Certification Exhibit

FCC ID: Y75WINTLAW

FCC Rule Part: 15.247

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Manufacturer: BAE Systems
Model: R3T-S-700

Manual

R3T-S-700 Users Guide
Jan 19, 2011

Prepared For: General Distribution

DUNS 19-495-6751

Total number of pages: 87

FCC General Statements and Warnings:

Warning: Changes or modifications to this device not expressly approved by **BAE Systems** could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

NOTE: This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter."

Table Of Contents

1.0   802.16 SYSTEM OVERVIEW AND INTERCONNECTS

The functional block diagram of the 802.16 System is shown in Figure 1. The R3T-S-700 radio system is comprised of the R3T-S-700 Indoor radio and the Outdoor RF Unit. Table 1 provides a definition of the system interfaces. The RF Outdoor unit can be located up to 100 feet from the indoor unit. The system is designed to operate with up to 10 db cable loss between the Indoor and Outdoor units.
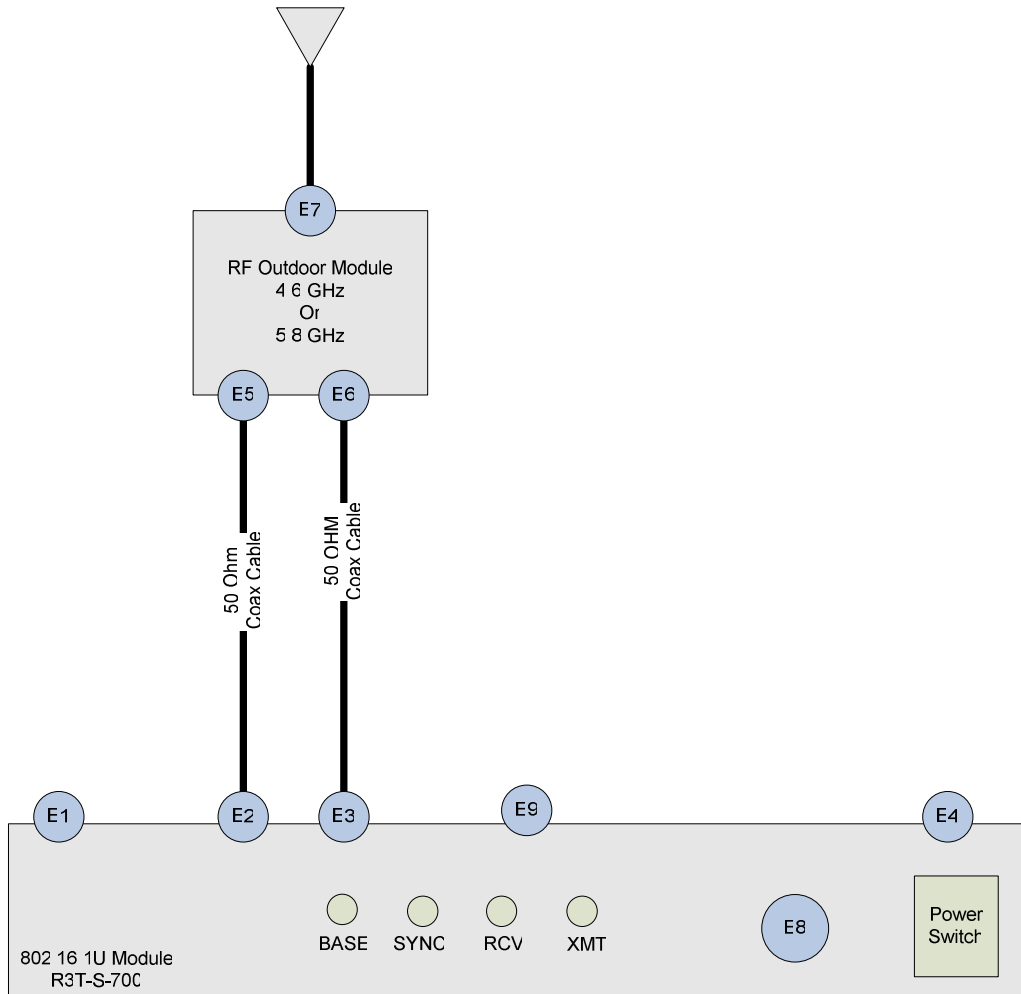
Figure 1 : 802.16 System Block Diagram

No.	Interface	Connector	Direction	Description
E1	Ethernet Control/Data	RJ-45	Input/Output	10/100BaseT Ethernet Network Connector
E2	RF -Radio	RX TNC Female	Input/Output	Input: RF Rx IF Input 5.8 or 4.6 GHz Output: 15VDC prime power for RF Unit
E3	RF -Radio	Tx TNC Female	Output	RF Tx IF Output 5.8 or 4.6 GHz. TTL Signal For RF Unit T/R Control: HIGH, 2.4V MIN TO 5V MAX; LOW, 0.7 VOLTS MAX TO 0 V MIN.
E4	Power	AC Plug	Input	110 VAC Power Source –Less than 1 Amp
E5	RF - RF Unit	J2 Type N Female	Input/Output	Output: RF Unit Rx out Port Input: Primary 15VDC
E6	RF –RF Unit	J1 Type TNC Female	Input	RF Module Tx in Port. TTL Signal : HIGH, 2.4V MIN TO 5V MAX; LOW, 0.7 VOLTS MAX TO 0 V MIN.
E7	RF –RF Unit	J3 Type N Female	Input/Output	Antenna Port (Tx/Rx) Omni or Directional Antenna
E8	Serial Control Interface	DB9	Input/Output	RS-232 Serial Connection – User Port SW Maintenance
E9	Serial Control Interface	DB25	Input/Output	RS-422/232 Serial Connection supporting GPS 1PPS, T/R Switch

