

# Users Manual

SLE900 STK® Plugin Version 2.00



*RF Test Equipment for Wireless Communications*

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## Installation and Operation

### Description of the STK® Plugin Version 2.00

#### Overview:

The STK® user interface (UI) Plugin is a COM component loaded at run-time. The UI Plugin stays active for as long as the STK® Desktop Application is running. The UI Plugin extends the STK® Desktop Application's user interface by adding a custom toolbar, menu, and control window.

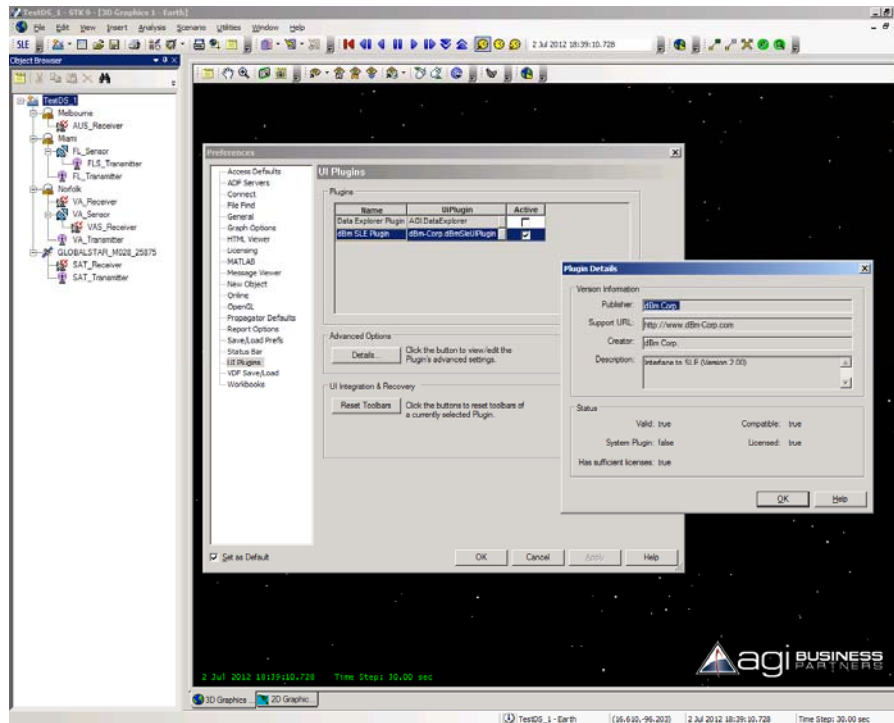
The following is a description of the dBmSleUIPlugin, capable of communicating with dBm's SLE900 Series Satellite Link Emulators via a LAN connection. This manual assumes the reader is familiar with the capabilities, operation and control of the SLE900 product and the STK® Desktop Application.

#### Installation:

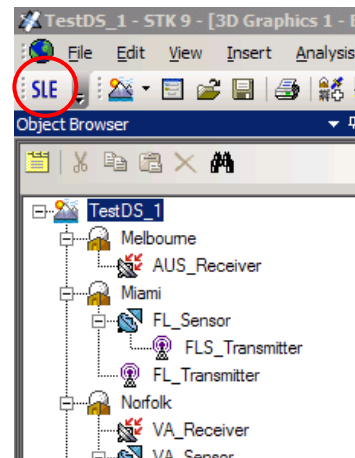
An installation wizard has been developed to register the plugin dll and copy the necessary files to required location. The plugin name is dBmSleUIPlugin.dll and the installation program is dBmSlePluginSetup. The installation program requires two files: setup.exe and dBmSlePluginSetup.msi. Running setup.exe invokes the wizard. Use the default values for each step of the wizard. If the dll is already installed, or if it needs to be reinstalled, the wizard will allow the dll to be repaired or removed.

#### Invoking the Plugin:

Once the plugin is installed, it is available for use in the STK® Desktop Application. Go to "Edit...Preferences...UI Plugins" to activate/deactivate the plugin or to display additional information. If the plugin appears on the Preferences page but does not appear in the button bar, check and uncheck the plugin in the "Active" column and press the "Reset Toolbars".

