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# 3.10 Determining RF Signal Levels

An operational host/remote pair has forward and reverse path RF signals passing through it between the SDR BTS application and the cell phone user. The RF signals are transported in digital format as RF spectrum data by way of fiber or fiber-to-free-space optics links between the host unit (Host PCIx Card) and remote unit (in both directions).

## To view RF signal levels for a host/remote pair

- 1. From the **View** menu, select the site names of a host/remote pair.
- 2. Click on the host **RF** tab for the host or remote unit to view **RF** signal levels and associated information for the selected unit (see Figure 33).
- 3. To interpret host display, see Topic 4.4.2, Host RF Window, on page 71. To interpret remote display, see Topic 4.5.2, Remote RF Window, on page 82.

Askov/1	ower
HOST Alarms RF Host DC Pwr Prg Load Config SDR Cfg	Alarms Oper Mode Norma RF Overdrive RF Underdrive
REMOTE	
REMOTE Alarms	RF System
REMOTE Alarms RF STM	RF System      Oper Mode      Incor Down Amplifur      Incor Down Amplifur
REMOTE Alarms RF STM DC Pwr	
REMOTE Alarms RF STM DC Pwr Ext Alm	RF System       Oper Mode       NormL       System VSWR       Linear Power Amplifier       LPA Detect       LPA Disable       LPA DC Fail       LPA Loop Failed       LPA Low Power       LPA VSWR
REMOTE Alarms RF STM DC Pwr Ext Alm Prg Load	RF System     Oper Mode     Norma     System VSWR     Linear Power Amplifier     LPA Detect     LPA Disable     LPA DC Fail     LPA Loop Failed     LPA Loop Failed     LPA Loop Failed
REMOTE Alarms RF STM DC Pwr Ext Alm Prg Load Config	RF System         Oper Mode       Normal         System VSWR         Linear Power Amplifier         LPA Detect       LPA Disable         LPA Low Power       LPA VSWR         RF Levels
REMOTE Alarms RF STM DC Pwr Ext Alm Prg Load Config	RF System         Oper Mode       Normal         System VSWR         Linear Power Amplifier         LPA Detect       LPA Disable         LPA Low Power       LPA VSWR         RF Levels
REMOTE Alarms RF STM DC Pwr Ext Alm Prg Load Config	RF System         Oper Mode       Normal       System VSWR         Linear Power Amplifier
REMOTE Alarms RF STM DC Pwr Ext Alm Prg Load Config	RF System         Oper Mode       Normal       System VSWR         Linear Power Amplifier       Linear Power Amplifier         LPA Detect       LPA Disable       LPA DC Fail         LPA LPA VSWR       LPA A DC Fail       LPA LPA Loop Failed         LPA Low Power       LPA VSWR       LPA Fan         RF Power       RF Levels       10       20         Normal       Source       Source       Source

Figure 33. RF Display Example

## To view RF signal levels using the NOC-NEM interface

Use the GET DATA command (see Topic 5.5.7 on page 105).

# 3.11 Setting RF Forward Attenuation

Using the remote unit RF window, you can adjust the current attenuation setting for the RF forward path. This setting affects the strength of the forward path RF analog signal transmitted from the remote unit antenna. Adjustments made in EMS are passed to the remote unit control software, which operates a digital attenuator. The attenuator provides an attenuation adjustment range of 0 to 31 dB, and can be set in 1 dB increments. Any input signal with a level of -9 dBm to -40 dBm (composite) can be adjusted to the required level using the forward path attenuator.

NOTE: Default settings for the attenuator are the maximum, 31 dB.

*NOTE:* An external attenuator is required if more than 30 dB of attenuation is required to adjust the input RF signal to the required level.

To adjust the attenuator, use the procedure below.

## To enter attenuation settings for a host RF signal

- 1. From the View menu, select the names of a host/remote pair.
- 2. Click on remote **RF** tab to view the remote **RF** window (for an example, see Figure 33 on page 43).
- 3. Click on the **Edit** button in the **Remote Fwd Att** area in the window to display the **Remote Fwd Att** dialog shown in Figure 34. (The **Edit** button to be clicked on is in the lower right in the figure.)



