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Huawei BTS Field Commissioning and Acceptance Test Plan (ATP) Guide

DRAFT

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1 References

Huawei BTS Network Commissioning Guide

2 Revisions

Date	Revision	Description	Author
June 1, 2009	1.0	Initial release.	Jeff Fry
September 2, 2009	1.4	Added Multi-carrier Section	Jeff Fry
September 8, 2009	1.5	Added section for interference checks after diplexer cut.	Jeff Fry
September 8, 2009	1.6	Added section for checking rolled fiber.	Jeff Fry
September 9, 2009	1.7	Highlighted and emphasized that manual configuration of the OMCH should be done only if requested by commissioning.	Jeff Fry
September 10, 2009	1.8	Added section for installation checks during diplexer cut.	Jeff Fry
September 17, 2009	1.9	Updated diplexer installation check for SPC202.	Jeff Fry
October 7, 2009	2.0	Updated clkmode to MANUAL for diplexer installation check.	Jeff Fry
October 16, 2009	2.1	Changed VSWR guidelines in Section 12.7.	Jeff Fry
April 15, 2009	2.2	Added HapSat sections.	Jeff Fry

3 Overview

The purpose of the commissioning and ATP process is to install a new site and bring it into commercial service. It is a multi-step process that involves checking hardware, programming software, and validating the site with field tests. It ultimately verifies field performance as a customer would experience.

Depending upon when microwave or backhaul is available to the site, the commissioning and validation steps are executed in a different order. Referring to Figure 1, if backhaul is available to the site, then Scenario 1 is followed. This also assumes that the commissioning team has provisioned the BTS into the EMS and ASN-GW. This quickly brings the site to commercial service.

If backhaul is not available, then Scenario 2 is followed. Scenario 2 programs the BTS with a non-commercial configuration in order to verify basic RF configuration such as sector orientation, frequency, and transmit power. When backhaul is available then the commercial RF parameters are configured and the site is fully verifyd including performing network entry and handovers.

In order to determine which sections in this document to follow please refer to Figure 1.



Figure 1: Commissioning Scenarios



Figure 2: Network Architecture

4 Tools Setup

The following are the list of hardware, software, and data required.

Equipment	Quantity	Description
Laptop	1	IBM Thinkpad (T41, T42, T60, X60, R60)
		Dell (D400, D410, D600)
OS System	1	Windows XP Professional SP2
Device	1	Motorola Tornado
Connection Manager	1	SmithMicro "Clear" CM 1.01.0019 or newer
GPS	1	GlobalSat Waterproof Serial GPS Receiver BR-
		355
Power Supply	1	350-400 Watts
Cat-5 Patch Cable	1	Used for LMT and file transfer to DBS3900.
WiTT	1	Field test tool.
		Clearwire Sharepoint: Wimax-Operations ->
		Software -> WiTT
Java 1.5+	1	Software for running WiTT.
		http://java.sun.com/javase/downloads/index.jsp
Google Earth	1	Free map software.
_		http://earth.google.com/download-earth.html
RF-EMSS Site Data	1	From ClearVision.

TABLE 1: List of Hardware, Software, and Data

4.1 SmithMicro "Clear" Connection Manager Configuration

In order to collect drive data on a specific sector, the connection manager must be initially configured for Clearwire's private NAP ID. This will prevent customers form accidently connecting to the site.

The NAP ID (network access provider identification) is an identifier that is part of the BSID (base identification) that is broadcast in the downlink by each DAP. As part of network entry, a device reads this NAP ID in order to determine whether to complete network entry on the site. NAP IDs can be public (for commercial use) or private (for testing). During commissioning, we will use a private NAP ID in order to prevent customers from connecting to the un-commissioned DAP. After EMS bootstrap, the connection manager is then reconfigured for the commercial NAP ID.

The following explains how to configure the connection manager for the private NAP ID.

1. In the Connection Manager, access the *Profiles* menu.



Figure 1: Profiles Menu

- 2. Hold the Control + Shift keys and Click the *Add* button.
- 3. Select the *Wimax* profile type.

Profiles	🗹 🚺
Settings Help	
Description	Select profile type to create:
🖳 Clear	
	WIMAX
	Add Help Close
Add	Edit Remove Connect Help Close

Figure 2: Wimax Profile Type

4. For the profile options, check *Override Identity*, *Select TLS Certificate*, and *Filter By Network Access Provider ID*.

Edit Profile
General WIMAX
Authentication
Verride Identity
%MACADDR% Configure
EAP Method:
Smith Micro EAP-TLS
Select TLS Certificate Certificate
Network Properties
NAP ID Add
FFAB63 Remove
Remove All
Frequencies:
Center Freque Bandwidths
2655000 kHz 10 MHz Add
2525000 kHz 10 MHz
2661000 kHz 10 MHz
2673000 kHz 10 MHz Remove
2583000 kHz 10 MHz
Remove All
OK Cancel Apply Help

Figure 3: New Profile

5. Click the *Certificate* button and then check *Attempt to Load Embedded Device Certificate first*. Click *OK*.

Edit Profile	×
General WIMAX	
Authentication	
Certificate Selection	ı 🔀
Attempt to load Embe	edded Device Certificate first
🔲 Select backup Certifi	cate
Select personal certific	ate that you want to use in authentication:
Certificate issued to:	PC Tel 💌
Friendly name:	PC Tel
Issuer:	lab-AAA-pri
Expiration date:	12/8/2017 11:57:54 PM
Thumbprint:	f4 56 ba 4d 51 ed 58 0f 20 63 ae 85 a4 31 fa 7f 7d 80 71 68
0	K Cancel
2573000 kHz 2583000 kHz	10 MHz Remove All
ОК	Cancel Apply Help

Figure 4: Choose Certificate Method

6. Click the *Add* button under *Filter by Network Access Provider ID* area. Specify the NAP ID for your market. Click *OK*.

WIMAX	×
Authentication	
%MACADDR% Configure	
EAP Method: Smith Micro EAP-TLS	
Select TLS Certificate Certificate	
Network Properties	
Network Access Provider ID	
Z655000 kHz 10 MHz Add 2553000 kHz 10 MHz Edit 2661000 kHz 10 MHz Edit 2667000 kHz 10 MHz Edit 2667000 kHz 10 MHz Edit 2667000 kHz 10 MHz Edit 2583000 kHz 10 MHz Edit 2661000 kHz 10 MHz Edit	
Remove All	
< Back Next > Cancel Help	

Figure 5: Setting the NAP ID

7. If necessary, add or remove frequencies by clicking *Add* or *Remove* under the *Frequencies* area. Click *OK*.

WIMAX	×
Authentication	
%MACADDR% Configure	
EAP Method: Smith Micro EAP-TLS	
Select TLS Certificate Certificate	
Network Properties	
N FF 2525000 kHz Bandwidths: V 10 MHz 8.75 MHz 7 MHz 5 MHz Freque OK Cancel Help	
2655000 kHz 10 MHz Add 2553000 kHz 10 MHz Edit 2661000 kHz 10 MHz Edit 2667000 kHz 10 MHz Edit 2673000 kHz 10 MHz Edit 2673000 kHz 10 MHz Edit 2583000 kHz 10 MHz Edit	
Remove All	
< Back Next > Cancel Help	

Figure 6: Adding Frequencies

- 8. Click *Next* >.
- Specify **Private** for the *Profile name*.
 For *Connection options*, select *Automatic*. Click *Finish*.

General	
Profile name	Connection options
Private	Manual 🔽
~ VPN	
Auto Launch	Settings
Browser Settings	
Disable IE's manual proxy settings on co	nnect
Launch browser window on connect Start URL:	
(Please enter your full URL, including the ht	tp:// prefix.
For example: http://www.yourwebaddress	comy
< Back Finish	Cancel Help

Figure 7: Profile Name

11. Select the *Private* profile and click the *Up* button to move it to the top of the list. After EMS bootstrap, you will need to revert back to the commercial NAP ID. To do this, move the *Clear* profile to the top.

Profiles		? 🛛
Settings Help		
Description	Profile Name	Private
Rivate 2	Profile Type	User
B Clear	VPN	Launch - No
Private	Connection Options	Manual
	Browser	Launch - No / Use Proxy - Yes
	IP Address	Obtain IP automatically
	DNS Server	Obtain DNS automatically
Up Down		
Add Edit Remove	Connect	Help Close

Figure 8: Private Preferred Profile

12. The connection manager is now configured. Click *Close*.

4.2 FreeFTPd

FreeFTPd is a free FTP/FTPS/SFTP server that enables user to access remote files over TCP/IP network.

FreeFTPd Installation

- Download and install freeFTPd from http://www.freeftpd.com/?ctt=download.
- 2. Use the default setting for the installation
- 3. Start freeFTPd.
- 4. Click the Users menu option to open the users window.
- 5. Click the Add button.
 - a. Login should be "apftp"
 - b. Authorization should be set to "Password stored as SHA1 ${\rm hash}^{\prime\prime}$
 - c. Password should be set to "apftp"
 - d. Confirmation password should be setup to "apftp"
 - e. All other settings should be correct.

4.3 **WiTT**

The Wimax Tester Tool (WiTT) was created to help test Beceembased Wimax devices such as USB, ExpressCard and PCMCIA on the Windows platform. It is a tool that will typically be used for drive tests. It provides GPS integration and mapping that allows the collection of metrics along a drive route.



Figure 9: WiTT User Interface

The following lists the high-level features that WiTT provides:

- Real-time display of GPS, baseband, MAC messages, and OS throughput statistics.
- Logging of GPS, baseband, MAC messages, and OS throughput statistics to a CSV file for processing.
- Real-time map tracking while displaying the current position colored per current RSSI, CINR, DL-Tput, and UL-Tput (and more) color scale.
- Ability to load additional map images and select maps on the fly.
- Map zooming and centering per your current location.
- Ability to save the current map image.
- Visual display of handovers and custom text tagging at current position.
- Audible indication if network entry, network drop and handovers.

- Full-screen mode of real-time map for presentations.
- Iperf integration

Statistics

The following lists the statistics that are displayed and logged by WiTT:

Last Baseband Event Network Entry Status Client IP Latitude Longitude Distance (km) RSSI (dBm) CINR (dB) Frequency (KHz) Frames Received COICH CRC Errors Frame Errors HCS Errors PER DL FEC Tx Power Base ID BRTH CIDs Mac Msg Direction Mac Msg Text DL Tput (Kbps) UL Tput (Kbps) Packets/sec Packets Outbound Discarded Packets Received Errors Current Bandwidth Packets Received/sec Packets Received Non-Unicast/sec **Output Queue Length** Packets Received Discarded Packets Sent Unicast/sec Packets Outbound Errors Packets Received Unknown Packets Received Unicast/sec Packets Sent/sec Packets Sent Non-Unicast/sec

Installation

If a previous version of WiTT is installed, uninstall it completely by running the WiTT uninstaller from Start->Programs->Clearwire->WiTT->Uninstall WiTT.

- WiTT is a Java-based tool that requires Java 1.5.0 or higher. Java can be downloaded from the Sun web site: <u>http://java.sun.com/javase/downloads/</u>
- 2. Go to

<u>https://share.clearwire.com/WIMAX%20%20Operations/Forms/</u> <u>AllItems.aspx?RootFolder=%2fWIMAX%20%20Operations%2fS</u> <u>oftware%2fWiTT</u>

and download the WiTT package.

