

# MobileAccessHX High Power DAS System

## Operational Description

## 1.1 System Monitoring and Management

The MobileAccessHX Remote Unit is centrally managed via the MobileAccess SC-450 Controller. *Note that MobileAccessHX is not connected directly to the controller. It is connected to the Base Unit (that is connected to the controller). Thus, the controller monitors views and manages the HX via the Base Unit to which the HX is connected.*

The following shows the Config(uration) tab of the selected HX unit. The system configuration and management is described in Chapter **Error! Reference source not found.4**.

The screenshot displays the MobileAccessHX configuration interface. The top navigation bar includes 'Monitor', 'Config', 'Events', 'Set-up', 'Management', and 'Help'. The left sidebar shows a tree view of the system hierarchy, including SC-450, CNTRL-M-HX\_verification, P5-RIU, P6-RIU, P13-BASE UNIT, BU 1-4-HX\_VoD1, RHU3-P.S0, ADDON1-aws, HX4-HX\_US\_VoD, BU 5-8-VoD\_HX\_2, CNTRL16-lior 8-----107, EHU-172.19.70.10, EHU-0.0.0.0, EHU-172.19.70.22, and EHU-172.19.1.15. The main content area shows a 3D model of the HX cabinet. Below the model, there are two panels: 'HX Cabinet Alarms' and 'Module Info'. The 'HX Cabinet Alarms' panel lists several alarms with checkmarks: HX General Alarm, Optical Link Alarm, Fans Alarm, Service 1 Cell800, Service 2 700LTE, Service 3 PCS1900, and Service 4 AWS. The 'Module Info' panel displays various parameters for the selected unit, including Name (Building A 3rd Floor), Type (US), First Band (Cell800), Second Band (700LTE), Third Band (PCS1900), Fourth Band (AWS), Location Index (0/13/1/4), Serial Number (0A380EF), Firmware Version (1.0B10), Product Revision (0.0), Laser and Optics, Link Status (NORMAL), and Link Level (193).

## 1.2 HX Unit Interfaces

The HX *antenna port* is located *externally*. All other interfaces such as F/O connections, power connections, etc. are located inside the cabinet and are accessed by opening the cabinet door.

**The HX model consists of the following main components – open door view:**

- Quad-band Service Module – connects to the Base Unit using a single fiber pair and supports up to four services
- External Amplifiers blade – 2 External Amplifiers are mounted on each of the 2 blades and provide the additional amplification on the DL signals coming from the Quad-band Service Module top the Multiplexer

- 8:1 Multiplexer – combines UL & DL signals of the 4 bands, while providing the proper filtering, into a single duplexed antenna port
- Power supply – local AC or Remote DC power feed (model depended)
- Duplexed antenna port – interface to RF antennas

Note: More information on the components and LEDs is provided in the tables in the next page.

