editor toolbar button or by selecting Analysis | Properties… from the menu bar.

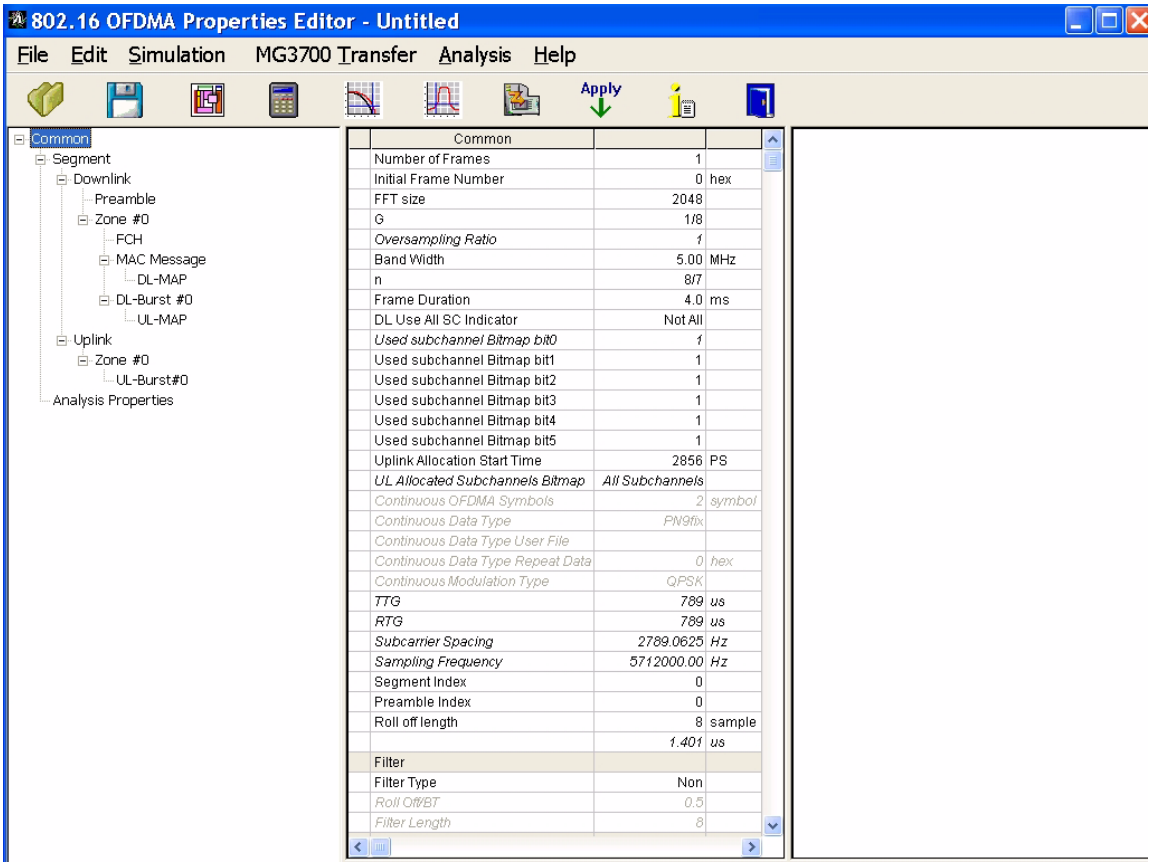


Figure 3-3. Analysis Properties Editor

2. Select File | Load Predefined Properties File from the drop-down menus and load the following file:

   Preset_DL_5M_1024_1.xml

3. Select the Segment node on the Properties Editor tree.
4. In the Common parameter list, make the following changes:

   FFT Size: 1024

   Bandwidth: 10 MHz

   n: 8/7

   Frame Duration: 5 ms

   DL Use All SC Indicator: All

5. Right-click on the DL-Burst #2 Tree item and select Delete Burst.

6. A graphical view of the current Data Burst state can be seen by clicking on the Show Segment Edit toolbar button. It should look like the following:

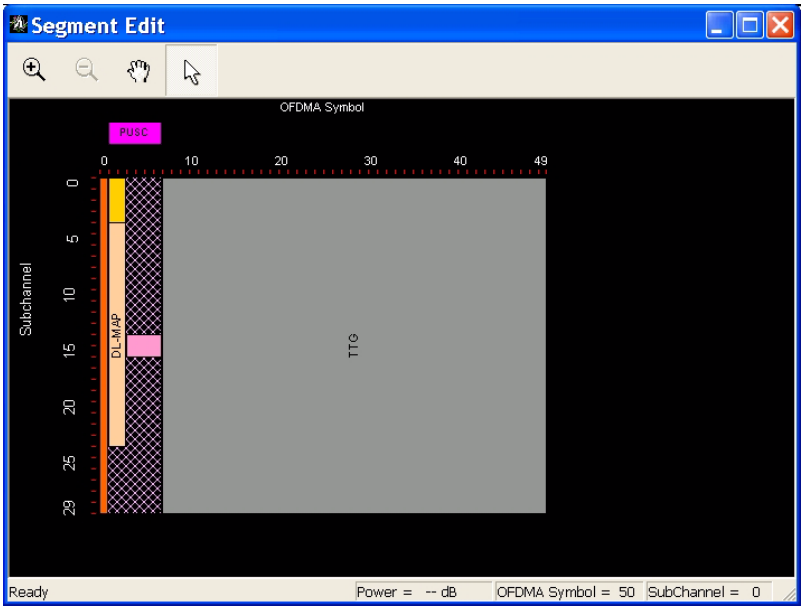


Figure 3-4. Segment Editor

7. Minimize the Segment Editor window and select the Zone #0 node on the Properties Editor tree.

8. Make the following change in the Zone #0 parameter list:

No. OFDMA Symbols: 20

9. Select the DL-Burst #1 node on the Properties Editor tree and make the following changes in the parameter list:

OFDMA Subchannel Offset: 0

No. OFDMA Symbols: 18

No. Subchannels: 30

FEC Code Type and Modulation Type: 64QAM(CC)1/2

DL Burst Data Type: PN9fix

10. Open the Segment Editor and verify that the Data burst looks like the following:

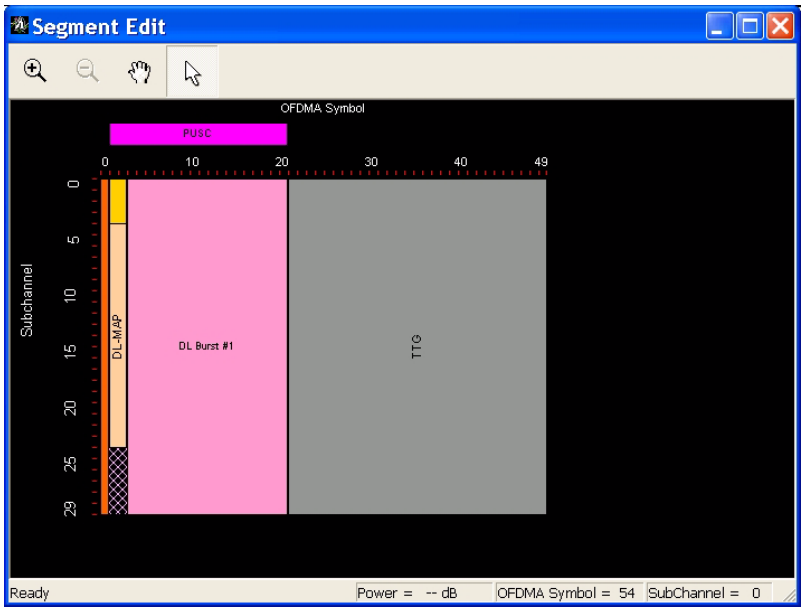


Figure 3-5. Segment Editor

11. Save the configuration to a file by selecting File | Save Properties File from the drop-down menus as:

DL_10M_1024_64QAM

12. Certain Signature parameters, such as Center Frequency and Reference Level, can be set via the Analysis Properties Tree node. To set these properties, select the Analysis Properties node on the Properties Editor tree and make the required changes to the analysis properties configuration shown below.

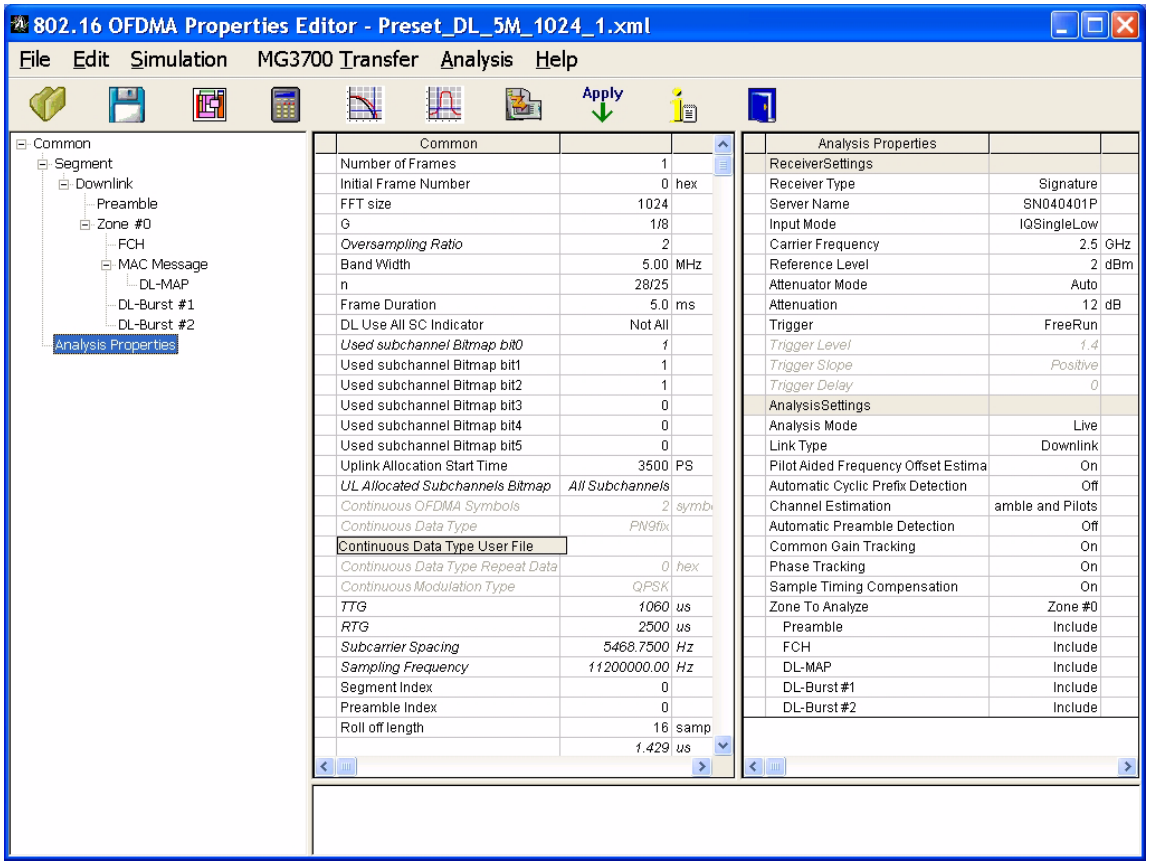


Figure 3-6. Analysis Properties Editor

13. Pick the settings that should be used for deciding whether an Uplink or Downlink type link should be used for the analysis as well as the particular zone and bursts that should be selected.

14. Click the Apply toolbar button or select Analysis | Apply Settings from the drop-down menu to apply the configuration to the SignalLab application for analysis.

Note: When you Apply a configuration, the Properties Window will minimize and the SignalLab application will be displayed.

Creating an Analysis Configuration File with the Segment Editor

The Segment Editor can be used when an OFDMA signal type is selected. Open the Segment Editor by clicking on the Show Segment Edit toolbar button, and then adjust the Analysis Configuration Parameters. For example, when you click in the middle of a DL Burst #1 graphic segment to select it, you will see a dashed square appear around the perimeter of the graphic (see figure below).

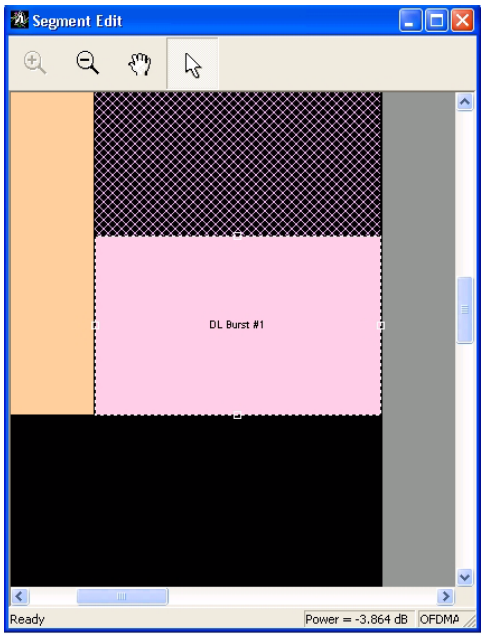


Figure 3-7. Segment Editor Selection

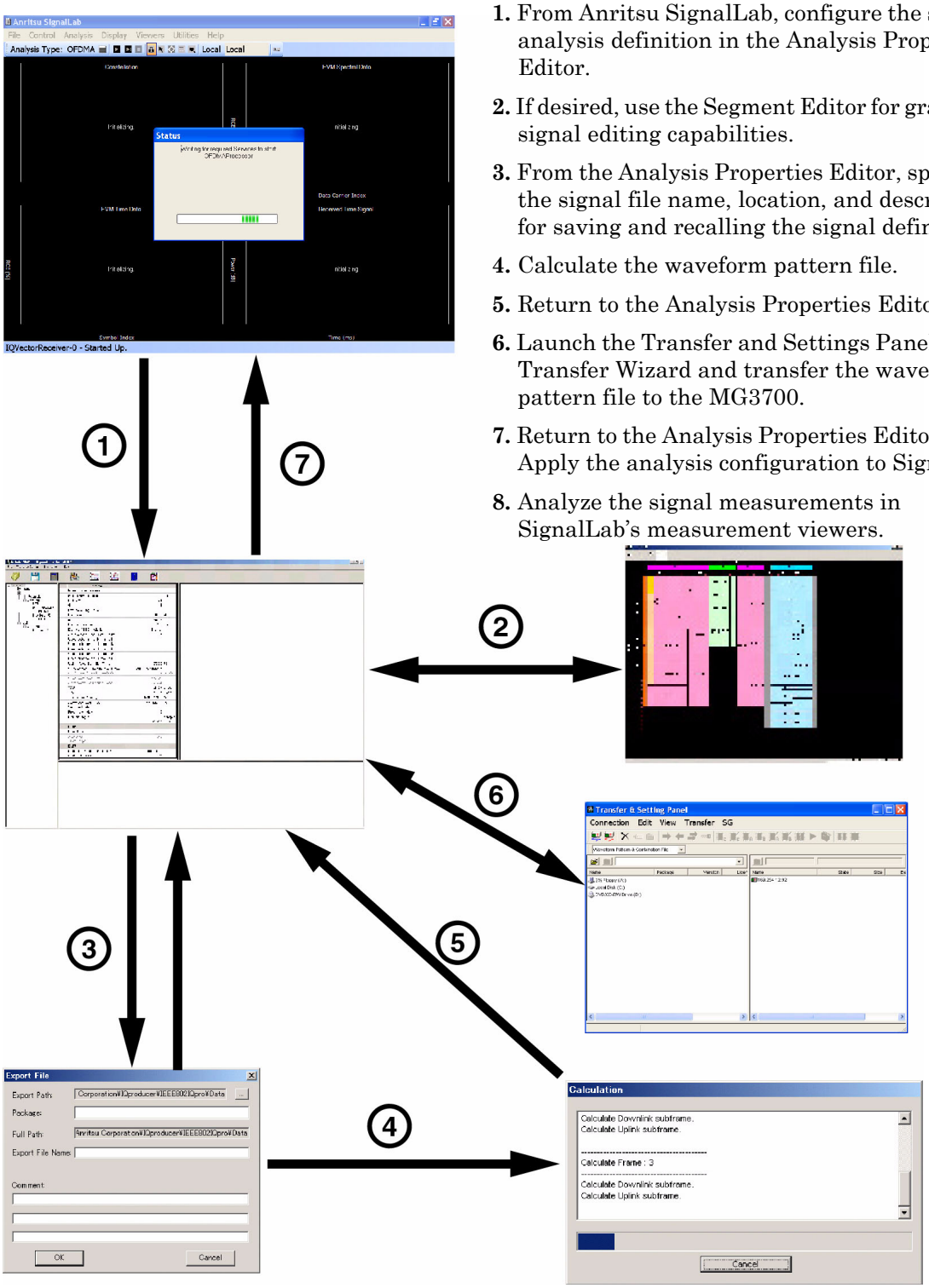
Once selected, the entire graphic can be dragged to a new position and any of its four sides can be re-positioned. Re-positioning the top segment of the DL Burst #1 graphic changes the OFDMA Subchannel Offset point for the burst. Re-positioning the right segment of the DL Burst #1 graphic changes the number of OFDMA symbols for the burst. Re-positioning the bottom segment of the DL Burst #1 graphic changes the number of subchannels occupied by the burst. Re-positioning the left segment of the DL Burst #1 graphic changes the OFDMA Symbol Offset point for the burst, as well as the number of symbols for the burst.

Changes to the graphics in the Segment editor result in corresponding changes in the Properties Editor parameter lists. The other signal segments can also be adjusted in this fashion. This graphical means of creating a WiMAX signal definition quickly allows a measurement configuration.

Note: It is easiest to perform the preceding operations using a mouse, but the touchscreen can also be used to reposition and resize the Segment Editor Graphics.

3-4 Creating a Waveform File for the MG3700

Once an OFDMA configuration properties file is created, it can be used to create corresponding waveform pattern files. These files can then be transferred to MG3700 and used for generating the desired signal. The workflow process is the same as described previously, but with additional steps for calculating and transferring the Signal Definition file to the MG3700.



1. From Anritsu SignalLab, configure the signal analysis definition in the Analysis Properties Editor.
2. If desired, use the Segment Editor for graphical signal editing capabilities.
3. From the Analysis Properties Editor, specify the signal file name, location, and description for saving and recalling the signal definition.
4. Calculate the waveform pattern file.
5. Return to the Analysis Properties Editor.
6. Launch the Transfer and Settings Panel or the Transfer Wizard and transfer the waveform pattern file to the MG3700.
7. Return to the Analysis Properties Editor and Apply the analysis configuration to SignalLab.
8. Analyze the signal measurements in SignalLab's measurement viewers.

Figure 3-8. SignalLab Analysis Overview

1. Create an Analysis Configuration file as described in Section 3-3, or use File | Open Properties File to recall a previously created file.

Note: Recalled files must have been created by the OFDMA Properties Editor in order to be able to complete the following process.

2. Click on the Calculation Toolbar button or select Edit | Calculation to launch the Export File dialog.

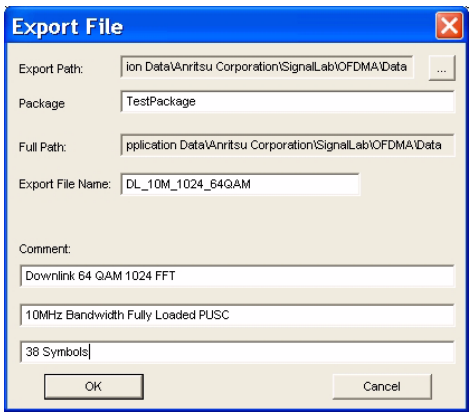


Figure 3-9. Export File Dialog

3. Select the Export Path location to store the file using the browse button.
4. Enter a Package name and File Name (entering comments is optional, but is helpful in describing the contents of the file).
5. Click the OK button.