- 3. Launch witt—vX.X-install.jar by double-clicking the file.
- 4. Follow the steps of the installer to install WiTT. Accept the default selections.
- 5. Launch WiTT from Start->Programs->Clearwire->WiTT.

Monitoring

The following describes how to start using WiTT to monitor statistics.

- 6. Ensure your GPS is connected and your Beceem-based Wimax device is connected.
- 7. If drive testing, ensure your other network connections such as Wifi and OpenVPN are disabled.
- 8. Launch WiTT.
- 9. Select the appropriate map.
- 10. Select the 'Start Monitor' button at the bottom.

That's it! You should now see your current location on the map and statistics being displayed to the left. At any time, you can select 'Stop Monitor' to stop the monitoring.

Logging

WiTT logs all the displayed statistics to a CSV file. This CSV file is created in the installation directory of Witt (C:\Program Files\WiTT).

The following steps describe how to start logging.

- 11. Ensure your GPS is connected and your Beceem-based Wimax device is connected.
- 12. Launch WiTT.
- 13. Select the appropriate map.
- 14. Select the 'Start Monitor' button at the bottom. The 'Start Log' button will now be enabled.
- 15. Select the 'Start Log' button. This creates a CSV file with a named based on the selected map and the time. For example, the following is a file name created when logging the 'PDX Warehouse' map.

'PDX Warehouse02008_January_16-12_11_56_stats.csv'

That's it! You are now logging statistics to a CSV in the installation directory. At any time, you can select 'Stop Log' to stop the logging.

Adding New Maps for WiTT

RF engineering will be supplying the MAP to use for WiTT

Prior to performing the acceptance test on the site, you may need to upload a new map to WiTT in order to view your desired coverage area. WiTT supports the adding of new maps. The following describes how to upload a new map using Google Earth. Google Earth can be download for free from: http://earth.google.com/download-earth.html

- 1. Launch Google Earth and navigate to your site and desired coverage area.
- 2. When you are satisfied with the view, switch to full screen mode under View->Full Screen (or F11).



Figure 10: Google Earth Full Screen View

3. When uploading a new map image to WiTT, the northwest and southeast latitude and longitude coordinates of the corners are required for image calibration. These coordinates must be in decimal format. Google Earth must be configured to do this under Tools->Options->3D View-> Show Lat/Long->Decimal Degrees. Once this is set, your cursor latitude and longitude coordinates will appear in the lower left of the Google Earth view. For your desired view, record the northwest and southeast corner coordinates. It's very important that this be as accurate as possible.

O VIEW	Cache To	uring Nevigation	General			
Cetal Are Small Mediu E Large	e (256×256) m (512×512) (1024×1024)	Texture Colors High Color (1 True Color (3 Compress	6 bit) 2 bit)	Anisotropic Filtering O Ott O Medium O High	Labels/con Size Snal Medun Large	
Oraphics Mode OpenOL (detault) OpenCX Use safe mode		Show LabLong Decimal Degrees Degrees, Minutes, Seconds Degrees, Decimal Minutes Universal Transverse Mercator		Show Elevation © Feet, Miles O Meters, Kilometers	Forts Primary 3D fort Secondary 3D fort	
Ternain Gr Lower (faster)	uality			Devation Exaggers	(slower) dion: 1 (0.5 - 3)	
Overview Map Size Zoom Rele	Map dior: infinity	Snal			Large	

Figure 11: Google Earth Latitude and Longitude Settings

- 4. Now save your Google Earth view as an image using File->Save Image. Remember your image file location.
- 5. In WiTT, select Maps->Manage Maps to launch the Map Management Dialog.

🛃 Map Management						×
Name	Location		NV/Latitude	NVV Longitude	SE Latitude	SE Longitude
Highway 26	\sim	classpath:hwy26.jpg	45.561107	-122.911674	45.523877	-122.83749
Northrup		classpath northrup.jpg	47.635094	-122.187196	47.624201	-122.164641
PDX Warehouse	\sim	classpath warehouse.jpg	45.568499	-122.947777	45.536953	-122.884901
Site 18A Single Sectro	-	classpath.site18a_single_sector.jpg	45.585222	-122.914398	45.556438	-122.857012
Add						
Delete						
			0			
		OK Cance	9			

Figure 12: Map Management Dialog

- 6. Right-click and select 'Add' from the popup menu.
- For the new row, specify your map name, navigate to your image location, and specify the northwest and southeast coordinates.

8. Select 'OK' in the dialog and your map image will be available immediately in the WiTT map selection pull down.

Adding New Bases to WiTT

WiTT allows you to add new bases to be displayed in the map view. This will probably need to be done when commissioning new sites. WiTT allows you to specify the name, location, azimuth, beamwidth and color of the base to be displayed.



Figure 13: Base Displayed in WiTT

1. In WiTT, select Maps->Manage Bases.

<u> B</u> ase Manag	gement							X
Name		Base ID	Latitude	Longitude	Azimuth	Beamwidth	Color	
POR064_B		0000020001B1	45.48608	-122.72218	120.0	90	#ffff99	6
POR064_C		0000020001B2	45.48608	-122.72218	280.0	90	#ccffff	- 11
POR065_A		000002000283	45.420597	-122.78398	70.0	90	#ff33cc	- 11
POR065_B		000002000281	45.420597	-122.78398	210.0	90	#ffff99	- 11
POR065_C		000002000282	45.420597	-122.78398	320.0	90	#ccffff	- 11
POR067_A		00000200013A	45.43504	-122.75922	20.0	90	#ff33cc	- 11
POR067_B		00000200013B	45.43504	-122.75922	120.0	90	#ffff99	- 11
POR067_C		000002000139	45.43504	-122.75922	270.0	90	#ccffff	- 11
POR068_A		000002000151	45.46696	-122.72275	40.0	90	#ff33cc	- 11
POR068_B		000002000152	45.46696	-122.72275	200.0	90	#ffff99	- 11
POR068_C		000002000153	45.46696	-122.72275	320.0	90	#ccffff	- 11
POR071_A		000002000149	45.449694	-122.72872	60.0	90	#ff33cc	- 11
POR071_B		00000200014A	45.449694	-122.72872	160.0	90	#ffff99	- 11
POR071_C		00000200014B	45.449694	-122.72872	290.0	90	#ccffff	- 11
POR072_A		0000020001DA	45.40266	-122.76368	40.0	90	#ff33cc	- 11
POR072_B		0000020001DB	45.40266	-122.76368	230.0	90	#ffff99	- 11
POR072_C		0000020001D9	45.40266	-122.76368	310.0	90	#ccffff	- 11
POR074_A		000002000169	45.419817	-122.74576	40.0	90	#ff33cc	
POR074_B		00000200016A	45.419817	-122.74576	160.0	90	#ffff99	
POR074_C		00000200016B	45.419817	-122.74576	260.0	90	#ccffff	
POR075_A		000002000183	45.463069	-122.7017	40.0	90	#ff33cc	
POR075_B		000002000181	45.463069	-122.7017	150.0	90	#ffff99	
POR075_C		000002000182	45.463069	-122.7017	280.0	90	#ccffff	- X
New Base	Add	00000000000	0.0	0.0	0.0	90	#00ff	Ŧ
	Delete		OK Cancel					

Figure 14: Base Management Dialog

- 2. Right-click and select 'Add' from the popup menu.
- 3. For the new row, specify your name, base ID, location coordinates, azimuth, beamwidth and color.
- 4. Select 'OK' in the dialog and your base will be available immediately in the WiTT map view.

5 BTS Overview

5.1 **Overview**

The section describes the hardware components and configuration of a Huawei Wimax DBS3900 BTS. Standard commissioning involves a single BBU (Baseband unit) chassis connected to 3 RRUs (Remote Radio Unit).





The BBU chassis has the following cards installed:

Card	Location	Description
BMPT	Slot 7	The BMPT is the main processing and transmission board.
BBI	Slot 3	The BBBI is the baseband processing and radio interface unit.
UPEU	UPEU1 Slot	The UPEU is the chassis power supply unit.
FAN	Fan Slot	The fan unit for the chassis.
BSBC	Backplane	The BSBC is the backplane of the chassis and provides power supply and
		service channels for each board.

SLOT0 BBBI	SLOT4 USCU	UPEU0
SLOT1 BBBI	SLOT5 USCU	
SLOT2 BBBI	SLOT6 reserved	UPFU1
SLOT3 BBBI	SLOT7 BMPT	01 201

Figure 16: BBU Chassis Slot Locations

The typical new site will have one BMPT, one BBI, and one UPEU. The FAN and BSBC modules are standard components.

5.2 **BMPT**

The BMPT is the main processing unit and includes three Ethernet ports for access to the BTS. These are labeled ETH, FE/GE0, and FE/GE1 on the card. ETH is the local maintenance port. FE/GE0 is the backhaul interface for OAM and signaling/traffic. The port is connected to the site switch. FE/GE1 is reserved for future use.



Figure 17: BMPT Card

Ports SFP0, SPF1, USB, and TST are not used.

RST is the reset switch for the board.

The GPS labeled connection is the GPS connection for the BTS and serves as the reference clock source.

The following table describes the LED indicators for the BMPT.

Port/LED Name	Color	State	Meaning
RUN	Green	On	There is power, but there is a fault.
		Off	No power.
		Blinking quickly	Board is loading.
		Blinking slowly	Normal operation.
ALM	Red	On	Critical alarm is active.
		Off	No alarm.
		Blinking	An alarm is active.
ACT	Green	On	BMPT is primary.
		Off	BMPT is standby.
ETH	Green (Link)	On	Connected.
		Off	Not connected.
	Orange (Act)	On	Data transmitting.
		Off	No data transmitting.
FE/GE0	Green (Link)	On	Connected.
		Off	Not connected.
	Orange (Act)	On	Data transmitting.
		Off	No data transmitting.

Figure 18: BMPT LED Indicators

5.3 **BBI**

The BBI card is the baseband and radio processing unit. The BBI is connected to the RRUs via optical ports located on the front panel.



Figure 19: BBI Card

The following table describes the LED indicators for the BBI.

Port/LED Name	Color	State	Meaning
RUN	Green	On	There is power, but there is a fault.
		Off	No power.
		Blinking quickly	Board is loading.
		Blinking slowly	Normal operation.
ALM	Red	On	Critical alarm is active.
		Off	No alarm.
		Blinking	An alarm is active.
АСТ	Green	On	The board is operating normally.
		Off	The board is not operational.
LINK	Green	On	Link is normal.
		Off	Link is faulty.
ACT	Green	On	Data transmitting.
		Off	No data transmitting.

Figure 20: BBI LED Indicators

5.4 **UPEU**

The UPEU is the power supply unit for the chassis. It converts the - 48 V DC input power to +12 V DC output power. A switch on the front panel can be used to power down the chassis.



Figure 21: UPEU Card

5.5 **FAN**

The FAN unit provides cooling for the chassis.

The following table describes the LED indicators for the FAN unit.

Port/LED Name	Color	State	Meaning
State	Green	Blinking quickly	The board is not registered with the chassis.
		Blinking slowly	Normal operation.
	Red	On	Critical alarm is active.
		Off	No power.