Table 1 – R3T-S-700 Interfaces

Table 1 describes the interface of the R3T-S-700 System. Connections between the Indoor and Outdoor units should be made using low loss 50 ohm coaxial cable. The RF unit includes a solar shield and can be mounted to a mast as shown in Figure 2 below. Most omni-directional antenna designs can be mounted directly to the RF Unit Antenna Port N-Type connector (J3)
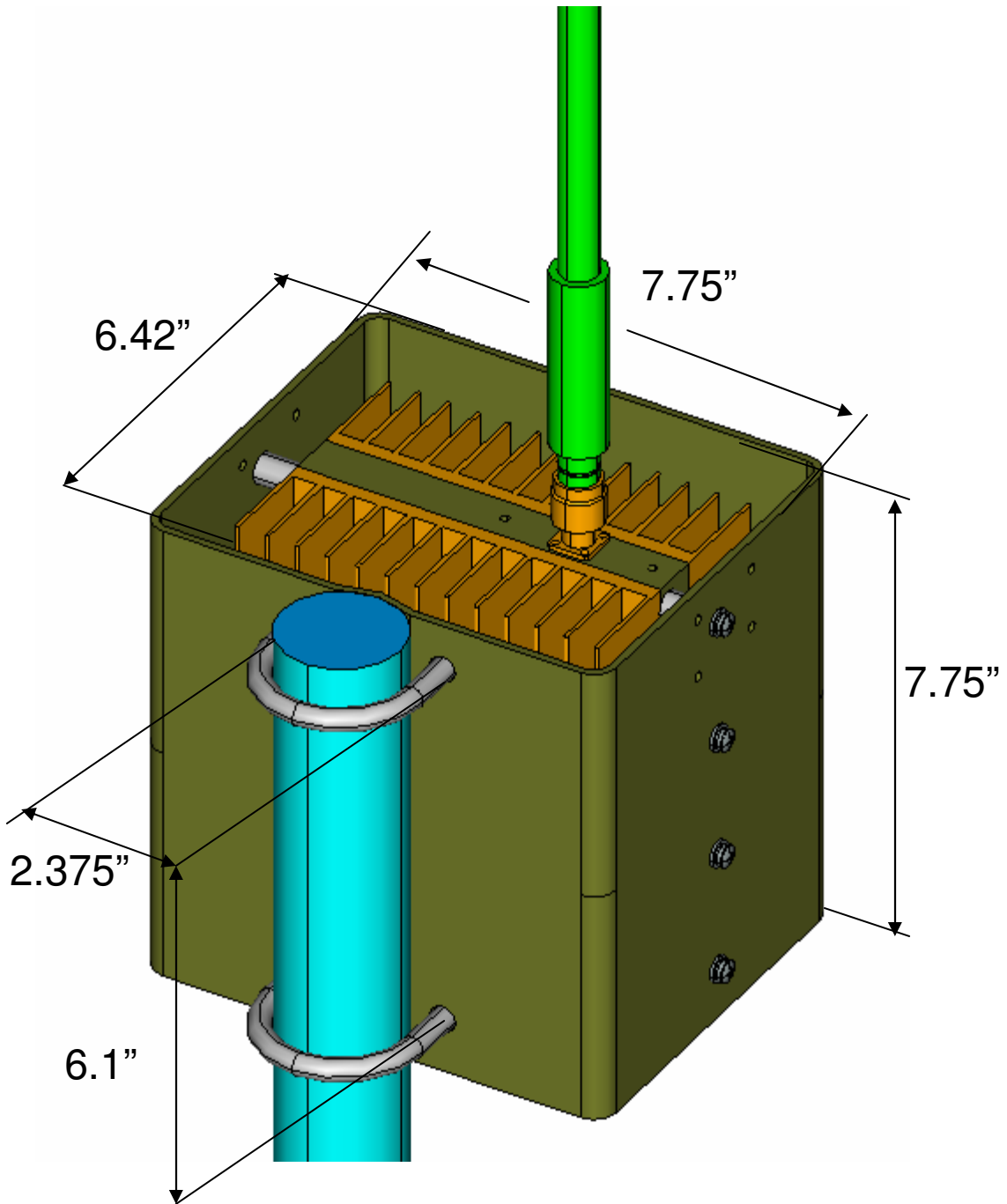
Figure 2 – Typical RF Outdoor Unit Mount to Mast

Figure 3 shows a typical radio setup using an omni antenna

Antenna

Tx Rx Module
* 4 5– 4 7 GHz or
* 5 725 – 5 825 GHz
* 5 Watt PA
* LNA
*Tx/Rx Switch

RF Tx

RF Rx

R3T-S-700
* 802 16 Radio
* BIAS-T
* Power Supply
* Processor/
Motherboard

802 16 User Console Port
* RS-232 Serial

802 16 Base Station GU
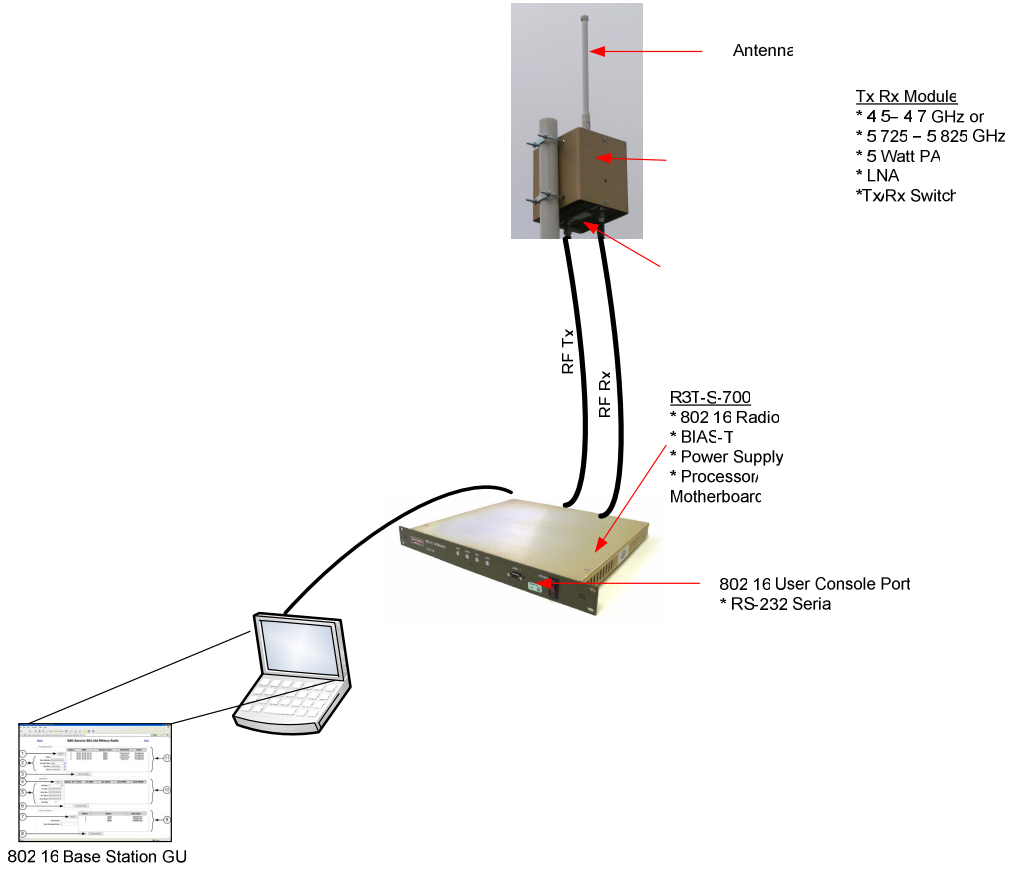
Figure 3 – Typical R3T-S-700 Configuration

2.0 1U RADIO

This unit is a COTS 1U Radio (1UR) that contains 802.16+ functionality. This unit mates with BAE supplied RF Unit and antenna system. With the appropriate external powerhead and antenna systems, it operates at both 5.8 GHz and 4.6 GHz ranges.

Figure 4. COTS 802.16 1U Radio (1UR)

2.1 1UR Features
- All the features and advantages of an IEEE 802.16 platform.
- Simple yet powerful GUI for radio configuration.
- Additional features from Aeronix 802.16+ MAC and PHY.
    - Designed for 2000 mph Doppler
    - Designed for 70 Mile Range, 72 Mbps Burst Rate (QAM64)
    - TRANSEC (v2.0 and above)
    - Designed for vibration tolerance
    - Extra Modulation/Encoding options for rotor aircraft
    - Dual Frequency (supports 5.8 GHz and 4.6 GHz).
    - IPV6 Capable
    - Linux Based MAC
    - Software Defined Radio
    - Evolution Path to 802.16e

2.2 UR Installation and Startup Procedures

Cable Connection

With unit power OFF, connect the cables as described and shown below:

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1) **Connect the RF Receive Cable to the 1U radio rear panel RX port, as shown in Figure 5.**