   The analysis configuration currently loaded in the Properties editor is then packaged into a file format that can be uploaded to the MG3700. The following dialogs are seen at this point:

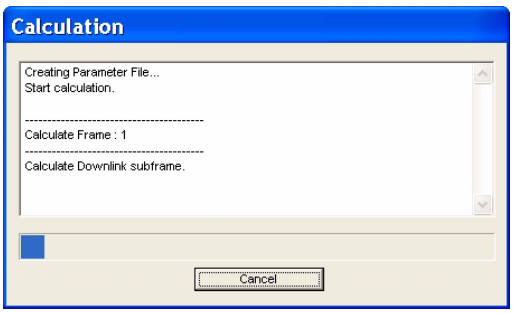


Figure 3-10. Calculation Dialog

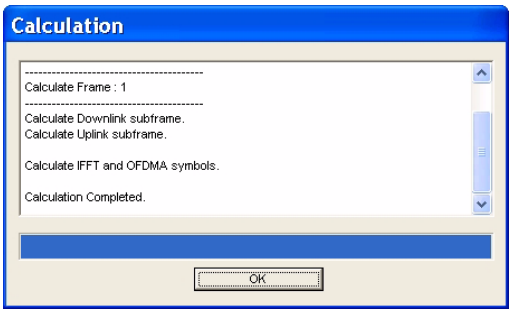


Figure 3-11. Calculation Dialog

3-5 Displaying Graphs

A generated waveform pattern can be displayed in a CCDF or FFT graph by using the Analysis Properties Editor CCDF and FFT toolbar buttons only when an OFDMA signal analysis type is selected.

Displaying the CCDF Graph

1. Generate a waveform pattern by executing a Calculation process (Refer to “Creating a Waveform File for the MG3700” on page 3-8).
2. Select CCDF from the Simulation menu or click the CCDF toolbar button.

The CCDF Graph Monitor screen shown below is displayed with the trace of the generated waveform pattern.

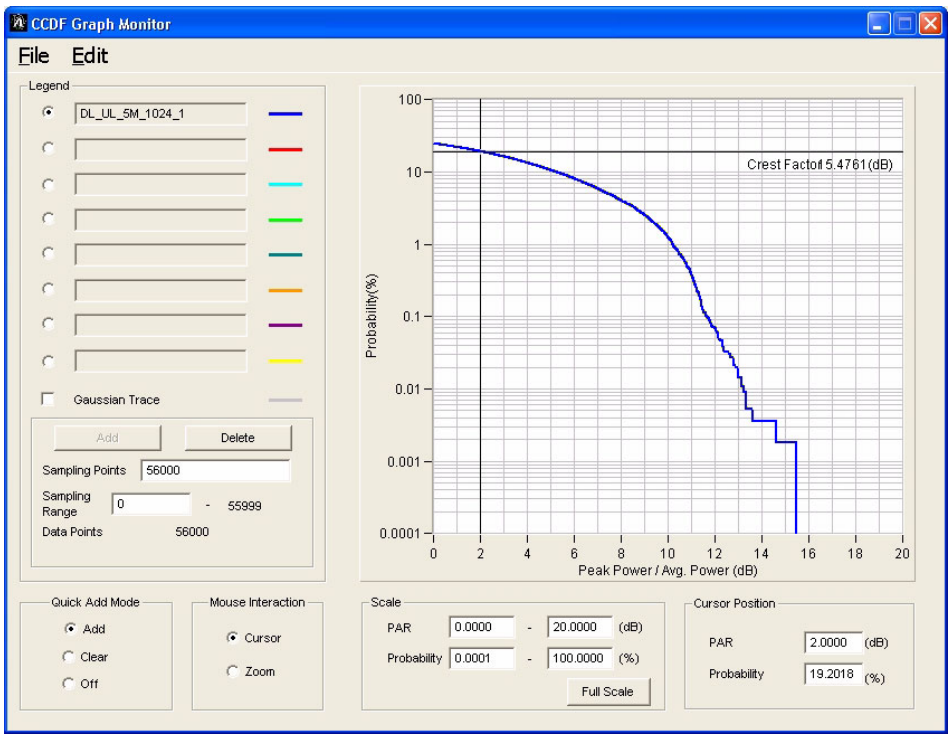


Figure 3-12. CCDF Graph Monitor

When a waveform pattern is generated by changing parameters and executing “Calculation” while other traces are displayed in the CCDF Graph Monitor screen, the trace of the newly generated waveform pattern can be displayed in either a new monitor window or added to the existing CCDF monitor through the following procedures:

Note: A CCDF graph and an FFT graph cannot be generated at the same time. When displaying a CCDF graph while an FFT graph is displayed, execute the CCDF graph generation after the FFT graph generation is completed.

To display a new trace in the same screen with the previous traces:

1. Generate a waveform pattern by executing a Calculation process (Refer to "Creating a Waveform File for the MG3700" on page 3-8).
2. Select an empty trace position to be added from the CCDF Graph Monitor Legend (this makes the Add button to become available). If there are no empty trace positions available, an existing trace must be deleted first.
3. Press the Add button and select the previously generated trace from the menu.

   The trace of the newly generated waveform pattern is displayed in the existing CCDF Graph Monitor screen.

To display a new trace in a new CCDF Graph Monitor screen:

1. Generate a waveform pattern by executing a Calculation process (Refer to "Creating a Waveform File for the MG3700" on page 3-8).
2. Select CCDF from the Simulation menu or click the CCDF toolbar button.

   The trace of the newly generated waveform pattern is displayed in a new CCDF Graph Monitor screen.

Note: The Quick Add Mode selections have no function in this release.

Displaying the FFT Graph

1. Generate a waveform pattern by executing a Calculation process (Refer to "Creating a Waveform File for the MG3700" on page 3-8).
2. Select FFT from the Simulation menu or click the FFT toolbar button.

The FFT Graph Monitor screen shown below is displayed with the trace of the generated waveform pattern.

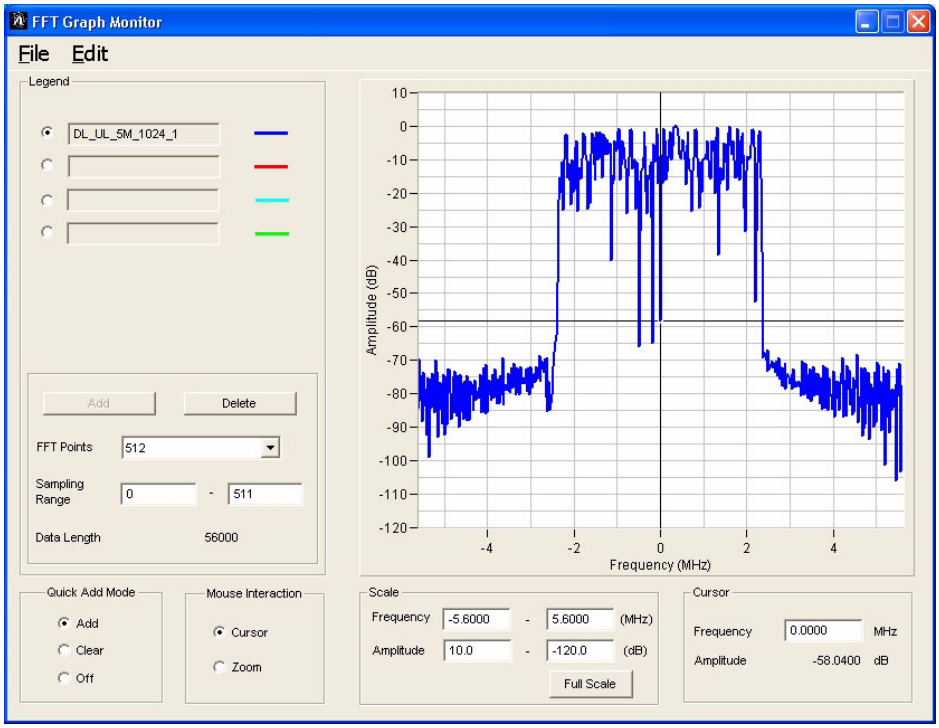


Figure 3-13. FFT Graph Monitor

When a waveform pattern is generated by changing parameters and executing "Calculation" while other traces are displayed in the FFT Graph Monitor screen, the trace of the newly generated waveform pattern can be displayed in either a new monitor window or added to the existing FFT monitor through the following procedures:

Note: An FFT graph and a CCDF graph cannot be generated at the same time. When displaying an FFT graph while a CCDF graph is displayed, execute the FFT graph generation after the CCDF graph generation is completed.

To display a new trace in the same screen with the previous traces:

1. Generate a waveform pattern by executing a Calculation process (Refer to “Creating a Waveform File for the MG3700” on page 3-8).
2. Select an empty trace position to be added from the FFT Graph Monitor Legend (this makes the Add button to become available). If there are no empty trace positions available, an existing trace must be deleted first.
3. Press the Add button and select the previously generated trace from the menu.

   The trace of the newly generated waveform pattern is displayed in the existing FFT Graph Monitor screen.

To display a new trace in a new FFT Graph Monitor screen:

1. Generate a waveform pattern by executing a Calculation process (Refer to “Creating a Waveform File for the MG3700” on page 3-8).
2. Select FFT from the Simulation menu or click the FFT toolbar button.

The trace of the newly generated waveform pattern is displayed in a new FFT Graph Monitor screen.

Note: The Quick Add Mode selections have no function in this release.

3-6 Transferring Waveform Data to a MG3700

Once you have complete Segment definition, you can create a corresponding waveform by selecting Edit/Calculation from the menu. This functionality is only available if SignalLab or Mobile WiMAX IQproducer was used for defining the segment properties.

Once the waveform files have been created, these can be transferred to a MG3700 by using either of the two utilities available from the MG3700 Transfer drop-down menu. The utilities are selected by navigating through the MG3700 Transfer drop-down menu or by clicking on the Transfer Settings button from the menu bar.

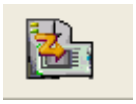


Figure 3-14. Choose Transfer Application Dialog

Transfer Wizard

If the Transfer Wizard utility is selected, the following dialog box appears:

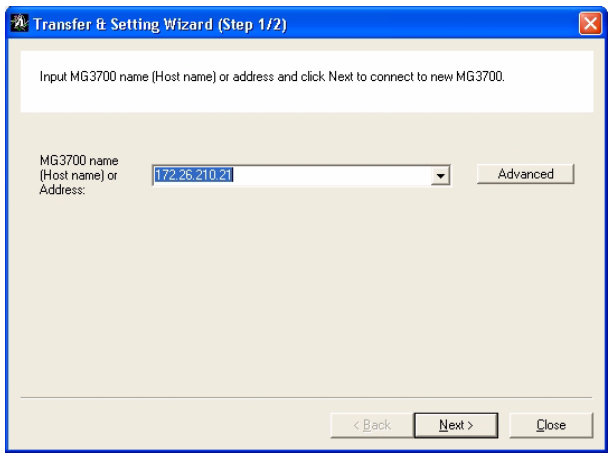


Figure 3-15. Transfer and Setting Wizard (Step 1 of 2)

Enter the IP address of MG3700 in the dialog box.

Note: It is assumed that MG3700 is on the same LAN as the machine running Anritsu SignalLab and that ethernet connectivity exists.

If the Transfer Wizard successfully connects to the MG3700, the following screen is displayed.

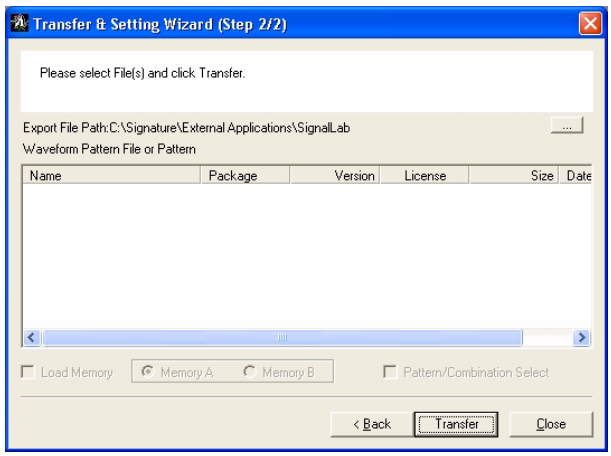


Figure 3-16. Transfer and Setting Wizard (Step 2 of 2)

From this screen, browse to the desired waveform data file, and then select the choices at the bottom of the dialog box to decide which memory bank to load the waveform file into. Also select to run the pattern by checking Pattern/Combination Select, and then click Transfer.

Transfer Panel

If Transfer Panel is selected, the following dialog box appears:

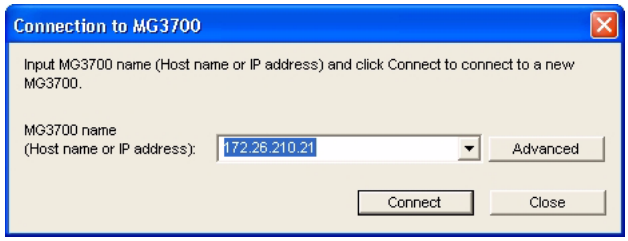


Figure 3-17. Connection to MG3700

This dialog box first prompts you for the IP address of an available MG3700. Once this information is provided and the Connect button is clicked, SignalLab connects to the signal generator. Selecting Close makes the Transfer & Setting Panel shown below to become active.

Note: If SignalLab is unable to connect to an MG3700, the Transfer & Setting Panel will be visible, but will not have functionality.

The Transfer & Setting Panel main screen consists of drop-down menus, a toolbar, a transfer file type selection box, a folder selection box, a PC-side file display area, an SG-side file display area, logs, and a status bar.

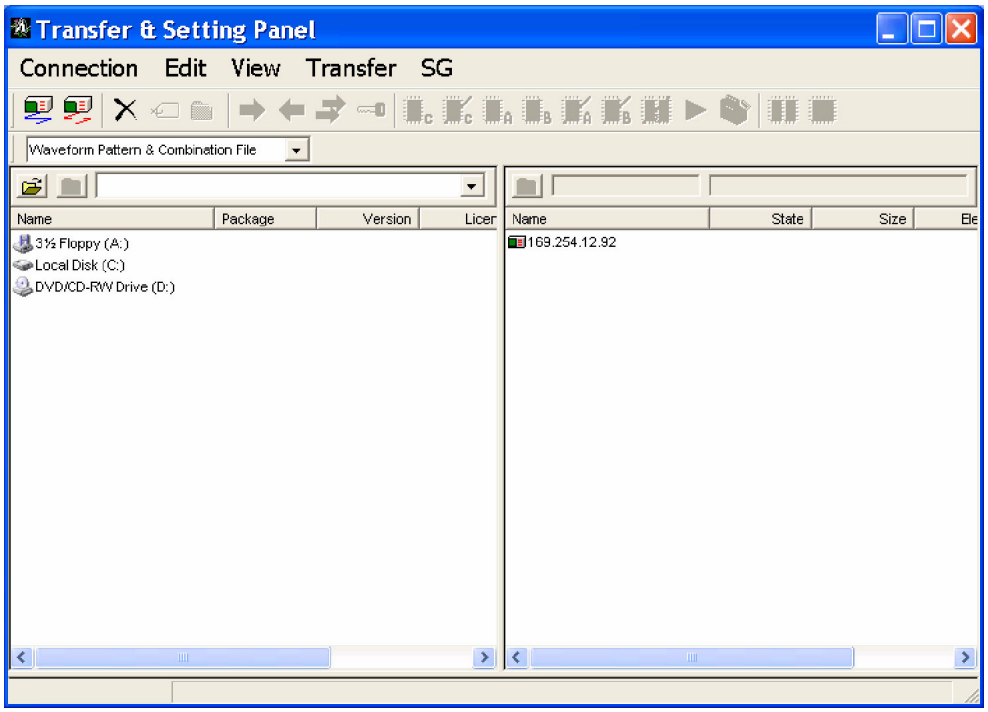


Figure 3-18. Transfer & Setting Panel

By using the file navigation on the left panel, you can select the waveform files (file extensions of .wvi) to transfer to the MG3700.

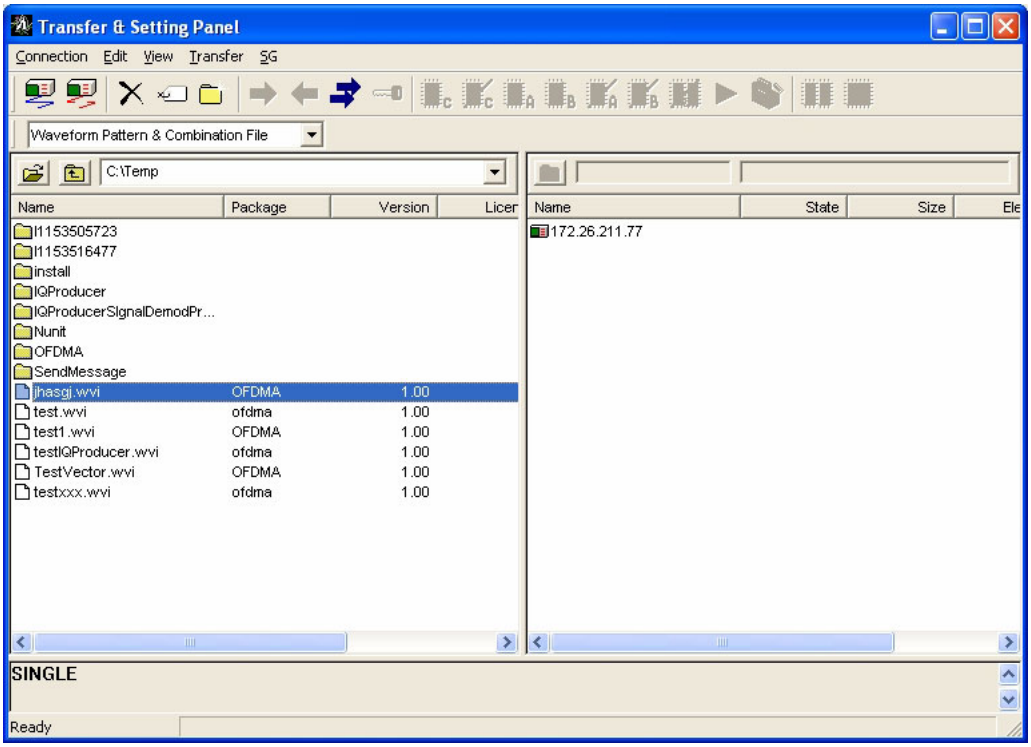


Figure 3-19. Transfer and Setting Panel

Once the files have been selected, the transfer is executed by selecting the Transfer button on the toolbar.

To view the files that are transferred to the MG3700, double click on the IP address icon in the right panel.

This shows the waveform file structure from the Signal Generator on the right panel as shown below.