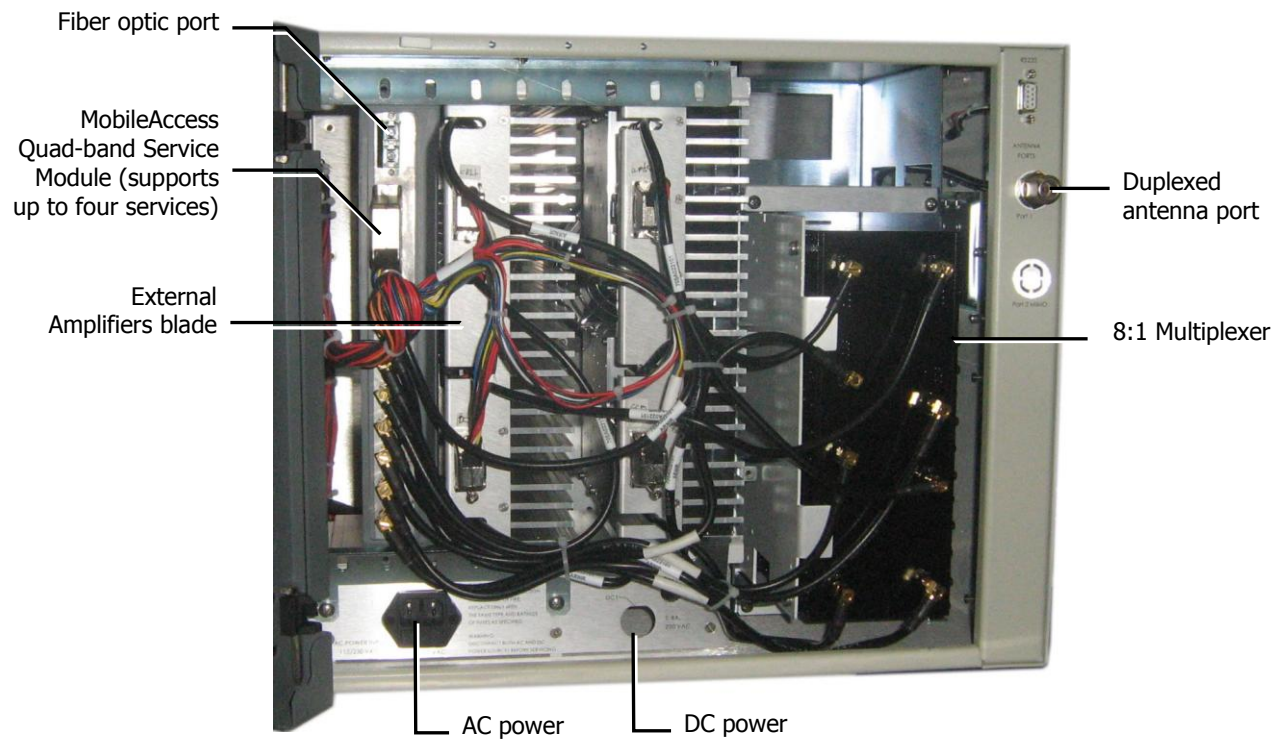


Figure 0-1. Example of Indoor HX Remote Unit Open front View



Figure 0-4. Example of Indoor HX Remote Unit rear View

The following tables provide a description of the HX indoor type connectors and LEDs.

Table 0-1. Connector Descriptions

Connector	Description
F/O	SC/APC fiber-optic connector for either SM or MM fibers
Antenna	N-Type female 50Ω duplexed connector for RF antenna
AC PWR	110/220 VAC power feed
DC	Direct 48VDC power feed
RS-232	Local craft connector
Grounding	Grounding lug

Table 0-2. LED Descriptions

Name	Description	Color	Status
Power	Device is powered	GREEN	Steady On
	Power not supplied to the unit	GREEN	Off
Comm	When connected and discovered by an OPTM (BU)	GREEN	Blink per communication attempt
	When device is powered on but no external communication is received	GREEN	Steady Slow Blink
Link	No Optical link is present	GREEN	Off
	Low optical link level from OPTM	GREEN	Blink
	Normal optical link level from OPTM	GREEN	Steady On

## 1.3 Connections

The HX main connections consist of the following:

- RF antenna
- Fiber Optic connection
- Power connections

### Connect the HX Indoor unit as follows

1. Connect broadband ANTENNA coax to HX cabinet DUPLEXED ANTENNA port (external).
2. OPEN cabinet door.

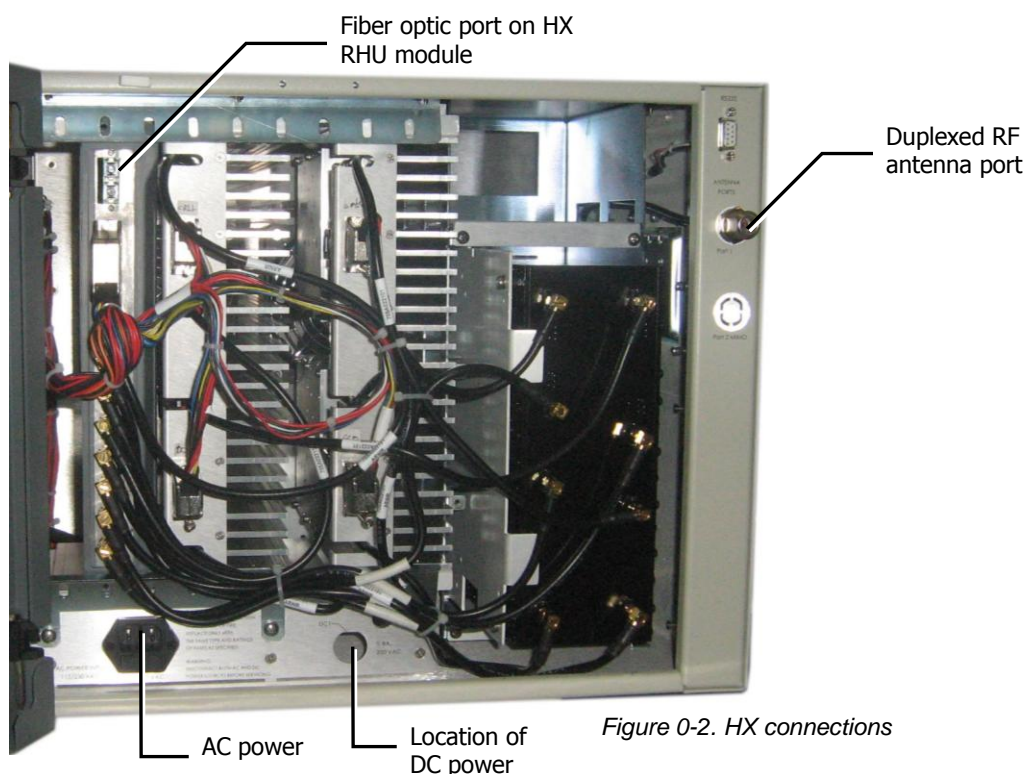


Figure 0-2. HX connections

3. Connect F/O cables to RHU optic port (internal).

**NOTE:** Keep in mind the rules for handling and connecting F/O cables. The F/O cables will be connected to the associated BU in the communication room at a later phase.