WARNING!
Unit power must be OFF.
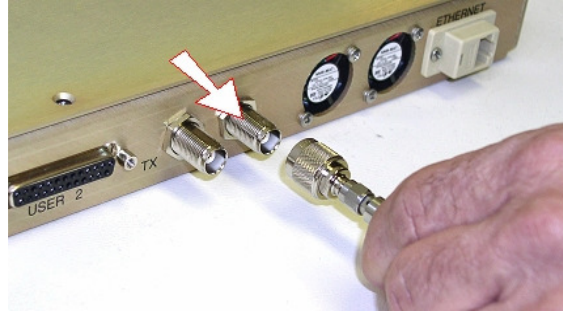
Figure 5. 1UR Receive Connection

2) **Connect the RF Transmit Cable to the 1U radio rear panel TX port, as shown in Figure 6.**

WARNING!
Unit power must be OFF.
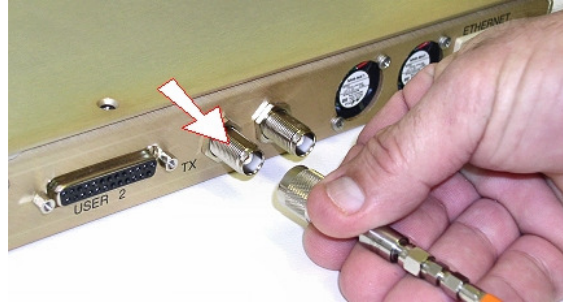
Figure 6. 1UR Transmit Connection

3) **Plug in the RJ-45 Network Connector into the RJ-45 ETHERNET receptacle on the 1U chassis rear panel, as shown in Figure 7.**

Figure 7. 1UR AX100617-00x Network Connection

4) **Plug supplied Power Cable female end into 1U chassis rear panel POWER receptacle as shown in Figure 8.**

5) **Plug supplied Power Cable male end into correct power source.**

6) **Power-on the unit by pressing the power switch on the 1U chassis front panel.**

Figure 8. 1UR Power Connection

7) Connect to the appropriate 9-pin Cable to the 1U chassis front panel USER 1 port, as shown in Figure 9.

Figure 9. 1UR User Port Connection

Startup – BS, SS, Bridging, Non-Bridging

Enter the following commands from a terminal connected to the user1 port. The terminal should be connected serially at Baud Rate = 115200, 8-N-1, and no flow control.

There are four base startups which are Base-station or Subscriber-station running in either bridging mode or non-bridging mode. To start in the modes perform the following:

1) >cd /mnt/jffs2
2) To run the system as a Base station in bridging mode: >cp startShimBridgeBS start
3) To run the system as a Base station in non-bridging mode: >cp startShimBS start
4) To run the system as a Subscriber station in bridging mode: >cp startShimBridgeSS start
5) To run the system as a Subscriber station in non-bridging mode: >cp startShimSS start

Once you have copied the appropriate script to the 'start' script perform one of the following modifications.

Startup Bridging Mode

Enter the following commands from any console connected to the 802.16 radio.

1) >cd /mnt/jffs2
2) Vi the start* file. The following (or similar) results will be displayed on the console.

```
-
-
-
./mnt/jffs2/brctl addbr mybridge
./mnt/jffs2/brctl addif mybridge eth0
./mnt/jffs2/brctl addif mybridge aend0
#This is where you need to set the network address so that you can run
the GUI
ifconfig mybridge 192.168.100.1 netmask 255.255.255.0

cd /mnt/jffs2
-
-
-
```

3) Modify the "ifconfig" line to have the desired IP address.
4) Reboot at the console prompt: >reboot

Startup IP Mode

Enter the following commands from any console connected to the 802.16 radio.

1) >cd /mnt/jffs2

2) Vi the start* file. The following (or similar) results will be displayed on the console.

   -

   insmod macss.ko subscriberNumber=1

   -
   ```
   ifconfig eth0 192.168.100.1
   ```
   -

   route add -net 192.168.1.0 netmask 255.255.255.0 gw 10.1.1.1 dev aend0

   -

3) Modify the "ifconfig eth0" line to have the desired IP address.

4) If this is for a subscriber change this line 'insmod macss.ko subscriberNumber=1' to = the desired subscriber number.

5) Modify the "route add" line to have the appropriate -net address. If you're on the base add the subscribers, if you're on the subscriber add the base-stations.

6) Reboot at the console prompt: >reboot

3.0 1UR Physical I/O

The front panel of a COTS 1U 802.16+ radio is shown in Figure 10. The rear panel is shown in Figure 11. Indicated controls, connectors, ports, and indicators are described below.
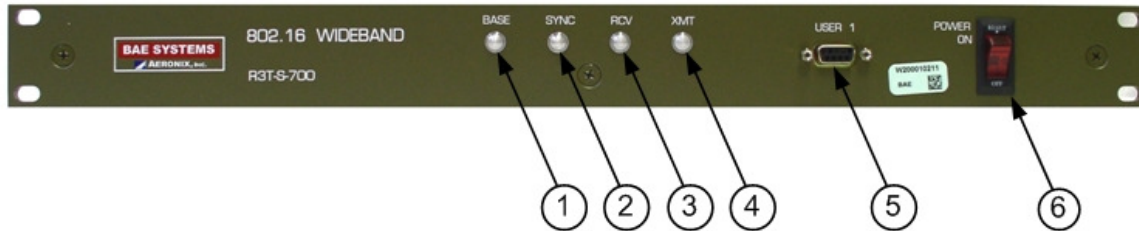
Figure 10. COTS 1UR Physical I/O, Front Panel
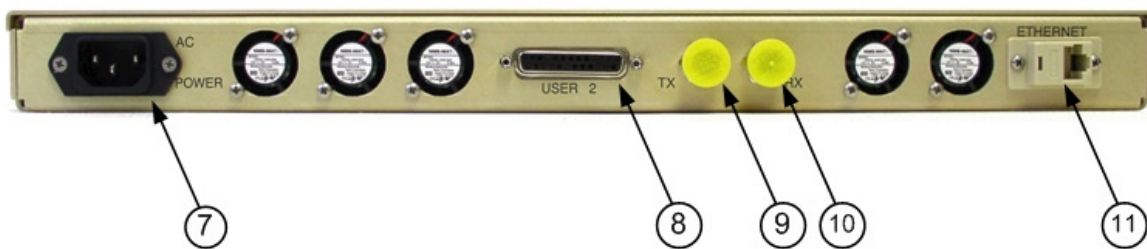
Figure 11. COTS 1UR Physical I/O, Rear Panel

①   **1UR LED - Base Indicator -** The 'BASE' LED is illuminated continuously when the radio is configured as a Base-Station. The 'Base' LED flashes at 1 second intervals when the radio is configured as a Subscriber-Station. When the LED is not illuminated, the power is off.

②   **1UR LED - Synchronization Indicator** – The 'SYNC' LED flashes on a Subscriber-Station when it has received maps from the Base-Station (sync) and it is illuminated continuously when the Subscriber-Station has registered with the Base-Station. The 'SYNC' LED is off on the Base-Station when no Subscriber-Stations are registered and is illuminated continuously when Subscriber-Stations are registered.

③   **1UR LED - Receive Indicator -** The 'RCV' LED is illuminated when a unit is receiving frames. It is sampled on a 1 second interval.

④   **1UR LED - Transmit Indicator -** The 'XMT' LED is illuminated when a unit is transmitting frames. It is sampled on a 1 second interval.

⑤ **1UR PORT – User 1 Port -** The User 1 port is a standard 9 pin female connector that supports RS-232 signals (Baud = 115200, 8-N-1 no flow control) with the following pin assignments:

Table 3.0-1. 1UR User 1 Port Pinout		
Pin	**Signal Name**	**Signal Description**
01		
02	RS232_TX1A	RS232 Output
03	RS232_RX1A	RS232 Input
04		
05	RS232_RTN2	Sig_Gnd
06		
07		
08		
09		

⑥ **1UR SWITCH – Power On/Off Switch and Indicator** - This power switch turns the radio On and Off. The switch is illuminated when the power is turned On and not illuminated when the power is turned Off.