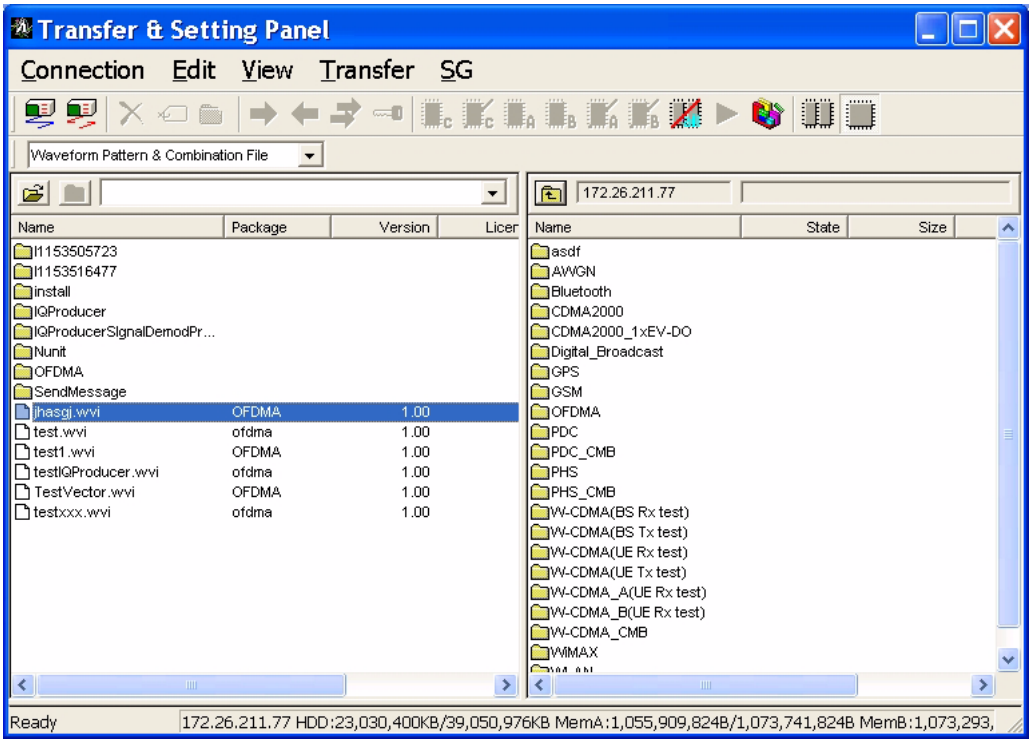


Figure 3-20. Transfer and Setting Panel

Selecting the package name that was used when creating the waveforms makes the list of the waveform files to become available as shown below:

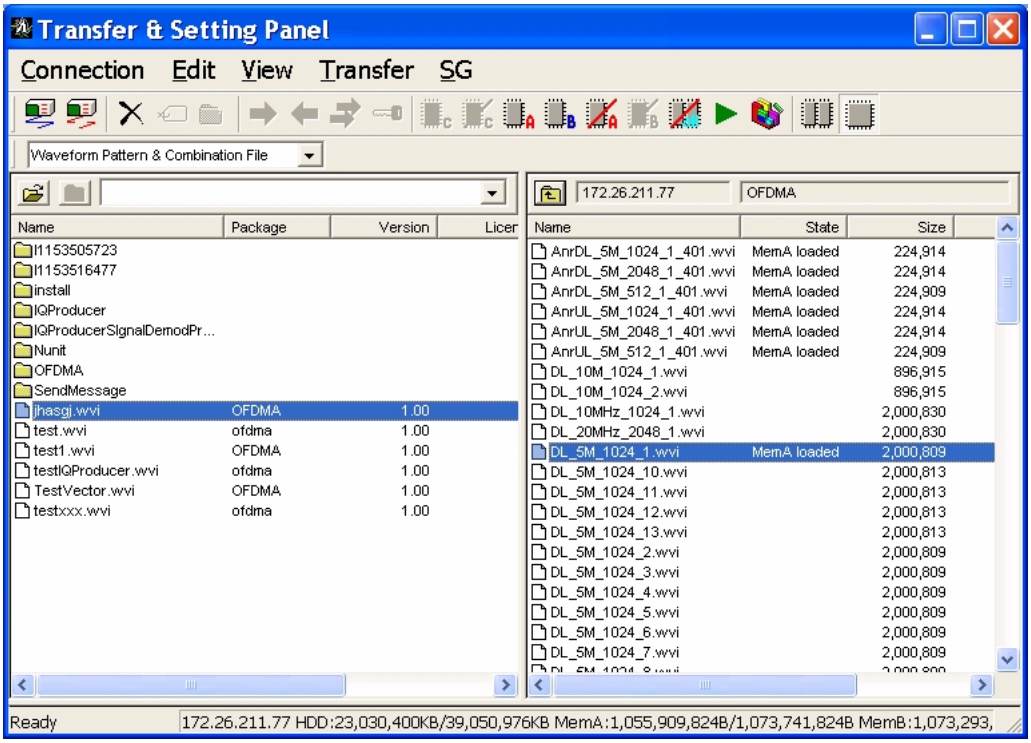


Figure 3-21. Transfer and Setting Panel

Waveform files can then be loaded into memory bank A or B by right-clicking on the file and selecting the pop-up menu option:

Load to Memory A
Load to Memory B

To select the waveform file that was just loaded into waveform memory, click the Pattern Select button.

The signal is now being output from the MG3700 and the Transfer and Setting panel can be minimized.

To analyze the signal that is being received at Signature, click the Apply button in the Analysis Properties Editor. This will cause the configuration information to be transferred to SignalLab's analysis engine. To run the analysis, press the Run or Single Step button available on Signallab's toolbar. The viewers will then populate with measurement results.

3-7 Triggering SignalLab and the MG3700

Under most circumstances, the segment under analysis includes only an Uplink or a Downlink signal, but not both. In this situation, the Signature Trigger Source may be set to Free Run in order to obtain an adequate trigger to capture the WiMAX waveform. However, the Signature Trigger Source may also be set to External and the MG3700 Aux Trigger Outputs may be used to trigger the analysis. When an analysis contains both a Downlink and an Uplink burst, then the best method of obtaining stable triggering and adequate analysis capture is to use External Triggering.

Triggering between SignalLab and the MG3700 can be established by connecting a BNC cable between the Signature Gate/Trigger input and one of the three MG3700 AUX Input/Output connectors shown below:

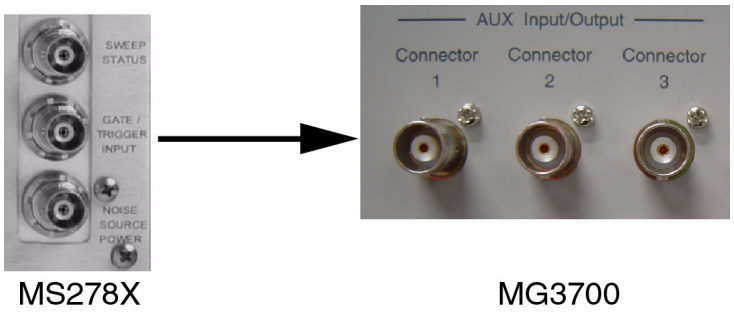


Figure 3-22. MG3700 AUX Connectors

The AUX Input/Output connectors on the rear panel of the MG3700 are identified as follows:

- **Connector 1 = Frame Pulse:** A pulse that is synchronized with the symbol at the beginning of the frame. The pulse width is one OFDMA symbol.
- **Connector 2 = Uplink Subframe Clock:** A pulse that is synchronized with the symbol at the beginning of the uplink subframe. The pulse width is one OFDMA symbol.
- **Connector 3 = RF Gate:** Indicates burst ON/OFF status of the MG3700 RF output. Correspondence between burst status and output signal status is shown below:

  Burst ON: High level
  Burst OFF: Low level

Triggering an Uplink/Downlink Combination Signal

Triggering an uplink/downlink signal is applicable to IF Input Wideband mode only.

1. Connect the MG3700 Connector 1 Aux input to the Signature Gate/Trigger input.
2. Set the Signature Center Frequency to that of the WiMAX Signal.
3. Set the Signature Span for Zero Span.
4. Set the Signature Triggering to ExternalTTL.
5. If Analyzing the Uplink signal, set the Signature Trigger Delay to 0 µS.

   If Analyzing the Downlink signal, set the Signature Trigger Delay to –250 µS.
6. Launch the SignalLab application.
7. Use the Property Editor to set up your analysis as described in “Configuring a Signal Analysis” on page 3-3. Verify that Triggering is set for ExternalTTL in the Analysis Properties section of the Property Editor.
8. Apply the Analysis in the Properties Editor.

9. Run the Analysis.

Note: You can easily switch back and forth between SignalLab and the Signature application by clicking on the Signature toolbar button in SignalLab. This places the Signature back into Spectrum Analyzer mode so that the Trigger Delay can be adjusted. The analysis can then be restarted by switching back to the SignalLab application, clicking on the Refresh toolbar button, and clicking on the Run toolbar button in SignalLab.

Figure 3-23 is an illustration that shows the output timing of auxiliary signals for the generated waveform pattern.

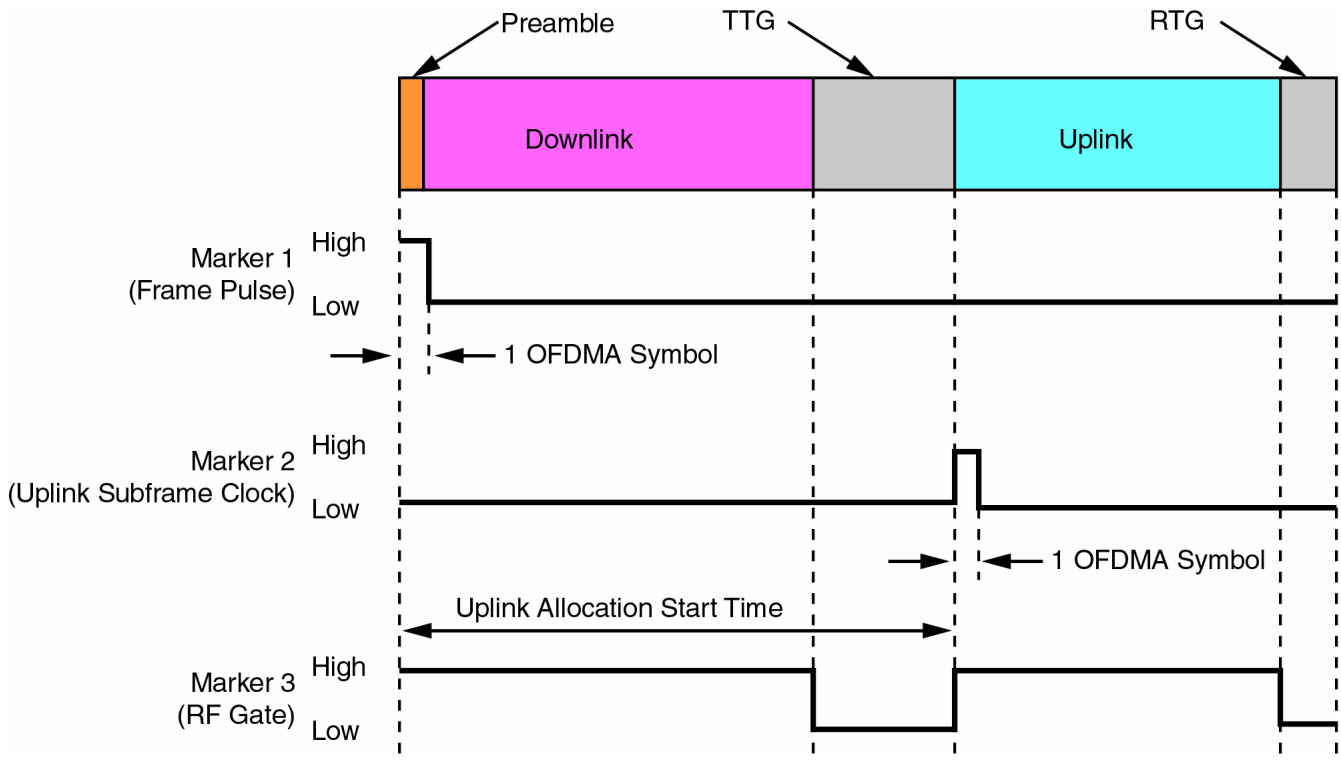


Figure 3-23. Auxiliary Signal Output Timing

The correspondences and descriptions shown above apply when the MG3700 Polarity is set to Positive. These correspondences are reversed when the Polarity is set to Negative. The Polarity is set via the MG3700 Marker placeholders and can be accessed as follows:

1. On the MG3700 front panel, select Baseband | Ext I/O Setup.
2. Use the front panel Up/Down step buttons to move down to the Marker section and place the prompt in the Marker (trigger signal) polarity that you wish to change.
3. Use the MG3700 Front Panel Set button to bring up the selection menu.
4. Use the Up/Down buttons to select Positive or Negative.
5. Use the Set button to apply the change.

3-8 Remote Control Programming

Remote programming allows the SignalLab application to be controlled programmatically to perform OFDM/ OFDMA analysis, and then read the result data once the analysis has been completed.

Note: The information in this section assumes that you are familiar with Visual Studio 2003 or later for C# development and Visual Basic 6.0 or later for VB development, and that your host PC is configured adequately to support these programming environments. You may need to refer to your software documentation for further details on programming.

A flowchart for using the remote control functionality is shown below:

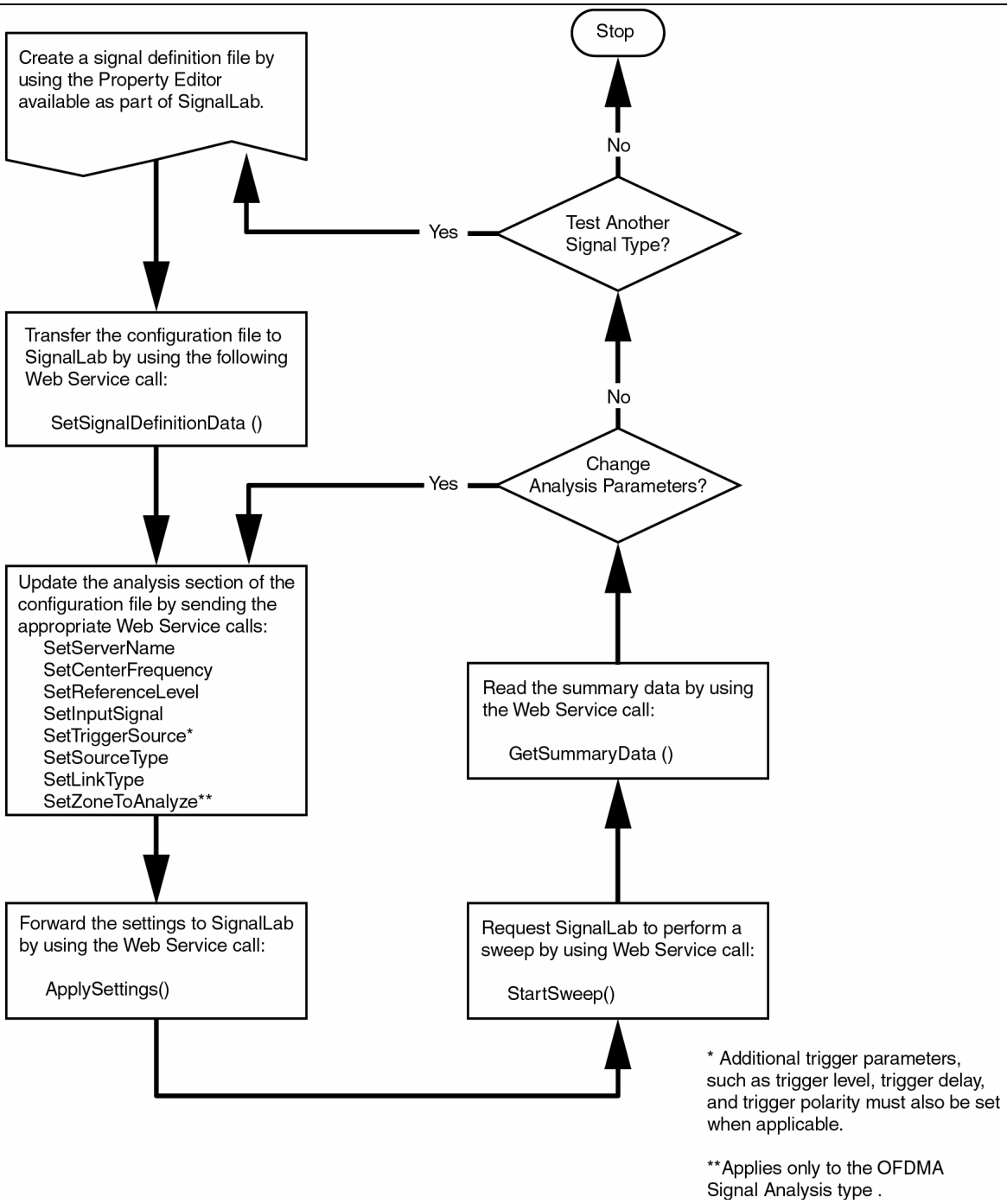


Figure 3-24. Remote Control Programming Flow Chart

Instantiating in the .NET Environment

The following procedure describes how to create an instance of the SignalLabRemoteControl web service using Visual Studio .NET 2005.

Note: This example assumes that you have created a C# SampleWSClient project using the Console application template available as part of the Visual Studio .NET 2005.