- Install splice box near Remote Cabinet.
- Connect fiber optic cable to splice box and the SC/APC pigtails to the HX RHU module.

- For the downlink, connect the fiber optic cable pigtails from splice box coming from the BU port to the corresponding RU port (routing the optic fibers so they will fit through the top opening in the door.)
- For the uplink, connect the fiber optic cable pigtails from splice box from the RU (routing the optic fibers so they will fit through the top opening in the door), to the uplink port that connects to the BU.

*Note: The internal power connections and other connections should already be connected.*

4. Connect AC (cable supplied) or DC power according to your MODEL. (Unit should power-ON).
5. Verify that the RHU LEDs are GREEN:
  - PWR and Link: Steady Green
  - COMM: Blinking GreenIf the LEDs are not as described above, refer to HX Unit Interfaces for troubleshooting.
6. Route the fiber optic cables toward the TOP of the cabinet and the power cable towards the bottom.

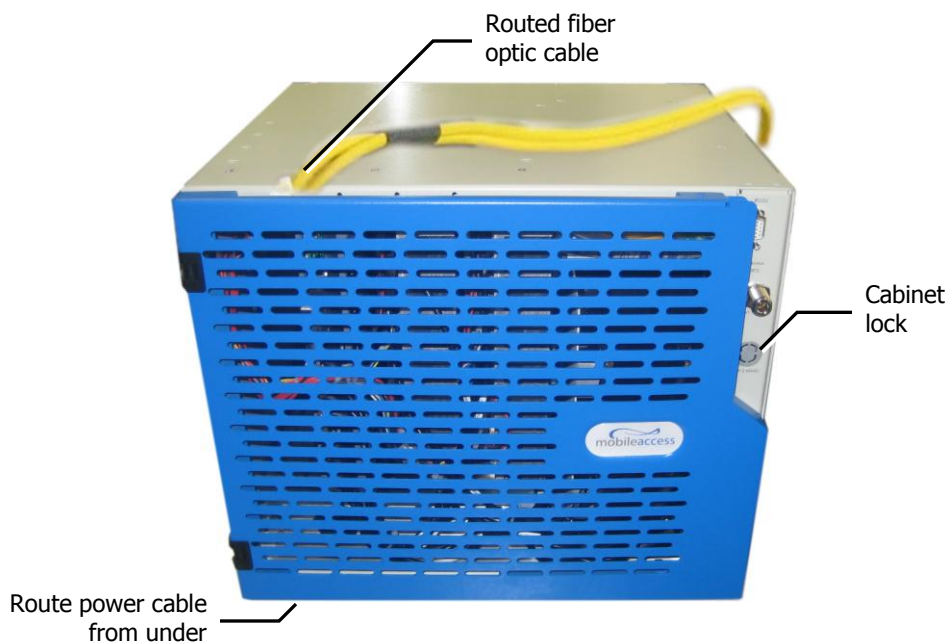


Figure 0-3. Closed HX Cabinet with Routed Cables

7. Close the cabinet door, routing the corresponding cables through the top and bottom openings and lock the door.

## 1.4 Initial Controller Setup

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NOTE: The available tabs and options may vary depending on the access level used to open your session.

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This section provides the details on the basic setup and configuration of the SC-450 management interface. It is to be completed after the physical installation of the controller and connections to the relevant devices has been completed.

### 1.4.1 Open a Session to the Controller

1. Verify your computer is configured for a DHCP server:

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NOTE: The procedure may differ depending on your specific Windows OS.

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- a. In the **Local Area Connections** choose **Properties**.
- b. Select **Internet Protocol (TCP/IP) Connection**, choose **Properties** and define for DHCP and automatic DNS server address acquisition as shown in following figure. Click **OK**.

2. Connect the PC directly to the **SC-450 LOCAL** port via the supplied cross-cable as illustrated below.

**Warning!!! Do NOT connect the SC-450 LOCAL port to a network as its DHCP server can disrupt LAN IP addressing.**

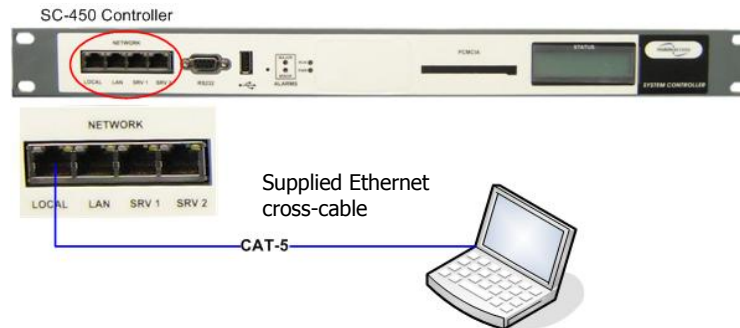
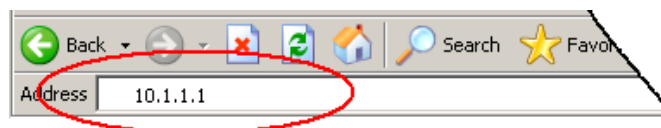