⑦ **1UR CONNECTOR – AC Power Connector -** The unit requires 120V AC @ 60Hz power. It accepts the supplied standard IEC-430 AC power cord.

⑧ **1UR PORT – User 2 Port -** The User 2 port is a standard 25 pin female connector that supports RS-232/RS-422 maintenance debug, transmit receive switch, 1PPS, and reserved signals with the following pin assignments:

Pin	Signal Name	Signal Description
Table 3.0-2. 1UR User 2 Port Pinout		
01	RS232/RS422-_TX2A	RS232 / RS485 / RS422- Output
02	RS232/RS422-_RX2A	RS232 / RS485 / RS422- Input
03	RS485 / RS422+_TX2B	RS485 / RS422+ Output
04	RS485 / RS422+_RX2B	RS485 / RS422+ Input
05		
06	RS232_RTN	Sig_Gnd
07		
08		
09*	TR_SW1+	RS422 Output
10*	TR_SW1-	RS422 Output
11		
12	RSVD (TR_SW2+)	RS422 Output
13	RSVD (TR_SW2-)	RS422 Output
14		
15	RSVD (ZEROIZE+)	No Connect
16	RSVD (ZEROIZE-)	No Connect
17		
18		
19		
20	1PPS_TTL	50 Ohm TTL Input - Daisy Chain
21	1PPS_TTL	50 Ohm TTL Input
22	1PPS_RTN	Sig_Gnd
23	1PPS_RTN	Sig_Gnd - Daisy Chain
24	1PPS_TERM_IN	Termination Jumper
25	1PPS_TERM_OUT	Termination Jumper

Table 3.0-3. 1UR User 2 Port TX Enable Specifications						
	Parameter	**Test Conditions**	**Min**	**Typ[1]**	**Max**	**Unit**
V_O	Open-circuit output voltage	A or B, No load	0	- -	$+5V_{CC}$	V
$\mid V_{OD(SS)} \mid$	Steady-state differential output voltage magnitude	No load (open circuit)	3.3	4.2	$+5V_{CC}$	V
		$R_L = 54\ \Omega$	1.8	2.5	- -	
$\Delta\mid V_{OD(SS)} \mid$	Change in Steady-state differential output voltage between logic states	- -	-0.1	- -	0.1	V

[1] All typical values are at V_{CC} = 5V and 25°C
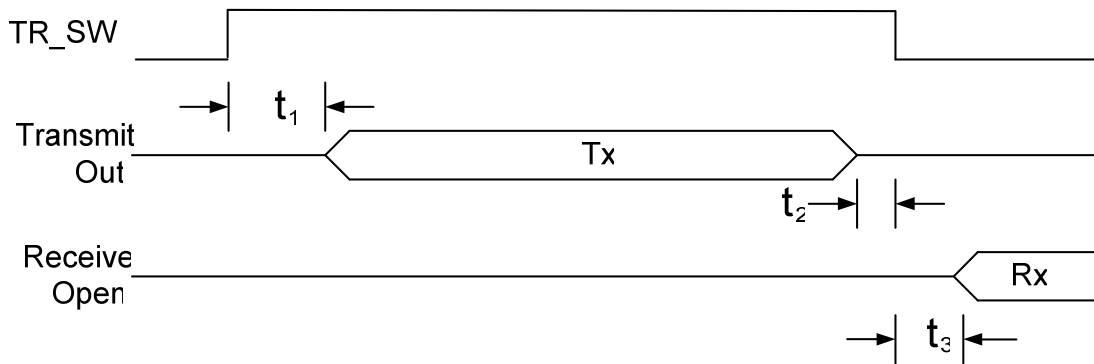
Figure 12. TR_SW Timing

Marker	Time (us)	Description
t1	1.5 us	Time from Tx Enable Active to start of Tx
t2	0.5 us	Time from Transmit Out Complete to Tx Enable Inactive
t3	1.5 us	Time from Tx Enable Inactive to start of Rx Window

⑨ **1UR CONNECTOR – Tx RF / Tx Enable Connector** - This female TNC connector is connected to the 802.16 RF Transmit system. +5 DC Power is present on center pin.

⑩ **1UR CONNECTOR - Rx RF Connector-** This female TNC connector is connected to the 802.16 RF Receive system. +15V, 4 Amps is present on center pin.

⑪ **1UR CONNECTOR - Ethernet Connector -** The Ethernet connector is a standard 10/100/1000BaseT RJ45 receptacle. It has the following pin assignments which conform to the Ethernet specification:

Table 3.0-4. 1UR Ethernet RJ45 Connector Pinout		
Pin	**Signal Name**	**Signal Description**
01	ETH_CHA+	10/100/1000BaseT
02	ETH_CHA-	10/100/1000BaseT
03	ETH_CHB+	10/100/1000BaseT
04	ETH_CHC+	10/100/1000BaseT
05	ETH_CHC-	10/100/1000BaseT
06	ETH_CHB-	10/100/1000BaseT
07	ETH_CHD+	10/100/1000BaseT
08	ETH_CHD-	10/100/1000BaseT

4.0 SYSTEM CONFIGURATION

This simple yet powerful GUI uses uncomplicated intuitive screens to allow the average 802.16 user:

- Configure the system for their network
- Take the system operational
- Perform maintenance

The GUI screens and all their respective elements are described in the following subsections.

To get to the main page, types the following URL: http://<ip address of the radio>/

A step-by-step setup example for bridging mode and non-bridge mode are provided in section 5 of this document. The bridging is the preferred method due to enhanced capabilities such as multicast and it does not require manual route configuration.

The recommended browsers to use are Internet Explorer Version 7 and Mozilla Firefox.

Base-Station Login Page

The base station requires a login for access to configuration screens. The base station contains one crypto officer login and one user login.   Access to certain configuration items is restricted for the user login.

	Table 0-1. Base Station Login Page	
	Link	**Description**
1	Login	Location to provide the username and password