6 Checking BTS Physical Installation

6.1 Installing Hardware for Multi-Carrier

The default installation of a BBU supports 3 carriers with a single BBI card and 3 fiber cables connected. In some cases, additional carriers are required and this will be indicated in Clearvision by additional carrier IDs A2, B2, and C2. The field team must then add a second BBI card in slot 2 and connect the 2nd set of fiber from the RRU (s). This can be done before or after the commissioning process.



6.2 Fiber Cabling Check

The new BTS may have a single BBI card that supports 3 sectors or carriers. This BBI card is located in slot 3 or the bottom left slot. RRU fiber cables for A1, B1, and C1 should be connected as shown:



Figure 23: BBI Fiber Connections for 3 Sector/Carriers

If the BTS is configured for 4 or more carriers (A2,, B2, and C2), then a second BBI is added to slot 2. The second set of fibers corresponding to the 2^{nd} port on the RRU are used for these additional carriers. These fibers are connected to the second BBI in the same left-to-right (A2, B2, C2) order.

6.3 Ethernet Cabling Check

The BTS has one backhaul Ethernet connection on the BMPT FE/GE0 for OAM and signaling/traffic. Ensure this is connected to Port 12 on the site switch.



Figure 24: BMPT Ethernet Connections

6.4 **GPS Cabling Check**

Ensure that the GPS is connected to the RF GPS connector on the BMPT card. Refer to figure 23.

6.5 **Power Cabling Check**

The BTS contains one power supply unit. Check that the power cabling is connected.



Figure 25: BMPT Power Connection

Check the power connections on the PB1. Refer to Figure X. (Need picture of this. PB1?)

7 Powering Up the BTS

The BTS power procedure is simple and only requires applying power to the RRUs and BBU chassis. Apply power at the PB1. Power on the RRUs and then the BBU chassis.

8 Accessing the BTS LMT

The BTS provides a web-based local maintenance terminal (LMT) for configuring and troubleshooting. The LMT will be used to commission the site and check status. Follow the steps below to access the LMT.

1. Connect an Ethernet from your laptop to the BTS Ethernet port labeled ETH.



Figure 26: Laptop Connected to BTS

 Configure your laptop network interface for 192.168.0.101/255.255.255.0 with no default gateway.

Internet Protocol (TCP/IP) Prope	rties 🛛 🛛 🔀
General	
You can get IP settings assigned auton this capability. Otherwise, you need to a the appropriate IP settings.	natically if your network supports ask your network administrator for
🔘 Obtain an IP address automaticall	y
💿 Use the following IP address: —	
IP address:	192.168.0.101
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	· · ·
Obtain DNS server address autom	natically
Ouse the following DNS server add	Iresses:
Preferred DNS server:	
Alternate DNS server:	· · ·
	Advanced
	OK Cancel



- 3. Launch your browser and go http://192.168.0.100.
- 4. Log in using *admin/admin123*.

VVIIV			
	Name	admin	
	Password	•••••	
	User Type	Local 🗸	
	Verify Code	1516 1516	
	<u>0</u>	Change the verify code	
	Logi	Reset	

Figure 28: LMT Login Screen

5. You'll presented with the main LMT screen for the BTS.



Figure 29: BTS LMT

The BTS LMT window is divided into 3 areas: Command List, Command Entry, and Command Output. For the procedures in this document, commands will be selected from the Command List, command parameters and execution will occur in the Command Entry, and output will be observed in the Command Output. The commands are referred to as MML commands (Man-to-Machine Language).
9 Querying and Configuring the BTS with HapSat

HapSat is a tool that was created to assist in performing site acceptance against the Huawei DBS3900. HapSat provides the ability to execute commands without the tedious and error-prone manual entry of MML commands. Additionally, command sets provide the ability to execute multiple commands quickly. All the MML commands listed in this document are available in HapSat and can be executed with a one-button click. Although HapSat provides an easy-to-use tool for performing tasks, a field tech should still be familiar with executing MML commands using the BTS LMT.

For additional HapSat documentation, please refer to the User Guide that is included in the HapSat installation.

9.1 Installation

If a previous version of HapSat is installed, uninstall it completely by running the HapSat uninstaller from Start->Programs->Clearwire->HapSat->Uninstall HapSat.

- HapSat is a Java-based tool that requires Java 1.5.0 or higher. Java can be downloaded from the Sun web site: <u>http://java.sun.com/javase/downloads/</u>
- 2. Go to

https://share.clearwire.com/WIMAX%20%20Operations/Forms/ AllItems.aspx?RootFolder=%2fWIMAX%20%20Operations%2fS oftware%2fHapSat

Portal: Technology Strategy & Standards Portal > WiMAX - Operations > Software > HapSat

and download the HapSat package.

- 3. Launch hapsat—vX.X-install.jar by double-clicking the file.
- 4. Follow the steps of the installer to install HapSat. Accept the default selections.
- 5. Launch HapSat from Start->Programs->Clearwire->HapSat.

9.2 Executing HapSat Commands

By default, HapSat includes some typical MML commands that are used for site acceptance. Additional commands can be added by editing the hapsat_config.xml file in the HapSat installation directory. See the Appendix for an example HapSat configuration file with example commands. Also see the Appendix for notes and descriptions of some of the included commands. On launch, HapSat loads this file automatically to import commands.

The following steps describe how to execute commands with HapSat.

- 1. Launch HapSat.
- 2. Enter the IP address and login username and password.
- 3. Select 'Connect' and wait for the connection to be established.

BBU IP: Username: Password: 192.168.0.100 admin password Imade: Image: Disconnect Disconnect mends: Image: Disconnect Image: Disconnect Disconnect Mand Name Type Value Status Action Orofigure Full MmlCommand File configure.mml Configure Ethort MmlCommand SET EHPORT: CN=0, SRN=0; Configure Ethort MmlCommand SET EHPORT: CN=0, SRN=0; Configure Ethort MmlCommand SET EHPORT: CN=0, SRN=0; Configure Ethort MmlCommand SET DHCPFUNC; READY Check DHCP MmlCommand SET DHCPFUNC; READY Dist Board Firmware MmlCommand DSP BRDSTATUS; READY List Board Status MmlCommand DSP BRDVER; READY List Alarms MmlCommand LST ALMAF; READY List Alarms MmlCommand LST CARRIERLICENSEINFO; READY List Alarms MmlCommand LST CARRIERLICENSEINFO; READY List Alarms MmlCommand LST ALMAF; READY List Alarms MmlCommand LST ALMAF; READY List Alarms MmlCommand <td< th=""><th>BBU IP: Username: Password 192.168.0.100 admin password Connect Disconnect nands: mand Name Type Value Status Action © Configure Full MmiCommandFile configure.mml READY Gi © Get ESN MmiCommand DSP ELABEL: CN=0, SRN=0; READY Gi © Configure Ethport MmiCommand DSP ELABEL: CN=0, SRN=0; READY Gi © Configure Ethport MmiCommand DSP ELABEL: CN=0, SRN=0; READY Gi © Configure Ethport MmiCommand DSP ELABEL: CN=0, SRN=0; READY Gi © Check DHCP MmiCommand LST DHCPFUNC: STRFLG=E READY Gi © List Software MmiCommand DSP BRDVER;; READY Gi © List Board Status MmiCommand DSP BRDYER;; READY Gi © List RRUs MmiCommand LST CARRIERLICENSEINFO;; READY Gi © List Licenses MmiCommand LST CARRIERLICENSEINFO;; READY Gi © List Of Channel MmiCommand DSP OMCH: FLAG=MASTER; READY Gi © List Channel MmiCommand DSP OMCH: FLAG=MASTER; READY Gi <th>nnection Properties</th><th></th><th></th><th></th><th></th></th></td<>	BBU IP: Username: Password 192.168.0.100 admin password Connect Disconnect nands: mand Name Type Value Status Action © Configure Full MmiCommandFile configure.mml READY Gi © Get ESN MmiCommand DSP ELABEL: CN=0, SRN=0; READY Gi © Configure Ethport MmiCommand DSP ELABEL: CN=0, SRN=0; READY Gi © Configure Ethport MmiCommand DSP ELABEL: CN=0, SRN=0; READY Gi © Configure Ethport MmiCommand DSP ELABEL: CN=0, SRN=0; READY Gi © Check DHCP MmiCommand LST DHCPFUNC: STRFLG=E READY Gi © List Software MmiCommand DSP BRDVER;; READY Gi © List Board Status MmiCommand DSP BRDYER;; READY Gi © List RRUs MmiCommand LST CARRIERLICENSEINFO;; READY Gi © List Licenses MmiCommand LST CARRIERLICENSEINFO;; READY Gi © List Of Channel MmiCommand DSP OMCH: FLAG=MASTER; READY Gi © List Channel MmiCommand DSP OMCH: FLAG=MASTER; READY Gi <th>nnection Properties</th> <th></th> <th></th> <th></th> <th></th>	nnection Properties				
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▷ List RRUs MmICommand LST RRU;; READY Gi ▷ List Alarms MmICommand LST ALMAF;; READY Gi ▷ List Licenses MmICommand LST CARRIERLICENSEINFO;; READY Gi ▷ List OK Channel MmICommand DSP OMCH: FLAG=MASTER; READY Gi ≫ List R6 Channel MmICommandSet READY Gi	▷ List RRUs MmlCommand LST RRU;; READY Si ▷ List Alarms MmlCommand LST ALMAF;; READY Si ▷ List Licenses MmlCommand LST CARRIERLICENSEINFO;; READY Si ▷ List OM Channel MmlCommand DSP OMCH; FLAG=MASTER; READY Si ▷ List GC Channel MmlCommandSet READY Si	List Board Status	MmlCommand	DSP BRDSTATUS:;	READY	G
▷ List Alarms MmICommand LST ALMAF:; READY Search ▷ List Licenses MmICommand LST CARRIERLICENSEINFO;; READY Search ▷ List OM Channel MmICommand DSP OMCH: FLAG=MASTER; READY Search ≫ List R6 Channel MmICommandSet READY Search mmand Output: Command Output: CommandOutput:	▷ List Alarms MmICommand LST ALMAF.; READY G ▷ List Licenses MmICommand LST CARRIERLICENSEINFO.; READY G ▷ List OM Channel MmICommand DSP OMCH: FLAG=MASTER; READY G ▷ List GC Channel MmICommandSet READY G □ mmand Output: 0 0 0 0	List RRUs	MmICommand	LST RRU:;	READY	G
▷ List Licenses MmICommand LST CARRIERLICENSEINFO:; READY Image: Command ▷ List OM Channel MmICommand DSP OMCH: FLAG=MASTER; READY Image: Command Set ▷ List R6 Channel MmICommandSet READY Image: CommandSet Image: CommandSet > mmand Output: > CommandSet > CommandSet > CommandSet > CommandSet	▷ List Licenses MmICommand LST CARRIERLICENSEINFO:; READY G ▷ List OM Channel MmICommand DSP OMCH: FLAG=MASTER; READY G ▷ List R6 Channel MmICommandSet READY G > List CARRIERLICENSEINFO:; READY G G > micommandSet READY G > mandOutput: C C	List Alarms	MmlCommand	LST ALMAF:;	READY	G
▷ List OM Channel MmiCommand DSP OMCH: FLAG=MASTER; READY G ▷ List R6 Channel MmiCommandSet READY G mmand Output: 0 0 0	List OM Channel MmlCommand DSP OMCH: FLAG=MASTER; READY Ist R6 Channel MmlCommandSet READY MmlCommandOutput: 2 Company	List Licenses	MmlCommand	LST CARRIERLICENSEINFO:;	READY	G
Isis R6 Channel MmICommandSet READY G Immend Output: 1000000000000000000000000000000000000		List OM Channel	MmlCommand	DSP OMCH: FLAG=MASTER;	READY	G
nmand Output:	nmand Output:	🕪 List R6 Channel	MmICommandSet		READY	G
	innorna Suapou.	mend Output:		•		
		imanu Output.				