Figure 0-1. Connect PC to the SC-450 Local Port

3. Open a **Web browser** and enter the SC-450 default address: **10.1.1.1**.



The SC-450 has been optimized for use on IE 6.0 and Firefox 3.0 or higher. For proper display on IE 8.0 use compatibility mode by selecting Tools -> Compatibility View Options and Add the SC-450 website 10.1.1.1.

The Login dialog appears.



4. To open a session with configuration privileges, enter:
  - a. User Name: '**engineer**'
  - b. Default Password: '**eng**'



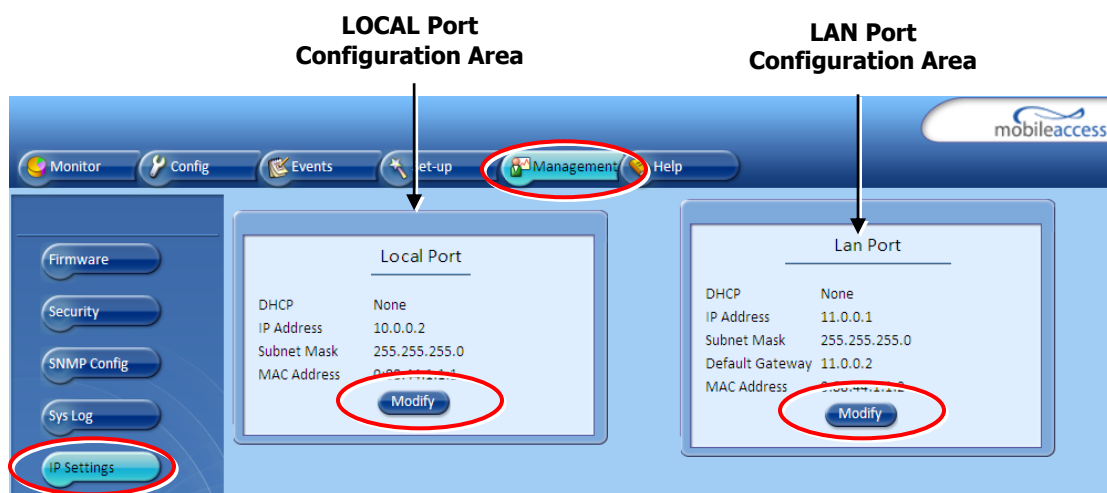
## 1.4.2 IP Address Configuration

Set the SC-450 **LAN port** for remote control via *static or dynamic IP address*.

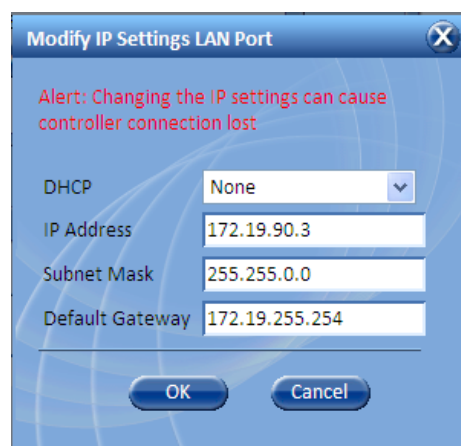
NOTE: Local setup and troubleshooting is performed via the **SC-450 LOCAL** port. In addition, the Local port can be assigned a *static IP address* and connected to the customer LAN for remote access capability.

### To Configure SC-450 for Remote or Local Management

1. Access the GUI interface of the SC-450.
2. Select the **Management** tab and then click **IP Settings** on the side bar menu.

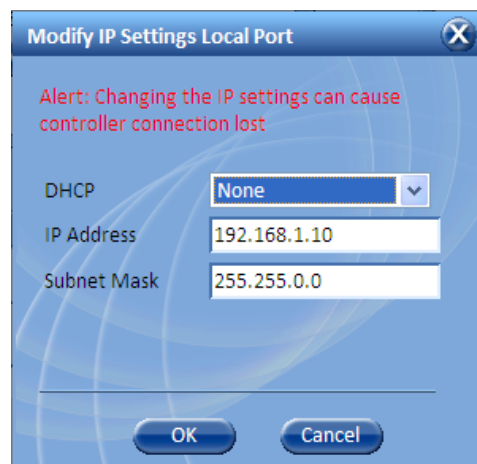


3. To change the LAN Port network settings, click the **Modify** button in the LAN Port Configuration Area. The following dialog appears.