1. In the Solution Explorer pane, right click on *Web References* under the project listing. Refer to SampleWSClient in Figure 3-25 below:

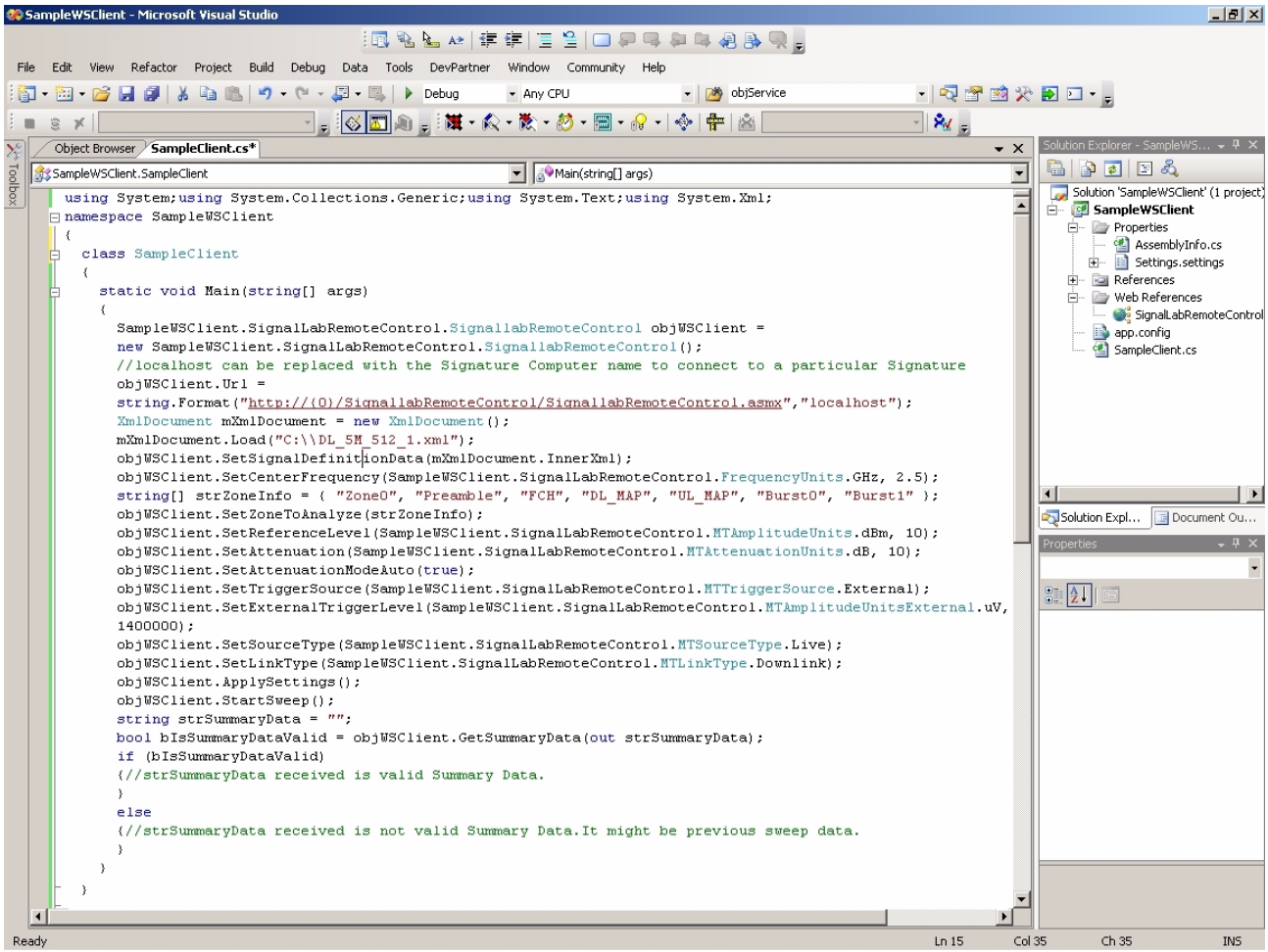


Figure 3-25. Visual Studio .NET SampleWSClient

2. On the resulting pop-up dialog, click on *Add Web Reference* to open the Add Web Reference dialog shown in Figure 3-26 below:

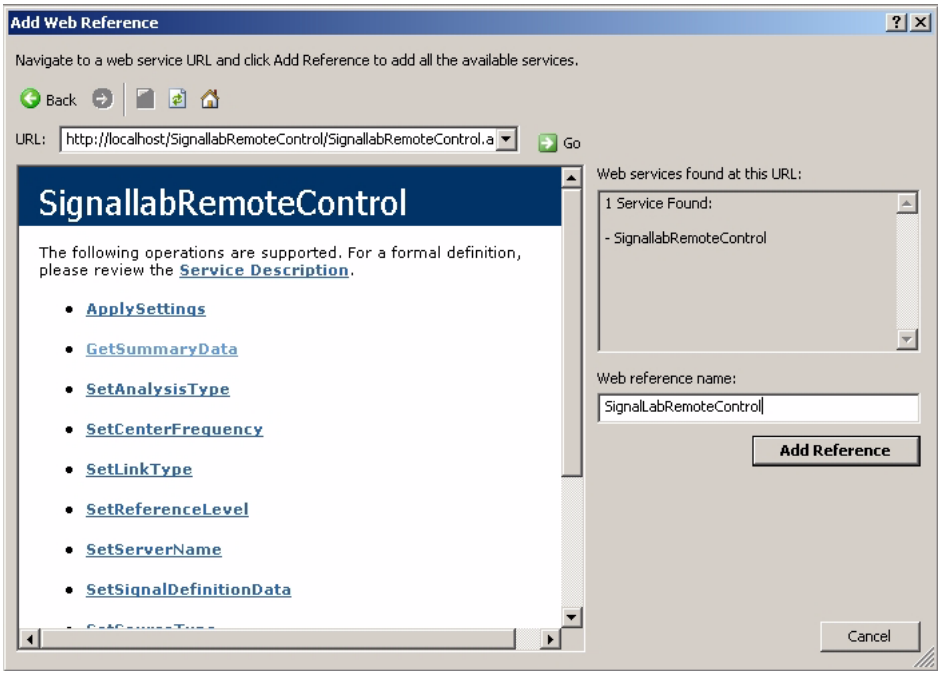


Figure 3-26. Add Web Reference Dialog

3. In the URL field, type in the URL of the Web Service of interest. In this example: http://<Computer Name>/SignalLabRemoteControl/SignalLabRemoteControl.asmx.

Note: <Computer Name> represents the name of the Signature system that is running the SignalLab application. If SignalLab is running on the same machine where the control application is being developed, then "localhost" can be used for <Computer Name>.

4. Change the *Web reference name* to be the same as the Web Service name that you are initializing. In this example, SignalLabRemoteControl.

5. Click on the *Add Reference* button. The object corresponding to this Web Service is then added to your application.

6. Instantiate the object of the above type as follows:

```
SampleWSClient.SignalLabRemoteControl.SignallabRemoteControl objWSClient = new
SampleWSClient.SignalLabRemoteControl.SignallabRemoteControl();
//localhost can be replaced with the Signature Computer name to connect to a
//particular Signature
objWSClient.Url = string.Format("http://{0}/SignallabRemoteControl/
SignallabRemoteControl.asmx","localhost");
```

Setting up the Visual Basic 6 Environment

The following procedure describes how to set up the SignalLabRemoteControl web service using Visual Basic 6.0 development environment.

1. Download and install the Microsoft SOAP Toolkit from the Microsoft developers Web site:

   http://msdn.microsoft.com/soap

2. Run VB6 and start a new project.
3. Add the SOAP reference to the project:

   Project | References menu

4. Select the "Microsoft SOAP Type Library V3.0."

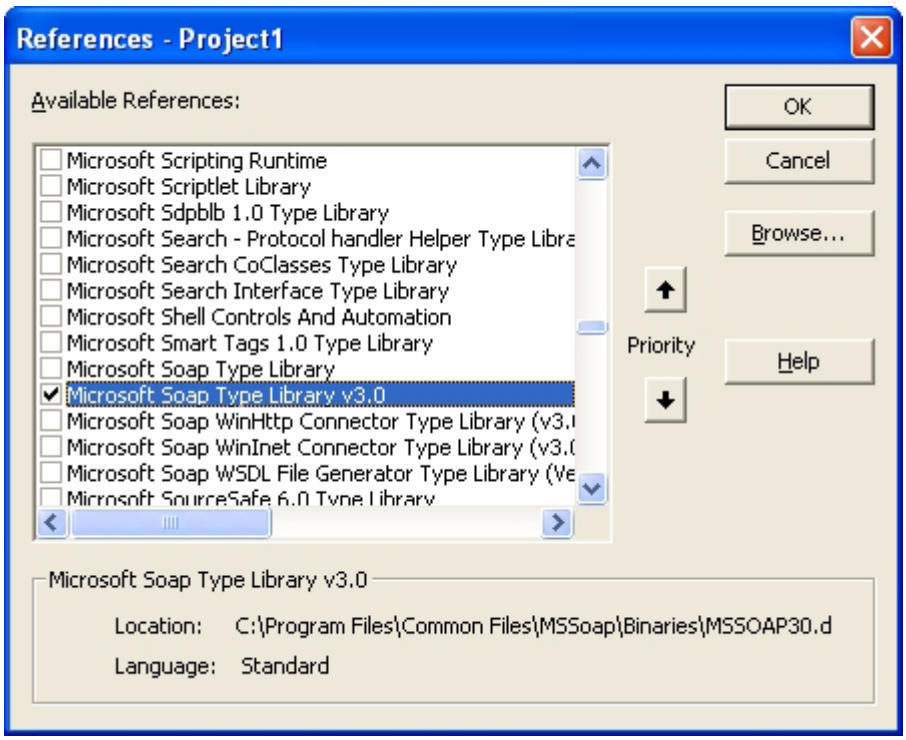


Figure 3-27. Adding a Reference in VB6

5. Add the XML reference to the project by selecting "Microsoft XML, V4.0," and then press OK.

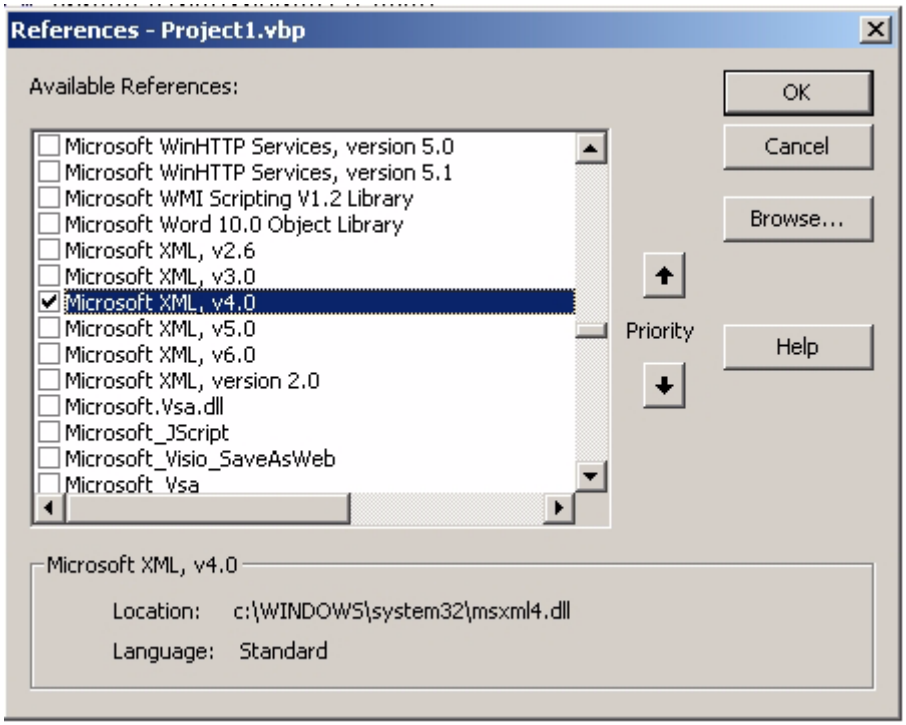


Figure 3-28. Adding a Reference in VB6

Instantiating in the VB6 Environment

1. Define a variable for each of the interfaces you wish to access, for example:

```
SignalLab
```

2. Assign the variable type as a new MSSOAPLib30.SoapClient30, for example:

```
Dim SignalLab As New MSSOAPLib30.SoapClient30
```

3. Connect the new variable to the SignalLab remote control web server address, for example:

```
SignalLab.MSSoapInit _
"http://<Computer Name>/SignalLabRemoteControl/SignalLabRemoteControl.asmx?wsdl"
```

Note: <Computer Name> represents the name of the Signature system that is running the SignalLab application. If SignalLab is running on the same machine where the control application is being developed, then "localhost" can be used for <Computer Name>.

4. Issue any desired Web Services calls.

Note: The intellisense functionality of the Microsoft SOAP object variable does not include the Web Services commands. These commands must be typed directly into the editor without using the intellisense functionality.

Additionally, the properties of the SOAP object are available to use, such as:

```
SignalLab.ConnectorProperty("Timeout") = 1000
```

The default SOAP values will work, but you can adjust these values as necessary. See the SOAP documentation for full details on these properties and their use.

For more information about programming with Web Services on Signature, refer to the MS278XB Remote Programming manual, part number: 10410-00274.

SignalLabRemoteControl Class

The SignalLabRemoteControl class provides access to SignalLab's WiMAX analysis controls and queries. The examples provided in this section require the appropriate header code as follows:

C#.Net Example Header Code

```
using System;
namespace SampleWSClient
{
/// <summary>
/// This is a sample web service client that demonstrates how to use the Anritsu
/// SignalLabRemoteControl web services in a C# .NET environment.
/// </summary>
class SampleClient
{
[STAThread]
static void Main(string[] args)
{
  SampleWSClient.SignalLabRemoteControl.SignallabRemoteControl objWSClient = new
  SampleWSClient.SignalLabRemoteControl.SignallabRemoteControl();
  //localhost can be replaced with the Signature Computer name to connect to a
  //particular Signature
  objWSClient.Url = string.Format("http://{0}/SignallabRemoteControl/
  SignalLabRemoteControl.asmx","localhost");
}
```

VB6 Example Header Code

```
Dim SignalLab As New MSSOAPLib30.SoapClient30
SignalLab.MSSoapInit _
"http://localhost/SignalLabRemoteControl/SignalLabRemoteControl.asmx?wsdl"
'Enter SignalLab VB6 Example Code here to remotely program the application.
```

Note: SignalLab must be running in the correct Analysis mode of OFDM or OFDMA **prior** to issuing Web Service Calls. To change the analysis mode, close SignalLab, restart the application, and select the expected analysis mode from the initial configuration dialog.

In some rare cases, the SignalLabRemoteControl web service calls result in the following error message:

Error –2147467259-Requested Service Not Found

To resolve this error, restart the SignalLab application.

SetSignalDefinitionData

This call sets the signal definition file.

API: `public void SetSignalDefinitionData(string strXMLInfo)`

Arguments: **`strXMLInfo:`** Contains the signal definition file content when the call is sent and is defined as an enumeration constant.

The path and filename specified in the variable file in the examples below points to a definition file that exists on the same PC as the application that is making this call.

VB6 Example:
```
Dim mXmlDocument As MSXML2.DOMDocument
Set mXmlDocument = New MSXML2.DOMDocument
mXmlDocument.Load "C:\\DL_5M_512_1.xml"
Call SignalLab.SetSignalDefinitionData (mXmlDocument.xml)
```

C#.NET Example:
```
XmlDocument mXmlDocument = new XmlDocument();
mXmlDocument.Load("C:\\DL_5M_512_1.xml");
objWSClient.SetSignalDefinitionData(mXmlDocument.InnerXml);
```

SetServerName

This call sets the computer name of the Signature instrument that is used by SignalLab.

API: `public void SetServerName(string strServerName)`

Arguments: **`strServerName:`** Contains the computer name when the call is sent and is defined as a string.

VB6 Example:
```
Dim strServerName As String
strServerName = "SN123456"
Call SignalLab.SetServerName(strServerName)
```

C#.NET Example:
```
string strServerName = "SN123456";
objWSClient.SetServerName(strServerName);
```

SetCenterFrequency

This call sets the carrier frequency of the signal to be analyzed.

API: `public void SetCenterFrequency(FrequencyUnits freqUnits, double newValue)`

Arguments: **`FrequencyUnits:`** Contains the frequency units when the call is sent and is defined as an enumeration constant with one of the following values:
"Hz", "KHz" "MHz", "GHz"

`newValue:` Contains the frequency value when the call is sent and is defined as a double. Ranges from 5 Hz to 8.079999995 GHz with 4 GHz as the default value. Constrained to: (MinStart + MinSpan ÷ 2) to (MaxStop – MinSpan ÷ 2)

VB6 Example:
```
Call SignalLab.SetCenterFrequency("MHz", 4325#)
```

C#.NET Example:
```
double newValue = 100.0;
objWSClient.SetCenterFrequency(newValue,SignalLab.
FrequencyUnits.MHz);
```

SetReferenceLevel

This call sets the reference level on Signature.

API: `public void SetReferenceLevel(MTAmplitudeUnits newUnitValue, double newValue)`

Arguments: **`newUnitValue:`** Contains the reference level units when the call is sent and is defined as an enumeration constant with one of the following values:
“dBm”, “dBmV”, “dBuV”,” W”, “, “mW”, “uW”, “nW”, “mV”, “uV”, “nV”, “pW”, “pV”, “fW”, “aW”, “zW”, “yW”

`newValue:` Contains the reference level value when the call is sent and is defined as a double. Ranges from 30 dBm to –150 dBm with a default value of 0 dBm.

VB6 Example:
```
Call SignalLab.SetReferenceLevel("dBm", -20#)
```

C#.NET Example:
```
double newValue = 20.0;
objWSClient.SetReferenceLevel(newValue,
SignalLab.MTAmplitudeUnits.dBm);
```

SetAttenuation

Sets the attenuation level when attenuation is set to manual mode.

API: `public void SetAttenuation(MTAttenuationUnits enumAttunits, double newValue)`

Arguments: **`enumAttunits:`** Contains the Attenuation units when the call is sent and is defined as an enumeration constant with the following value: dB

`newValue:` Contains the Attenuation value when the call is sent and is defined as a double. Ranges from 0 dB to 62 dB in steps of 2 dB with a default value of 10 dB.

VB6 Example:
```
dim newValue as double
newValue = 20
Call SignalLab.SetAttenuation("dB", newValue)
```

C#.NET Example:
```
double dnewVlaue = 9;
objWSClient.SetAttenuation(SignalLab.SignalLabRemoteControl.MTAttenu
ationUnits.dB, dnewVlaue);
```

SetAttenuationModeAuto

Sets the attenuation mode to Auto or Manual mode.

API: `public void SetAttenuationModeAuto(bool bAuto)`

Arguments: **`bAuto:`** "True" to set Attenuation mode to Auto, "False" to set Attenuation Mode to manual.

VB6 Example:
```
dim bAttenuationModeAuto as Boolean
bAttenuationModeAuto = False
Call SignalLab.SetAttenuationModeAuto(bAttenuationModeAuto)
```

C#.NET Example:
```
bool bAttenuationModeAuto = false;
objWSClient.SetAttenuationModeAuto(bAttenuationModeAuto);
```

SetInputSignal

Sets the input signal interface type as defined below.

API: `public void SetInputSignal(MTInputSignal newValue)`

Arguments: **`newValue:`** Contains the Input Signal Value when the call is sent and is defined as an enumeration constant with one of the following values:
"mtIFInputWideBand", "mtIQDiffHigh", "mtIQDiffLow", "mtIQSingleHigh", "mtIQSingleLow"

VB6 Example:
```
dim sNewValue as string
sNewValue = "mtIFInputWideBand"
Call SignalLab.SetInputSignal(sNewValue)
```

C#.NET Example:
```
SignalLab.SignalLabRemoteControl.MTInputSignal eInputSignal =
SignalLab.SignalLabRemoteControl.MTInputSignal.mtIFInputWideBand;
objWSClient.SetInputSignal(eInputSignal);
```

SetTriggerSource

This call sets the trigger mode to be used on Signature.

API: `public void SetTriggerSource(MTTriggerSource newValue)`

Arguments: **`MTTriggerSource:`** Contains the trigger source value and is defined as an enumeration constant with one of the following values:
"FreeRun", "WideIF", "Line", "External", "Video", "ExternalTTL"

VB6 Example:
```
Call SignalLab.SetTriggerSource("External")
```

C#.NET Example:
```
objWSClient.SetTriggerSource(SignalLabEnums.MTTriggerSource.
External);
```

SetExternalTriggerLevel

Sets the trigger level when the trigger source is set to External.

API: `public void SetExternalTriggerLevel(MTAmplitudeUnitsExternal amplitudeUnitsExternal, double newValue)`

Arguments: **`amplitudeUnitsExternal:`** Contains the External Trigger units when the call is sent and is defined as an enumeration constant with one of the following values:
"V", "mV", "uV", "nV"

`newValue:` Contains the External Trigger Level value when the call is sent and is defined as a double. Ranges from +10 V to –10 V with a default of +1.4 V.