Figure 30: HapSat GUI

- 4. When ready, select the 'Go' button for the command you would like to execute. The 'Status' column provides feedback on the execution of the command.
- 5. When complete, the 'Status' column will provide completion status. If the command produces output, select the row of the command and view the output in the 'Command Output' text area.

onnection Properties				
BBU IP:	Use	mame:	Passw	vord:
10 31 42 114	admin		admin123/	
10.01.12.111	Connect	Disconnect	uunn1201	
ommands:	Type	Value	Status	Action
Configure Full	MmlCommandFile	configure.mml	READY	Go
➢ Get ESN	MmlCommand	DSP ELABEL: CN=0, SRN=0;	CHECK	Go
Configure Ethport	MmICommand	SET ETHPORT: CN=0, SRN=	READY	Go
Check DHCP	MmICommand	LST DHCPFUNC::	READY	Go
Enable DHCP	MmlCommand	SET DHCPFUNC: STRFLG=E	. READY	Go
List Software	MmlCommand	LST SOFTWARE:;	READY	Go
List Board Firmware	MmlCommand	DSP BRDVER:;	READY	Go
List Board Status	MmlCommand	DSP BRDSTATUS:;	READY	Go
List RRUs	MmICommand	LST RRU:;	READY	Go
List Alarms	MmlCommand	LST ALMAF:;	READY	Go
List Licenses	MmlCommand	LST CARRIERLICENSEINFO:;	READY	Go
List OM Channel	MmlCommand	DSP OMCH: FLAG=MASTER;	READY	Go
🔻 🕪 List R6 Channel	MmICommandSet		READY	Go
N 11101 101 1		•	BEABY/	
Command Output:				
+++ HUAWEI 2010-04-0	6 12:10:02			
0&M #334				
%%DSP ELABEL: CN=0, SRN	I=0;%%			
RETCODE = 0 Operation succ	eeded			
Electronic Johol — /@[Archivee]	nfo Vorcion1			
Liectronic laber − /φ[Attrives] /\$ΔrchivesInfoVersion=3.0	nio versionij			
w/wc/mycaline/veraion=3.0				
(Board Properties)				
BoardType=WD2BBBUC				
BarCode=21021127226T9B010	742			

Figure 31: Executing a Command and Viewing Output

- 6. When complete, select 'Disconnect' to disconnect from the BBU.
- If needed, debug output is created in messages.log located in the HapSat installation directory. This can be used to troubleshoot errors or failures.

9.3 **BBU Configuration with HapSat**

HapSat includes a special command "Configure Default Offline Configuration" that will configure the BBU for offline configuration mode. This uses a default MML configuration script file located in the HapSat installation directory:

C:\Program Files\HapSat\configure.mml

This is the same set of commands that are used to configure a BBU in the Huawei field commissioning guide. Executing this command will execute all the MML commands in this file to modify hardware

and software configuration. If necessary, you can modify this file to change frequencies or other parameters.

10 Configuring the OM Channel

10.1 Configuration via DHCP

The OM channel is the operations and maintenance connection that allows the commissioning team to configure and upgrade the BTS. The field commissioning team must set up this channel by enabling the Ethernet backhaul interface. Once enabled the interface receives a management IP address via DHCP. This allows the commissioning team to manage the BTS from the Huawei EMS. The following steps enable the Ethernet interface.

- 1. Log into the BTS LMT as described section 8.
- 2. Execute the following command to retrieve the ESN number.

```
/*Get ESN*/
```

DSP ELABEL: CN=0, SRN=0;

3. Provide this ESN number to the commissioning team before going to the next step.

```
2009-05-21 05:31:50
+++
       HUAWEI
N&O
       #1975
%%DSP ELABEL: CN=0, SRN=0;%%
RETCODE = 0 Operation succeeded
Electronic label = /$[ArchivesInfo Version]
/$ArchivesInfoVersion=3.0
[Board Properties]
BoardType=WD2BBBUC
BarCode=21021127226T92027028 ←ESN
Item=02112722
Description=HERT BBU, WD2BBBUC, HERT BBU Box
Manufactured=2009-02-22
VendorName=Huawei
IssueNumber=00
CLEICode=
BOM=
(Number of results = 1)
       END
___
```

4. Execute the following command to configure the Ethernet interface.

```
/*Set Ethernet Port*/
SET ETHPORT: CN=0, SRN=0, SN=7, SSN=0, PT=ETH, PN=0, PA=ELEC,
MTU=1500, SPEED=100M, DUPLEX=FULL, FERAT=10, FERDT=8;
```

- Notify the commissioning team that the Ethernet interface is now configured. The commissioning team will enable the backhaul port on the site switch. This will initiate the DHCP process for configuring the OM channel and the assigned management IP.
- 6. Verify the BTS DHCP function is operating with the following command.

```
/*List DHCP Func*/
```

LST DHCPFUNC:;

7. This should show as *enabled*.

8. If it is disabled, use the SET DHCPFUNC to enable it. This command can be used to reset the BTS DHCP agent by disabling and the enabling.

```
/*SET DHCP Func*/
```

```
SET DHCPFUNC: STRFLG=ENABLE;
```

10.2 Manual Configuration (Only if Requested by Commissioning)

In the event that DHCP fails, the commissioning team may ask you to assign the OM channel IP manually. **Only perform these steps if requested by the commissioning team.** Use the following commands. The **RED** highlight indicates information that must be provided by commissioning.

/*Add Next Hop VLAN Mapping for OM Channel*/
ADD ARPVLAN: NEXTHOPIP="10.60.20.1", VLANMODE=SINGLEVLAN,
VLANID=12;
/*Add Interface IP Address*/
ADD ITFIP: CN=0, SRN=0, SN=7, SSN=0, PT=ETH, PN=0,
IP="10.60.20.32", MASK="255.255.252.0";
/*Add OM Channel*/
ADD OMCH: FLAG=MASTER, LOCALIP="10.60.20.32",
LOCALMASK="255.255.252.0", PEERIP="10.85.25.18",
PEERMASK="255.255.252.224", BRT=NO, CN=0, SRN=0, SN=7, SSN=0;
/*Add IP Route*/
ADD IPRT: CN=0, SRN=0, SN=7, SSN=0, DSTIP="0.0.0.0",
DSTMASK="0.0.00", RT=NEXTHOP, NEXTHOPIP="10.60.20.1", PREF=60;

11 Upgrading the BTS Software (If Needed)

11.1 Check BTS Software Version

The BTS software must be checked in order to determine whether a software upgrade is needed. Execute the following steps:

1. In the command entry, type:

LST SOFTWARE

2. The out put should look like the following. From this, you can determine whether a local software upgrade is needed. If so, proceed to section 9.3.

```
%%LST SOFTWARE:;%%
RETCODE = 0 Operation succeeded
Result of software query
______
Storage Area Software Version Software Status
Standby Area V300R002C01B032SPC004 Available
Main Area V300R002C02B025 Available
(Number of results = 2)
```

11.2 Local Software Upgrade (If Needed)

Board Software Upgrade

Follow the next steps to perform a local software upgrade for the application software for the BMPT, BBI, and RRU.

- If not running, start your local FTP server (on your laptop). Note the username and password for your FTP server.
- 2. Place the BTS application software package in the root directory of your FTP server.
- 3. Log into the BTS LMT.
- 4. In the command input area enter:

DLD SOFTWARE

- 5. Specify your FTP server, username, and password.
- 6. For the software type, specify "SOFTWARE".
- 7. Execute the command. Progress of the download should appear in the output window:

```
%%DLD SOFTWARE: IP="192.168.0.101", USR="apftp", PWD="*****";%%
RETCODE = 0 Progress report, Operation succeeded
Report Type = DOWNLOAD SOFTWARE
    Status = Progressing
    Progress = 08%
    Session ID = 65539
```

The following is reported when the software download is complete:

```
%%DLD SOFTWARE: IP="192.168.0.101", USR="apftp", PWD="*****";%%
RETCODE = 0 Progress report, Operation succeeded
Report Type = DOWNLOAD SOFTWARE
    Status = Success
Session ID = 65536
--- END
```

8. When the software download is complete, enter:

LST SOFTWARE

The new software appears in the STANDBY area:

Bootrom Software Upgrade

Follow the next steps to perform a local software upgrade for the bootrom software for the BMPT, BBI, and RRU.

- If not running, start your local FTP server (on your laptop). Note the username and password for your FTP server.
- 2. Place the BTS application software package in the root directory of your FTP server.
- 3. Log into the BTS LMT.
- 4. In the command input area enter:

DLD SOFTWARE

- 5. Specify your FTP server, username, and password.
- 6. For the software type, specify "BOOTROM".
- 7. Execute the command. Progress of the download should appear in the output window:

```
%%DLD SOFTWARE: IP="192.168.0.101", USR="apftp", PWD="*****";%%
RETCODE = 0 Progress report, Operation succeeded
Report Type = DOWNLOAD SOFTWARE
    Status = Progressing
    Progress = 08%
    Session ID = 65539
```

The following is reported when the software download is complete:

```
%%DLD SOFTWARE: IP="192.168.0.101", USR="apftp", PWD="*****";%%
RETCODE = 0 Progress report, Operation succeeded
Report Type = DOWNLOAD SOFTWARE
Status = Success
Session ID = 65536
--- END
```

 Next, execute the following command to load the software the running area. For the software type, specify "BOOTROM". Specify the new software label for the version. LOD SOFTWARE

Progress of the loading should appear in the output window:

```
%%LOD SOFTWARE: SV="V300R002C02B026";%%
RETCODE = 0 Progress report, Operation succeeded
Report Type = LOAD SOFTWARE
    Status = Progressing
    Progress = 78%
    Session ID = 65537
--- END
```

The following is reported when the loading is complete:

```
%%LOD SOFTWARE: SV="V300R002C02B026";%%
RETCODE = 0 Progress report, Operation succeeded

    Report Type = LOAD SOFTWARE
        Status = Success
        Session ID = 65537
        Total Boards = 5
        Succeed Boards = 5
        Failed Boards = 0
--- END
```

Activate Software

The following steps will activate the software and load it into RAM.