To Define...	Do This...
Static IP Address	Set <b>DHCP</b> as <b>None</b> . Enter the IP Address, Subnet and Gateway. Click <b>OK</b> .
Dynamic IP Address	Set <b>DHCP</b> as <b>Client</b> and click <b>OK</b> .

4. To change the LOCAL Port network settings, click the **Modify** button in the LOCAL Port Configuration Area. The following dialog appears. The LOCAL Port configuration settings are displayed on the SC-450 LCD.



To Define...	Do This...
Static IP Address	Set <b>DHCP</b> as <b>None</b> . Enter the IP Address and Subnet. Click <b>OK</b> .
DHCP Server	Set <b>DHCP</b> as <b>Server</b> and click <b>OK</b> . <b>WARNING!!!</b> When using this setting, connect ONLY directly to the PC – NOT to a network.

## 1.5 Configure Controller Settings

In the **Network Topology**, double-click on the controller item. The controller *General* tab is displayed, where the **Controller Mode** is displayed as shown below.

General		Aux Alarms	
Name	Master13_19	Date	03/Nov/10
Firmware Version	4.6/5.6	Time	10:34:25
Serial Number	0533363		Modify
Product Revision	B51		
Controller Type		Baseline	Set
Controller Mode			

### Configure as follows:

- In the **General** tab:
  - Assign the controller a recognizable **Name** indicating its location or other.
  - Verify that the correct **Time and Date** are set for the controller since events for devices under this controller will be received with the set time and date.
  - Set the **Controller Type** according to your system.
  - Click the **Base Line** button. This sets *all* of the MobileAccess devices currently displayed in the Network Topology pane as a reference and will continue displaying them (in gray) even if communication is lost with a device.

## 1.6 Device Configuration and Preparation

This procedure consists of two phases: configuration and preparation phase and adjustment procedure.

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**NOTE:** The available tabs and options in the SC-450 Web GUI may vary depending on the access level used to open your session.

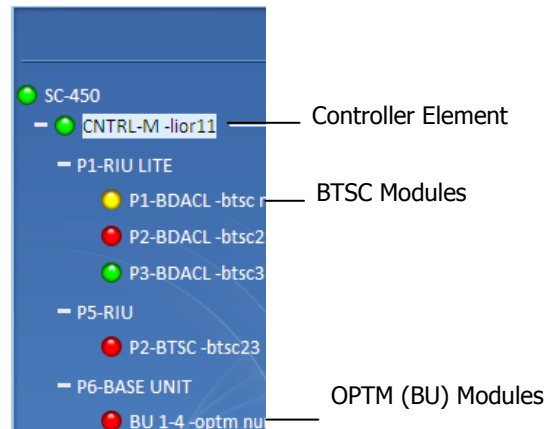
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### Phase I

- Log-in to the SC-450. Refer to section **Error! Reference source not found.3.1.1** for details.
- Verify that the **Base Unit**, **RIU** and **HX** units are displayed in the Network Topology tree.

*NOTE: HX units are hosted by the BU and are detected every time the BU is powered-up or reset from the Web GUI application.*

Verify that all the elements are displayed in the Network Topology pane under their corresponding hosts, and are colored **green**, **red**, or **yellow**. Any of these colors are acceptable before the adjustment procedure has been performed (following sections).



3. Verify that the BU is set to operate with RIU:
  - Click on the BU item in the **Network Topology Tree** → Select **RF Parameters Tab** from the Work Area → **Interface Type** to **MA RIU**
  - Optional: Assign the BU an identifiable name by Modifying the Name parameter in the Module Info tab
4. Using a Fiber Optic Tester, verify that the UL Optical Link Level of the fiber connected to the BU is >0
  - Set the Fiber Optic Tester to a wavelength of 1310nm
  - Unplug the UL fiber connection from the BU and test to make sure it is at a level >0
  - If the level is not >0, clean the fiber and retest
5. Set up CW signal to be connected to the signal conditioner (BTSC/BDAC). The 700 MHz LTE conditioner does not need an external CW signal (See Section **Error! Reference source not found.3.3.3**).
  - BTSC acceptable input power range = +10 to +36dBm
  - BDAC acceptable input power range = -16 to +10 dBm
  - Acceptable frequency range depends upon the RF service
6. Adjust the signal conditioner (BTSC/BDAC) with the CW signal. The 700 MHz LTE conditioner does not need an external CW signal. (See Section **Error! Reference source not found.3.3.3**).
  - Connect the CW signal to the BTSC/BDAC DL Port or Duplex port located on the rear of the RIU associated with the slot that the signal conditioner (BTSC/BDAC) is inserted into
  - Click on the conditioner in the Network Topology Tree → Select RF Parameters Tab from the Work Area → Adjust Max Input Power by clicking on the Adjust button in the DL Power section → Select Use Current Input Power
  - After a few moments, verify that the Target Max Input Power and the Current Input Power are equivalent

7. Repeat Step 6 for each signal conditioner
8. Perform a Quality and Integrity Check of the installed system as per the RF Design and Statement of Work. Contact a MobileAccess Project Manager for more instructions.