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Configuration 🔀	il 📃
Remote Fwd Att	ux Fault 📃
The Remote Fwd Att threshold may be changed. It can range from 0 to 31 dB. Remote Fwd Att <u>1</u> dB	
<u>O</u> K <u>C</u> ancel <u>D</u> efault	
10         20         30         40         50         60         0         10 </th <th>18 1</th>	18 1

### Figure 34. Attenuation Area in RF Window

4. In the **Remote Fwd Att** dialog, key in the desired setting as shown in the example in Figure 35.

Configuration 🗙
Remote Fwd Att
The Remote Fwd Att threshold may be changed. It can range from 0 to 31 dB.
Remote Fwd Att 1 dB
<u>O</u> K <u>C</u> ancel <u>D</u> efault

### **Figure 35. Entering Remote Forward Attenuation**

5. When done, click on the **OK** button.

## To enter forward path attenuation values using NOC-NEM interface

Use the SET THRESHOLD command (see Topic 5.5.18 on page 115).

# 3.12 Defining RF Logical Channels

Using the host **SDR Config** window, shown in Figure 36, you can define a logical RF channel and enter gain settings for each path within the channel. A logical RF channel is a multiplex of up to eight RF voice channels. A logical RF channel consists of a forward path, a primary reverse path, and a secondary reverse path, if supported by the remote unit. The gain setting is simply a number that affects the amount of gain to applied to the signal within the specified path. A negative value results in attenuation. Each gain setting increment corresponds approximately to 1 dBm of adjustment.

# To define an RF logical channel

- 1. From the View menu, select the names of a host/remote pair.
- 2. Click on the host **SDR Cfg** tab to display the window shown in Figure 36. (This example shows typical a data display for logical RF channels that are already defined.)



HOST	Band-Sub-Band-Div								
Alarms RF	Band	<mark>19 (</mark>	DBE	DiversityLE	D	Green	HostF	PCIxFaultLED	Green
Host									
DC Pwr	Logical RF Channel	Modulation Type	FCCF	RF Chnl Nu	Fwd RF Chnl Gain	Rev RF Chi	nl Gain	Div RF Chnl Gain	RF Chnl Enable
ProLoad	1	GSM	587		10.0	0.0		0.0	true
Contin	2	GSM	590		10.0	0.0		0.0	true
Config	3	GSM	594		10.0	0.0		0.0	true
SDR Cfg	4	GSM	600		10.0	0.0		0.0	true
	5	GSM	603		10.0	0.0		0.0	true
	6	GSM	605		10.0	0.0		0.0	true
	7	GSM	606		10.0	0.0		0.0	false
	8	GSM	608		10.0	0.0		0.0	false

### Figure 36. Host SDR Cfg Window

- 3. Determine which logical RF channel you want to enter data for. To enter values for that channel, move across in the same row in the window. The system supports up to eight logical channels.
- 4. Click on the **Modulation Type** field to display a pulldown list such as shown in Figure 37. From the list, select the modulation type of the channel being configured.

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Modulation	і Туре
NC.	•
GSM	
NC	

Figure 37. Modulation Type

5. Click in the **FCC RF Chnl Number** field and from the pulldown list select an FCC channel number as shown in the example in Figure 38. Based on modulation type, band, and sub-band, EMS will list only available FCC channel numbers.

FCC RF Chnl Num	ber
587	-
587	<b></b>
588	881
589	
590	
591	
592	
593	
594	-

Figure 38. FCC RF Chnl Number (Example)

 Click in the Fwd RF Chnl Gain field to display a pulldown list such shown in Figure 39. Select the item for the desired gain setting for the forward path. The range of possible values is from 10 to −20 dBm. The standard value for this field is 10.

	Fwd RF Chnl Gain	
-20		•
3		
4		
5		
6		
7		
8		222
9		00000
10		-

Figure 39. Fwd RF Chnl Gain

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- Click in the Rev RF Chnl Gain field to display a pulldown list. Select the item for the desired amount of signal gain. The range of possible values is from 10 to -20 dBm. The standard value for this field is 0.
- 8. If the remote unit supports the diversity option (second reverse path), click on the **Div RF Chnl Gain** field to display the pulldown list. Select the item for the desired amount of signal gain. The range of possible values is from 10 to −20 dBm. The standard value for this field is 0.
- 9. Use the last field on the right, **RF Chnl Enable**, to enable the channel if it will go into immediate use. To enable the channel, click on the field to set the displayed value to "true." If the channel should not be enabled at this time, let it stay at the value "false." When a value is changed in this field, a box appears temporarily as shown in Figure 40.

