

Figure 4-4. Select Control Program File Window

4. Select the first file to download and click on the **OK** button.
5. Click on the **HOST Load** button (see [Figure 4-3](#)) to start the download.
6. Repeat steps 4 and 5 for each file that requires downloading.
7. Repeat steps 2 through 5 for the **REMOTE**.

2.3 Determine Forward Path Input Signal Level

The level of the composite RF input signal at the FORWARD RF IN port at the HU will vary depending on the type of BTS, the cable loss, the number of channels present, and the required forward path composite power. If maximum composite RF output is required, the signal level of the composite forward path RF signal at the HU forward path input must be adjusted to fall within a range of **-9 to -40 dBm**. If the signal level is not within this range, it must be adjusted to fall within this range through the use of an external attenuator capable of handling the BTS forward path output power.

If using the Conditioning Panel or Duplexing Panel, refer to the Digivance 800 and 1900 MHz Interface Panels User Manual (ADCP-75-147) for the procedures for measuring and adjusting the input RF signal level at the HU. If connecting a single HU to a single BTS, use the following procedure to measure and adjust the input RF signal level at the HU:

1. Connect a spectrum analyzer or power meter to the forward path output port of the BTS. The required signal levels and test points are shown in [Figure 4-5](#).
- ▶ **Note:** Check the input rating of the test equipment and the output rating of the BTS. To avoid burning out the spectrum analyzer or power meter, it may be necessary to insert a 30 dB 100W (or similar) attenuator between the BTS and test equipment.
2. If using a spectrum analyzer, proceed to step 3. If using a power meter, measure the composite signal power from the BTS and then proceed to step 5.
3. Measure the RF level of a single carrier, such as the control channel, in dBm. Make sure the resolution bandwidth of the spectrum analyzer is 30 kHz. Maximum power in any channel should not exceed 5W (+37 dB).

4. Calculate the total composite signal power from the BTS using the following formula:

$$P_{\text{tot}} = P_c + 10\text{Log } N - (\text{see Note})$$

Where,

P_{tot} is the total composite power in dBm

P_c is the power per carrier in dBm as measured in step 3, and

N is the total number of channels.

- **Note:** If calculating the composite power for a CDMA system, reduce the initial result by 16.23 dB.

5. Determine the total cable loss that is imposed by the forward path coaxial cable that links the BTS to the HU and also any insertion loss imposed by splitters or combiners.
6. Subtract the total cable loss and any insertion losses from the total composite power calculated in step 4.
7. Subtract -25 (midpoint of the required range) from the value determined in step 6. The difference (which should be positive) equals the value of the external attenuator that is required to reduce the forward path signal level to fall within the required range. The following formula outlines the required calculations for steps 6 and 7:

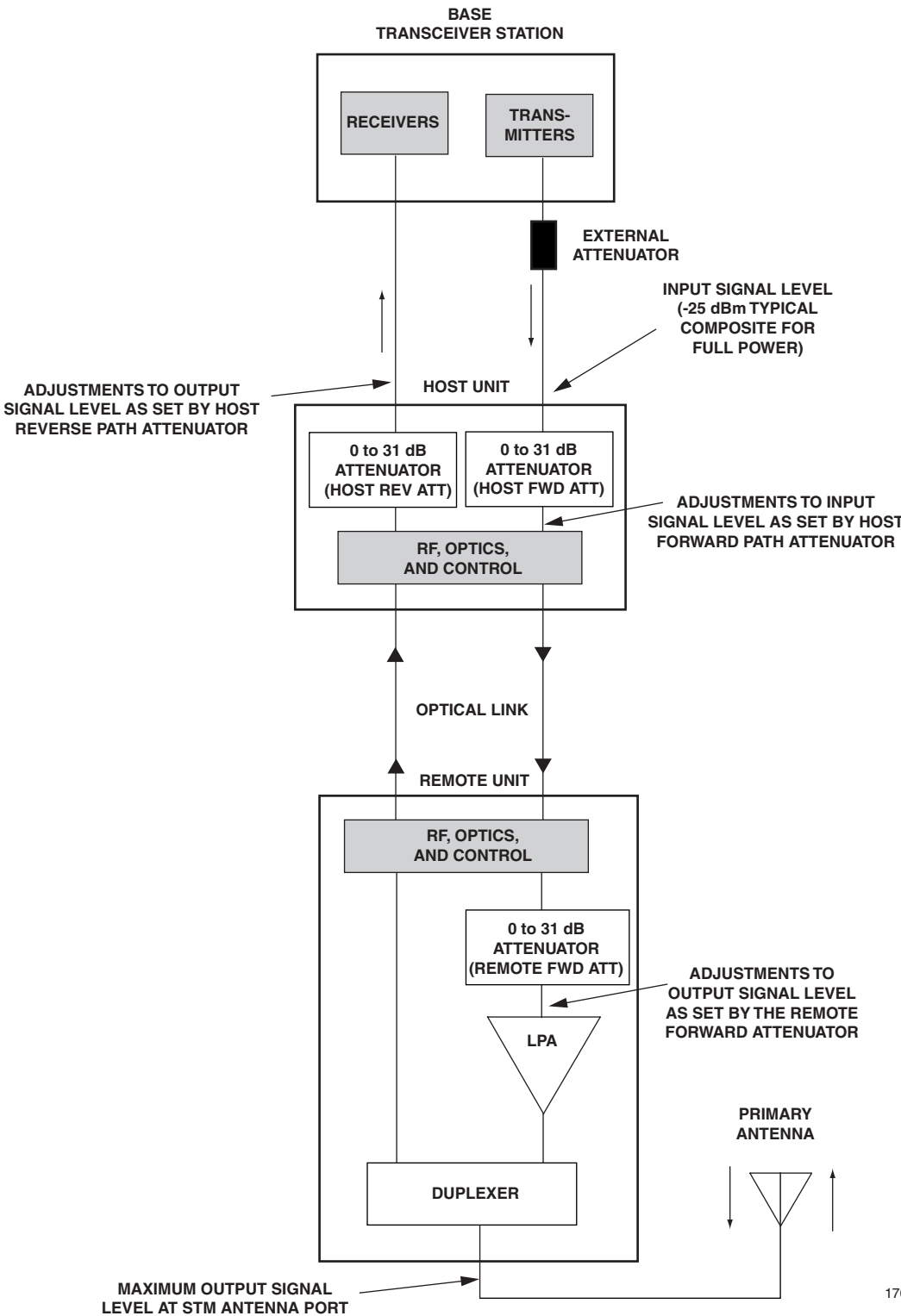
$$P_{\text{tot}} - (\text{Cable and insertion loss}) - (-25) = \text{Value of external attenuator required}$$

- **Note:** If the input signal level is already within the required range of -9 to -40 dBm, then no external attenuator is required.
8. Select an attenuator that is as close to the value calculated in step 7 as possible. Select a value that will adjust the signal level of the composite input signal to fall within the specified range.
 9. Install the external attenuator in the coaxial cable that is connected to the FORWARD RF IN port at the HU.



Caution: *The Host Unit can be damaged if it is overdriven by the BTS. Always install an external protective attenuator at the Host Unit FORWARD RF IN port if the forward path composite input signal level is greater than -9 dBm.*

10. Subtract the value of the external attenuator used in step 9 from the total composite signal power (P_{tot}) and record the result. This value will be required when setting the attenuation of the HU's internal forward attenuator.



17000-C

Figure 4-5. Signal Levels, Test Points, and Adjustments

2.4 Enter Site Name and Site Number

All HU's and RU's are programmed with the same site name and site number. It is therefore necessary to assign a unique site name and site number to the HU and RU before they can be connected to the same CAN. Use the following procedure to assign a unique site name and number to each HU and RU system:

1. Click on the **HOST Config** tab and on the **REMOTE Config** tab. The **HOST Config** display and the **REMOTE Config** display will open within the EMS main window as shown in [Figure 4-6](#).