VB6 Example:
```
dim newValue as double
newValue = 1.4
Call SignalLab.SetExternalTriggerLevel("V", NewValue)
```

C#.NET Example:
```
SignalLab.SignalLabRemoteControl.MTAmplitudeUnitsExternal
eAmplitudeUnitsExternal =
SignalLab.SignalLabRemoteControl.MTAmplitudeUnitsExternal.uV;
objWSClient.SetExternalTriggerLevel(eAmplitudeUnitsExternal,
1400000);
```

SetWideIFTriggerLevel

Sets the trigger level when the trigger source is set to WideIF.

API:
```
public void SetWideIFTriggerLevel(MTAmplitudeUnitsWideIF
amplitudeUnitsWideIF, double newValue)
```

Arguments: **amplitudeUnitsWideIF:** Contains the Wide IF Trigger units when the call is sent and is defined as an enumeration constant with the following value:
"dBm"

newValue: Contains the Wide IF Trigger Level value when the call is sent and is defined as a double. Ranges from the current reference level setting to 40 dB below the current reference level setting. Default value is the current reference level setting.

VB6 Example:
```
dim newValue as double
newValue = -10
Call SignalLab.SetWideIFTriggerLevel("dBm", NewValue)
```

C#.NET Example:
```
SignalLab.SignalLabRemoteControl.MTAmplitudeUnitsWideIF
eAmplitudeUnitsExternal =
SignalLab.SignalLabRemoteControl.MTAmplitudeUnitsWideIF.dBm;
objWSClient.SetWideIFTriggerLevel(eAmplitudeUnitsExternal, -10 );
```

SetVideoTriggerLevel

Sets the trigger level when the trigger source is set to Video.

API:
```
public void SetVideoTriggerLevel(MTAmplitudeUnitsVideo
amplitudeUnitsVideo, double newValue)
```

Arguments: **amplitudeUnitsVideo:** Contains the Video Trigger units when the call is sent and is defined as an enumeration constant with the following value:
"dBm"

newValue: Contains the Video Trigger Level value when the call is sent and is defined as a double. Ranges from +30 dBm to –150 dBm with a default value of 0 dBm.

VB6 Example:
```
dim newValue as double
newValue = -10
Call SignalLab.SetVideoTriggerLevel("dBm", NewValue)
```

C#.NET Example:
```
SignalLab.SignalLabRemoteControl.MTAmplitudeUnitsVideo
eAmplitudeUnitsVideo =
SignalLab.SignalLabRemoteControl.MTAmplitudeUnitsVideo.dBm
objWSClient.SetVideoTriggerLevel(eAmplitudeUnitsVideo, 10);
```

SetTriggerEdgeRising

Sets the trigger to rising or falling edge.

API:
```
public void SetTriggerEdgeRising(bool bTriggerEdge)
```

Arguments: **bTriggerEdge:** "True" to trigger on Rising edge, "False" to trigger on Falling edge. Default: "True"

VB6 Example:
```
Call SignalLab.SetTriggerEdgeRising("True")
```

C#.NET Example:
```
bool bTriggerEdge = True;
objWSClient.SetTriggerEdgeRising(bTriggerEdge);
```

SetTriggerDelay

Sets the trigger delay.

API: `public void SetTriggerDelay(MTTimeUnits mtTimeUnits, double newValue)`

Arguments: mtTimeUnits: Contains the Trigger Delay units when the call is sent and is defined as an enumeration constant with one of the following values:
"mtns", "mtus", "mtms", "mts", "mtks"

newValue: Contains the trigger delay value when the call is sent and is defined as a double. Ranges from –1 ms to 65 ms in zero span and 0 to 65 ms in all other spans with a default value of 0 ms.

VB6 Example:
```
Call SignalLab.SetTriggerDelay("mtms", 10#)
```

C#.NET Example:
```
double newValue = 10.0;
objWSClient.SetTriggerDelay(SignalLab.MTTrgAmplitudeUnits.mtms,
newValue);
```

SetSourceType

This call sets the source of the IQ data to be used for analysis. The source could be a live receiver, such as Signature, or a baseband signal generated in the SignalLab application.

API: `public void SetSourceType(MTSourceType newValue)`

Arguments: **`MTSourceType:`** Contains the trigger source when the call is sent and is defined as an enumeration constant with one of the following values:
"Simulation" or "Live"

Note: For Simulation in OFDMA mode, contact your Anritsu sales representative for support.

VB6 Example:
```
Call SignalLab.SetSourceType("Live")
```

C#.NET Example:
```
objWSClient.SetTriggerSource(SignalLabEnums.MTSourceType.Live);
```

SetLinkType

This call sets the type of the subframe to be analyzed.

API: `public void SetLinkType(MTLinkType newValue)`

Arguments: **`MTLinkType:`** Contains the link type when the call is sent and is defined as an enumeration constant with one of the following values:
"Downlink", "Uplink"

VB6 Example:
```
Call SignalLab.SetLinkType("Downlink")
```

C#.NET Example:
```
objWSClient.SetLinkType(SignalLabEnums.MTLinkType.Downlink);
```

SetZoneToAnalyze

This call sets the zone to analyze for OFDMA signal types.

API: `public void SetZoneToAnalyze(string[] strZoneInfo)`

Arguments: **`strZoneInfo:`** Contains the analysis zone information when the call is sent and is defined as a string array. The array must have a minimum of the Zone and Burst strings with all of the other strings determined by the signal analysis definition.

Downlink example:
"Zone0", "Preamble", "FCH", "DL_MAP", "UL_MAP", "Burst0", "Burst1"

Uplink example:
"Zone0", "Burst0", "Burst1"

The examples below assume that all of the specified input parameters are present in the signal analysis definition.

VB6 Example:
```
Dim strZoneInfo() As Variant
strZoneInfo() = Array _
("Zone0", "Preamble", "FCH", "DL_MAP", "UL_MAP", "Burst0", "Burst1")
Call SignalLab.SetZoneToAnalyze(strZoneInfo)
```

C#.NET Example:
```
string[] strZoneInfo = { "Zone0", "Preamble", "FCH", "DL_MAP",
"UL_MAP", "Burst0", "Burst1" };
objWSClient.SetZoneToAnalyze(strZoneInfo);
```

ApplySettings

This call transfers the cumulative configuration to SignalLab for an analysis.

API: `public void ApplySettings()`

Arguments: None

VB6 Example: `Call SignalLab.ApplySettings`

C#.NET Example: `objWSClient.ApplySettings();`

StartSweep

This call starts an analysis sweep cycle.

API: `public string StartSweep()`

Arguments: None

Return Result: `"Success" if the command completed successfully, otherwise returns an error message string.`

VB6 Example:
```
Dim sResult as String
sResult = SignalLab.StartSweep
```

C#.NET Example:
```
string sResult = null;
sResult = objWSClient.StartSweep();
```

GetSummaryData

This call reads the summary result data from SignalLab.

API: `public bool GetSummaryData(out string strSummaryData)`

Arguments: **`strSummaryData:`** Contains the summary data in XML format as shown below:

OFDM Signal Analysis Type:

"<Crest_factor_dB>9.7335</Crest_factor_dB>
<Av_SINR>24662.7442</Av_SINR>
<Av_SINR_db>43.9204</Av_SINR_db>
<RSSI_over_whole_packet>0.0045</RSSI_over_whole_packet>
<RSSI_over_whole_packet_dB>-23.4659</RSSI_over_whole_packet_dB>
<evmPeakMin1>3.0726</evmPeakMin1>
<evmPeakMin>52</evmPeakMin2>
<evmPeakMin3>169</evmPeakMin3>
<evm_av_percent>0.4156</evm_av_percent>
<relative_const_error_percent>0.6368</relative_const_error_percent>
<IQ_offset_percent>0.1491</IQ_offset_percent>
<evmPeakMin>0.0051</evmPeakMin4>
<evmPeakMin5>60</evmPeakMin5>
<evmPeakMin6>81</evmPeakMin6>
<IQ_imbalance_percent>6.6186</IQ_imbalance_percent>
<quad_error>-0.2111</quad_error>
<resultant_freq_offset_estimate>0.0017</resultant_freq_offset_estimate>
<frequency_offset_Hz>105.2584</frequency_offset_Hz>
<Normalized_sampling_time_offset_ppm>0.085
</Normalized_sampling_time_offset_ppm>
<Normalized_alternative_sampling_time_offset_ppm>0.0377
<Normalized_alternative_sampling_time_offset_ppm>
<Normalized_sampling_time_offset_data_aided_ppm>0.0302
<Normalized_sampling_time_offset_data_aided_ppm>
<max_auto_correlation_for_packet_detection>0.9982
</max_auto_correlation_for_packet_detection>
<detected_mod></detected_mod>
<BER>0</BER>
<SNR_long>44.0819</SNR_long>
<RSSI_long>-23.47</RSSI_long>
<std_SNR>25.6417</std_SNR>
<std_RSSI>-53.5986</std_RSSI>"

OFDMA Signal Analysis Type:
"<rce_data_av_percent>0.443</rce_data_av_percent>
<rce_pilot_av_percent>0.3414</rce_pilot_av_percent>
<IQoffset>-93.0099</IQoffset>
<frequency_offset_Hz>79.4509</frequency_offset_Hz>
<CINR_dB>48.7417</CINR_dB>
<rce_peak1>1.6819</rce_peak1>
<rce_peak2>10</rce_peak2>
<rce_peak3>75</rce_peak3>
<IQ_imbalance_DB>0.0189</IQ_imbalance_DB>
<Normalized_sampling_time_offset_ppm>
-0.1104<Normalized_sampling_time_offset_ppm>
<RSSI_dBm>-22.8365</RSSI_dBm>
<rce_peak4>0.9314</rce_peak4>
<rce_peak5>8</rce_peak5>
<rce_peak6>2</rce_peak6>
<quad_error>-0.1351</quad_error>"

Return Values: If summary data is invalid, then the return value is “False”
If the summary data is valid, then the return value is “True”

VB6 Example:
```
Dim bValidData as Boolean
Dim strSummaryData as String
bValidData = SignalLab.GetSummaryData(strSummaryData)
```

C#.NET Example:
```
bool bValidData = false;
string strSummaryData = null;
bValidData = objWSClient.GetSummaryData(strSummaryData);
```

Appendix A OFDMA Parameter Reference

This appendix provides a parameter setting reference for the parameters listed in SignalLab's Analysis Properties Editor. The following list is a quick reference to the parameters in each respective node:

A-1 Common Parameters

Filter

DLFP

A-2 Segment Parameters (PHY/MAC)

Preamble

FCH

A-1 Common Parameters

The items displayed in the Common parameter list are described below. The common parameter list contains parameters that need to be set regardless of whether or not Bursts or MAC messages are mapped. The common parameters are displayed under the Common area in the middle pane. The prefix "0x" at the beginning of a value indicates that the data is expressed in hexadecimal format. The data is expressed in decimal format when there is no prefix.

Table A-1. Number of Frames

Function	Sets the number of frames to be generated.
Initial value	1
Setting range	1 to Max. number of frames that can be stored in the MG3700's waveform memory
Remark	Example: When FFT size = 1024, Band Width = 10.00 MHz, n = 28/25, Frame Duration = 5 ms, Oversampling Ratio = 2, With Option21 (Memory 512Msamples), up to 4793 frames can be set. This parameter cannot be edited when Frame Duration = Continuous. If the number of frames exceeds the maximum number of frames that can be stored in the MG3700 waveform memory according to the setting of other parameters, this parameter is reset to 1.

Table A-2. Initial Frame Number

Function	Sets the initial value for the Frame Number.
Initial value	0x000000
Setting range	0x000000 to 0xFFFFFF
Remark	This parameter cannot be edited when Frame Duration = Continuous.

Table A-3. FFT Size

Function	Sets the FFT point count.
Initial value	1024
Setting range	128, 512, 1024, 2048
Remark	

Table A-4. G

Function	Sets the CP time ratio.
Initial value	1/8
Setting range	1/4, 1/8, 1/16, 1/32
Remark	

Table A-5. Oversampling Ratio

Function	Sets the oversampling ratio.
Initial value	2
Setting range	Display only

Table A-6. Band Width

Function	Sets the bandwidth.
Initial value	10.00 MHz
Setting range	1.25, 1.50, 1.75, 2.50, 3.00, 3.50, 5.00, 6.00, 7.00, 8.75, 10.00, 12.00, 14.00, 15.00, 17.50, 20.00, 24.00, 28.00 MHz

Table A-7. n

Function	Sets the sampling factor.
Initial value	28/25
Setting range	8/7, 28/25
Remark	For the System Profile, set 8/7 if the Band Width is a multiple of 1.75 MHz (1.75, 3.50, 7.00, 8.75, 14.00, 17.50, 28.00). Set 28/25 if the Band Width is a multiple of 1.25, 1.50, 2.00, or 2.75 MHz (1.25, 1.50, 2.50, 3.00, 5.00, 6.00, 10.00, 12.00, 15.00, 20.00, 24.00).

Table A-8. Frame Duration

Function	Sets the frame duration.
Initial value	5.0 ms
Setting range	2.0, 2.5, 4.0, 5.0, 8.0, 10.0, 12.5, 20.0 ms, Continuous
Remark	When a waveform pattern is created with Frame Duration set to Continuous, the OFDMA waveform pattern with the Sub channel set in Used sub channel Bitmap bits 0 to 5 turned On. The parameters that must be set when Frame Duration is set to Continuous are FFT size, G, Band Width, n, DL Use All SC Indicator, Used subchannel Bitmap bits 0 to 5, Continuous OFDMA Symbols, Continuous Data Type, Continuous Modulation Type, Roll off length, Filter Type, Roll Off/BT, and Filter Length. The other parameters are invalid. The arrangement of Pilot Subcarriers in a Continuous waveform pattern is the same as DL PUSC. No MAC Message such as Preamble, FCH, or DL-MAP is added to the Continuous waveform pattern. When Frame Duration is Continuous, tree view cannot be changed.

Table A-9. DL Use All SC Indicator

Function	Sets the state in which all subchannels are used regardless of the Used subchannel Bitmap.
Initial value	Not All
Setting range	All, Not All
Remark	

Table A-10. Used subchannel Bitmap bit0 to bit5

Function	Sets the subchannel group used for Downlink PUSC.
Initial value	(FFT size ≠ 512, 128) Used subchannel Bitmap bit0: 1 Used subchannel Bitmap bit1: 1 Used subchannel Bitmap bit2: 1 Used subchannel Bitmap bit3: 1 Used subchannel Bitmap bit4: 1 Used subchannel Bitmap bit5: 1 (FFT size = 512, 128) Used subchannel Bitmap bit0: 1 Used subchannel Bitmap bit1: 0 (This setting cannot be changed.) Used subchannel Bitmap bit2: 1 Used subchannel Bitmap bit3: 0 (This setting cannot be changed.) Used subchannel Bitmap bit4: 1 Used subchannel Bitmap bit5: 0 (This setting cannot be changed.)
Setting range	1, 0
Remark	This parameter is applied to all the Downlink PUSC zones. Any value other than 1 cannot be selected for bit 0 when Segment Index = 0, bit 2 when Segment Index = 1, and bit 4 when Segment Index = 2.

Table A-11. Uplink Allocation Start Time

Function	Sets the delay for the starting timing of the Uplink subframes with respect to the frame starting timing.
Initial value	7000 PS
Setting range	0 to Frame End PS
Remark	This parameter cannot be edited when Frame Duration = Continuous.Refer to “Uplink Allocation Start Time setting method” for details on the setting method.

Table A-12. UL Allocated Subchannels bitmap

Function	Displays the number of subchannels used in Uplink.
Initial value	All Subchannels
Setting range	Display only
Remark	This parameter is fixed to All Subchannels and cannot be changed.

Table A-13. Continuous OFDMA Symbols

Function	Sets the number of OFDMA symbols of the continuous wave when Continuous is selected.
Initial value	2 symbols
Setting range	2 to Maximum number of OFDMA symbols that can be stored in the MG3700's waveform memory
Remark	This parameter is valid only when Frame Duration = Continuous. It can be set in multiples of two symbols. If the number of OFDMA symbols exceeds the maximum number of OFDMA symbols that can be stored in the MG3700 waveform memory according to the setting of other parameters, this parameter is reset to 2.

Table A-14. Continuous Data Type

Function	Sets the data when Continuous is selected.
Initial value	PN9fix
Setting range	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File
Remark	This parameter is valid only when Frame Duration = Continuous. Neither Coding nor Randomization is performed for the data selected here. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the length of the waveform pattern to be generated. The PN data therefore does not have continuity between the end of a waveform pattern and the start of the next waveform pattern. Refer to Appendix B "User File Format" for details on the user file format.

Table A-15. Continuous Data Type Repeat Data

Function	Sets the data when Continuous Data Type = 16 bit repeat.
Initial value	0x0000
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when Continuous Data Type = 16 bit repeat.

Table A-16. Continuous Data Type User File

Function	Sets the user file when Continuous Data Type = User File.
Remark	This parameter is displayed only when Continuous Data Type = User File.

Table A-17. Continuous Modulation Type

Function	Sets the primary modulation type when Continuous is selected.
Initial value	QPSK
Setting range	QPSK, 16QAM, 64QAM
Remark	This parameter is valid only when Frame Duration = Continuous.

Table A-18. TTG

Function	Displays the gap interval between Downlink and Uplink.
Setting range	Displays the calculated value.
Remark	

Table A-19. RTG

Function	Displays the gap interval between Downlink and Frame End.
Setting range	Displays the calculated value.
Remark	

Table A-20. Subcarrier Spacing

Function	Displays the subcarrier spacing.
Setting range	Displays the value.
Remark	

Table A-21. Sampling Frequency

Function	Displays the sampling frequency.
Setting range	Displays the value.
Remark	This parameter changes depending on the settings of Band Width, n (Sampling Factor), and Oversampling Ratio.

Table A-22. Segment Index

Function	Sets the segment number.
Initial value	0
Setting range	0, 1, 2
Remark	This parameter cannot be edited when Frame Duration = Continuous.