## **Phase II**

These Phase II steps should only be performed after completing Phase I of the commissioning process.

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NOTE: Please consult a MobileAccess certified installer on the details of these steps or access the MobileAccess Partner Portal for more information.

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1. Perform an Emulated Adjustment
2. Perform UL Noise Mitigation

## 1.7 Accessing HX Management Options

### To access the MobileAccessHX management options

In the **Network Topology** tree, expand the relevant **Controller** item, expand the relevant **Base Unit** (to which the HX is connected) and click on the **HX**. The HX alarms and management tabs appear.

The screenshot displays the MobileAccessHX management interface. On the left, a network topology tree is shown with the following structure:

- Controller: SC-450
  - CNTRL-M-HX\_verification
  - P5-RIU
  - P6-RIU
  - P13-BASE UNIT
    - BU 1-4 -HX\_VoD1
      - RHU3-P\_S0
        - ADDON1 -aws
        - HX4-HX\_US\_VoD1 (selected)
        - BU 5-8-VoD\_HX\_2
      - CNTRL16-ltor 8-----107
      - ERU-172.19.70.10
      - EHU-0.0.0.0
      - EHU-172.19.70.22
      - EHU-172.19.1.15

On the right, the HX Cabinet Alarms and management tabs are displayed. The HX Cabinet Alarms tab shows the following status:

Alarm	Status
HX General Alarm	Green
Optical Link Alarm	Green
Fans Alarm	Green
Service 1 Cell800	Green
Service 2 700LTE	Green
Service 3 PCS1900	Green
Service 4 AWS	Green

The management tabs are: Module Info, RF Parameters, DL Adjustment, and Service Alarms. The Module Info tab is currently selected, showing the following information:

Field	Value
Name	Building A 3rd Floor
Type	US
First Band	Cell800
Second Band	700LTE
Third Band	PCS1900
Fourth Band	AWS
Location Index	0/13/1/4

The Service Alarms tab shows the following information:

Field	Value
Serial Number	0A360EF
Firmware Version	1.0610
Product Revision	0.0
Laser and Optics	
Link Status	NORMAL
Link Level	193

The **HX Cabinet Alarms** are continuously displayed (to the left of the tabs). The monitoring and configuration options are distributed over four tabs:

- Module Info - device version and identification definitions
- RF Parameters – service control options.
- RF Adjustment – provides the adjustment options.
- Service Alarms – used for masking redundant alarms

## 1.8 Basic Setup Procedure

### To perform basic setup

1. Verify that the alarms show green in the following tabs:
  - **HX Cabinet Alarms** – displays system level alarms



The following table provides a description of the device alarms shown above.

Table 0-1. HX Alarms Description

Alarm	Description
HX General Alarm	N/A
Optical Link Alarm	Low optical level from BU (link level < 56)
Fans Alarm	Faulty fans
Service 1/2/3/4	Summary of all port x / PA x monitored parameters displayed in the <i>Service Alarms</i> sub-tab
Overall status	Calculated according to its active alarms – corresponds to highest alarm level detected.

- **Service Alarms** – displays specific alarms for each supported service.