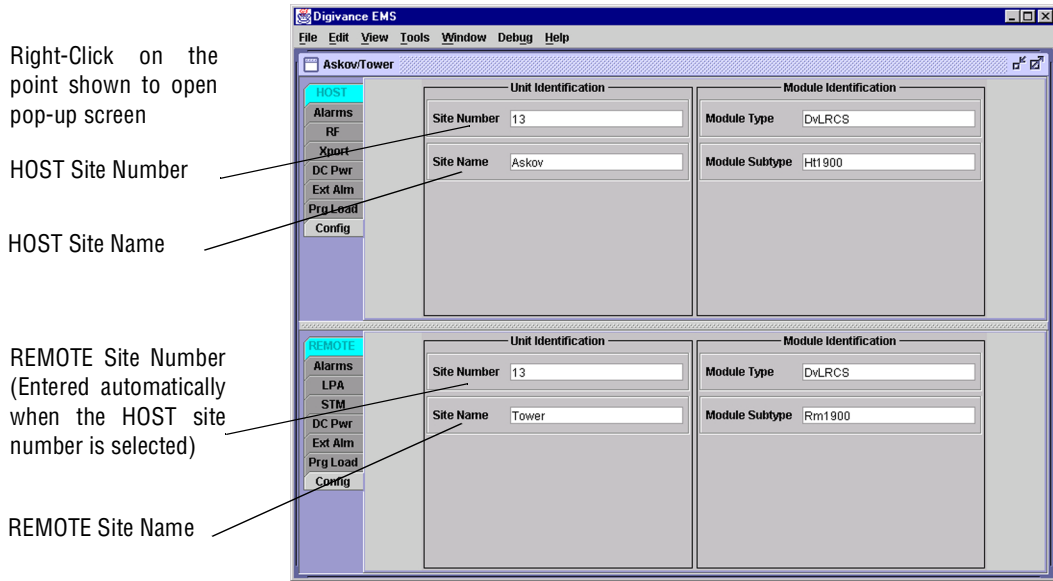


Figure 4-6. HOST and REMOTE Config Displays

2. Right-click on the **HOST Site Name** field (see [Figure 4-6](#)). The **Site Name** pop-up screen will open as shown in [Figure 4-7](#). Enter a unique name for the HOST. The name may be up to 32 characters long and must not contain any spaces. The name may include numbers, punctuation, and upper or lower case letters and must always begin with a letter. Click on **OK** to close the screen and make the changes take effect.

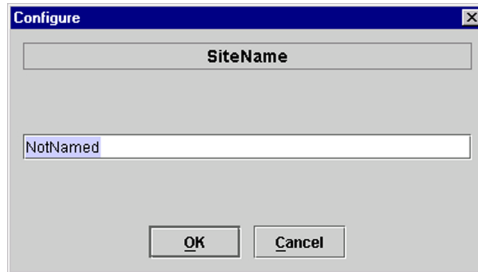


Figure 4-7. HOST Site Name Pop-Up Screen

3. Right-click on the **HOST Site Number** (see [Figure 4-6](#)). The **Site Number** pop-up screen will open. Enter any number between 1 and 24 and then click on OK to close the screen and make the changes take effect.
4. Check the **REMOTE Site Number** field (see [Figure 4-6](#)). The **REMOTE Site Number** does not have to be entered. When the **HOST Site Number** is entered, the system will automatically enter the same number for the **REMOTE Site Number**.
5. Right-click on the **REMOTE Site Name** field (see [Figure 4-6](#)). The **Site Name** pop-up screen will open. Enter a unique name for the **REMOTE**. The name may be up to 32 characters long and must not contain any spaces. The name may include numbers, punctuation, and upper or lower case letters and must always begin with a letter. Click on OK to close the screen and make the changes take effect.
6. Open the Tools menu at the top of the main window and then select Refresh Catalog to make the new Host and Remote site names appear in the View menu.