Table A-23. Preamble Index

Function	Sets the preamble index. The setting range varies depending on Segment Index. When Preamble Index is set, IDcell is also set automatically.
Initial value	0 (IDcell=0)
Setting range (Segment Index = 0)	0 (IDcell=0), 1 (IDcell=1), 2 (IDcell=2), 3 (IDcell=3), 4 (IDcell=4), 5 (IDcell=5), 6 (IDcell=6), 7 (IDcell=7), 8 (IDcell=8), 9 (IDcell=9), 10 (IDcell=10), 11 (IDcell=11), 12 (IDcell=12), 13 (IDcell=13), 14 (IDcell=14), 15 (IDcell=15), 16 (IDcell=16), 17 (IDcell=17), 18 (IDcell=18), 19 (IDcell=19), 20 (IDcell=20), 21 (IDcell=21), 22 (IDcell=22), 23 (IDcell=23), 24 (IDcell=24), 25 (IDcell=25), 26 (IDcell=26), 27 (IDcell=27), 28 (IDcell=28), 29 (IDcell=29) , 30 (IDcell=30), 31 (IDcell=31), 96 (IDcell=0), 99 (IDcell=3), 102 (IDcell=6), 105 (IDcell=9), 108 (IDcell=12), 111 (IDcell=15)
(Segment Index = 1)	32 (IDcell=0), 33 (IDcell=1), 34 (IDcell=2), 35 (IDcell=3), 36 (IDcell=4), 37 (IDcell=5), 38 (IDcell=6), 39 (IDcell=7), 40 (IDcell=8), 41 (IDcell=9), 42 (IDcell=10), 43 (IDcell=11), 44 (IDcell=12), 45 (IDcell=13), 46 (IDcell=14), 47 (IDcell=15), 48 (IDcell=16), 49 (IDcell=17), 50 (IDcell=18), 51 (IDcell=19), 52 (IDcell=20), 53 (IDcell=21), 54 (IDcell=22), 55 (IDcell=23), 56 (IDcell=24), 57 (IDcell=25), 58 (IDcell=26), 59 (IDcell=27), 60 (IDcell=28), 61 (IDcell=29), 62 (IDcell=30), 63 (IDcell=31), 97 (IDcell=1), 100 (IDcell=4), 103 (IDcell=7), 106 (IDcell=10), 109 (IDcell=13), 112 (IDcell=16)
(Segment Index = 2)	64 (IDcell=0), 65 (IDcell=1), 66 (IDcell=2), 67 (IDcell=3), 68 (IDcell=4), 69 (IDcell=5), 70 (IDcell=6), 71 (IDcell=7), 72 (IDcell=8), 73 (IDcell=9), 74 (IDcell=10), 75 (IDcell=11), 76 (IDcell=12), 77 (IDcell=13), 78 (IDcell=14), 79 (IDcell=15), 80 (IDcell=16), 81 (IDcell=17), 82 (IDcell=18), 83 (IDcell=19), 84 (IDcell=20), 85 (IDcell=21), 86 (IDcell=22), 87 (IDcell=23), 88 (IDcell=24), 89 (IDcell=25), 90 (IDcell=26), 91 (IDcell=27), 92 (IDcell=28), 93 (IDcell=29), 94 (IDcell=30), 95 (IDcell=31), 98 (IDcell=2), 101 (IDcell=5), 104 (IDcell=8), 107 (IDcell=11), 110 (IDcell=14), 113 (IDcell=17)
Remark	This parameter cannot be edited when Frame Duration = Continuous.

Table A-24. Roll off length

Function	Sets the length of the window function applied to the symbol guard segment.
Initial value	16 samples
Setting range	0 to 64 (when Oversampling Ratio = 2)
Remark	The length of the guard segment is displayed on a time basis in the field below.

Filter

Table A-25. Filter Type

Function	Sets the filter type.
Initial value	None
Setting range	None, Gaussian, Root Nyquist, Nyquist, or Ideal
Remark	The output level may be lowered if a filter that narrows the signal bandwidth is selected.

Table A-26. Roll Off/BT

Function	Sets the roll off rate or bandwidth time.
Initial value	0.5
Setting range	0.1 to 1.0
Remark	The setting changes between the Roll Off value (for Root Nyquist or Nyquist) and BT product (for Gaussian), depending on the setting of Filter Type. This parameter cannot be edited when Filter Type = None or Ideal.

Table A-27. Filter Length

Item	Sets the symbol length of the filter.
Initial value	8
Setting range	1 to 1024
Remark	This parameter cannot be edited when Filter Type = None or Ideal.

DLFP

Table A-28. Repetition Coding Indication

Function	Sets the repetition Coding Indication used for DL-MAP.
Initial value	No repetition
Setting range	No repetition,2, 4, 6
Remark	This parameter cannot be edited when Frame Duration = Continuous.

Table A-29. Coding Indication

Function	Sets the Coding Indication used for DL-MAP.
Initial value	CC
Setting range	CC, CTC
Remark	This parameter cannot be edited when Frame Duration = Continuous.

A-2 Segment Parameters (PHY/MAC)

The items displayed in the PHY/MAC parameter list are described in this section. When Frame Duration is set to Continuous in the Common parameters, the PHY/MAC parameters cannot be changed.

Preamble

When Preamble is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table A-30. Preamble Index

Function	Displays the setting value of the parameter of the same name in the common parameter list.
Initial value	0 (IDcell=0)
Setting range	Display only

Table A-31. IDcell

Item	Displays IDcell determined depending on the setting of Preamble Index.
Initial value	0
Setting range	Display only

FCH

When FCH is selected in the tree view, the following items are displayed in the PHY/MAC parameter list:

Table A-32. FCH Type

Function	Sets the data type to be inserted into FCH.
Initial value	DLFP
Setting range	16 bit repeat, PN9fix, PN15fix, DLFP, User File
Remark	When DLFP is selected, the data of FCH is set. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the length of the waveform pattern to be generated. The PN data therefore does not have continuity between the end of a waveform pattern and the start of the next waveform pattern.

Table A-33. FCH Type Repeat Data

Function	Sets the data to be inserted to FCH when FCH Type = 16 bit repeat.
Initial value	0x0000
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when FCH Type = 16 bit repeat.

Table A-34. FCH Type User File

Function	Sets the user file when FCH Type = User File.
Remark	This parameter is displayed only when FCH Type = User File.

Table A-35. Used subchannel Bitmap bits0 to 5

Function	Sets the displays the setting of Used subchannel Bitmap bits0 to 5.
Setting range	Display only
Remark	Displays the setting values of the common parameters Used subchannel Bitmap bits 0 to 5.

Table A-36. Repetition Coding Indication

Function	Displays the Repetition Coding used for DL-MAP.
Setting range	Display only
Remark	Displays the setting value of Repetition Coding Indication in the common parameter DLFP.

Table A-37. Coding Indication

Function	Displays the Coding Indication used for DL-MAP.
Setting range	Display only
Remark	Displays the setting value of Coding Indication in the common parameter DLFP.

Table A-38. DL-MAP Length

Function	Sets the displays the DL-MAP Length.
Setting range	Display only
Remark	Displays DL-MAP Length set in Section 5.1.4.3 “DLMAP”.

MAC Messages such as FCHs and DL-MAPs can be added to Downlink. The format of the data mapped to the FCHs is shown below. The prefix “0b” at the beginning of a value indicates that the data is expressed in binary format, “0x” indicates that the data is expressed in hexadecimal format. The data is expressed in decimal format when there is no prefix.

The following tables show the data format for FCH when the value of FCH Type is set to “DLFP.”

Table A-39. Data Format for FCH (when FFT size is other than 128)

Syntax	Size	Note
Used Subchannel Bitmap	6 bits	Bit#0: 0 or 1 (Subchannel group 0) Bit#1: 0 or 1 (Subchannel group 1) Bit#2: 0 or 1 (Subchannel group 2) Bit#3: 0 or 1 (Subchannel group 3) Bit#4: 0 or 1 (Subchannel group 4) Bit#5: 0 or 1 (Subchannel group 5)
Reserved	1 bit	0
Repetition Coding Indication	2 bits	If (No repetition coding used on DL-MAP){ 0b00 } else if(Repetition coding of 2 used on DL-MAP){ 0b01 } else if(Repetition coding of 4 used on DL-MAP){ 0b10 } else if(Repetition coding of 6 used on DL-MAP){ 0b11 }
Coding Indication	3 bits	If(CC encoding used on DL-MAP){ 0b000 } else if(CTC encoding used on DL-MAP){ 0b010 }
DL-MAP Length	8 bits	0 to 255 (DL-MAP Length in slots)
Reserved	4 bits	0

Table A-40. Data Format for FCH (when FFT size is 128)

Syntax	Size	Note
Used Subchannel Indicator	1 bit	If(Subchannel 0 is Used for segment 0 or Subchannel 1 is Used for segment 1 or Subchannel 2 is Used for segment 2){ 0 } else if (Use All subchannels){ 1 }
Reserved	1 bit	0
Repetition Coding Indication	2 bits	If(No repetition coding used on DL-MAP){ 0b00 } else if(Repetition coding of 2 used on DL-MAP){ 0b01 } else if(Repetition coding of 4 used on DL-MAP){ 0b10 } else if(Repetition coding of 6 used on DL-MAP){ 0b11 }
Coding Indication	3 bits	If(CC encoding used on DL-MAP){ 0b000 } else if(CTC encoding used on DL-MAP){ 0b010 }
DL-MAP Length	5 bits	0 to 31 (DL-MAP Length in slots)

The following table shows the correspondence between the subchannel group of the subchannel bitmap used in FCH and the subchannels used.

Table A-41. Correspondence between Subchannel Group and Subchannel Count

FFT Size	Subchannel Group	Subchannel Range	FFT Size	Subchannel Group	Subchannel Range
2048	0	0 to 11	512	0	0 to 40
	1	12 to 19		1	N/A
	2	20 to 31		2	5 to 9
	3	32 to 39		3	N/A
	4	40 to 51		4	10 to 14
	5	52 to 59		5	N/A
1024	0	0 to 5	128	0	0
	1	6 to 9		1	N/A
	2	10 to 15		2	1
	3	16 to 19		3	N/A
	4	20 to 25		4	2
	5	26 to 29		5	N/A

DL-MAP

Table A-42. DL-MAP Type

Function	Sets the data to be inserted to DL-MAP.
Initial value	DL-MAP
Setting range	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM,S_64QAM, DL-MAP, Compressed DL-MAP, User File
Remark	If DL-MAP is selected, the data shown in the DL-MAP format in Section 5.1.7 will be set. If Compressed DLMAP is selected, the data in the Compressed DL-MAP format in Section 5.1.7 will be set. If any value other than DL-MAP or Compressed DL-MAP is selected, the selected data without any Header or CRC added will be mapped to the DL-MAP field. If it is set to any value other than DL-MAP and Compressed DL-MAP, the data of the DL-MAP remains continuous over the number of frames set in the common parameter Number of Frames. For example, if Number of Frames is set to a value greater than or equal to 2 and DL-MAP Type is set to PN9fix, the data following the DL-MAP data of the first frame is mapped to the data of the DL-MAP of the next frame. Only Compressed DL-MAP can be selected if the UL-MAP is added to MAC Message. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the length of the waveform pattern to be generated. The PN data therefore does not have continuity between the end of a waveform pattern and the start of the next waveform pattern. Refer to Appendix B “User File Format” for details on the user file format.

Table A-43. DL-MAP Type Repeat Data

Function	Sets the data when DL-MAP Type = 16 bit repeat.
Initial value	0x0000
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when DL-MAP Type = 16 bit repeat.

Table A-44. DL-MAP Type User File

Function	Sets the user file when DL-MAP Type = User File.
Remark	This parameter is displayed only when DL-MAP Type = User File.

Table A-45. DL-MAP Length

Function	Sets the slot count of DL-MAP.
Setting range	0 to 255 slots
Remark	Display only when DL-MAP Type is DL-MAP or Compressed DL-MAP. If any value other than DL-MAP or Compressed DL-MAP is selected, the data length of the DL-MAP is set. If the specified DL-MAP Length is not a multiple of the Repetition Coding Indication set in the common parameter DLFP, an error occurs.

Table A-46. DCD Count

Function	Sets the DCD Count.
Initial value	0
Setting range	0 to 255
Remark	Valid when DL-MAP Type is DL-MAP or Compressed DL-MAP.

Table A-47. Base Station ID

Function	Sets the Base Station ID.
Initial value	0x0000 0000 0000
Setting range	0x0000 0000 0000 to 0xFFFF FFFF FFFF
Remark	Valid when DL-MAP Type is DL-MAP or Compressed DL-MAP.

DL-MAP PHY Synchronization Field

Table A-48. Frame Duration

Function	Displays the setting value of the parameter of the same name in the common parameter list.
Setting range	Display only
Remark	

DL-MAP IE

Table A-49. DIUC

Function	Sets the Downlink Interval Usage Code.
Initial value	0
Setting range	0 to 12
Remark	

Table A-50. OFDMA Symbol Offset

Function	Displays the setting value of the parameter of the same name in DL-Burst.
Setting range	Display only
Remark	

Table A-51. OFDMA Subchannel Offset

Function	Displays the setting value of the parameter of the same name in DL-Burst. Setting range
Setting Range	Display only
Remark	

Table A-52. Boosting

Function	Displays the setting value of the parameter of the same name in DL-Burst.
Setting range	Display only
Remark	

Table A-53. No. OFDMA Symbol

Function	Displays the setting value of the parameter of the same name in DL-Burst.
Setting range	Display only
Remark	

Table A-54. No. Subchannels

Function	Displays the setting value of the parameter of the same name in DL-Burst.
Setting range	Display only
Remark	

Table A-55. Repetition Coding Indication

Function	Displays the setting value of the parameter of the same name in DL-Burst.
Setting range	Display only
Remark	

The format of the data mapped to the DL-MAPs is shown below. The prefix "0b" at the beginning of a value indicates that the data is expressed in binary format, "0x" indicates that the data is expressed in hexadecimal format. The data is expressed in decimal format when there is no prefix.

In DL-MAP_IEs, DL-MAP_IEs (DIUC = 0 to 12) for the number of Downlink Bursts and DL-MAP_IEs (DIUC = 15) for the number of Downlink Zone-1's are mapped. When three Zones exist in the Downlink, for example, the order of mapping is as follows. First, the DL-MAP_IEs (DIUC = 0 to 12) that belong to the first Zone are mapped in ascending order of Burst numbers. When the mapping of the DL-MAP_IEs corresponding to all the Bursts in the Zone is completed, the STC_DL_ZONE_IEs (DIUC = 15) of the second Zone in ascending order of Zone numbers are mapped. After that, the DL-MAP_IEs (DIUC = 0 to 12) that belong to the second Zone are mapped in ascending order of Burst numbers. When the mapping of the DLMAP_IEs corresponding to all the Bursts in the Zone is completed, the STC_DL_ZONE_IEs (DIUC = 15) of the third Zone in ascending order of Zone numbers are mapped. In this way, all of the DL-MAP_IEs corresponding to all of the Bursts in the Zone are mapped.

Table A-56 shows the data format for DL-MAP when the value of DLMAP Type is set to "DL-MAP."

Table A-56. Data Format for DL-MAP

Syntax	Size	Note
Management Message Type	8 bits	2
PHY Synchronization Field	32 bits	Frame Duration Code (8 bits): 0 to 8 Frame Number (24 bits): 0x000000 to 0xFFFFFF
DCD Count	8 bits	0 to 255
Base Station ID	48 bits	0x000000000000 to 0xFFFFFFFFFFFF
No. OFDMA Symbols	8 bits	(Number of OFDMA symbols in the DL-subframe)
DL-MAP_IEs	Variable	for(i=1;i<=(DL-MAP_IE count);i++){ DL-MAP_IE() }
Padding Nibble	4 bits	Padding to reach byte boundary

Table A-57 shows the data format for DL-MAP when the value of DL-MAP Type is set to "Compressed DLMAP."

Table A-57. Data Format for Compressed DL-MAP

Syntax	Size	Note
Compressed Map Indicator	3 bits	0b110
UL-MAP Appended	1 bit	0 or 1
Reserved	1 bit	0
Map Message Length	11 bits	0 to 2047
PHY Synchronization Field	32 bits	Frame Duration Code (8 bits): 0 to 8 Frame Number (24 bits): 0x000000 to 0xFFFFFF
DCD Count	8 bits	0 to 255
Operator ID	8 bits	0 to 255
Sector ID	8 bits	0 to 255
Number of OFDMA Symbols	8 bits	0 to 255 (Number of OFDMA symbols in the DL-subframe)
DL IE Count	8 bits	0 to 255
DL-MAP_IEs	Variable	for(i=1;i<=(DL-MAP_IE count);i++){ DL-MAP_IE() }
Padding Nibble	4 bits	(Padding to reach byte boundary)

Table A-58 shows the data format for DL-MAP_IE when DIUC is other than 15.

Table A-58. Data Format for DL-MAP_IE (when DIUC = 0 to 12)

Syntax	Size	Note
DIUC	4 bits	0 to 12
OFDMA Symbol Offset	8 bits	(OFDMA Symbol Offset of Burst)
Subchannel Offset	6 bits	(Subchannel Offset of Burst)
Boosting	3 bits	if(not boosted){ 0b000 } else if(+6dB){ 0b001 } else if(-6dB){ 0b010 } else if(+9dB){ 0b011 } else if(+3dB){ 0b100 } else if(-3dB){ 0b101 } else if(-9dB){ 0b110 } else if(-12dB){ 0b111 }
No. OFDMA Symbols	7 bits	0 to 127 (Number of OFDMA symbols in the DL-subframe)
No. Subchannels	6 bits	0 to 63 (Number of subchannels)
Repetition Coding Indication	2 bits	if(No repetition coding used on DL0b00 } else if(Repetition coding of 2 used on DL-MAP){ 0b01} else if(Repetition coding of 4 used on DL-MAP){ 0b10} else if(Repetition coding of 6 used on DL-MAP){ 0b11}

Table A-59 shows the data format for DL-MAP_IE when DIUC is 15.

Table A-59. Data Format for DL-MAP_IE (when DIUC = 15, STC DL ZONE IE)

Syntax	Size	Note
DIUC	4 bits	15
Extended DIUC	4 bits	1
Length	4 bits	4
OFDMA Symbol Offset	8 bits	0 to 255 (OFDMA Symbol Offset of Zone)
Permutation	2 bits	if(PUSC){ 0b00} else if(FUSC){0b01}
Use All SC indicator	1 bit	if(Do not use all subchannels){0} else if(Use all subchannels){1}
STC	2 bits	0b00 (No STC)
Matrix Indicator	2 bits	0
DL_PermBase	5 bits	0 to 31
PRBS_ID	2 bits	0 to 31
AMC Type	2 bits	0
Midamble Presence	1 bit	0
Midamble Boosting	1 bit	0
2/3 Antennas Select	1 bit	0
Dedicate Pilots	1 bit	0
Reserved	4 bits	0

Table A-60 shows the Frame Duration Codes used in DL-MAP.

Table A-60. Frame Duration Code

Frame Duration Code	Frame Duration (ms)	Frames per Second
1	2.0	500
2	2.5	200
3	4.0	250
4	5.0	200
5	8.0	125
6	10.0	100
7	12.5	80
8	20.0	50

STC/Zone switch IE

For STC/Zone switch IEs, the STC/Zone switch IE of Zone#0 is not included in DL-MAP.

Table A-61. OFDMA Symbol Offset

Function	Displays the setting value of the parameter of the same name in DL-Zone.
Setting range	Display only
Remark	

Table A-62. Permutation

Function	Displays the setting value of the parameter of the same name in DL-Zone.
Setting range	Display only
Remark	

Table A-63. DL Use All SC Indicator

Function	Displays the setting value of the parameter of the same name in the common parameter list.
Setting range	Display only
Remark	

Table A-64. DL-PermBase

Function	Displays the setting value of the parameter of the same name in DL-Zone.
Setting range	Display only
Remark	

UL-MAP

When UL-MAP is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table A-65. UL-MAP Type

Function	Sets the data to be inserted to UL-MAP.
Initial value	UL-MAP
Setting range	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, UL-MAP, Compressed UL-MAP, User file
Remark	If UL-MAP is selected, the data shown in the UL-MAP format in Section 5.1.7 will be set. If Compressed ULMAP is selected, the data shown in the Compressed ULMAP format in Section 5.1.7 will be set. Compressed UL-MAP becomes unavailable if UL-MAP is added to Burst#0 of Zone#0, and UL-MAP becomes unavailable if it is added to the MAC Message. DL-MAP must exist in the MAC Message and DL-MAP Type must be set to Compressed DL-MAP before adding UL-MAP to MAC Message. If any value other than UL-MAP or Compressed UL-MAP is selected, the selected data with the Header and CRC added is mapped to the UL-MAP field. For the Payload Data of the UL-MAP, the same data is mapped for each frame. The Payload Data of the UL-MAP therefore does not have continuity over frames. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the length of UL-MAP. The PN data therefore does not have continuity over frames.