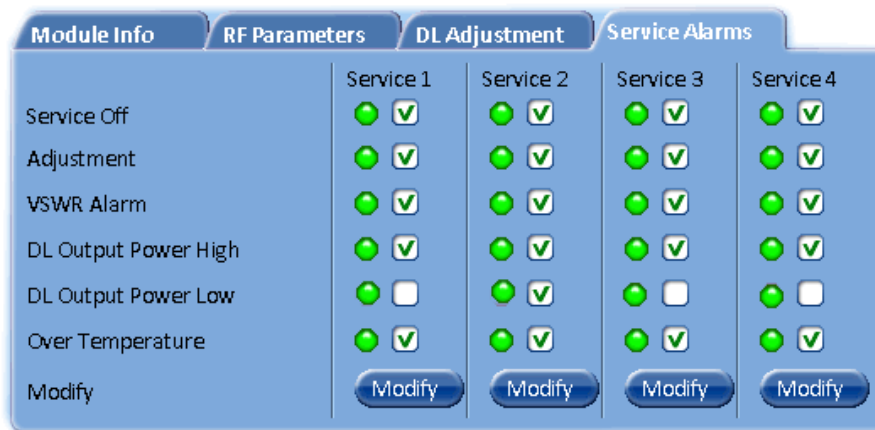


Table 0-2. HX Service Alarms Description

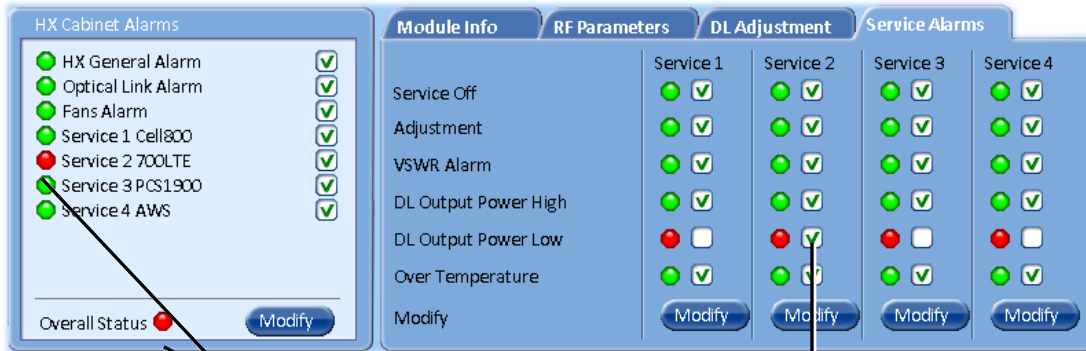
Alarm	Description
Service Off	Service disabled by the User
Adjustment	Adjustment for target DL Output Power
VSWR Alarm	Antenna disconnected (VSWR > 5:1)
DL Output Power High	DL Output Power > "Target Adjustment value" + 2dB
DL Output Power Low	DL Output Power < "Target Adjustment value" - 15dB
Over Temperature	Ambient temperature inside the HX unit >65°C

2. Mask irrelevant alarm conditions, in both tabs via the **Modify** button, to avoid having them reflected overall status of the HX unit (displayed in the *HX Alarms* area).

**For Example**

In the example below, the *HX Cabinet Alarms* dialog shows the alarm response if the Service 2 **DL Output Power Low** alarm is **NOT masked** (enabled). In that case the *Service 2* and *Overall Status* will be RED indicating a fault.



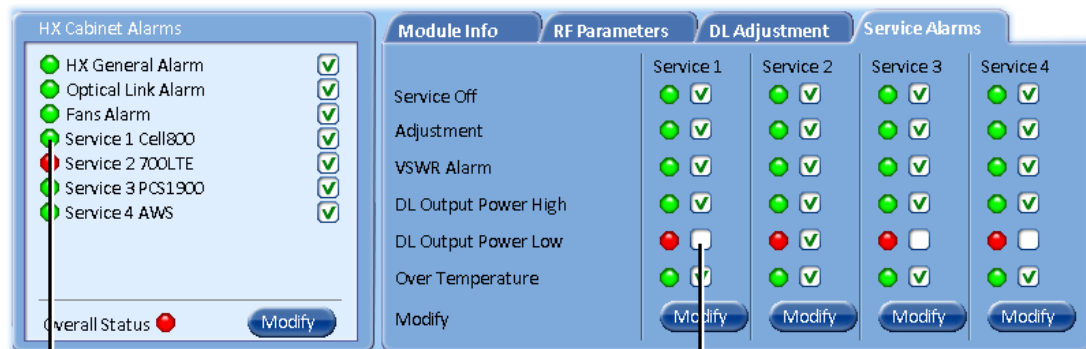


RED - Unmasked alarm reflects on corresponding Service alarm and Overall Status

Unmasked alarm

If the **Service 1** alarm is **MASKED** (Disabled), then the LED for the alarm will be RED; but, the corresponding Service alarm in *HX Cabinet Alarms* area will be GREEN – showing NO Fault.

*Note: The Overall Status alarm will only show green if all of the generated alarms are masked (or if all alarms are green).*



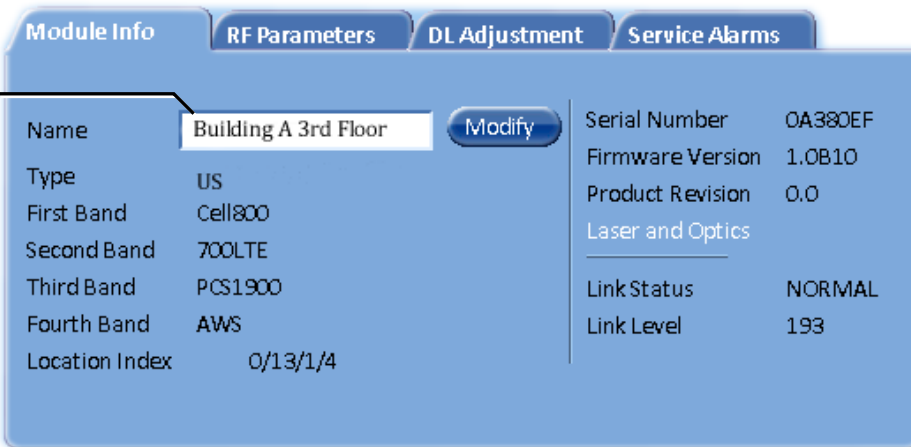
GREEN - Masked DL Output Power Low alarm (for Service 1) alarm does not reflect on corresponding Service alarm in *HX Cabinet Alarms* area.