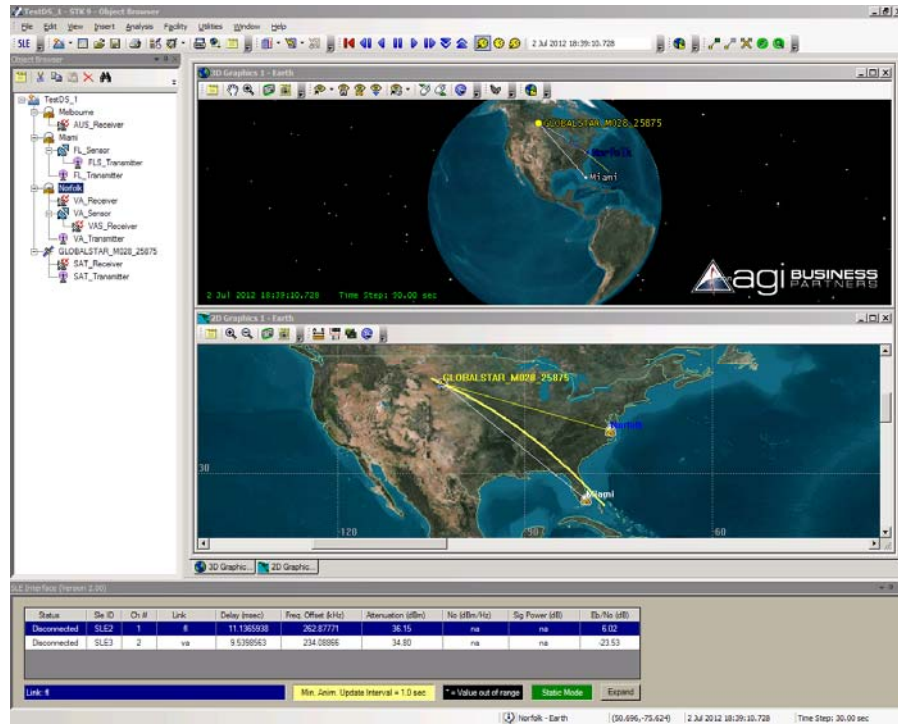


The toolbar button for the SLE900 plugin is an icon with the letters “SLE”. Pressing the SLE button invokes the plugin control window. If a scenario is not loaded, the SLE button will be grayed out. The SLE900 does not have to be connected in order to configure items in the plugin windows.



### Expanded View and Summary View:

The plugin control initially appears docked at the bottom in an expanded view that shows the details of the connection and links. Pressing the “Collapse” button at the bottom hides the details and leaves only a summary of each link.



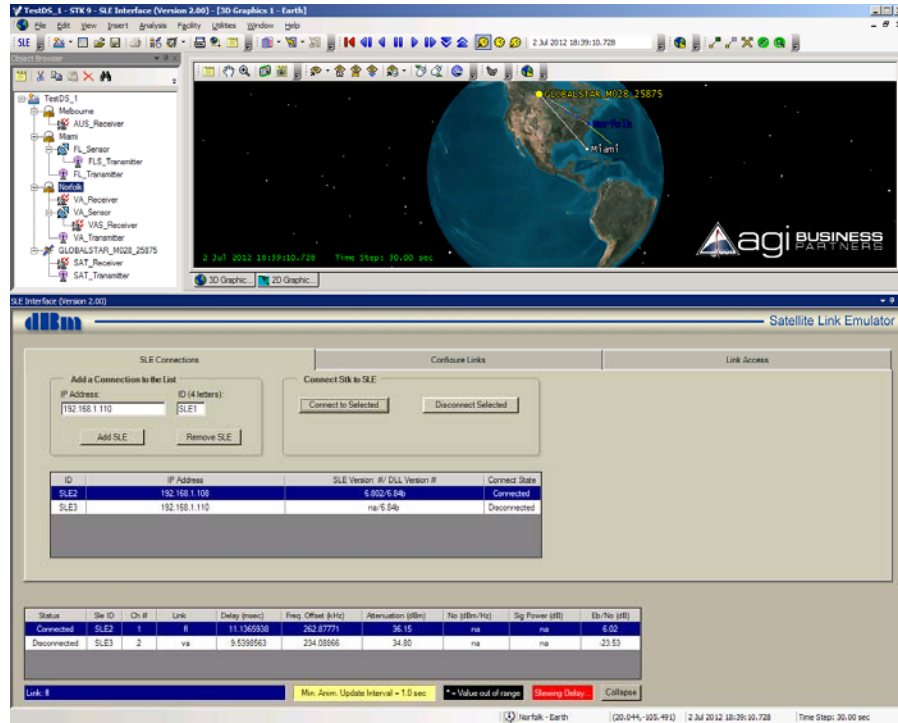
The summary contains the status of the connection to the SLE900, the name given to the SLE900, the channel number associated with the link, the name of the link, and the six parameter values. The table indicates out of range values (“\*”), parameters that are not available (“na”) resulting from unavailable channels or no access time computed, parameters that are not available because the receiver is not in communication with the transmitter (No LOS), or parameters not calculated (“---”) such as when the noise turned off.