	RF Chnl Enable
true	
false	



10. When done, exit the window to proceed with other tasks if desired.

## To do this same task using the NOC-NEM interface

You cannot use NOC-NEM to perform these tasks.

# 3.13 Setting Operating Mode

A host/remote pair has three user-selectable operating modes plus two modes that happen automatically when a program file is downloaded. User-selectable modes can be started or stopped using the **OpMode** window, shown in Figure 41.



### To set operating modes

- 1. From the **Tools** menu, select **Opmode**.
- 2. Click on the host or remote name.
- 3. For a description of the modes, refer to Topic 4.1.4 on page 60. The modes are the same for the host and remote units.

### CAUTION! Care is needed to prevent damage to the system in Test Mode. Test Mode causes the system to ignore alarms that would otherwise prevent RF signals from being transported.

- 4. Select an operating mode using the pull-down menu after first checking the CAUTION statements above.
- 5. Stop an operating mode by selecting another mode. (In the end, select **Norml** mode to return the host/remote pair to normal operation.)

👹 OpMode				×
Host Node	Host Name	Remote Node	Remote Name	Site Number
35	Embarrass	34	IntiFalls	11
39	Askov	38	Tower	13
J				
	Normi		-	
	Normi			
	Stdby			
	Test 1			

Figure 41. Selecting an Operating Mode



# 3.14 Downloading Program Files

The host and remote **Prg Load** windows are used to download program files to a host/remote unit. The downloaded file may be either a control program or a Field Programmable Gate Array (FPGA). The file is downloaded from the EMS computer to the host/remote control board.

The loaded files have file names in the following format:

```
<Name><Version>.sr where
```

```
<Name> = program name
```

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<Version> = software version number in major.minor.rev.build form

Figure 42 shows the host and remote **Prg Load** windows. Table 3 describes the programs identified in the window.

Askov/Tower		t
HOST Alarms RF Host	Operational State	Control Program File
DC Pwr Prg Load		
Config	Software Info	FBCA Drowrow File
SDR Ctg	Init-er 3.00.00	- FPSA Program File
	Reflasher 3.00.03	
	Control program 3.00.00	Select Load Validate
	FPGA program 2.00.09	
	TPOA program 3.00.09	
REMOTE Alarms RF STM DC Pwr Ext Alm Prg L pad	Operational State	Control Program File
	Init.er 3.00.00	FPGA Program File
Config	3.00.00	
Config	Poflacher 2.00.02	
Config	Reflasher 3.00.03	
Config	Reflasher         3.00.03           Control program         3.00.00	Select Load Validate

Figure 42. Host and Remote Prg Load Windows

<name></name>	DESCRIPTION	CAN DOWNLOAD?
Host Unit		
SDR HIniter	Host Initialization Program version	No
SDR HReflsh	Host Reprogram Program version	No
HMR HstCP	Host Control Program version	Yes
FPGA Program	Field Programmable Gate Array version	Yes
Remote Unit		
SDR RInter	Remote Initialization Program version	No
SDR RReflsh	Remote Reprogram Program version	No
HMR RemCP	Remote Control Program version	Yes
FPGA Program	Field Programmable Gate Array version	Yes

#### Table 3: Host and Remote Programs

## To load a program file

- 1. Load programs from source CD-ROM to known folder on EMS computer.
- 2. In EMS, select names of a host/remote pair from View menu.
- 3. Click on the host or remote **Prg Load** tab (as appropriate) to view the host or remote program load window, shown in Figure 42.
- 4. Click on the **Select** button and browse to find the program to be loaded.
- 5. Depending in whether the file being loaded is a control program or FPGA, proceed as follows:
  - a. If loading a control program, click on the **Compare** button to verify that the file you are about to load is a newer version (greater version number) than the program than the file already loaded on the unit
  - b. If loading an FPGA, first check the **FPGA Program** field. If it contains the word "UNKNOWN," the unit has older type hardware with a non-replaceable FPGA, so you cannot proceed. If the field contains a version number, click on the **Validate** button to verify that the FPGA is functional (working). When you get a message back that the FPGA is functional, you can proceed.