Table A-66. UL-MAP Type Repeat Data

Function	Sets the data when UL-MAP Type = 16 bit repeat.
Initial value	0x0000
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when UL-MAP Type = 16 bit repeat.

Table A-67. UL-MAP Type User File

Function	Sets the user file when UL-MAP Type = User File.
Remark	This parameter is displayed only when UL-MAP Type = User File.

Table A-68. UL-MAP Length

Function	Sets the number of bytes of UL-MAP.
Setting range	0 to 2037 bytes
Remark	Display only when UL-MAP Type is UL-MAP or Compressed UL-MAP. If any value other than UL-MAP or Compressed UL-MAP is selected, the length of the payload data of the UL-MAP is set.

Table A-69. UCD Count

Function	Sets the UCD Count.
Initial value	0
Setting range	0 to 255
Remark	This parameter can be edited when UL-MAP Type is set to UL-MAP or Compressed UL-MAP.

Table A-70. Uplink Allocation Start Time

Function	Sets the delay for the starting timing of the Uplink subframes with respect to the frame starting timing. Displays the setting value of the parameter of the same name in the common parameter list.
Setting range	Display only
Remark	

Table A-71 shows the data format for UL-MAP when the value of ULMAP Type is set to "UL-MAP." Table A-72 shows the data format for UL-MAP when the value of UL-MAP Type is set to "Compressed ULMAP."

In UL-MAP_IEs shown in Table A-71 and Table A-72, ULMAP_IEs (UIUC = 1 to 10) for the number of Uplink Bursts and ULMAP_IEs (UIUC = 15) for the number of Uplink Zones are mapped. When three Zones exist in the Uplink, for example, the order of mapping is as follows. First, the UL_ZONE_IEs (UIUC = 15) that belong to the first Zone are mapped, and the UL-MAP_IEs (UIUC = 1 to 10) that belong to the first Zone are mapped in ascending order of Burst numbers. When the mapping of the UL-MAP_IEs corresponding to all the Bursts in the Zone is completed, the UL_ZONE_IEs (UIUC = 15) of the second Zone in ascending order of Zone numbers are mapped. After that, the UL-MAP_IEs (UIUC = 1 to 10) that belong to the second Zone are mapped in ascending order of Burst numbers. When the mapping of the UL-MAP_IEs corresponding to all the Bursts in the Zone is completed, the UL_ZONE_IEs (UIUC = 15) of the third Zone in ascending order of Zone numbers are mapped. In this way, all the ULMAP_IEs corresponding to all the Bursts in the Zone are mapped.

Table A-71. Data Format for UL-MAP

Syntax	Size	Note
Management Message Type	8 bits	3
Reserved	8 bits	0
UCD Count	8 bits	0 to 255
Allocation Start Time	32 bits	(UL Allocation Start Time in PS)
No. OFDMA Symbols	8 bits	(Number of OFDMA symbols in the UL-subframe)
UL-MAP_IEs	Variable	for(i=1;i<=(UL-MAP_IE count);i++){ UL-MAP_IE() }
Padding Nibble	4 bits	(Padding to reach byte boundary)

Table A-72. Data Format for Compressed UL-MAP

Syntax	Size	Note
UCD Count	8 bits	0 to 255
Allocation Start Time	32 bits	(UL Allocation Start Time in PS)
No. OFDMA Symbols	8 bits	(Number of OFDMA symbols in the UL-subframe)
UL-MAP_IEs	Variable	for(i=1;i<=(UL-MAP_IE count);i++){ UL-MAP_IE() }
Padding Nibble	4 bits	(Padding to reach byte boundary)

Table A-73 shows the data format for UL-MAP_IE when UIUC is other than 15. Table A-74 shows the data format for UL-MAP_IE when UIUC is 15.

Table A-73. Data Format for UL-MAP_IE (when UIUC = 1 to 10)

Syntax	Size	Note
CID	16 bits	0 to 65535
UIUC	4 bits	1 to 10
Duration	10 bits	Burst Duration in slots
Repetition Coding Indication	2 bits	if(No repetition coding used on UL0b00 } else if(Repetition coding of 2 used on UL-MAP){ 0b01} else if(Repetition coding of 4 used on UL-MAP){ 0b10} else if(Repetition coding of 6 used on UL-MAP){ 0b11}

Table A-74. Data Format for UL-MAP_IE (when UL ZONE IE, UIUC = 15)

Syntax	Size	Note
CID	16 bits	65535
UIUC	4 bits	15
Extended UIUC	4 bits	4
Length	4 bits	3
OFDMA Symbol Offset	7 bits	OFDMA Symbol Offset of Zone
Permutation	2 bits	0
AMC Type	2 bits	0
Use All SC Indicator	1 bit	1
Reserved	5 bits	0

UL-MAP IE

The items that correspond to Uplink Burst are displayed under UL-MAP IE.

Table A-75. CID

Function	Sets the CID.
Initial value	0
Setting range	0 to 65535
Remark	

Table A-76. UIUC

Function	Sets the Uplink Interval Usage Code.
Initial value	0
Setting range	1 to 10
Remark	

Table A-77. UL-Burst Duration

Function	Displays the setting value of the parameter of the same name in UL-Burst.
Setting range	Display only
Remark	

Table A-78. Repetition Coding Indication

Function	Displays the setting value of the parameter of the same name in UL-Burst.
Setting range	Display only
Remark	

DCD

When DCD is selected in the tree view, the following items are displayed in the PHY/MAC parameter list. The values set in DCD are mapped in the format shown in Section 5.1.7.

Table A-79. DCD Length

Function	Sets the data length of the DCD. Displays the value obtained from TLV encoded information for overall Length, Burst Profile count, and TLV encoded information Length is displayed.
Setting range	Display only
Remark	

Table A-80. Configuration Change Count

Function	Sets the Configuration Change Count (DCD data).
Initial value	0
Setting range	0 to 255
Remark	

Table A-81. TLV encoded information for overall Type

Function	Sets the TLV encoded information for overall Type.
Initial value	PN9fix
Setting range	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File
Remark	TLV encoded information for overall Type does not have continuity over frames. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the data length of the TLV encoded information (set by the TLV encoded information for overall Length parameter). The PN data therefore does not have continuity over frames of the waveform pattern. Refer to Appendix B “User File Format” for details on the user file format.

Table A-82. TLV encoded information for overall Type Repeat Data

Function	Sets the data when TLV encoded information for overall Type = 16 bit repeat.
Initial value	0x0000
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when TLV encoded information for overall Type = 16 bit repeat.

Table A-83. TLV encoded information for overall Type User File

Function	Sets the user file when TLV encoded information for overall Type = User File.
Remark	This parameter is displayed only when TLV encoded information for overall Type = User File.

Table A-84. TLV encoded information for overall Length

Function	Sets the data length of the TLV encoded information.
Initial value	0 byte
Setting range	0 to 2037 bytes
Remark	

Table A-85 shows the data format for DCD. In the Downlink_Burst_Profiles, Downlink_Burst_Profiles for the number of Downlink Bursts are mapped. Downlink_Burst_Profiles are sorted in ascending order of Burst numbers starting from the Downlink_Burst_Profile corresponding to the first Burst of the first Zone. When the mapping of the Downlink_Burst_Profiles corresponding to all the Bursts in the Zone is completed, mapping starts from the first Burst of the next Zone in ascending order of Zone numbers. Table A-86 shows the data format for Downlink_Burst_Profile data.

Table A-85. Data Format for DCD

Syntax	Size	Note
Management Message Type	8 bits	1
Reserved	8 bits	0
Configuration Change Count	8 bits	0 to 255
TLV Encoded Information for the Overall Channel	Variable	(User selected data type in TLV encoded information for overall Type)
Downlink_Burst_Profiles	Variable	for(i=1;i<=(Downlink_Burst_Profile count);i++) {Downlink_Burst_Profile()}

Table A-86. Data Format for Downlink_Burst_Profile

Syntax	Size	Note
Type	8 bits	1
Length	8 bits	0 to 255
Reserved	4 bits	0
DIUS	4 bits	0 to 12
TLV Encoded Information	Variable	(User selected data type in TLV encoded information Type)

DL-Burst Profile (for each Burst #0 to #m)

Table A-87. DL-Burst Profile Length

Function	Displays the data length of the Burst Profile.
Setting Range	Display only
Remark	

Table A-88. DIUC

Function	Sets the DIUC of the Burst Profile.
Initial value	0
Setting range	0 to 12
Remark	

Table A-89. TLV encoded information Type

Function	Sets the TLV encoded information Type.
Initial value	PN9fix
Setting range	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File
Remark	TLV encoded information Type does not have continuity over frames. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the data length of the TLV encoded information (set by the TLV encoded information Length parameter). The PN data therefore does not have continuity over frames. Refer to Appendix B “User File Format” for details on the user file format.

Table A-90. TLV encoded information Type Repeat Data

Function	Sets the data when TLV encoded information Type = 16 bit repeat.
Initial value	0x0000
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when TLV encoded information Type = 16 bit repeat.

Table A-91. TLV encoded information Type User File

Function	Sets the user file when TLV encoded information Type = User File.
Remark	This parameter is displayed only when TLV encoded information Type = User File.

Table A-92. TLV encoded information Length

Function	Sets the data length of the TLV encoded information.
Initial value	0 byte
Setting range	0 to 254 bytes
Remark	

UCD

When UCD is selected in the tree view, the following items are displayed in the PHY/MAC parameter list. The values set in UCD are mapped as UCD data in the format shown in Section.

Table A-93. UCD Length

Function	Sets the data length of the UCD. The UCD data length obtained from TLV encoded information for overall Length, Burst Profile count, and TLV encoded information Length is displayed.
Setting range	Display only
Remark	

Table A-94. Configuration Change Count

Function	Sets the Configuration Change Count, which is UCD data.
Initial value	0
Setting range	0 to 255
Remark	

Table A-95. TLV encoded information for overall Type

Function	Sets the TLV encoded information for overall Type.
Initial value	PN9fix
Setting range	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File
Remark	TLV encoded information for overall Type does not have continuity over frames. The same data as the TLV encoded information for overall is also set to the Ranging Backoff Start, Ranging Backoff End, Request Backoff Start, and Request Backoff End set in the UCD. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the data length of the TLV encoded information (set by the TLV encoded information for overall Length parameter). The PN data therefore does not have continuity over frames.

Table A-96. TLV encoded information for overall Type Repeat Data

Function	Sets the data when TLV encoded information for overall Type = 16 bit repeat.
Initial value	0x0000
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when TLV encoded information for overall Type = 16 bit repeat.

Table A-97. TLV encoded information for overall Type User File

Function	Sets the user file when TLV encoded information for overall Type = User File.
Remark	This parameter is displayed only when TLV encoded information for overall Type = User File.

Table A-98. TLV encoded information for overall Length

Function	Sets the data length of the TLV encoded information.
Initial value	0 byte
Setting range	0 to 2037 bytes
Remark	Be sure to include the lengths of the Ranging Backoff Start, Ranging Backoff End, Request Backoff Start, and Request Backoff End when setting this parameter.

Table A-99 shows the data format for UCD. In the Uplink_Burst_Profiles, Uplink_Burst_Profiles for the number of Uplink Bursts are mapped. Uplink_Burst_Profiles are sorted in ascending order of Burst numbers starting from the Uplink_Burst_Profile corresponding to the first Burst of the first Zone. When the mapping of the Uplink_Burst_Profiles corresponding to all the Bursts in the Zone is completed, mapping starts from the first Burst of the next Zone in ascending order of Zone numbers. Table A-100 shows the data format for Uplink_Burst_Profile data.

Table A-99. Data Format for UCD

Syntax	Size	Note
Management Message Type	8 bits	0
Configuration Change Count	8 bits	0 to 255
Ranging Backoff Start	Variable	(User selected data type in TLV encoded information for overall Type)
Ranging Backoff End		
Request Backoff Start		
Request Backoff End		
TLV Encoded Information for the Overall Channel		
Uplink_Burst_Profiles	Variable	for(i=1;i<=(Uplink_Burst_Profile count);i++) {Uplink_Burst_Profile()}

Table A-100. Data Format for Uplink_Burst_Profile

Syntax	Size	Note
Type	8 bits	1
Length	8 bits	0
Reserved	4 bits	0
UIUC	4 bits	1 to 10
TLV Encoded Information	Variable	(User selected data type in TLV encoded information Type)

UL-Burst Profile (for each Burst #0 to #m)

Table A-101. UL-Burst Profile Length

Function	Displays the data length of the Burst Profile.
Setting range	Display only
Remark	

Table A-102. UIUC

Function	Sets the UIUC of the Burst Profile.
Initial value	1
Setting range	1 to 10
Remark	

Table A-103. TLV encoded information Type

Function	Sets the TLV encoded information Type.
Initial value	PN9fix
Setting range	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File
Remark	TLV encoded information Type does not have continuity over frames. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the data length of the TLV encoded information (set by the TLV encoded information Length parameter). The PN data therefore does not have continuity over frames.

Table A-104. TLV encoded information Type Repeat Data

Function	Sets the data when TLV encoded information Type = 16 bit repeat.
Initial value	0x0000
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when TLV encoded information Type = 16 bit repeat.

Table A-105. TLV encoded information Type User File

Function	Sets the user file when TLV encoded information Type = User File.
Remark	This parameter is displayed only when TLV encoded information Type = User File.

Table A-106. TLV encoded information Length

Function	Sets the data length of the TLV encoded information.
Initial value	0 bytes
Setting range	0 to 254 bytes
Remark	

DL-Zone

When Zone that belongs to Downlink is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table A-107. Permutation

Function	Sets the Permutation type.
Initial value	PUSC
Setting range	PUSC, FUSC
Remark	Only PUSC can be selected for Zone#0.

Table A-108. OFDMA Symbol Offset

Item	Sets the Zone switching position.
Initial value	Zone#0: 1 symbol when Preamble exists 0 symbol when no Preamble exists Zone#1 to #7 The last symbol of the previous Zone
Setting range	Zone#0: Display only Zone#1 to #7: 0 to 255 symbols (when no Preamble exists) 1 to 255 symbols (when any Preamble exists)
Remark	

Table A-109. No. OFDMA Symbols

Item	Sets the number of symbols of the Zone.
Initial value	2 symbols
Setting range	1 to 255 symbols (for FUSC) 2 to 254 symbols (for PUSC)
Remark	It can be changed in 1-symbol steps for FUSC and 2symbol steps for PUSC.

Table A-110. DL-PermBase

Function	Sets the DL-PermBase.
Initial value	0
Setting range	0 to 31
Remark	It cannot be edited for Zone#0.

Table A-111. DL-Burst Number

Function	Sets the number of Bursts included in the DL-Zone.
Initial value	1
Setting range	1 to 16
Remark	

Table A-112. PRBS_ID

Function	Sets the PRBS_ID.
Initial value	0
Setting range	0 to 3
Remark	This setting item is not displayed for Zone#0.

DL-Burst

When Burst that belongs to Downlink is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table A-113. OFDMA Symbol Offset

Function	Sets the first OFDMA symbol position of the Burst.
Initial value	OFDMA Symbol Offset of the Zone to which it belongs
Setting range	Zone#0: When no Preamble exists and Permutation is PUSC 0 to 254 symbols (can be set in even symbol). Zone#0: When Preamble exists and Permutation is PUSC 1 to 255 symbols (can be set in odd symbol). Zone #1 to #7: When no Preamble exists and Permutation is PUSC (i) OFDMA Symbol Offset of the Zone is even 0 to 254 symbols (can be set in even symbol). (ii) OFDMA Symbol Offset of the Zone is odd 0 to 255 symbols (can be set in odd symbol). Zone#1 to #7: When Preamble exists and Permutation is PUSC (i) OFDMA Symbol Offset of the Zone is even 1 to 254 symbols (can be set in even symbol). (ii) OFDMA Symbol Offset of the Zone is odd 1 to 255 symbols (can be set in odd symbol). Zone#1 to #7: When no Preamble exists and Permutation is FUSC 0 to 255 symbols. Zone#1 to #7: When Preamble exists and Permutation is FUSC 1 to 255 symbols.
Remark	Set the offset counted from the starting symbol of the frame.

Table A-114. OFDMA Subchannel Offset

Function	Sets the minimum number for sub channels used in the Burst
Initial value	OFDMA sub channel Offset of the Zone to which it belongs
Setting range	0 to 255
Remark	

Table A-115. Boosting

Function	Sets the power boosting for the Burst
Initial value	0 dB
Setting range	0, +/-3, +/-6, +/-9, -12 dB
Remark	

Table A-116. No. OFDMA Symbols

Function	Sets the number of OFDMA symbols used
Initial value	2
Setting range	1 to 127 symbols (for FUSC) 2 to 126 symbols (for PUSC)
Remark	For PUSC, if an odd number of symbols is entered, 1 will be added to the value to adjust it to an even value

Table A-117. No. Subchannels

Function	Sets the number of subchannels used.
Initial value	7
Setting range	1 to 63
Remark	

Table A-118. Repetition Coding Indication

Function	Sets the repetition Coding used for the Burst
Initial value	No repetition
Setting range	No repetition, 2, 4, 6
Remark	No repetition is set when FEC Code Type and Modulation Type are not set to QPSK(CC)1/2, QPSK(CC)3/4, QPSK(CTC)1/2, QPSK(CTC)3/4, or QPSK(No Ch Coding).

Table A-119. FEC Code Type and Modulation Type

Function	Sets the FEC Code Type and Modulation Type of the Burst.
Initial value	QPSK(CC)1/2
Setting range	QPSK(CC)1/2, QPSK(CC)3/4, 16QAM(CC)1/2, 16QAM(CC)3/4, 64QAM(CC)1/2, 64QAM(CC)2/3, 64QAM(CC)3/4, QPSK(CTC)1/2, QPSK(CTC)3/4, 16QAM(CTC)1/2, 16QAM(CTC)3/4, 64QAM(CTC)1/2, 64QAM(CTC)2/3, 64QAM(CTC)3/4, 64QAM(CTC)5/6 QPSK (No Ch Coding), 16QAM (No Ch Coding), 64QAM (No Ch Coding)
Remark	

Table A-120. DL- Burst Data Type

Function	Sets the data of the DL-Burst.
Initial value	16 bit repeat
Setting range	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
Remark	The data set in this list item is channel-coded as the Burst data, and then mapped to the field assigned to the Burst. When MAC PDU is selected, “1” is inserted if the total data size of the MAC PDU is smaller than the field assigned to the Burst. If this item is set to any value other than MAC PDU, the data of each Burst remains continuous over the number of frames set in the common parameter Number of Frames. For example, if Number of Frames is set to greater than or equal to 2 and PN9fix is set in the data of Burst#1 in Zone#1, the data after the Burst#1, Zone#1 of the first frame is mapped to the data of Burst#1, Zone#1 of the next frame. Also, if this item is set to other than MAC PDU while MAC PDU is added under Burst, the set data is mapped as the Burst data. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the length of the waveform pattern to be generated. The PN data therefore does not have continuity between the end of a waveform pattern and the start of the next waveform pattern. Note also that the PN data varies depending on Burst when PN9fix or PN15fix is selected.