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Base-Station Home Page

The base station home page contains hardware and software version information. It also contains network address information.
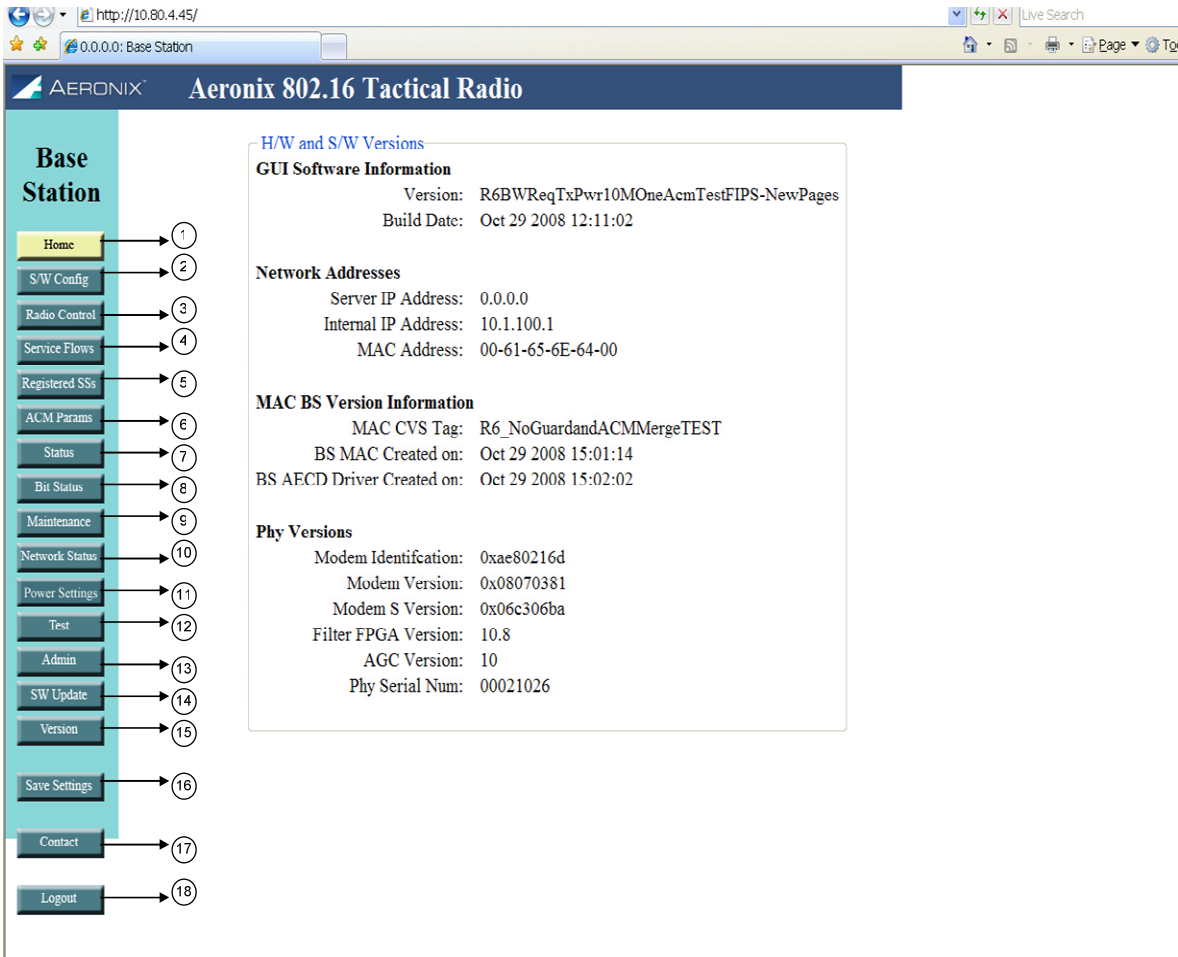
Table 0-2. Base Station Home Page		
	Link	**Description**
①	Home	HTML Link to the Home page that displays network access information as well as the hardware and software version information.
②	SW Config	HTML Link to the software configuration page; the configuration page contains the needed tools to define and configure the external systems interaction with the 802.16 radio.
③	Radio Control	HTML Link to the Radio Control Page; the radio control page contains channel, initial ranging and TRANSEC parameters. The user has limited capabilities for

Table 0-2. Base Station Home Page		
	Link	**Description**
		TRANSEC and keying.
(4)	Service Flow	HTML Link to the Service Flow page; the service flow page displays the current service flows within the node and the current state of each service flow; this page is used to enable or disable the ARQ.
(5)	Registered SS	HTML Link to the Registered SS page; the registered SS page displays the current subscribers registered within the node; this is a display page only with no actions.
(6)	ACM Params	HTML Link to the parameters to adjust the automatic changing of modulations. This screen is only accessible to the crypto officer.
(7)	Status	HTML Link to the Status page; the status page contains operating status of the radio.
(8)	Bit Status	HTML Link to the Bit Status results page. This page provides results of the test executed at startup.
(9)	Maintenance	HTML Link to the Maintenance; the maintenance page contains information for debugging and antenna pointing.
(10)	Network Status	HTML Link to the Network Status page; this page provides transmit and receive status for the Ethernet interface.
(11)	Power Settings	HTML link to the Power Settings page; this page provides the capability to enter gain settings and cable loss settings for ranging purposes.
(12)	Test	HTML Link to the Test page for running either a CW test or BER test.
(13)	Admin	HTML Link to the administration page. This page provides TRANSEC key selection and password changing capabilities. The user login does not have access to the TRANSEC key selection functions.
(14)	Software Update	HTML Link to the software update page. This page provides the capability to update the software to the crypto officer only.
(15)	Version	HTML Link to Version page; the version page contains the hardware and software version information.
(16)	Save Settings	Save Settings control key will save the current selected values in each GUI screen to the Base Station database. **Additions, modifications or deletions are not permanently saved to the database unless this control key is selected.**
(17)	Contact	HTML Link to the Contact Page; the contact page contains Aeronix Inc. contact information.
(18)	Logout	The logout control key logs the current user out of the system.

BAE SYSTEMS

Base-Station Software Configuration Page

Non-Bridging Example

http://10.80.4.45/80216d/Configuration.htm   Live Search

0.0.0.0: Base Station Configuration

AERONIX   **Aeronix 802.16 Tactical Radio**

Base Station

Home
S/W Config
Radio Control
Service Flows
Registered SSs
ACM Params
Status
Bit Status
Maintenance
Network Status
Power Settings
Test
Admin
SW Update
Version
Save Settings
Contact
Logout

Service Classes ①

Index	Name	Schedule Type	Max Rate	Min Rate	Latency (msec)	Priority	Jitter (msec)
1	initial	Best Effort	5885 Kbps	1 Kbps	80	1	20
2	little	Best Effort	100 Kbps	1 Kbps	80	1	20
3	middle	Best Effort	2500 Kbps	1 Kbps	80	1	20
4	BE_MAX	Best Effort	50000 Kbps	1000 Kbps	80	1	80
5	BE_MULTICAST	Best Effort	6096 Kbps	3657 Kbps	80	1	80

ADD ENTRY | MODIFY ENTRY ... | REMOVE ENTRY ... | CANCEL

Provisioned SFs ②

SF Index	MAC	Service Class	Direction	State
4	00-61-65-6E-64-01	BE_MAX	Downstream	Provisioned
5	00-61-65-6E-64-01	BE_MAX	Upstream	Provisioned
6	00-61-65-6E-64-02	BE_MAX	Downstream	Provisioned
7	00-61-65-6E-64-02	BE_MAX	Upstream	Provisioned

ADD ENTRY | MODIFY ENTRY ... | REMOVE ENTRY ... | CANCEL

Class Rules ③

Address Mode: MAC   IPV4 | MAC

Index	SF	Fwd	Src MAC	Src Mask	Dest MAC	Dest MASK
4	4	N	00-61-65-6E-64-00	FF-FF-FF-FF-FF-FF	00-61-65-6E-64-01	FF-FF-FF-FF-FF-FF
5	5	N	00-61-65-6E-64-01	FF-FF-FF-FF-FF-FF	00-61-65-6E-64-00	FF-FF-FF-FF-FF-FF
6	6	N	00-61-65-6E-64-00	FF-FF-FF-FF-FF-FF	00-61-65-6E-64-02	FF-FF-FF-FF-FF-FF
7	7	N	00-61-65-6E-64-02	FF-FF-FF-FF-FF-FF	00-61-65-6E-64-00	FF-FF-FF-FF-FF-FF
8	4	Y	00-61-65-6E-64-01	FF-FF-FF-FF-FF-FF	00-61-65-6E-64-02	FF-FF-FF-FF-FF-FF
9	5	N	00-61-65-6E-64-01	FF-FF-FF-FF-FF-FF	00-61-65-6E-64-02	FF-FF-FF-FF-FF-FF
10	6	Y	00-61-65-6E-64-02	FF-FF-FF-FF-FF-FF	00-61-65-6E-64-01	FF-FF-FF-FF-FF-FF
11	7	N	00-61-65-6E-64-02	FF-FF-FF-FF-FF-FF	00-61-65-6E-64-01	FF-FF-FF-FF-FF-FF