A status bar at the bottom indicates additional information about the access computation. The minimum animation update rate, based on the maximum time for slewing the delay, is displayed, as well as an indicator that changes color and text when the SLE900 is busy initializing large changes in delay.

Pressing the “Expand” button at the bottom shows additional details for adding connections and links to be emulated. The expanded view has three tabs: SLE Connections, Configure Links, and Link Access.

### SLE Connection Tab Description:

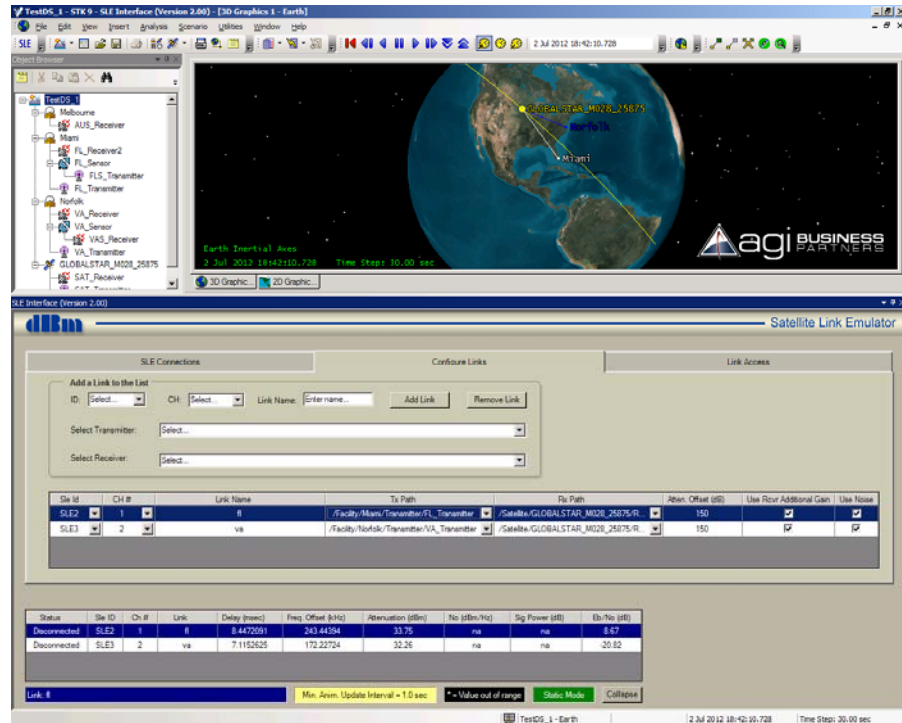
The first tab is used to define connections to multiple SLE900s. The IP address of the SLE900 and a short name are required. After adding the SLE connection to the list of available connections, the connection can be opened or closed. Connections can also be removed from the list. If a connection that is currently being used is removed from the list, all links that use the connection are also removed.



### Configure Links Tab Description:

The second tab is used to specify where links are to be emulated. The SLE900 used by the link is identified by the short name given in the first tab (such as SLE1, SLE2). The links are defined by a transmitter and a receiver. A short name is given to the link to help identify the link in the list (such as Uplink, Downlink). The complete paths for the transmitter and receiver are displayed in the list box.





Once a link is added, the link parameters can be changed with combo boxes and text boxes in the link list box. Links can also be removed from the list. If a transmitter or receiver defined in a link is deleted from the scenario, the link containing it will also be deleted from the link list box. If a transmitter or receiver is renamed, it will be renamed in the link list box.

A check box allows an additional gain to be included in order to bring the attenuation value in range for the case when path loss values are larger than the maximum attenuation capability of the SLE900.