2.5 Enter Host Forward Attenuation

The HU internal forward path attenuator setting determines the maximum composite output signal level at the STM antenna port. The appropriate attenuation value for any particular system is based on the number of channels the system is transporting and the level of the composite forward path signal input at the HU's FORWARD RF IN port. The maximum output power that can be provided by the system is 40.5 dBm (11 Watts). The total forward path gain that is provided by the system (with host and remote forward attenuators set to 0 dB) is 80.5 dBm. Use the following procedure to set the forward path attenuation to provide the maximum composite output signal level:

1. Click on the **HOST RF** tab. The **HOST RF** display will open within the EMS main window as shown in [Figure 4-8](#).
2. Right-click on the **Host Fwd Att** section of the display (see [Figure 4-8](#)). The **Host Fwd Att** pop-up screen will open as shown in [Figure 4-9](#).
3. Obtain the value of the total composite input signal level as determined in step 10 of [Section 2.3](#).
4. Determine the appropriate value to enter for the Host forward path attenuator by subtracting the required system output level (per system design plan) from 80.5 (the total system gain) and then adding the composite input signal level. The result (see sample calculation) is the amount of attenuation required.

$$\text{Atten Required} = 80.5 - (\text{Required System Output Power}) + (\text{Composite Input Power})$$

5. Enter the attenuation value and click OK to close the pop-up screen and to make the changes take effect.

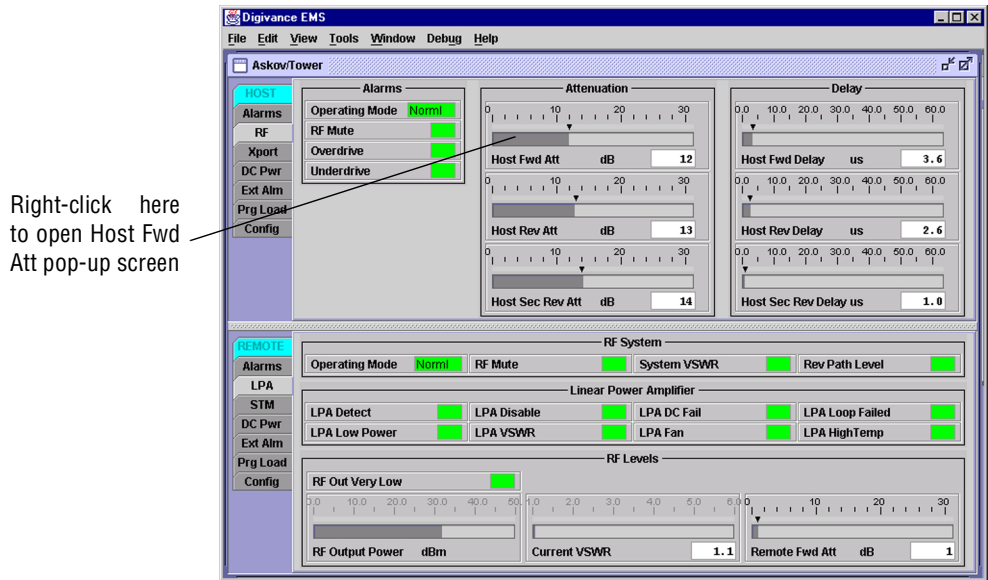


Figure 4-8. HOST RF Display

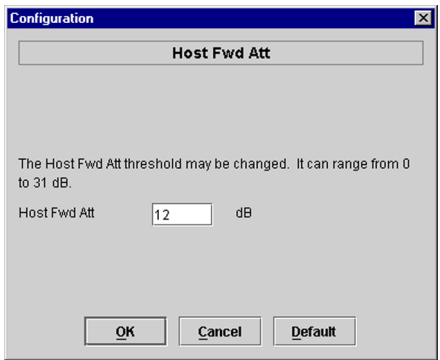


Figure 4-9. Host Fwd Att Pop-Up Screen

2.6 Determine Output Signal Level at STM Antenna Port

The RF output signal level should be measured at the STM ANTENNA port to verify that maximum composite signal level is at the required level. Use the following procedure to determine the power level:

1. Verify that RF ON/OFF switch on the LPA in the **OFF** position.
2. Disconnect the antenna cable from the STM ANTENNA port.
3. Connect a spectrum analyzer or RF power meter to the STM ANTENNA port. (Check the input rating of the test equipment. Insert a 30 dB 100 W attenuator if necessary.)