1. To activate the software, enter the following and specify the new software version:

ACT SOFTWARE

2. Progress of the activation should appear in the output area:

```
%%ACT SOFTWARE: OT=NE, SV="V300R002C02B026";%%
RETCODE = 0 Progress report, Operation succeeded
Report Type = ACTIVATE SOFTWARE
    Status = Progressing
    Progress = 06%
    Session ID = 65539
```

3. The board LEDs can be used to monitor the activation status. Refer to section 5 for LED status descriptions.

During activation, BMPT will reboot. Outage time is approximately 5 minutes. The following is reported when the activation is complete:

```
%%ACT SOFTWARE: OT=NE, SV="V300R002C02B026";%%
RETCODE = 0 Progress report, Operation succeeded

    Report Type = ACTIVATE SOFTWARE
        Status = Success
        Session ID = 65540
        Total Boards = 5
        Succeed Boards = 5
        Failed Boards = 0
--- END
```

 When activation is complete, check the software version. The new software version should be listed in the main area.

LST SOFTWARE

5. Next, check the bootrom version.

DSP BRDVER

6. The correct bootrom version should be displayed.

%%DSP BRDVER RETCODE = 0	CN=0;%% Operation	succeed	led			
Result of cu	irrent boar	d softwa	re query			
Subrack No.	Slot No.	Туре	Software Version	Hardware Version	BOOTROM Version	Operation Result
22	0	RRU	11.011.10.013	MRRU.HWEI.bB3610200	11.011.10.013	Operation
21	0	RRU	11.011.10.013	MRRU.HWEI.bB3610200	11.011.10.013	Operation
20	0	RRU	11.011.10.013	MRRU.HWEI.bB3610200	11.011.10.013	Operation
0 0	43 33	CMU PSU	NULL NULL	0 0	NULL NULL	Ru Not Online Operation
succeeded 0 succeeded	44	BAT	NULL	0	NULL	Operation
0 0	32 19	PMU BBUPWR	NULL NULL	0 0	NULL NULL	Ru Not Online Operation
0 Succeeded	16	BBUFAN	NULL	0	NULL	Operation
0 succeeded	3	BBI	V300R002C02B026	WIMAX.BBBI.0.1	2.3.1.1	Operation
0 succeeded	7	MPT	V300R002C02B025	WIMAX.MPT.0.0	03.001.01.004	Operation
(muniper or r	.esuits - 1	. ±)				
END						

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12 Verifying Operational Status

After the upgrade is complete, the BTS status must be verified before performing drive tests. The next sections will verify the operational status of the BTS.

12.1 Verify Alarm Status

- 1. Log into the BTS LMT.
- 2. In the command input area enter:

LST ALMAF

3. The active alarms should be displayed in the output area. The only acceptable alarm is *Alarm of No User of Carriers*. This is a minor alarm that indicates no users are on the sector/carrier. There should be no other alarms.

12.2 Verify Fiber Status

The following steps will verify the fiber (and optical transceivers) for each of the sectors.

- 1. Log into the BTS LMT.
- 2. In the command input area execute the following commands:

GET	OPTICALPORTINFO:	RACKNO=0,	SUBRACKNO=20,	BOARDNO=0;
GET	OPTICALPORTINFO:	RACKNO=0,	SUBRACKNO=21,	BOARDNO=0;
GET	OPTICALPORTINFO:	RACKNO=0,	SUBRACKNO=22,	BOARDNO=0;

3. Each of these commands checks the fiber to the RRU. Each should return a valid response that includes the optical characteristics:

%%GET OPTICA RETCODE = 0	LPORI Oper	INFO: RACKNO=0, SU ation succeeded	JBRACKNO	=22,	BOARDNO	=0;%%					
RRU optical	port	information									
OPTICALPORTI RATING(100Mb LINKLENGTH62 INPUTPOWER(u	NDEX (62 (62) (7)	INPOSITIONSTATUS LINKLENGTH9M1KU(9 2.5µm) TEMPERATURE	OPTICA 1m) LIN 2(dedegr	LMOD KLEN ees (JLETYPE GTH9M100 Celsius)	VENDORNAME U(9µm) LINKLE VOLTAGE(mV)	NGTH CUR	OPTICALMODE 50M(50µm) RENT(mA) OUT	WAVELEN PUTPOWER	IGTH (nm) t (uW)	
0		INPOSITION	ESFP			FINISAR CORP.		MULTIMODE	850		42
0	_	0		0.7.0	15		7			36	
3393 1	5	3// NOT INPOSITION	SED	3/3		NUIT.T.		SINGLEMODE	0		0
0		0	011		0	NOTE	0	DINGEBRIODE	0	0	0
0	0	0		0							

```
(Number of results = 2)
```

--- END

4. An invalid response will be show in red:

```
%%GET OPTICALPORTINFO: RACKNO=0, SUBRACKNO=20, BOARDNO=0;%%
RETCODE = 1611202576 board unconfig or uninstall
```

-- END

12.3 Verify GPS Status

Follow the next steps to verify sector GPS status.

- 1. Log into the BTS LMT.
- 2. In the command input area enter:

DSP CLKSTAT

3. This will list the GPS state. Normal operation should appear as Normal and Locked:

12.4 Verify Clock Source

Follow the next steps to verify the BTS clock source.

- 1. Log into the BTS LMT.
- 2. In the command input area enter:

LST TIMESRC

3. GPS should be listed as the time source. A valid response should appear as:

```
%%LST TIMESRC:;%%
RETCODE = 0 Operation succeeded
Time Source Information
TIMESOURCE = GPS
(Number of results = 1)
--- END
```

12.5 Verify Carrier Status

Follow the next steps to verify sector RF transmission status.

- 1. Log into the BTS LMT.
- 2. In the command input area enter:

DSP CARRIERSTATUS

3. This will list the operational state of each of the sectors. Normal operation should appear as:

12.6 Verify R6 ASN-GW Connectivity

Follow the next steps to verify R6 ASN-GW connectivity status. This is very important for network entry.

- 1. Log into the BTS LMT.
- 2. In the command input area enter:

LST SIGCH

3. This will list the R6 IP information and should appear as seen below with *Local Signaling IP* set to the R6 IP of the

site. The *Peer Signaling IP* should be set to the ASN-GW IP.

```
LST SIGCH:;
WA-SEA610
+++
                      2009-07-29 10:40:54
      HUAWET
       #15174
M&O
%%/*38927*/LST SIGCH:;%%
RETCODE = 0 Operation succeeded
LST SIGCH Result
_____
Local Signaling IP = 10.60.24.42 <- check site specific R6 IP
 Peer Signaling IP = 10.85.25.96 <- check for ASN-GW IP
       Cabinet No. = 0
Subrack No. = 0
Slot No. = 7
(Number of results = 1)
___
       END
```

4. Check that the ASN-GW identification has been entered with the following command:

LST MIXCFG

5. This will list the R6 IP information and identifier as seen below. Specifically, check the ASN-GW IP and the ID.

```
LST MIXCFG:;
WA-SEA610
+++ HUAWEI
                    2009-07-29 12:05:36
0&M
     #15312
%%/*60150*/LST MIXCFG:;%%
RETCODE = 0 Operation succeeded
                     MaxLatency = 0
                 MsRelR1MsgType = BWA MS RELMSG RNG-ABORT
                           GWIP = 10.85.25.96 <- Check ASN-GW IP
                           GWId = 0000-0000-0064 <- Check ID
                    TEKLifetime = 700
         Sleep send type switch = BWA SLP SEND SWITCH OFF
     Dynamic server flow switch = BWA Dynsf SWITCH OFF
 MS MAC for dynamic server flow = A9CC-CDDD-E123
           No user check period = 28800
User access fail times Threshold = 80
    User Reduce number Threshol = 40
(Number of results = 1)
```

```
--- END
```

6. Check that the LGCPORT has been set correctly:

LST LGCPORT:;

LST LGCPORT	Result		
	Cabinet No.	=	0
	Subrack No.	=	0
	Slot No.	=	7
	Logical Port No.	=	0
	Subslot No.	=	0
	Port Type	=	Ethernet
	Port No.	=	0
	TX Bandwidth[kbps]	=	100000
	RX Bandwidth[kbps]	=	100000
	TX Committed Burst Size[kbit]	=	100000
	TX Excessive Burst Size[kbit]	=	100000
	TX Traffic Shaping Switch	=	Off
Realtime	Traffic Measure Period[100ms]	=	5
TX Realtime	Traffic Filter Coefficient[%]	=	25
RX Realtime	Traffic Filter Coefficient[%]	=	25
	Traffic Control Switch	=	On
	OM FTP Traffic Control Switch	=	Off
	PQ Queue Number	=	5
	Congestion Time Threshold[ms]	=	100
Conge	stion Clear Time Threshold[ms]	=	50
(Number of :	results = 1)		
END			

7. Check that the IPPATH has been set correctly:

```
LST IPPATH:;

LST IP Path Result

IP Path ID = 0

Cabinet No. = 0

Subrack No. = 0

Slot No. = 7

Logical Port No. = 0

IP Path Type = QoS

DSCP = 63

Local IP = 10.60.24.42 <- Check site specific R6 IP

Peer IP = 10.85.25.96 <- Check ASN-GW IP

IP Path Check Flag = Disable

(Number of results = 1)
```

8. Verify connectivity to the ASN-GW by pinging it. Specify the R6 IP address for the source address and the ASN-GW address as the destination address:

```
PING: CN=0, SRN=0, SN=7, SRCIP="10.60.24.69", DSTIP="10.85.25.96",
CONTPING=DISABLE;
PING 10.85.25.96: 32 data bytes
Reply from 10.85.25.96: bytes=32 Sequence=1 ttl=63 time=1 ms
Reply from 10.85.25.96: bytes=32 Sequence=2 ttl=63 time=1 ms
Reply from 10.85.25.96: bytes=32 Sequence=3 ttl=63 time=1 ms
```

```
Reply from 10.85.25.96: bytes=32 Sequence=4 ttl=63 time=1 ms
--- 10.85.25.96 ping statistics ---
4 packet(s) transmitted
4 packet(s) received
Percent 0.00 packet lost <- Successful ping to the ASN-GW
round-trip min/avg/max = 1/1/1 ms
13 reports in total
-- END
```

12.7 Verify Handover Configuration

Follow the next steps to verify handover configuration.

- 1. Log into the BTS LMT.
- 2. In the command input area enter:

LST NBR

 This will list all the neighbors configured for each sector. At a minimum, intracell neighbors should be configured. The following example below shows a sure with intracell neighbors only.

```
LST NBR:;
RTB0003-HUA-BBU
                     2009-07-29 16:47:17
+++
      HUAWEI
       #1898
O&M
%%/*1040*/LST NBR:;%%
RETCODE = 0 Operation succeeded
CBSID
                NBRBSID
0000-0800-0300 0000-0800-0310 <-Sector A Neighbor
0000-0800-0300 0000-0800-0320 <-Sector A Neighbor
0000-0800-0310 0000-0800-0300 <-Sector B Neighbor
0000-0800-0310 0000-0800-0320 <-Sector B Neighbor
0000-0800-0320 0000-0800-0300 <-Sector C Neighbor
0000-0800-0320 0000-0800-0310 <-Sector C Neighbor
(Number of results = 6)
```

4. In the command input area enter:

```
LST TRIGGER
```

5. This will list all the handover triggers for each sector. Two trigger types should be configured for each sector as seen below.