ADD ENTRY | MODIFY ENTRY ... | REMOVE ENTRY ... | CANCEL

Bridging Example

Table 0-3. Base Station Software Configuration Page		
	Field/Control	**Description**
①	Service Classes	Displays the service classes currently entered which define the scheduling services for the network. • Add Entry Button allows for adding a new service class entry. Click on the button and enter the fields. When the fields are complete click on the add button to the right of the entry fields. • Modify Entry Button allows for modifying a service class entry in the table. Click on the button and then select the entry to modify by clicking on the modify button to the right of the entry line. When

	Field/Control	Description
Table 0-3. Base Station Software Configuration Page	
		modifications are complete click the save button to the right of the entry line. • Remove Entry Button allows for removing a service class entry from the table. Click on the button and then click on the remove button to the right of the entry line to remove. • Cancel Button allows for canceling the current add or modify request. Entry fields: • Index – the index into the service class table for the entry. This field is not entered by the user. • Name – the user defined name for the service class. • Schedule Type – the scheduling type for the service class. The entries are defined in a drop down by the system. • Max Rate – the maximum data rate for the service class in Kbps. • Min Rate – the minimum data rate for the service class in Kbps. • Latency – the latency of the service class. This is only used as a guideline for pertinent schedule types. • Priority - the priority of the service class. This is only used for the real time and non-real time scheduling types. Seven is the highest priority. • Jitter – the jitter of the service class. This is only used as a guideline for pertinent schedule types.
②	Provisioned Service Flows	Displays the provisioned service flows currently entered for the network. The service flows define the service class for the uplink and downlink of each subscriber station in the network. • Add Entry Button allows for adding a new provisioned service flow entry. Click on the button and enter the fields. When the fields are complete click on the add button to the right of the entry fields. • Modify Entry Button allows for modifying a provisioned service flow entry in the table. Click on the button and then select the entry to modify by clicking on the modify button to the right of the entry line. When modifications are complete click the save button to the right of the entry line. • Remove Entry Button allows for removing a provisioned service flow entry from the

Table 0-3. Base Station Software Configuration Page			
	Field/Control	**Description**	
		table. Click on the button and then click on the remove button to the right of the entry line to remove. • Cancel Button allows for canceling the current add or modify request. Entry fields: • SF Index – unique index for the service flow. Valid entries are 3-255. The values of 1,2,3 are reserved. • MAC – the IEEE 802.16 MAC address of the subscriber station. • Service Class – a drop down selection for the service class for the service flow. • Direction – the direction of the service flow. Downstream is BS to SS and upstream is SS to BS. • State – the state of the service flow (display only).	

③	Class Rules	Displays the classifier rules currently entered for the network. The classifiers define the paths that traffic is allowed to flow in the network.
		
		    • Add Entry Button allows for adding a new class rule for the network. Click on the button and enter the fields. When the fields are complete click on the add button to the right of the entry fields.
		    • Modify Entry Button allows for modifying a class rule entry in the table. Click on the button and then select the entry to modify by clicking on the modify button to the right of the entry line. When modifications are complete click the save button to the right of the entry line.
		    • Remove Entry Button allows for removing a class rule entry from the table. Click on the button and then click on the remove button to the right of the entry line to remove.
		    • Cancel Button allows for canceling the current add or modify request.
		
		Entry Fields:
		• Index - the index into the classifier table for the entry. This field is not entered by the user.
		• SF – the SF index that the classifier is associated. Defines the route for data traffic.
		• Fwd – forwarding flag used to specify a downstream forwarding classifier. Forwarding classifiers must be consistent	

Table 0-3. Base Station Software Configuration Page		
	Field/Control	**Description**
		with non-forwarding classifiers. For example, if using IP masks with the non-forwarders, one must also use the same mask with the forwarders. Forwarders define data traffic from a subscriber that should be forwarded to another subscriber. • Src MAC - The source external network nodes Ethernet MAC address. This is the source of data packets. • Src Mask - Mask to be applied to Source MAC field, allows you to open up a range of MAC addresses. • Dest MAC – The destination external network nodes Ethernet MAC address. This is the destination of packets. • Dest Mask - Mask to be applied to • Destination MAC field, allows you to open up a range of MAC addresses.

Multicast Note:

- o A service class for multicast data is automatically configured that defines the possible bandwidth for multicast messages. The maximum and minimum rate can be modified according to the expected multicast traffic of your system. The multicast service class cannot be deleted as multicast support is always on in the bridging configuration. Multicast is not currently supported in the non-bridging configuration.

Base Station Radio Control Page

	Field/Control	Description
①	Tx/Rx Status	The Tx/Rx Status indicates if the user has selected the Tx/Rx control on or off.
②	Tx/Rx On and Off Buttons	Buttons to select the Tx/Rx function to be turned on or off. When turned off the unit will not transmit or receive.
③	Link Bandwidth Allocation	The current link bandwidth allocation is shown in percentage of upstream and downstream allocation. • Up % and Down % on the left displays the current allocation of the network. • Link Bandwidth Allocation Slide Bar – method to adjust the allocation. The Down and Up percentages on each side of the slide bar displays the adjusted

Table 0-4. Base Station Radio Control

Table 0-4. Base Station Radio Control		
	Field/Control	**Description**
		value. • Set Allocation Button – changes the current allocation to the new settings displayed in the Down and Up boxes adjacent to the slide bar.
④	Channel / Channelization	Displays channel information for the base station. • Current Channel – displays the current channel of the base station. • Channel (Freq) – drop down to choose a different channel for the base station. • Set Button – changes the current channel of the base station to the channel selected by the channel (freq) drop down. • Current Channelization – displays the current channelization of the radio. The base station and subscriber stations need to be configured for the same channelization. • Channelization Selection – Allows the selection of the channelization. **The 10MHz Europe is not currently enabled in the product.** • Set Button – changes the current channelization selected by the user.
⑤	Power Values	Allows the user to adjust the transmit power of the radio. • Tx Pwr Ctrl – the value on the left of the screen shows the current setting. The drop down on the right side of the screen allows the user to choose a different setting. Any grey value in the drop down is not currently supported in the product. • Set Button – changes the transmit power control parameter to the chosen value from the drop down. • BS Estimated EIRP – the value is an estimated EIRP based upon configuration settings and received RSSI readings.
⑥	Cable Length	Allows the user to define certain cable length values. The choices are defined on the Power Settings configuration page by a privileged user. • External Rx – the current cable length and loss defined in the system for the external receive cable. • External Rx Cable Loss – drop down to choose the receive cable length and loss in dB for the external receive cable. • Set Button – changes the external receive cable loss parameter in the radio.

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Table 0-4. Base Station Radio Control		
	Field/Control	**Description**
		• Antenna – the current cable length and loss defined in the system for the antenna cable. • Antenna Cable Loss – drop down to choose the antenna cable loss parameter. • Set Button – changes the antenna cable loss parameter in the radio.
⑦	Transec	Displays the settings for Transec capability. • Status - Displays whether Transec is on or off on the base station. • Transec On/Off – buttons to turn Transec on or off. The crypto user is the only user that can turn Transec off. • Current Effective Key – displays the key slot of the current effective key. The current effective key is selected on the Admin page by the crypto officer. • Key – drop down to select a key slot to zeroize. • Zeroize – button to initiate the zeroization of the key slot selected in the key drop down.