4. Place the RF ON/OFF switch on the LPA in the **ON** position.
5. If using a spectrum analyzer, proceed to step 6. If using a power meter, measure the composite signal power from the STM and then proceed to step 8.
6. Measure the RF level of a single carrier, such as the control channel, in dBm. Make sure the resolution bandwidth of the spectrum analyzer is 30 kHz.
7. Calculate the total composite signal power using the following formula:

$$P_{\text{tot}} = P_c + 10\text{Log } N - (\text{see Note})$$

Where,

P_{tot} is the total composite power in dBm

P_c is the power per carrier in dBm as measured in step 6, and

N is the total number of channels.

- ▶ **Note:** If calculating the composite power for a CDMA system, reduce the initial result by 16.23 dB.
8. Record the result measured in step 5 or calculated in step 7.
 9. Place the MUTE/NORM/RESET switch on the LPA in the **OFF** position.
 10. Disconnect the spectrum analyzer or RF power meter from the STM ANTENNA port.
 11. Re-connect the antenna cable to the STM ANTENNA port.
- ▶ **Note:** To comply with Maximum Permissible Exposure (MPE) requirements, the maximum composite output from the antenna cannot exceed 1000 Watts EIRP and the antenna must be permanently installed in a fixed location that provides at least **6 meters** (20 feet) of separation from all persons.

2.7 Enter Remote Forward Attenuation

The STM internal forward path attenuator setting is used to reduce the power level of the composite output signal level at the STM antenna port. The maximum composite output signal level at the STM antenna port is set using the Host internal forward attenuator (see Section 2.4). However, component variations may result in the output power at the STM antenna port being slightly above or below the required power per channel. If this is the case, the STM forward attenuator may be used in conjunction with the Host forward attenuator to add or remove attenuation to produce the required output signal level. If less power is required, the STM forward attenuator may be used to reduce the power level. The default setting is 0 dB. Use the following procedure to change the STM forward attenuation:

1. Click on the REMOTE **LPA** tab. The REMOTE **LPA** display will open within the EMS main window as shown in [Figure 4-10](#).