LST TRIGGER:; RTB0002-HUA-BBU +++ HUAWEI 2009-07-29 16:50:57 O&M #15424 %%/*1128*/LST TRIGGER:;%% RETCODE = 0 Operation succeeded

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SECTORID TRIGGERAV	CARRIERID ERDURATION	TRIGGERID	TRIGGERTYPE	TRIGGERFUNCTION	TRIGGERACTION	TRIGGERVALUE
0	0	0	0	3	2	6
0	0	1	0	6	3	30
1	0	0	0	3	2	6
10	0	1	0	6	3	30
20 2	0	0	0	3	2	6
10 2	0	1	0	6	3	30
20 (Number o	f results =	6)				

12.8 Verify Licenses

Follow the next steps to verify handover configuration.

- 1. Log into the BTS LMT.
- 2. In the command input area enter:

LST CARRIERLICENSEINFO

3.	This will list the license configuration for all secto	rs and
	carriers. Ensure that all values are ON.	

CARRIER I	JICENSE INFC	1					
SECTORID AIRITFENC	CARRIERID CRYPT	BASIC	ETHCS	MOBILITY	TWOANTENNAMIMO	FOURANTENNAMIMO	
0	0	ON	ON	ON	ON	ON	ON
1	0	ON	ON	ON	ON	ON	ON
2	0	ON	ON	ON	ON	ON	ON
(Number o	of results =	3)					

13 Verifying Expedience and Wimax Installation During Diplexer Cut

After cutting over diplexers with Expedience and Wimax installed, it is necessary to perform various checks to validate the installation. In order to this, some configuration must be performed on the Huawei Wimax BTS. Then noisefloor and VSWR checks must be formed on both the Expedience and Huawei Wimax BTS. This section explains the steps to perform these tasks.

<u>Note:</u> Sections 12.1 and 12.2 can be completed prior to the antenna and diplexer installations. Sections 12.3 to 12.10 should be performed after the antenna and diplexer installations are completed.

13.1 Verify Expedience Noisefloor Pre Diplexer Cut

Prior to the diplexer cut, the Expedience noisefloor must be measured on all BTS sectors. These values will be used to determine whether Wimax has introduced interference after the cut. Use the following steps to take these noisefloor readings.

- 1. Telnet and log into the Expededience BTS.
- 2. Execute the following command to clear the interference counters.

interference -r

3. Wait approximately 2 minutes and execute the following command to get new interference readings.

SuperUser>interference

Time: Tue Sep 8 21:36:48 2009

Seconds since last clear: 1735 seconds

Instantaneous symbol counts:

Bad symbol 1 counts per FFAGC (from 0 to 11):

0,0,0,330233,139826,2538,42,0,13,2,0,0

Bad symbol 2-6 counts per FFAGC (from 0 to 11):

0,0,0,2021249,335451,10862,173,9,78,6,0,0

Good symbol counts per FFAGC (from 0 to 11) for 'me':

0,0,0,0,0,0,26120,131,9784,460,1,1 Good symbol counts per FFAGC (from 0 to 11) for other bases: 0,0,0,0,514,130416,236,56,51,0,0,0 Total symbols received destined for other bases: 131291 Count of symbols received destined for other bases (per base): These counts are accumulated periodically in a background task.

4. Take the highlighted **GREEN** values and use the embedded Excel table to calculate the noisefloor.

Bin->	0		2	3	4	5	6	7	8	9	10	11	Sums	
Counts->	0	0	0	3111148	285216	168	33	5	1	1	0	0	3396572	Noise Floor
Bin*Counts->	0	0	0	9333444	1140864	840	198	35	8	9	0	0	10475398	3.08410892

13.2 Configure the Huawei BTS

The BTS is delivered from the factory with a default configuration that only includes one RRU. The following steps must be executed in order to configure the hardware for a 3-sector BTS.

- 1. Power up the BBU and RRUs.
- 2. Log into the BTS LMT as described section 8.
- 3. This procedure only works on BTS software version SPC202 and higher. Execute the following MML command in the command input area to verify the software.

LST SOFTWARE

4. The main area should show SPC202 or higher.

LST SOFTWARE:; WA-SEA0005 +++HUAWEI 2009-09-17 20:30:22 #101614 M&O %%/*47549*/LST SOFTWARE:;%% RETCODE = 0 Operation succeeded Result of software query _____ Storage Area Software Version Software Status V300R002C02SPC202 Available Main Area Standby Area V300R002C02SPC200 Available

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(Number	of results =	2)						
	END							
	5	5. If the BBU	was just p	owered up, it w	vill take approximately			
		15 mins fo	or the RRUs	s to boot up. Us	se the following			
		command	to check th	ne status of the	RRUs.			
LST SOF	TWARE							
	6	5. If status is <i>Normal</i> sta may proce	s <i>StartingU</i> atus indicat eed with the	<i>p</i> then the RRUs tes that the RRU e following step	s are not ready. A Js are ready and you s.			
DSP BRD	STATUS:;							
WA-SEA0	005							
+++	HUAWEI	2009-09-17	20:34:48					
0&M #101620								
33/ JUSUSJ//DSP BRDSTATUS:;33								
Display board status								
RACKNO	SUBRACKTYPE	SUBRACKNO	BOARDNO	AVAILSTATUS	ADMINSTATUS			
0	BBU	0	3	NORMAL	Unlocked			
0	BBU	0	7	NORMAL	Unlocked			
0	BBU	0	16	NORMAL	Unlocked			
0	BBU	0	19	NORMAL	Unlocked			
0	RRU	20	0	NORMAL	Unlocked			
0	RRU	21	0	NORMAL				
(Numbor	of results -	22	0	NORMAL	υπτοςκέα			
(numper	or resurts =	/)						

7. Access the Batch window by clicking the Batch link at the top of the window

8. Copy and paste the following commands into the command input area and execute. The **RED** highlight indicates market specific information that must be provided. The **YELLOW** highlighted lines may fail with an error. This can be ignored.

/* Block sector in order to add and remove factory configured RRU*/ $% \left({{\left {{\left {{{\rm{RU}}} \right } \right }} \right)} \right)$
MOD CARRIERBLOCKFLAG: SECTORID=0, CARRIERID=0, BLOCKFLAG=BLOCKED;
RMV CARRIERBASICINFO: SECTORID=0, CARRIERID=0;
RMV SECTOR: SECTORID=0;
RMV RRU: RACKNO=0, SUBRACKNO=23, BOARDNO=0;
RMV SUBRACK: RACKNO=0, TYPE=RRU, SUBRACKNO=23;

```
RMV BTSINFO: OPERATORID=46;
/* Add Bts Info*/
ADD BTSINFO: OPERATORID=7, SITEID=0;
/* Add subracks*/
ADD SUBRACK: RACKNO=0, SUBRACKPOS=1, SUBRACKNAME="RRU01",
IS REMOTE=YES, TYPE=RRU, SUBRACKNO=20;
ADD SUBRACK: RACKNO=0, SUBRACKPOS=2, SUBRACKNAME="RRU02",
IS REMOTE=YES, TYPE=RRU, SUBRACKNO=21;
ADD SUBRACK: RACKNO=0, SUBRACKPOS=3, SUBRACKNAME="RRU03",
IS REMOTE=YES, TYPE=RRU, SUBRACKNO=22;
/* Add RRUs*/
ADD RRU: RACKNO=0, SUBRACKNO=22, BOARDNO=0, BBI SUBRACKNO=0,
RRUTYPE=RRU3702, BBI BOARDNO=3, BBI CPRINO=2;
ADD RRU: RACKNO=0, SUBRACKNO=21, BOARDNO=0, BBI SUBRACKNO=0,
RRUTYPE=RRU3702, BBI BOARDNO=3, BBI CPRINO=1;
ADD RRU: RACKNO=0, SUBRACKNO=20, BOARDNO=0, BBI SUBRACKNO=0,
RRUTYPE=RRU3702, BBI BOARDNO=3, BBI CPRINO=0;
/* add sector(using AntA& AntB only!!)*/
ADD SECTOR: SECTORID=0, TXANTNUM=4, RXANTNUM=4;
ADD SECTOR: SECTORID=1, TXANTNUM=4, RXANTNUM=4;
ADD SECTOR: SECTORID=2, TXANTNUM=4, RXANTNUM=4;
/* Add Carrier Basic Information*/
ADD CARRIERBASICINFO: SECTORID=0, CARRIERID=0, RACKNO=0, SUBRACKNO=0,
BOARDNO=3, CPRIID=0, CENTRALFREQUENCY=2673500, BANDWIDTH=10M,
DLZONETYPE=PUSC ALL, ULZONETYPE=PUSC ALL, SUBFRAMERATIO=29 18,
DLSEGMENTNO=0, CDMAGROUPSTART=0, EIRP=370, CELLRADIUS=COMMON,
TIMEDURATION=86400000, RNGPOWERTHRELD=30, ANTBITMAP=4T4R,
PREAMBLEINDEX=0;
ADD CARRIERBASICINFO: SECTORID=1, CARRIERID=0, RACKNO=0, SUBRACKNO=0,
BOARDNO=3, CPRIID=1, CENTRALFREQUENCY=2630500, BANDWIDTH=10M,
DLZONETYPE=PUSC ALL, ULZONETYPE=PUSC ALL, SUBFRAMERATIO=29 18,
DLSEGMENTNO=1, CDMAGROUPSTART=16, EIRP=370, CELLRADIUS=COMMON,
TIMEDURATION=86400000, RNGPOWERTHRELD=30, ANTBITMAP=4T4R,
PREAMBLEINDEX=33;
ADD CARRIERBASICINFO: SECTORID=2, CARRIERID=0, RACKNO=0, SUBRACKNO=0,
BOARDNO=3, CPRIID=2, CENTRALFREQUENCY=2650500, BANDWIDTH=10M,
DLZONETYPE=PUSC ALL, ULZONETYPE=PUSC ALL, SUBFRAMERATIO=29 18,
DLSEGMENTNO=2, CDMAGROUPSTART=32, EIRP=370, CELLRADIUS=COMMON,
```

TIMEDURATION=86400000, RNGPOWERTHRELD=30, ANTBITMAP=4T4R,

```
PREAMBLEINDEX=66;
/* Add GPS*/
ADD GPS: CN=0, SRN=0, SN=7, DELAY=0;
/*Set GPS*/
SET GPS: DELAY=0;
/*Add clock source*/
ADD CLKSRC: CLKSRC=GPS, PRI=1;
/*Set clock work mode*/
SET CLKMODE: MODE=MANUAL;
/*set time src to GPS*/
SET TIMESRC: TIMESRC=GPS;
```

13.3 Verify Carrier Status and Unblock

Note: Sections 12.3 to 12.10 should be performed after the antenna and diplexer installations are completed.