Base Station Service Flows

| **Table 0-5. Base Station Service Flow**		
	Field	**Description**
①	Service Flows	Displays every service flow that is currently configured in the base station. Displays the following selected fields: • Index - Actual index number assigned to the service flow. • CID - Basic CID for this service flow, corresponds to basic CID in registered SS page. • Direction - Direction is either upstream or downstream. To create 1 duplex connection you must configure an upstream and downstream service flow. • State - States can be Provisioned, Admitted, or Active. Provisioned is a service flow that was configured but the subscriber has not yet established communication with the base station. Admitted is a state in which a subscriber is

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Table 0-5. Base Station Service Flow		
	Field	**Description**
		registered and allowed in the system but is not yet flowing traffic. Active is a flow that currently has traffic or the ability to pass traffic. • Service Class - The textual name of a configured service class that the node is using for QOS parameters. • Max Sustained Rate - QOS parameter that defines the maximum sustained rate that will be made available to the flow. • ARQ Enabled – When the box is checked, ARQ is enabled for the service flow. A reboot is necessary after changing this value and saving the settings.
②	Downstream Burst Profiles	Displays the downstream burst profiles which define the FEC types that the base station uses for transmissions. • Add Entry Button allows for adding a new burst profile for the network. Click on the button and enter the fields. When the fields are complete click on the add button to the right of the entry fields. • Modify Entry Button – The modify capability has is enabled on the ACM parameter screen. • Remove Entry Button allows for removing a burst profile rule entry from the table. Click on the button and then click on the remove button to the right of the entry line to remove. • Cancel Button allows for canceling the current add or modify request. Entry Fields: • Index - the index into the burst profile table for the entry. This field is not entered by the user. • DIUC – the DIUC for the entry. This field is not entered by the user. • DCD FEC Code – drop down menu to choose the FEC to use for the burst profile. This defines the modulation type and forward error correction. • CINR Mandatory Exit – Threshold value of CINR in dB that is used as a decision point to exit the use of this profile. Valid values are 1-65. • CINR Minimum Entry - Threshold value of CINR in dB that is used as a decision point to enter the use of this profile. Valid values are 1-65. • FEC Mandatory Exit – Threshold value of FEC errors that is used as a decision point for exiting a current modulation. The unit of this value is bits per symbol. • FEC Mandatory Entry – Threshold value of FEC errors that is used as a decision point for entering a modulation. The unit of this value is bits per

Table 0-5. Base Station Service Flow		
	Field	**Description**
		symbol.
③	Upstream Burst Profiles	Displays the upstream burst profiles which define the FEC types that the subscriber stations use for transmissions. The current implementation uses the same values for upstream as downstream for CINR and FEC entry and exit. Entry Fields (display only): • Index - the index into the burst profile table for the entry. • UIUC – the UIUC for the entry. • FEC – type of modulation and forward error correction of the burst profile.

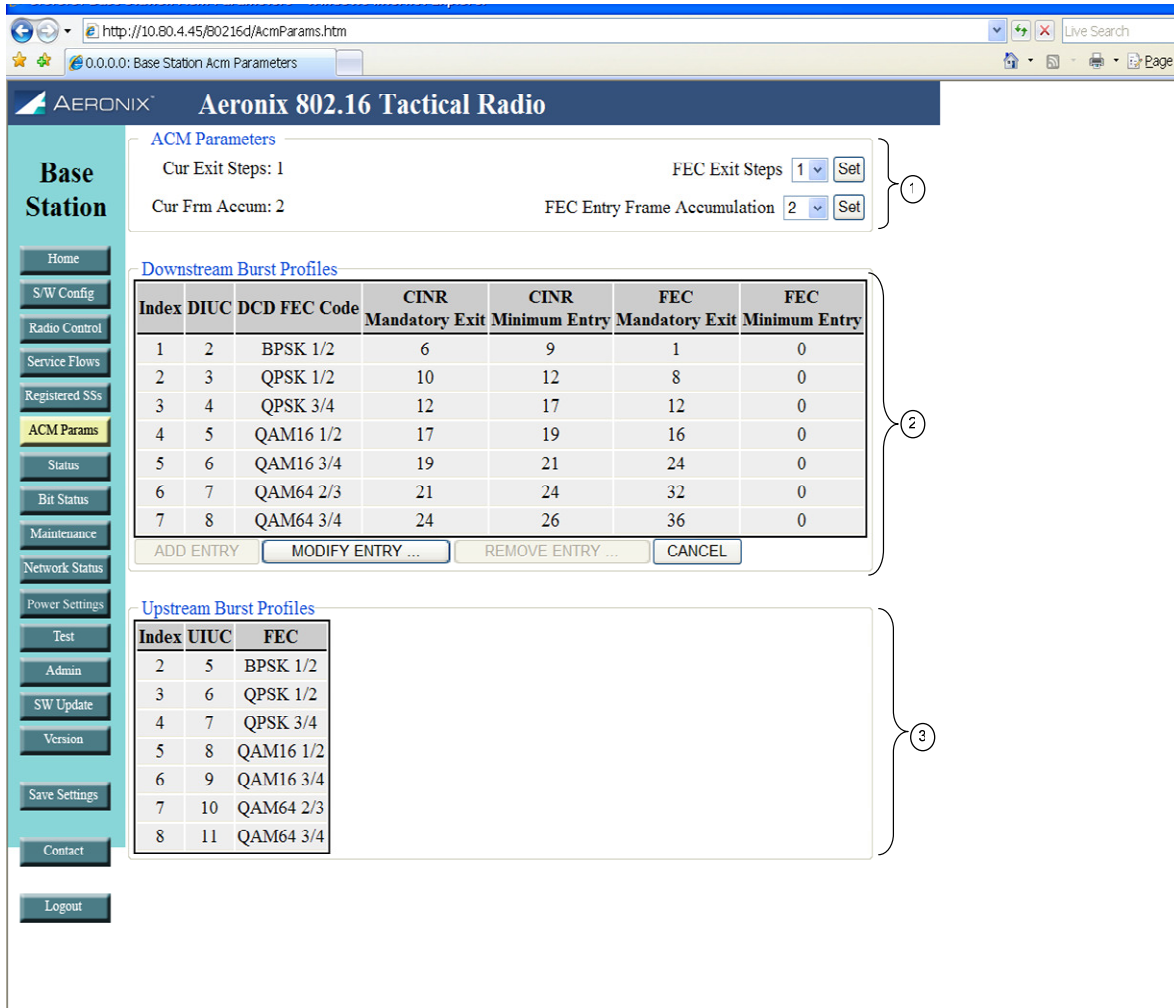## Base Station Registered SS Page
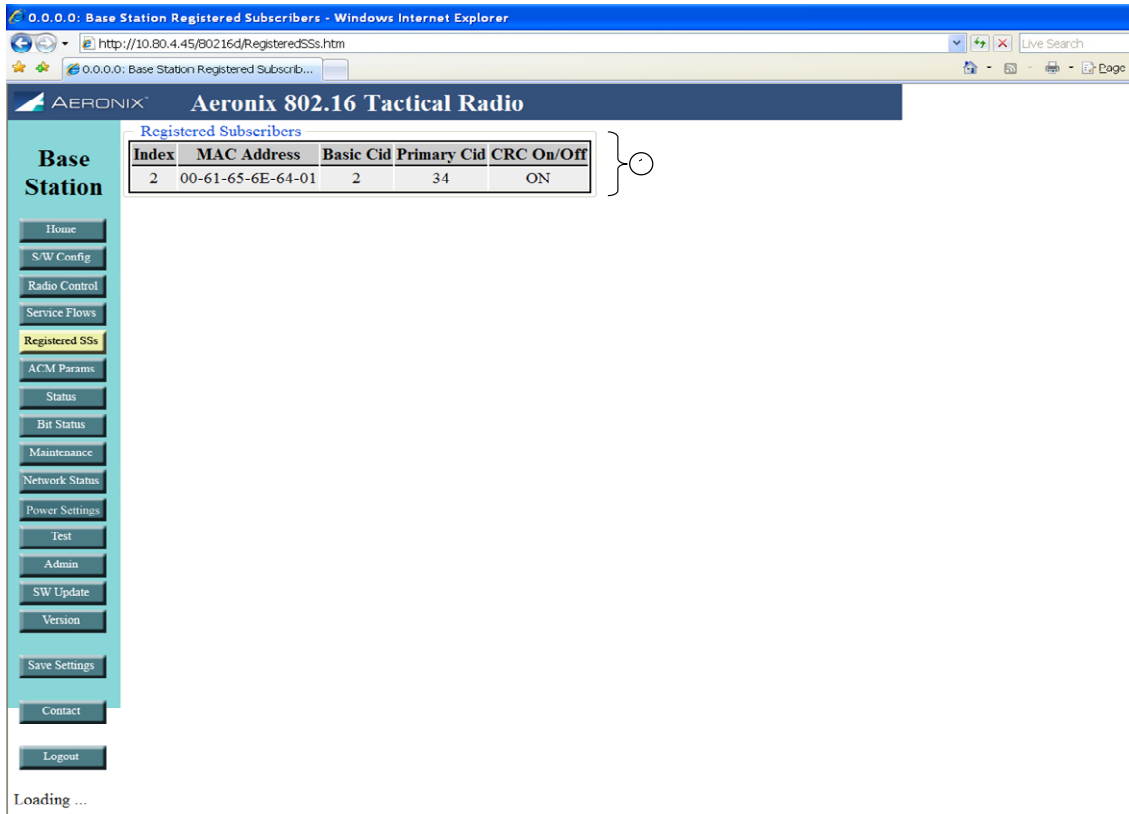
Table 0-6. Base Station Registered SS		
	Field	**Description**
①	Registered SSs Display	Displays all subscriber stations which are registered with the base station. Fields that are