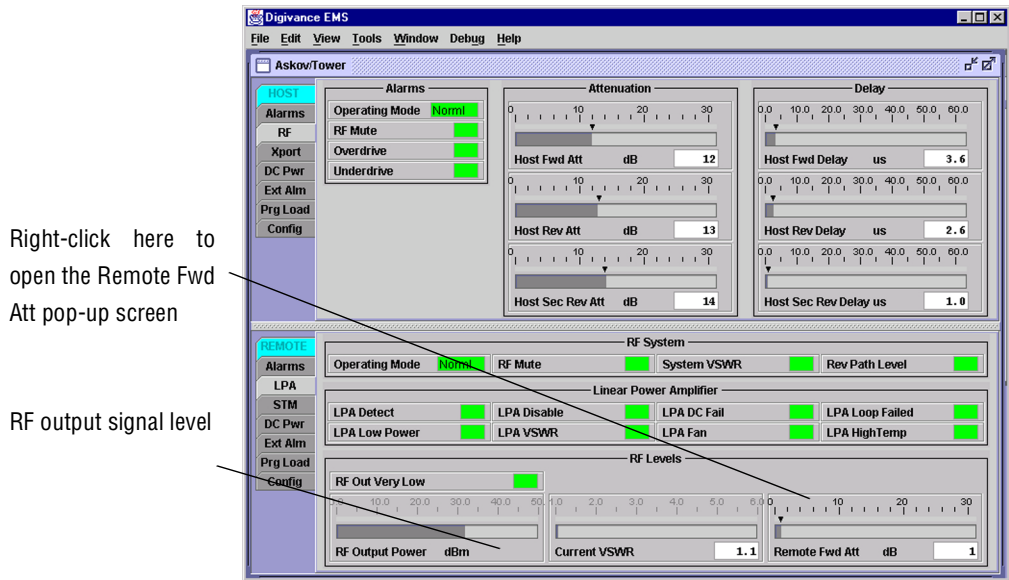


Figure 4-10. REMOTE LPA Display

2. Check the level of the RF output signal (as determined in Section 2.6) against the system design plan specifications. Table 4-1 shows the output signal level required to provide 5 watts per channel for systems with 1 to 2 channels. The maximum output signal level permitted for the system is 40.5 dBm (11 Watts).
3. Determine if more or less attenuation is required to produce the required output signal level.
4. Right-click on the **Remote Fwd Att** section of the display (see Figure 4-10). The **Remote Fwd Att** pop-up screen will open as shown in Figure 4-11.
5. Enter the required attenuation value and click OK to close the pop-up screen and to make the changes take effect.

Table 4-1. Composite Output Signal Levels

NUMBER OF CHANNELS	OUTPUT SIGNAL LEVEL REQUIRED TO PROVIDE 5 WATTS PER CHANNEL
1	37 dBm
2	40 dBm
When there are three or more channels, each channel will always be less than 5 watts since the system has a maximum power output of 11 watts (40.5 dBm).	

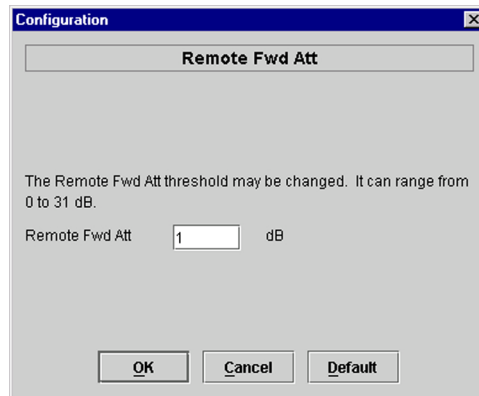


Figure 4-11. Remote Fwd Att Pop-Up Screen

6. Verify that the appropriate RF output signal level appears in the **RF Pwr-VSWR Low** section (see [Figure 4-10](#)). This is primarily a reference value and should not take the place of external test equipment when determining the power level of the composite RF output signal. Depending on the modulation type and number of channels, the EMS software may report a power level that is higher or lower than the actual RF output signal.
- **Note:** To comply with Maximum Permissible Exposure (MPE) requirements, the maximum composite output from the antenna cannot exceed 1000 Watts EIRP and the antenna must be permanently installed in a fixed location that provides at least **6 meters** (20 feet) of separation from all persons.

2.8 Enter Host Reverse Attenuation

The level of the RF signal that should be input to the BTS will vary depending on the type of BTS, the receive distribution, and the number of channels present. To interface with the BTS, the reverse path signal level must be adjusted to provide the signal level required by the BTS. The HU provides from -1 dB of gain to $+30$ dB of gain in the reverse path. Use the following procedure to set the reverse path gain:

1. Check the BTS manufacturer's specifications to determine the composite signal level required at the BTS reverse path input port.
2. Determine the overall gain and loss imposed on the signal by the antenna, antenna cable, and by the cables that connect the HU to the BTS.
3. Determine the amount of gain required to raise the reverse path signal to the level required at the BTS.
4. Click on the **HOST RF** tab. The **HOST RF** display will open within the EMS main window as shown in [Figure 4-12](#).