Masked alarm

In the figure above the alarm condition for (Service 1) "DL Output Power Low" actually exists, while the masking prevents this condition from affecting the overall status of the service and therefore the Service 1 led in *HX Cabinet Alarms* area is green.

3. Assign the unit a recognizable name (i.e. corresponding to its location):

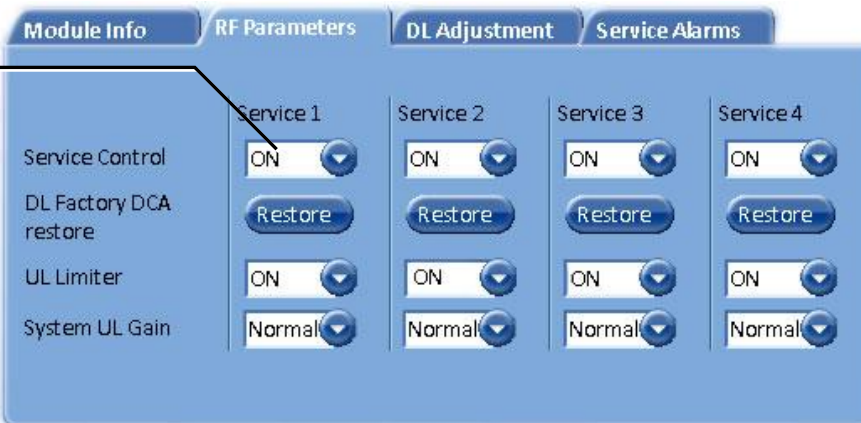
In the **Module Info** tab, click the **Modify** button, enter the required text and click **OK**. The assigned name will be displayed.



User assigned name

Module Info		RF Parameters	DL Adjustment	Service Alarms
Name	Building A 3rd Floor	Modify		Serial Number: 0A380EF
Type	US			Firmware Version: 1.0B10
First Band	Cell800			Product Revision: 0.0
Second Band	700LTE			Laser and Optics
Third Band	PCS1900			Link Status: NORMAL
Fourth Band	AWS			Link Level: 193
Location Index	0/13/1/4			

4. Click the **RF Paramaters** tab.



Services enabled

	Service 1	Service 2	Service 3	Service 4
Service Control	ON	ON	ON	ON
DL Factory DCA restore	Restore	Restore	Restore	Restore
UL Limiter	ON	ON	ON	ON
System UL Gain	Normal	Normal	Normal	Normal

5. In the **DL Adjustment** tab:

Verify the following:

- All required services (e.g. Cell 800, 700 LTE, etc.) are enabled (Default = On)
- UL Limiter is enabled (Default = On)

**NOTE: DL Factory DCA Restore – DO NOT click Restore button unless DL adjustment fails.**

6. Verify that the System UL Gain is set to default configuration (i.e. Normal). See following table for Description of System UL Gain values.

Field Value	UL Gain (dB)	UL Limiter Threshold (dBm)	NF Type (dB)	Case Scenario
Low	1	-30	13	Set in cases where mobile stations are very near to the HX antenna (e.g. in cases where HX unit antenna port is splitted to multiple lower power antennas to cover standard office building)
Normal	11	-40	10	Default – for standard HX installations
High	21	-50	7	Set in cases where mobile stations are located far from the HX antenna (e.g. in a parking lot, where the HX unit is mounted high on a pole).

\* Max. NF = Typical NF + 4dB

7. In the **DL Adjustment** tab, perform DL adjustment manually to complete the commissioning procedure.
- Set the **Target Max Pwr** (Target Pout) value according to site planning requirements. *Default Target Max Power value is the maximum value per each band (e.g. 33 dBm for 700LTE band).*
  - DL Output Power can be adjusted to a lower level (up to 10dB lower) as required.
  - Click the **Adjust** button.
  - Confirm that the adjustment procedure is successful (**Adjust Result** shows "Success") and verify actual readings of Adj. Date and DL Output Pwr .
- If adjustment procedure fails, refer to the **RF Parameters** tab, click the **Restore** button and perform adjustment again.

The screenshot shows the 'DL Adjustment' tab with four service columns. Service 1 has a Target Max Pwr of 31 dBm and an 'Adjust' button. Below it, the 'Adj. Result' is 'Success', 'Adj. Date' is '16/Jan/11', and 'DL Output Pwr' is 'Low'. Services 2, 3, and 4 have Target Max Pwr values of 25, 33, and 33 dBm respectively, with 'Adjust' buttons and 'Success' results. Annotations point to the 'Target Max Power' dropdown, the 'Adjust' button, and the 'Adj. Result', 'Adj. Date', and 'DL Output Pwr' fields.

**THE HX SETUP PROCEDURE IS NOW COMPLETE**