Table A-121. DL-Burst Data Type Repeat Data

Function	Sets the data when DL-Burst Data Type = 16 bit repeat.
Initial value	0xFFFF
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when DL-Burst Data Type = 16 bit repeat.

Table A-122. DL-Burst Data Type User File

Function	Specifies the user file when DL-Burst Data Type = User File.
Remark	This parameter is displayed only when DL-Burst Data Type = User File.

UL-Zone

When Zone that belongs to Uplink is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table A-123. Permutation

Function	Sets the permutation Zone type.
Initial value	PUSC
Setting range	PUSC
Remark	

Table A-124. OFDMA Symbol Offset

Item	Sets the Zone switching position.
Initial value	The last symbol of the previous Zone. Zone#0 is 0.
Setting range	0 to 255 symbols
Remark	

Table A-125. No. OFDMA Symbols

Item	Sets the number of symbols of the Zone.
Initial value	3 symbols
Setting range	3 to 255 symbols
Remark	If any value not a multiple of 3, which is the symbol count for 1 slot of the UL-PUSC, the input value is rounded up to the minimum multiple of 3 that is greater than it.

Table A-126. UL-PermBase

Function	Sets the UL-PermBase
Initial value	0
Setting range	0 to 69
Remark	

Table A-127. UL-Burst Number

Function	Sets the number of Bursts included in the UL-Zone.
Initial value	1
Setting range	1 to 16
Remark	

UL-Burst

When Burst that belongs to Uplink is selected in the tree view, the following items are displayed in the PHY/MAC parameter list.

Table A-128. UL Burst Duration

Function	Sets the data length of the Burst.
Initial value	3 symbols
Setting range	3 to 3069 symbols
Remark	If any value other than multiple of 3, which is the symbol count for 1 slot of the UL-PUSC, the input value is rounded up to the minimum multiple of 3 that is greater than itself.

Table A-129. Repetition Coding Indication

Item	Sets the Repetition Coding used for the Burst.
Initial value	No repetition
Setting range	No repetition, 2, 4, 6
Remark	No repetition is set when FEC Code Type and Modulation. Type is set to any other value than QPSK(CC)1/2, QPSK(CC)3/4, QPSK(CTC)1/2, QPSK(CTC)3/4, or QPSK(No Ch Coding).

Table A-130. FEC Code Type and Modulation Type

Function	Sets the FEC Code Type and Modulation Type of the Burst.
Initial value	QPSK(CC)1/2
Setting range	QPSK(CC)1/2, QPSK(CC)3/4, 16QAM(CC)1/2, 16QAM(CC), 3/4,64QAM(CC)1/2, 64QAM(CC)2/3, 64QAM(CC)3/4,QPSK(CTC)1/2, QPSK(CTC)3/4, 16QAM(CTC)1/2, 16QAM(CTC)3/4, 64QAM(CTC)1/2, 64QAM(CTC)2/3, 64QAM(CTC)3/4, 64QAM(CTC)5/6, QPSK(No Ch Coding), 16QAM(No Ch Coding),64QAM(No Ch Coding)
Remark	

Table A-131. UL- Burst Data Type

Function	Sets the data of the UL-Burst.
Initial value	PN9fix
Setting range	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, MAC PDU, User File
Remark	The data set in this list item is channel-coded as the Burst data, and then mapped to the field assigned to the Burst. When MAC PDU is selected, “1” is inserted if the total data size of the MAC PDU is smaller than the field assigned to the Burst. If this item is set to any value other than MAC PDU, the data of each Burst remains continuous over the number of frames set in the common parameter Number of Frames. For example, if Number of Frames is set to greater than or equal to 2 and PN9fix is set in the data of Burst#1 in Zone#1, the data after the Burst#1, Zone#1 of the first frame is mapped to the data of Burst#1, Zone#1 of the next frame. Also, if this item is set to other than MAC PDU while MAC PDU is added under Burst, the set data is mapped as the Burst data. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the length of the waveform pattern to be generated. The PN data therefore does not have continuity between the end of a waveform pattern and the start of the next waveform pattern. Note also that the PN data varies depending on Burst when PN9fix or PN15fix is selected.

Table A-132. UL-Burst Data Type Repeat Data

Function	Sets the data when UL-Burst Data Type = 16 bit repeat.
Initial value	0x0000
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when UL-Burst Data Type = 16 bit repeat.

Table A-133. UL- Burst Data Type User File

Function	Specifies the user file when UL-Burst Data Type = User File.
Remark	This parameter is displayed only when UL-Burst Data Type = User File.

MAC PDU

When MAC PDU is selected in the tree view, the following items are displayed in the PHY/MAC parameter list. The Burst Data Type parameter must be set to MAC PDU to specify MAC PDU for the data to be mapped to Burst The available parameters under MAC PDU are common for Downlink and Uplink.

Table A-134. MAC PDU Length

Function	Sets the data length of the MAC PDU.
Setting range	Display only
Remark	

Table A-135. Payload Data Length

Function	Sets the data length of the MAC PDU payload data.
Initial value	0 bytes
Setting range	0 to 2041 bytes (when CI = No CRC) 0 to 2037 bytes (when CI = With CRC)
Remark	

Table A-136. CID

Function	Sets the Connection Identifier.
Initial value	0
Setting range	0 to 65535
Remark	

Table A-137. CI

Function	Sets whether to add CRC of the MAC PDU.
Initial value	With CRC
Setting range	With CRC, No CRC
Remark	

Table A-138. Payload Type

Function	Sets the Payload Data of the MAC PDU.
Initial value	16 bit repeat
Setting range	16 bit repeat, PN9fix, PN15fix, S_QPSK, S_16QAM, S_64QAM, User File
Remark	If two or more MAC PDUs that have the same Payload Type and the same CID exist in the same frame, the Payload Data of the MAC PDUs becomes continuous data. However, it would not be continuous over MAC PDUs if 16 bit repeat is selected in Payload Data Type. The beginning of the Payload Data of the MAC PDU is the MSB of the value set in 16 bit repeat. Even if the CID is the same, the Payload Data would not become continuous data between Downlink and Uplink MAC PDUs. If the common parameter Number of Frames is set to a value greater than or equal to 2, the Payload Data of the MAC PDUs with the same Payload Type and the same CID over multiple frames created remains continuous. Therefore, for example, in the waveform pattern where MAC PDU#2 of Burst#0 of DL Zone#0, MAC PDU#1 of Burst#2 of DL Zone#0, and MAC PDU#3 of Burst#0 of DL Zone#1 have the same Payload Type and the same CID and Number of Frames=2, the following will be continuous; The end of the Zone#0 Burst#0 MAC PDU#2 data of Frame 1 and the start of the Zone#0 Burst#2 MAC PDU#1 data of Frame 1, The end of the Zone#0 Burst#2 MAC PDU#1 data of Frame 1 and the start of the Zone#1 Burst#0 MAC PDU#3 data of Frame 1, The end of the Zone#1 Burst#0 MAC PDU#3 data of Frame 1 and the start of the Zone#0 Burst#0 MAC PDU#2 data of Frame 2, The end of the Zone#0 Burst#0 MAC PDU#2 data of Frame 2 and the start of the Zone#0 Burst#2 MAC PDU#1 data of Frame 2, The end of the Zone#0 Burst#2 MAC PDU#1 data of Frame 2 and the start of the Zone#1 Burst#0 MAC PDU#3 data of Frame 2. However, if Zone#2 precedes Zone#1 on the Symbol axis, the data in Zone#1 follows the data in Zone#2. When PN9fix or PN15fix is selected, the PN data may be cut off halfway according to the length of the waveform pattern to be generated. The PN data therefore does not have continuity between the end of a waveform pattern and the start of the next waveform pattern. Note also that the PN data varies depending on CID when PN9fix or PN15fix is selected.

Table A-139. Payload Type Repeat Data

Function	Sets the data to be inserted into Payload Data of MAC PDU when Payload Type = 16 bit repeat.
Initial value	0x0000
Setting range	0x0000 to 0xFFFF
Remark	This parameter is displayed only when Payload Type = 16 bit repeat.

Table A-140. Payload Type User File

Function	Specifies the user file when Payload Type = User File.
Remark	This parameter is displayed only when Payload Type = User File.

A-3 OFDMA Analysis Parameters

The items displayed in the Analysis parameter list are described in this section.

Receiver Settings

Table A-141. Receiver Type

Function	Specifies the type of receiver that supplies the digitized data.
Value	Signature
Remark	Only one value at present

Table A-142. Server Name

Function	Specifies the IP address of the Signature instrument.
Value	Any legal IP name or address
Remark	The system automatically determines this address.

Table A-143. Input Mode

Function	Specifies the input mode of Signature.
Value	IFInputWideBand, IQDiffHigh, IQDiffLow, IQSingleHigh, IQSingleLow

Table A-144. Carrier Frequency

Function	Specifies the carrier frequency of the WiMAX signal
Value	100 MHz to 8 GHz
Remark	Applicable only if Input Mode is set to IFInputWideband.

Table A-145. Reference Level

Function	Specifies the reference level setting for Signature.
Possible Values	–150 dBm to +30 dBm

Table A-146. Attenuation Mode

Function	Specifies the attenuation mode of Signature.
Value	Auto, Manual
Remark	Manual setting ranges from 0 dB to 62 dB.

Table A-147. Trigger

Function	Specifies the type of trigger to be used on Signature.
Value	FreeRun, WideIF, Line, Video, External, or ExternalTTL

Table A-148. Trigger Level

Function	Specifies the trigger level to be used on Signature.
Value	10 V to –10 V (External), –40 dBm to 0 dBm (WideIF), –150 dBm to 30 dBm (Video)

Table A-149. Trigger Slope

Function	Specifies the trigger slope to be used on Signature.
Value	Positive, Negative

Table A-150. Trigger Delay

Function	Specifies the trigger delay to be used on Signature.
Value	–65.5 ms to 65.5 ms

Analysis Settings

Table A-151. Analysis Mode

Function	Specifies whether the data will come from Signature or generated within SignalLab.
Value	Live (from Signature) or Simulaiton (generated within the application)

Table A-152. Link Type

Function	Specifies the type of sub-frame to be analyzed.
Value	Uplink or Downlink

Table A-153. Pilot Aided Frequency Offset Estimation

Function	Specifies whether to use a pilot aided frequency offset estimation.
Value	On or Off

Table A-154. Automatic Cyclic Prefix Detection

Function	Specifies whether to automatically detect the value of the cyclic prefix.
Value	On or Off

Table A-155. Channel Estimation

Function	Specifies the type of carriers or bursts to be used for the channel estimation.
Value	Downlink: Preamble only or Preamble and Pilots Uplink: Pilots

Table A-156. Uplink Frame Number Detection

Function	Identifies the four least significant bits (LSB) of frame the number automatically.
Value	On or Off
Remark	Applies to Uplink Analysis only.

Table A-157. Common Gain Tracking

Function	Specifies whether to track gain changes from one OFDMA symbol to the next.
Value	On or Off
Remark	Available for Downlink only.

Table A-158. Phase Tracking

Function	Specifies whether to track phase changes from one OFDMA symbol to the next.
Value	On or Off
Remark	Available for downlink only.

Table A-159. Sample Timing Compensation

Function	Specifies whether to compensate for a reference clock variation.
Value	On or Off
Remark	Not implemented in the current release.

Table A-160. Zone to Analyze

Function	Specifies the zone to analyze.
Value	Selected from the available drop-down list.

Burst Selection for Analysis

Table A-161. Preamble

Function	Specifies whether to include or exclude the preamble burst.
Value	Include or Exclude
Remark	Applies only to the Downlink frame.

Table A-162. FCH

Function	Specifies whether to include or exclude the FCH burst.
Value	Include or Exclude
Remark	Applies only to the Downlink frame.

Table A-163. DL-MAP

Function	Specifies whether to include or exclude the DL-MAP burst
Value	Include or Exclude
Remark	Applies only to the Downlink frame.

Table A-164. UL-MAP

Function	Specifies whether to include or exclude the UL-MAP burst.
Value	On or Off
Remark	Applies only to the downlink frame.

Table A-165. Burst 1 ..n

Function	Specifies whether to include or exclude the data bursts 1..n, depending upon the segment definition.
Value	Include or Exclude

Appendix B OFDM Parameter Reference

This appendix provides a parameter setting reference for the parameters listed in SignalLab's Analysis Properties Editor. The following list is a quick reference to the parameters in each respective node:

B-1 Common Parameters

Table B-1. Project Name

Function	Specifies the name of the project.
Possible Values	Text string.

Table B-2. Project Comment

Function	Provides a project commenting field.
Possible Values	Text string

WiMAX Basic Parameters

Table B-3. Built Frames

Function	Specifies the number of frames that should be constructed.
Possible Values	1 to 16 (only one will be constructed currently)

Table B-4. Oversample Ratio

Function	Specifies the ratio of Output Frequency vs. Signal Frequency.
Possible Values	1 or 2

Table B-5. Bandwidth

Function	Specifies the bandwidth of the signal to be created.
Possible Values	One of the values from the drop-down list.

Table B-6. G

Function	Specifies the cyclic prefix.
Possible Values	1/4, 1/8, 1/16, or 1/32

Table B-7. N

Function	Specifies the sampling factor.
Possible Values	Computed automatically per the IEEE 802.16 standard.

Table B-8. Frame Duration

Function	Specifies the duration of the OFDMA frame
Possible Values	One of the values from the drop-down list.

Table B-9. BSID

Function	Specifies the Base Station ID
Possible Values	Hexadecimal value in the range of 00:00:00:00:00:00 to FF:FF:FF:FF:FF:FF

Table B-10. Optimized For

Function	Specifies the optimization consideration when creating the waveform.
Possible Values	EVM or ACPR
Remark	Not currently used.

WiMAX Operation Setup

Table B-11. Frame Setup Mode

Function	Specifies the type of frame to be constructed.
Possible Values	Physical or MAC type (the mode is always assumed to be a Physical Type)
Remark	PHY is the only active choice.

B-2 PHY Parameters

Gap Type Burst

Table B-12. Gap Interval (Samples)

Function	Specifies the length of the Gap in terms of the OFDM sample time.
Possible Values	Any meaningful value

Table B-13. Gap Interval (µs)

Function	Specifies the length of the Gap in terms of the absolute time.
Possible Values	Any meaningful value

Table B-14. Sample Time

Function	Specifies the duration of a sample.
Possible Values	Computed automatically

Preamble Type Burst

Table B-15. Preamble Type

Function	Specifies the type of preamble to be used.
Possible Values	Long or Short

Table B-16. OFDM Symbol Length

Function	Specifies the length of the preamble in terms of the OFDM symbols.
Possible Values	Automatically computed (either 1 or 2)

FCH Type Burst

Table B-17. Modulation Type

Function	Specifies the type of modulation to be used for FCH burst.
Possible Value	BPSK
Remark	Cannot be edited

Table B-18. Coding Type

Function	Specifies the type of channel coding.
Possible Values	RS-CC
Remark	Cannot be edited

Table B-19. Coding Rate Type

Function	Specifies the value of the coding rate.
Possible Values	Fixed at 2/3
Remark	Cannot be edited

Table B-20. ODFM Symbol Length

Function	Specifies the ODFM symbol length.
Possible Values	Fixed at 1
Remark	Cannot be edited

Table B-21. Data Type

Function	Specifies the type of data to include in the FCH.
Possible Values	
Remarks	This value is currently not considered.

Table B-22. Payload Length

Function	Specifies the size of the payload in bytes.
Possible Values	Computed automatically
Remark	This parameter is not currently active.

Data Burst

Table B-23. Modulation Type

Function	Specifies the type of modulation to be used for the burst.
Possible Values	BPSK, QPSK, 16QAM, or 64QAM

Table B-24. Coding Type

Function	Specifies the type of channel coding.
Possible Values	RS-CC or Raw

Table B-25. Coding Rate Type

Function	Specifies the value of the coding rate.
Possible Values	2/3 or 3/4

Table B-26. DIUC/UIUC

Function	Specifies the downlink or uplink interval usage code.
Possible Values	0 to15

Table B-27. ODFM Symbol Length

Function	Specifies the number of symbols to be included in the burst.
Possible Values	

Table B-28. Data Type

Function	Specifies the type of data to include in the FCH.
Possible Values	
Remarks	This value is currently not considered.

B-3 OFDM Analysis Parameters

The items displayed in the Analysis parameter list are described in this section.

Receiver Settings

Table B-29. Receiver Type

Function	Specifies the type of receiver that supplies the digitized data.
Value	Signature
Remark	Only one value at present

Table B-30. Server Name

Function	Specifies the IP address of Signature.
Value	Any legal IP name or address
Remark	The system automatically determines this address.

Table B-31. Input Mode

Function	Specifies the input mode of Signature.
Value	IFInputWideBand, IQDiffHigh, IQDiffLow, IQSingleHigh, IQSingleLow

Table B-32. Carrier Frequency

Function	Specifies the carrier frequency of the WiMAX signal
Value	100 MHz to 8 GHz

Table B-33. Reference Level

Function	Specifies the reference level setting for Signature.
Possible Values	–150 dBm to +30 dBm

Table B-34. Attenuation Mode

Function	Specifies the attenuation mode of Signature.
Value	Auto, Manual
Remark	Manual setting ranges from 0 dB to 62 dB.

Table B-35. Trigger

Function	Specifies the type of trigger to be used on Signature.
Value	FreeRun, WideIF, Line, Video, External, or ExternalTTL

Table B-36. Trigger Level

Function	Specifies the trigger level to be used on Signature.
Value	10 V to –10 V (External), –40 dBm to 0 dBm (WideIF), –150 dBm to 30 dBm (Video)

Table B-37. Trigger Slope

Function	Specifies the trigger slope to be used on Signature.
Value	Positive, Negative

Table B-38. Trigger Delay

Function	Specifies the trigger delay to be used on Signature.
Value	–65.5 ms to 65.5 ms

Analysis Settings

Table B-39. Analysis Mode

Function	Specifies whether the data will come from Signature or generated within SignalLab.
Value	Live (from Signature) or Simulation (generated within the application)

Table B-40. Link Type

Function	Specifies the type of sub-frame to be analyzed.
Value	Uplink or Downlink

Table B-41. Channel Estimation

Function	Specifies the type of carriers or bursts to be used for the channel estimation.
Value	Preamble only or Preamble and Pilots

Table B-42. Automatic Modulation Detection

Function	Specifies whether to automatically detect signal modulation.
Value	On or Off

Table B-43. Common Gain Tracking

Function	Specifies whether to track gain changes from one OFDM symbol to the next.
Value	On or Off

Table B-44. Phase Tracking

Function	Specifies whether to track phase changes from one OFDM symbol to the next.
Value	On or Off

Table B-45. Sample Timing Compensation

Function	Specifies whether to compensate for reference clock variation.
Value	On or Off

Burst Selection for Analysis

Table B-46. Preamble

Function	Specifies whether to include or exclude the preamble burst.
Value	Include or Exclude

Table B-47. FCH

Function	Specifies whether to include or exclude the FCH burst.
Value	Include or Exclude
Remark	Applies only to the Downlink frame.

Table B-48. Burst 1 ..n

Function	Specifies whether to include or exclude the data bursts 1..n, depending upon the segment definition.
Value	Include or Exclude

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