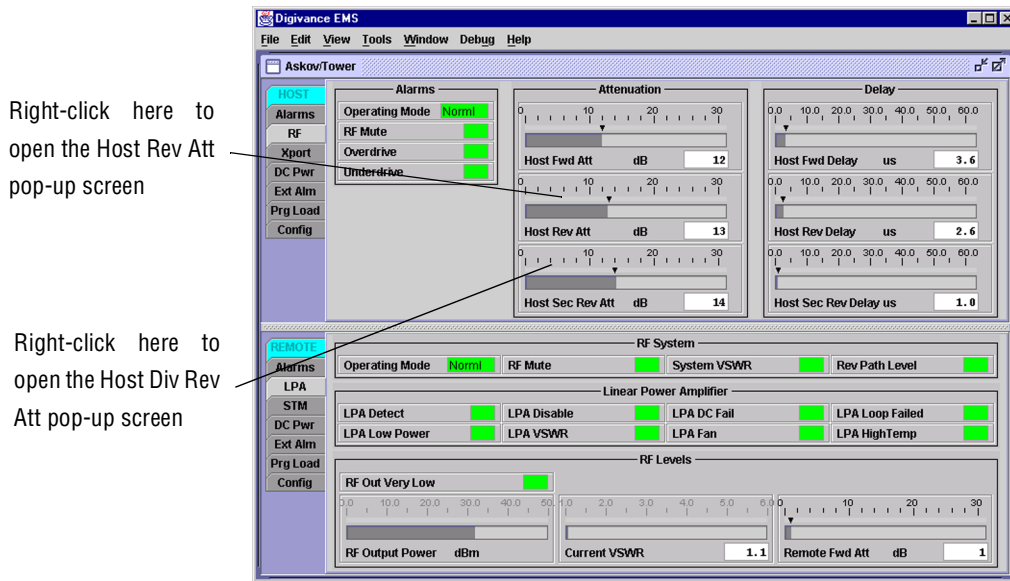


Figure 4-12. HOST RF Display

- Right-click on the **Host Rev Att** section of the display (see Figure 4-12). The **Host Rev Att** pop-up screen will open as shown in Figure 4-13.

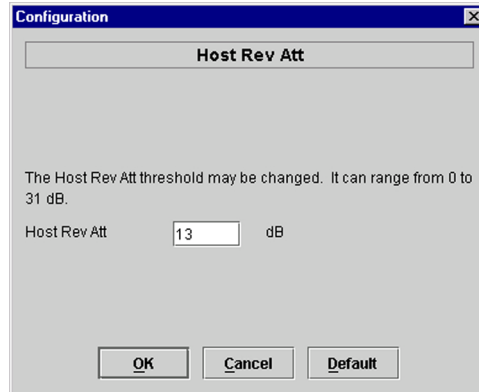


Figure 4-13. Host Rev Att Pop-Up Screen

- Enter the attenuation value that will provide the required gain. Refer to Table 4-2 for the attenuation values and the corresponding gain (nominal) values.
- Click OK to close the pop-up screen and to make the changes take effect.

Table 4-2. Reverse Path Attenuation Settings and Nominal Gain Provided

ATTENUATION SETTING	GAIN PROVIDED	ATTENUATION SETTING	GAIN PROVIDED	ATTENUATION SETTING	GAIN PROVIDED
0 dB →	30 dB	11 dB →	19 dB	22 dB →	8 dB
1 dB	29 dB	12 dB	18 dB	23 dB	7 dB
2 dB	28 dB	13 dB	17 dB	24 dB	6 dB
3 dB	27 dB	14 dB	16 dB	25 dB	5 dB
4 dB	26 dB	15 dB	15 dB	26 dB	4 dB
5 dB	25 dB	16 dB	14 dB	27 dB	3 dB
6 dB	24 dB	17 dB	13 dB	28 dB	2 dB
7 dB	23 dB	18 dB	12 dB	29 dB	1 dB
8 dB	22 dB	19 dB	11 dB	30 dB	0 dB
9 dB	21 dB	20 dB	10 dB	31 dB	-1 dB
10 dB	20 dB	21 dB	9 dB	--	--

2.9 Enter Host Forward and Reverse Delay

The forward and reverse delay function allows entry of from 0 to 63 μ sec of delay in the forward and reverse paths. This feature is used when multiple systems are used to transport the same channel and there is a significant difference in the path delay between systems. Additional delay may be entered to balance the overall system delay. The amount of delay required must be calculated by the RF engineer and should be included in the system design plan. The default setting is 0 μ sec. Use the following procedure to change the forward and reverse path delay:

1. Click on the HOST RF tab. The HOST RF display will open within the EMS main window as shown in [Figure 4-14](#).

Right-click here to open the Host Fwd Delay pop-up screen

Right-click here to open the Host Rev Delay pop-up screen

Right-click here to open the Host Div Rev Delay pop-up screen

Figure 4-14. HOST RF Display