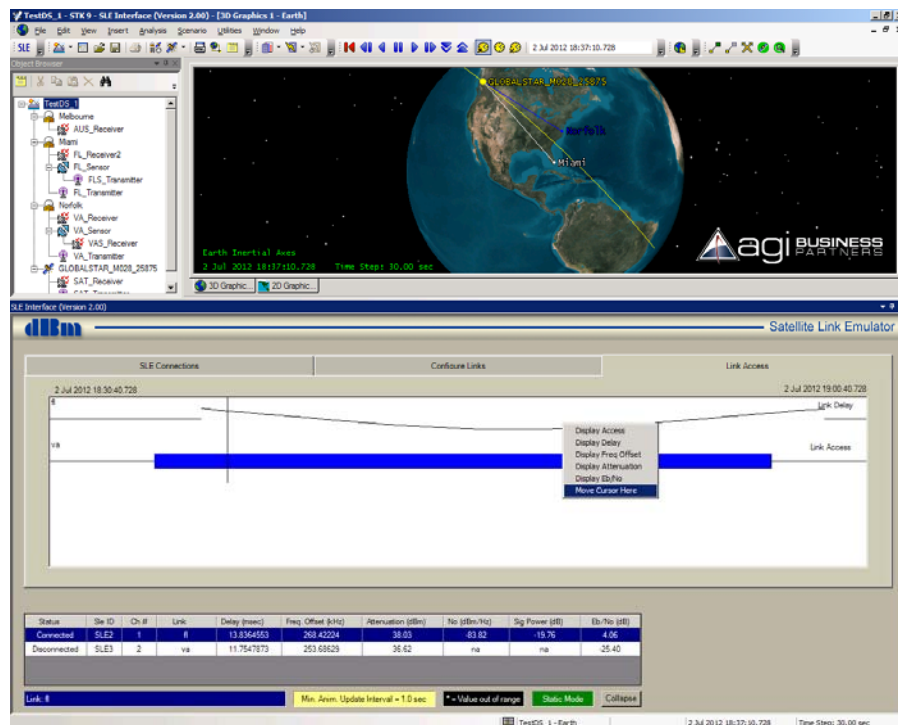
The noise density is calculated from the bit rate specified for the transmitter and Eb/No calculated from the STK® data provider. The noise can also be turned on and off from the link list box.

### Link Access Tab Description:

The third tab is used to display the data parameters in graphical form. The computation is automated and recalculated whenever the scenario objects change.

The graph window displays all of the links currently defined. This allows access times and parameters to be compared across links. The graph can display the access intervals, or, by right clicking the link, can display the parameters graphically. A vertical cursor shows the current scenario time.

Selecting “Move Cursor Here” from the right-clicked context menu will set the current animation time to that point on the graph.



### Saving and Loading Plugin Settings:

Whenever the scenario is saved, the list of SLE connections and links are saved in a separate XML formatted file with the same name as the scenario but with the extension “.dbm”. When a scenario is opened, the plugin settings for that file are loaded when the plugin is invoked. If any receivers or transmitters used in a link are deleted before the plugin is invoked, the link containing the receiver/transmitter will be deleted upon loading the file.

### Interfacing with the SLE900:

The plugin sends the following scenario parameters to the SLE900 in the static mode when connected:

- Delay
- Frequency Offset
- Attenuation
- Noise Density
- Noise On/Off

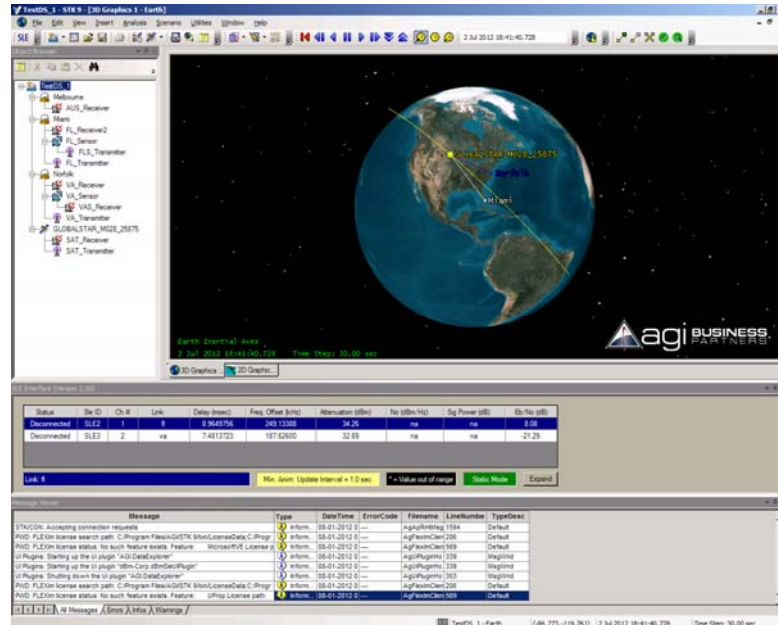
The plugin receives the following SLE900 parameters when connected:

- Signal Power
- SLE900 Version Number
- SLE900 DII Version Number

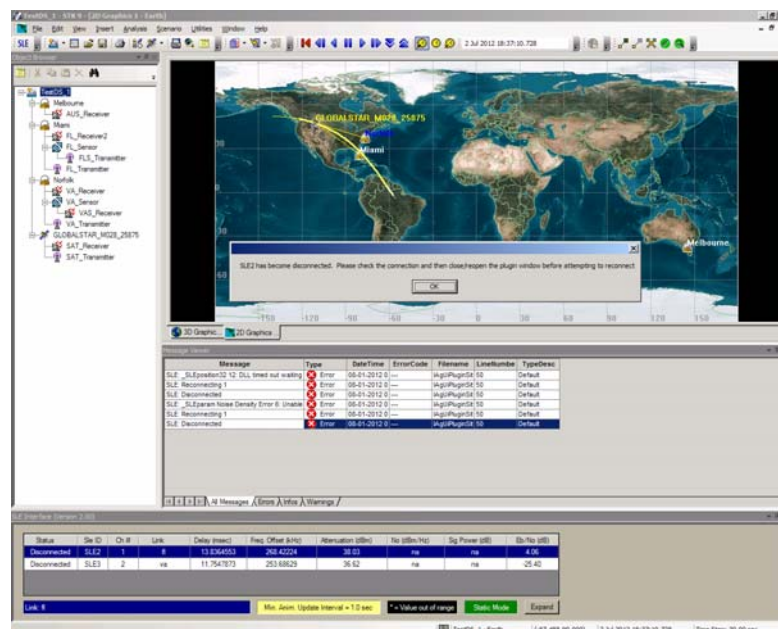
The parameters are updated as the user steps forward and backward through the scenario time span, or if played continuously with an animation refresh interval greater than the minimum animation update displayed at the bottom.

## Error Messages:

Error messages from the plugin are displayed in STK's Message Viewer Window and are prefaced with the letters "SLE".



If the SLE900 is turned off or set to Local Mode while the plugin is in the "Connected" mode, an error message will appear in the Message Viewer and the plugin will attempt to automatically reconnect. If reconnection fails, a message box appears stating that the connection has been lost. To reconnect after setting the SLE900 back to Remote Mode, close the plugin window and then reopen by pressing the SLE menu bar button.



### Configuring the Scenario to Achieve Valid SLE900 Parameters:

Values for link delay, carrier Doppler shift, and Eb/No are calculated by STK®, and the absolute values for those parameters are applied by the SLE900. Attenuation and AWGN noise density however must be adjusted to be relative to the signal power that is applied to the SLE900 input.

### AWGN Settings to Achieve the Desired Eb/No Ratio

STK® computes the Eb/No ratio at the receiver input. The SLE900 will implement that ratio by setting the noise density (No) relative to the signal power applied to the SLE900. The computation for No is:

$$N_o \text{ (dbm/Hz)} = P_{\text{sig}} \text{ (dBm)} - 10 \log \text{ BR (Hz)} - E_b/N_o \text{ (dB)}$$

where  $P_{\text{sig}}$  is the signal power measured by the SLE900  
and BR is the transmitter bit rate set in STK®

The value for transmitter bit rate can be found in STK® by right clicking on the transmitter icon in the browser : Transmitter>Properties>Basic>Definitions>Modulator  
At this window, the Data Rate and other modulation characteristics can be set.

### Attenuation Settings for the SLE900

STK® calculates the absolute value for link loss. This loss value must be offset to fit within the range of the SLE900 attenuation range.

On Configure Link tab of the plugin, set a value of attenuation offset such that the absolute link loss value is mapped within the attenuation range of the SLE900. For example, if the STK® computed path loss = 190 dB, applying an Attenuation offset = 170 dB will result in the SLE900 attenuation = 20 dB.