1. In the command input area enter the following to check the carrier status:

DSP CARRIERSTATUS

 This will list the current state of the carriers. If any carriers are blocked. You must unblock them in order to allow RF transmissions and to complete the next sections.

```
DSP CARRIERSTATUS:;
WA-SEA0005
                     2009-09-17 20:41:57
+++ HUAWEI
O&M
      #101632
%%/*57649*/DSP CARRIERSTATUS:;%%
RETCODE = 0 Operation succeeded
CARRIER STATUS INFO
_____
SECTORID CARRIERID BLOCKFLAG RESOUCESTATE OPERTIONSTATUS
              Unblocked Available Available
Unblocked Available Available
Unblocked Available Available
2
         0
          0
1
0
          0
(Number of results = 3)
```

- END

3. To unblock carriers use the following command with *Block Flag* set to *Unblock* for each blocked carrier.

MOD CARRIERBLOCKFLAG

13.4 Verify for Rolled Fiber

A fiber run ay be connected to the incorrect port on the RRU, this is termed as "rolled" fiber. Use the following steps to check this condition. Note: This check only applies to a site with a single carrier on the RRU.

1. In the command input area execute the following commands:

GET	OPTICALPORTINFO:	RACKNO=0,	SUBRACKNO=20,	BOARDNO=0;
GET	OPTICALPORTINFO:	RACKNO=0,	SUBRACKNO=21,	BOARDNO=0;
GET	OPTICALPORTINFO:	RACKNO=0,	SUBRACKNO=22,	BOARDNO=0;

Check the input power column of the output. Input power should be shown for port index = 0. If input power is zero for port index = 0, then the fiber is "rolled".

```
GET OPTICALPORTINFO: RACKNO=0, SUBRACKNO=20, BOARDNO=0;
HI-HON0063
+++
      HUAWEI
                      2009-09-08 23:07:52
0&M
       #11976
%%/*4054*/GET OPTICALPORTINFO: RACKNO=0, SUBRACKNO=20, BOARDNO=0;%%
RETCODE = 0 Operation succeeded
RRU optical port information
_____
OPTICALPORTINDEX INPOSITIONSTATUS OPTICALMODULETYPE VENDORNAME
                                                                            OPTICALMODE
WAVELENGTH (
nm) RATING(100Mbps) LINKLENGTH9M1KU(9micron) LINKLENGTH9M100U(9micron)
LINKLENGTH5OM(50micron) LINKLENGTH625M(62.5micron) TEMPERATURE(dedegrees Celsius)
VOLTAGE(mV) CURRENT(mA) OUTPUTPOWER(uW) INPUTPOWER(uW)
0
                  INPOSITION
                                     ESFP
                                                         AVAGO
                                                                            MULTIMODE
                                                                                          850
                 0
43
                                             0
                                                                         15
                             47
                                                              3402
                                                                            5
                                                                                          318
336
1
                  INPOSITION
                                     ESFP
                                                         AVAGO
                                                                            MULTIMODE
                                                                                          850
43
                  0
                                             0
                                                                         15
                                                             3397
7
                             43
                                                                            6
                                                                                          340
0
(Number of results = 2)
       END
___
```

13.5 Verify GPS Status

Follow the next steps to verify sector GPS status.

1. In the command input area enter:

DSP CLKSTAT

2. This will list the GPS state. Normal operation should appear as Normal and Locked:

13.6 Verify Clock Source

Follow the next steps to verify the BTS clock source.

1. In the command input area enter:

LST TIMESRC

2. GPS should be listed as the time source. A valid response should appear as:

```
%%LST TIMESRC:;%%
RETCODE = 0 Operation succeeded
Time Source Information
______
TIMESOURCE = GPS
(Number of results = 1)
____ END
```

13.7 Verify Wimax VSWR

The following steps will verify the VSWR levels for each of the sectors.

1.	In the command	input area	execute	the following
	commands:			

GET	RRUVSWR:	RACKNO=0,	SUBRACKNO=20,	BOARDNO=0;
GET	RRUVSWR:	RACKNO=0,	SUBRACKNO=21,	BOARDNO=0;
GET	RRUVSWR:	RACKNO=0,	SUBRACKNO=22,	BOARDNO=0;

2. Each of these commands checks the VSWR levels for each transmit/receive port. If Wimax is suspected to be causing Expedience interference, this command can be used to identify the port and jumpers that may be causing the interference. This command measures the reflection through the system that may give clues as to the cause. VSWR values should be equal to or less than 1.7 for non-diplexer installations. For diplexer installations, values should be equal to or less than 2.0. Higher values may indicate the need to replace jumpers on the offending port. This command must be executed against each RRU.

	Valid VSWR Values
Non-diplexer Installation	17/1.7 or less
Diplexer Installation	20/2.0 or less

```
2009-06-27 03:50:24
+++
       HUAWEI
0&M
       #25145
%%GET RRUVSWR: RACKNO=0, SUBRACKNO=20, BOARDNO=0;%%
RETCODE = 0 Operation succeeded
RRU VSWR
_____
TXINDEX VSWR(0.1)
0
         11
         11
1
         12
2
         10
3
(Number of results = 4)
___
       END
```

13.8 Verify Wimax Noisefloor Levels

The following steps will verify the noisefloor levels for each of the sectors.

1. In the command input area execute the following commands:

GET	RRURTWP:	RACKNO=0,	SUBRACKNO=20,	BOARDNO=0;
GET	RRURTWP:	RACKNO=0,	SUBRACKNO=21,	BOARDNO=0;
GET	RRURTWP:	RACKNO=0,	SUBRACKNO=22,	BOARDNO=0;

2. Each of these commands checks the interference levels. Each should return a valid response that shows a noise floor near -98 to -100dBm. The response shows 4 samples for our single carrier on the sector.

```
%%GET RRURTWP: RACKNO=0, SUBRACKNO=20, BOARDNO=0;%%
RETCODE = 0 Operation succeeded
RRU RTWP
RXIDDEX RRU CARRIERINDEX RTWP(0.1dBm)
0
         0
                           -986
                           -13486
0
         1
0
         2
                           -13486
1
         0
                           -987
1
        1
                           -13486
        2
1
                           -13486
2
        0
                           -991
2
                           -13486
        1
2
        2
                           -13486
3
         0
                           -986
3
         1
                           -13486
         2
3
                           -13486
(Number of results = 12)
___
       END
```

13.9 Verify Expedience Noisefloor Post Diplexer Cut

The Expedience noisefloor must also be verified after the diplexer cut in order to identify Wimax induced interference. Use the same steps in section 13.1 for taking post readings for comparison. An increase of more than 10% should be investigated.

13.10 Block Wimax Carriers

When all steps are complete, the Wimax RF transmission should be blocked before leaving the site. Follow the next steps to block RF transmission.

1. In the command input area enter the following command with *Block Flag* set to *Block* for each carrier:

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MOD CARRIERBLOCKFLAG

2. Next enter the following to check the carrier status:

DSP CARRIERSTATUS

3. This will list the current state of the carriers. All carriers should be *Blocked*.

DSP CARRIERSTATUS:; WA-SEA0005 +++ HUAWEI 2009-09-17 20:41:57 O&M #101632 %%/*57649*/DSP CARRIERSTATUS:;%% RETCODE = 0 Operation succeeded						
CARRIER ST	TATUS INFO					
SECTORID	CARRIERID	BLOCKFLA	G RESOUCESTATI	E OPERTIONSTATUS		
2 1 0 (Number of	0 0 f results =	Blocked Blocked Blocked 3)	Available Available Available	Available Available Available		
END						

14 Offline Acceptance Test

This section of the acceptance test plan is performed on sites that do not have any backhaul connectivity and network entry is not possible. The site acceptance procedures outlined below are a simplified subset of functionality checks that include verification of the following aspects:

- Basic airlink parameter verification (BSID, center frequency etc). Please note that we will be using a canned NECB file with simplified values.
- Identification of swapped sectors.
- Azimuth verification
- Field verification of Main/Diversity branch operation.
- Basic coverage and CINR checks.

14.1 **Obtain RF Planning Information**

RF engineering will provide the following info.

- RF coverage plot showing best server transmitter information
- BSID and preamble index
- Frequency of operation
- Sector distance limits

This information includes a plot of the best server transmitter information and a map specifying the boundaries of the sector to be driven. Also included are basic airlink parameters to test the validity of which sector/frequency is being tested.

The default BTS configuration will transmit with preamble indexes of 0, 33, 66 for A, B and C respectively.

BSIDs are set to :

Sector 1 = FFAB63000000

Sector 2 = FFAB63000010

Sector 3 = FFAB63000020

These BSID values will be used to verify sector coverage.

14.2 Verify Site Location

This portion of the test procedure requires the basic collection of site identifiers to verify coordinate and structure type information used in internal databases/prediction tools and to ensure that the right site is being tested.

- 1. Launch WiTT with the GPS.
- 2. Under *Maps-> Manage Bases*, update these BSIDs

Sector 1 = FFAB6300000

Sector 2 = FFAB63000010

Sector 3 = FFAB63000020

with the latitudes and longitudes coordinates and azimuths of the site. This will allow correct position and site acquisition on the WiTT map display.

🕺 Base Management				Upo coo	late la rdinat	t/long es and	
Name	Base ID	Latitude	Longitude	azir	nuthe	for the	20
HF_A	0003E8000111	45.53 38	-122.92701	uzn	nuciis	ior the	
HF_B	0003E8000112	45.5 238	-122.92701	BSI	De		
HF_C	0003E8000113	45 3238	-122.92701	0.51	03		
JF_A	0003E8000101	4 543255	-122.961293				
JF_B	0003E8000102	5.543255	-122.961293	100.0	55		
JF_C	0003E8000103	45.543255	-122.961293	280.0	90	#ff990	
KIRK001_A	000001000009	47.629958	-122.175841	80.0	90	#ff33cc	
OR_A	0003E8000121	45.523648	-122.898079	50.0	90	#00ff	
OR_B	0003E8000122	45.523648	-122.898079	180.0	90	#33ff0	
OR_C	0003E8000123	45.523648	-122.898079	300.0	90	#ff990	
Test_Site_A	000002000001	45.522625	-123.103245	80.0	90	#1133cc	
Test_Site_B	000002000002	45.522625	-123.103245	180.0	90	#ffff99	
Test_Site_C	000002000003	45.522625	-123.103245	300.0	90	#ccffff	
POR003_A	00000200001B	45.52454	-123.079845	80.0	90	#ff33cc	
POR003_B	000002000019	45.52454	-123.079845	170.0	90	#ffff99	
POR003_C	00000200001A	45.52454	-123.079845	280.0	90	#ccffff	
POR004_A	000002000032	45.52248	-123.04896	100.0	90	#ff33cc	
POR004_B	000002000033	45.52248	-123.04896	180.0	90	#ffff99	
POR004_C	000002000031	45.52248	-123.04896	280.0	90	#ccffff	
POR008_A	000002000049	45.521917	-122.99297	80.0	90	#ff33cc	
POR008_B	00000200004A	45.521917	-122.99297	200.0	90	#ffff99	
POR008_C	00000200004B	45.521917	-122.99297	340.0	90	#ccffff	
POR009_A	000002000091	45.543448	-122.96389	60.0	90	#ff33cc	
POR009_B	000002000092	45.543448	-122.96389	180.0	90	#ffff99	Ψ.
OK Cancel							

- 3. From the base of the site, record the following information
 - a. Latitude (5 decimal digits ex. 45.45653)
 - b. Longitude (5 decimal digits)
 - c. Structure Type (Monopole/Rooftop etc)
- 5. Verify the site location information corresponds with the map information.

14.3 Verify Interference Levels

The following steps will verify the interference levels for each of the sectors.

- 1. Log into the BTS LMT.
- 2. In the command input area execute the following commands:

GET	RRURTWP:	RACKNO=0,	SUBRACKNO=20,	BOARDNO=0;
GET	RRURTWP:	RACKNO=0,	SUBRACKNO=21,	BOARDNO=0;
GET	RRURTWP:	RACKNO=0,	SUBRACKNO=22,	BOARDNO=0;

3. Each of these commands checks the interference levels. Each should return a valid response that shows a noise floor near -100dBm. The response shows 4 samples for our single carrier on the sector.

```
%%GET RRURTWP: RACKNO=0, SUBRACKNO=20, BOARDNO=0;%%
RETCODE = 0 Operation succeeded
RRU RTWP
____
RXIDDEX RRU CARRIERINDEX RTWP(0.1dBm)
0
         0
                            -986
0
         1
                            -13486
0
         2
                            -13486
         0
                            -987
1
1
         1
                            -13486
1
         2
                            -13486
2
         0
                            -991
2
         1
                            -13486
2
                            -13486
         2
                           -986
3
         0
3
         1
                            -13486
3
         2
                            -13486
(Number of results = 12)
       END
___
```

14.4 Verify Coverage

- 1. Configure the device to scan on the frequency associated with the first sector to be tested.
- 2. Configure the device for the private NAP ID FFAB63 by selecting the Private connection manager profile.

 Select a test location for each sector within a block in the boresite of that sector with unobstructed views (LOS) of the antennas being tested for a total of three locations. (see Fig 6 below). Record the signal strength, CINR , and BSID values. <u>Verify the BSID is the correct one for the sector</u> <u>being tested.</u>



- 4. Based on the best server transmitter plot provided by RF engineering, drive the perimeter of the coverage area as close to the borders of the coverage as possible. This would be any roads close to the null area of the sector and the edge of the sector coverage. In addition drive nearly all the roads in the 0.25 mile buffer area shown by the first red circle on the RF plot.
- 5. Repeat for the other two sectors.
- 6. File naming convention at the end of every test before submitting to the RF engineer is "ATP_SectorID_Date.csv".

15 Online Acceptance Test

This section covers field verification of production RF parameters and network entry operation. This acceptance test procedure verifies that the EMS management process was successful by validating the key parameters of the airlink (BSID/Preamble Index and frequency). The following are the key objectives of this test procedure:

- Basic site verification information (latitude, longitude, and structure type)
- Verify site connectivity with backhaul (network entry and basic throughput testing)
- Verify sector level Key airlink parameters (BSID, frequency)
- Coverage verification (identify swapped sectors, azimuth deviations, and down-tilt deviations)
- Handover verification (intra-sector)

15.1 Obtain RF Planning Information

RF engineering will provide the following RF planning information for each sector. Obtain the RF coverage plot showing the best server transmitter. This information will be verifyd in the drive test procedures in the remaining sections.

15.2 Verify Site Location

This portion of the test procedure requires the basic collection of site identifiers to verify coordinate and structure type information used in internal databases/prediction tools and to ensure that the right site is being tested.

- 1. Launch WiTT with the GPS.
- 2. Under *Maps-> Manage Bases*, update or add your BSIDs

Sector 1 = 00000200000X

Sector 2 = 00000200000X

Sector 3 = 00000200000X
with the latitudes and longitudes coordinates and azimuths of the site. This will allow correct position and site acquisition on the WiTT map display.

Base Management Name HF_A HF_B HF_C JF_A JF_B JF_B JF C	Base D 0003E8000111 0003E8000112 0003E8000113 0003E8000101 0003E8000101 0003E8000103	Latitude 45,533,8 45,5238 45,238 45,43255 4,543255 5,543255	Longitude -122.92701 -122.92701 -122.92701 -122.961293 -122.961293	Upo lat/ and you	late or long co l azimu ır BSID	add oordina uths fo S	ates r
KIRK001 A	000001000009	47.629958	-122.175841	80.0	90	#ff33cc	
OR_A	0003E8000121	45.523648	-122.898079	50.0	90	#00ff	
OR_B	0003E8000122	45.523648	-122.898079	180.0	90	#33ff0	
OR_C	0003E8000123	45.523648	-122.898079	300.0	90	#ff990	
l est_Site_A	000002000001	45.522625	-123.103245	80.0	90	#113300	
Test_Site_B	000002000002	45.522625	-123.103245	180.0	90	#ffff99	
Test_Site_C	000002000003	45.522625	-123.103245	300.0	90	#ccffff	
POR003_A	00000200001B	45.52454	-123.079845	80.0	90	#ff33cc	
POR003_B	000002000019	45.52454	-123.079845	170.0	90	#ffff99	
POR003_C	00000200001A	45.52454	-123.079845	280.0	90	#ccffff	
POR004_A	000002000032	45.52248	-123.04896	100.0	90	#ff33cc	
POR004_B	000002000033	45.52248	-123.04896	180.0	90	#ffff99	
POR004_C	000002000031	45.52248	-123.04896	280.0	90	#ccffff	
POR008_A	000002000049	45.521917	-122.99297	80.0	90	#ff33cc	
POR008_B	00000200004A	45.521917	-122.99297	200.0	90	#ffff99	
POR008_C	00000200004B	45.521917	-122.99297	340.0	90	#ccffff	
POR009_A	000002000091	45.543448	-122.96389	60.0	90	#ff33cc	4
POR009_B	000002000092	45.543448	-122.96389	180.0	90	#ffff99	Ψ.
		OK Cancel)				

- 3. From the base of the site, record the following information
 - a. Latitude (5 decimal digits ex. 45.45653)
 - b. Longitude (5 decimal digits)
 - c. Structure Type (Monopole/Rooftop etc)
- 4. Verify the site location information corresponds with the map information.

15.3 Verify Interference Levels

The following steps will verify the interference levels for each of the sectors.

- 1. Log into the BTS LMT.
- 2. In the command input area execute the following commands:

GET	RRURTWP:	RACKNO=0,	SUBRACKNO=20,	BOARDNO=0;
GET	RRURTWP:	RACKNO=0,	SUBRACKNO=21,	BOARDNO=0;
GET	RRURTWP:	RACKNO=0,	SUBRACKNO=22,	BOARDNO=0;

3. Each of these commands checks the interference levels. Each should return a valid response that shows a noise floor near -98 to -100dBm. The response shows 4 samples for our single carrier on the sector.

```
%%GET RRURTWP: RACKNO=0, SUBRACKNO=20, BOARDNO=0;%%
RETCODE = 0 Operation succeeded
RRU RTWP
_____
RXIDDEX RRU CARRIERINDEX RTWP(0.1dBm)
                            -986
0
         0
0
         1
                            -13486
         2
0
                            -13486
1
         0
                            -987
                            -13486
1
         1
1
         2
                            -13486
2
         0
                            -991
                            -13486
2
         1
2
                            -13486
         2
3
         0
                            -986
3
                            -13486
         1
3
         2
                            -13486
(Number of results = 12)
       END
___
```

15.4 Verify Network Entry and Throughput Performance

This portion of the test procedure will test connectivity through the backhaul by using the connection manager utility and throughput testing.

- 1. Begin by performing network entry at cell-core.
- 2. Configure the device for the commercial NAP ID 2 by selecting the Clear connection manager profile.
- Launch Connection manager to verify that Network entry is successful and the BSID of the sector being tested is displayed. This may involve moving away from the cell core to a LOS location within the boresite of the sector being tested to ensure that we get onto the proper sector.
- Run a standard throughput test and record Downlink (DL) and uplink (UL) throughput values using <u>www.speedtest.net</u> or <u>http://www.internetfrog.com/myinternet/voip/</u> websites. Perform this test on each of the sectors near cell-core. Throughput guidelines for a device configured with unlimited bandwidth QoS are show in the following table.

CINR (dB)	DL Throughput (bps)	UL Throughput (bps)
30-35	10,000-16,000	2,000-2,500
27-29.9	8,500-9,999	1,750-1,999
24-26.9	7,000-8,499	1,500-1,749
21-23.9	6,000-6,999	1,200-1,499

Table 1: Throughput Guidelines

- 5. Record the DL and UL throughput values, RTD (Round trip delay) and Ping times.
- 6. Also record the CINR and RSSI values at the location where the throughput values were collected.

15.5 Verify Coverage and Key Airlink Parameters

The RF parameters from will be verified on the device side using WiTT. With WiTT, the following will be verified for each sector:

- Frequency
- BSID
 - 1. Begin by performing network entry at cell-core.
 - 2. Launch WiTT with GPS.
 - 3. Start WiTT monitoring and logging in advanced mode.
 - 4. Verify the Base ID and Frequency to ensure you are on the correct sector.
 - 5. Drive from cell-core to cell-edge until handover or network drop. A network drop would be acceptable if it is known that additional coverage is not provided by a neighboring sector.
 - 6. Once handover or network drop occurs, stop WiTT logging.
 - 7. Verify if the loss of coverage coincides with the RF coverage plot.
 - 8. Save the WiTT map view image.

- Rename the WiTT CSV log file to include the site and sector identifiers. (Naming Convention: *SiteID* _*SectorLabel_*Coverage_date)
- 10. Package up the map view image file and CSV log file for each sector and provide these to RF planning.
- 11. Report any failures of discrepancies to the field supervisor.



Figure 32: Drive Route for Validation of Coverage and Key Airlink Parameters

15.6 Verify Intra-Sector Handovers

The coverage verification drive entails driving a route from cell-core to cell-edge as depicted in Figure 31 to test and ensure inter-sector handover functionality. In addition to this, a loop drive route at approximately 0.25 to 0.5 miles away from the site will be needed to ensure intra-sector handover capability

- 1. Begin by performing network entry at a location in the middle of the sector.
- 2. Launch Connection manager to verify that Network entry is successful and the BSID of the sector being tested is displayed.
- 3. Launch WiTT with GPS.
- 4. Start WiTT monitoring and logging in advanced mode.
- 5. Drive a circular route around the site as depicted in Figure 31. Verify successful handover between each sector.

- 6. Once the route is complete, save the WiTT map view image.
- Rename the WiTT CSV log file to include the site and sector identifiers. (Naming Convention: *SiteID* _Intra_HO_date)
- 8. Package up the map view image file and CSV log file for each sector and provide these to RF planning.
- 9. Report any failures of discrepancies to the field supervisor.



Figure 33: Sample Intra-sector Handover Route

Appendix A Useful BTS MML Commands

The following commands may be useful for troubleshooting via the BTS LMT. Additional command information is provided on the Help tab of the LMT when the command is selected.

Command	Description	
GET RRUVSWR	Reports the system VSWR from the RRU.	
DSP BRDVER	Displays the bootrom and application software for the individual boards. Also displays hardware version.	
LST ALMAF	Lists the active alarms (Same as the Alarm window).	
LST SOFTWARE	List the main software package on the BTS.	
LST RRU	Lists the number of RRU and their subrack assignments.	
LST BRD	Lists BBU chassis slot assignments.	
MOD CARRIERBLOCKFLAG	Used to enable/disable transmission of a sector or carrier.	
PING	Used to ping from the BTS.	
ULK USR	If the LMT user is locked out due to too many failed login attempts, this command can be used to unlock the user.	