Table 0-6. Base Station Registered SS		
	Field	**Description**
		displayed include: • Index - Actual index numbered assigned to the entry. • MAC Address - IEEE 802.16 MAC address of subscriber station. • Basic Cid - Basic Connection ID of the subscriber station, used to flow traffic data between the base station and subscriber station. • Primary Cid - Primary Connection ID of the subscriber station, used to flow management data between the base station and subscriber station. • CRC On/Off - Indicates if CRC mechanism is on or off for the subscriber station. CRC covers the entire contents of each PDU within the connections.

Base Station ACM Parameters Page

<table>
<tr><td colspan="3" align="center">Table 0-7. Base Station ACM Page</td></tr>
<tr><td></td><td>Field</td><td>Description</td></tr>
<tr>
<td>①</td>
<td>ACM Parameters</td>
<td>Displays the adjustable ACM parameters which includes the following selected fields:

Current Exit Steps – Displays the current number of modulation steps to take when exiting the current modulation.
FEC Exit Steps – Drop down menu for selecting the number of steps to take in the modulation table when exiting the current modulation due to FEC errors occurring.
Set Button – Sets the exit steps selected in the FEC Exit Steps drop down.
Current Frame Accumulation – Displays the current number of frames to accumulate before deciding to adjust the modulation up or down.
FEC Entry Frame Accumulation – Drop down menu for selecting the number of frame to

</td>
</tr>
</table>

(BAE SYSTEMS logo)

Table 0-7. Base Station ACM Page		
	Field	**Description**
		accumulate before adjusting the modulation up or down. • Set Button – Sets the FEC Entry Frame Accumulation selected in the drop down menu.
②	Downstream Burst Profiles	Displays the downstream burst profiles which define the FEC types that the base station uses for transmissions as well as the entry and exit threshold for switching modulations. • Add Entry Button – the button is enabled on the service flow screen. • Modify Entry Button – The modify capability allows the user to modify the entry and exit thresholds for switching modulations. • Remove Entry Button - the button is enabled on the service flow screen. • Cancel Button allows for canceling the current modify request. Entry Fields: • Index - the index into the burst profile table for the entry. This field is not entered by the user. • DIUC – the DIUC for the entry. This field is not entered by the user. • DCD FEC Code – drop down menu to choose the FEC to use for the burst profile. This defines the modulation type and forward error correction. • CINR Mandatory Exit – Threshold value of CINR in dB that is used as a decision point to exit the use of this profile. Valid values are 1-65. • CINR Minimum Entry - Threshold value of CINR in dB that is used as a decision point to enter the use of this profile. Valid values are 1-65. • FEC Mandatory Exit – Threshold value of FEC errors that is used as a decision point for exiting a current modulation. The unit of this value is bits per symbol. • FEC Mandatory Entry – Threshold value of FEC errors that is used as a decision point for entering a modulation. The unit of this value is bits per symbol.
③	Upstream Burst Profiles	Displays the upstream burst profiles which define the FEC types that the subscriber stations use for transmissions. The current implementation uses the same values for upstream as downstream for CINR and FEC entry and exit. Entry Fields (display only): • Index - the index into the burst profile table for the entry. • UIUC – the UIUC for the entry.

Table 0-7. Base Station ACM Page

Field	Description
	• FEC – type of modulation and forward error correction of the burst profile.

Base Station Status Page

Table 0-8. Base Station Status

	Field	Description
①	Status	Status displays a subset of current settings. • Current Channel – the current 802.16 specified channel that the base station uses for transmit and receive. • MAC Address – The IEEE 802.16 MAC address of the base station. • BS Estimated EIRP – Displays the estimated EIRP of the base station based upon user configured gain a loss values.

Table 0-8. Base Station Status		
	Field	**Description**
		• Tx/Rx - Status indicating whether the base station Tx/Rx capability is currently on or off. • Current Channelization – displays the channelization of the base station. • Transec Status – displays the status of Transec (on or off).
②	Front Panel	Displays the PHY status lights on an interval basis. The lights should match those on the front of the unit but, could be delayed slightly due to sample rate.
③	Status Table	Displays the status of each subscriber connection. • Subscriber SFID - Contains the service flow ID of the downstream service flow to the subscriber. • Current Modulation Type – Contains the current modulation/FEC type for the subscriber connection. The display show the modulation of the receive frame at the time sampled. • Avg CINR – Displays the average CINR value for the subscriber connection. • Avg Leveled RSSI – Displays the average leveled RSSI value for the subscriber connection. The value is calculated from the receive loss and gain values entered by the user and the actual RSSI value received by the PHY. • Level – Displays the level of the RSSI.

Base Station Bit Status

This page shows the results of the bit tests executed at startup. The names and number of tests may change due to FIPS requirement changes.

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Base Station Maintenance Page

Table 0-9. Base Station Maintenance		
	Field/Control	**Description**
①	Node Maintenance	Provides a method of rebooting the system without a power cycle. Provides a method to revert back to the default database.
②	Channel Maintenance Status	Provides some additional values on a connection basis for debugging and antenna pointing purposes. • Current CINR – the instantaneous CINR for the connection. • Average CINR – the average CINR of the connection over a period of received

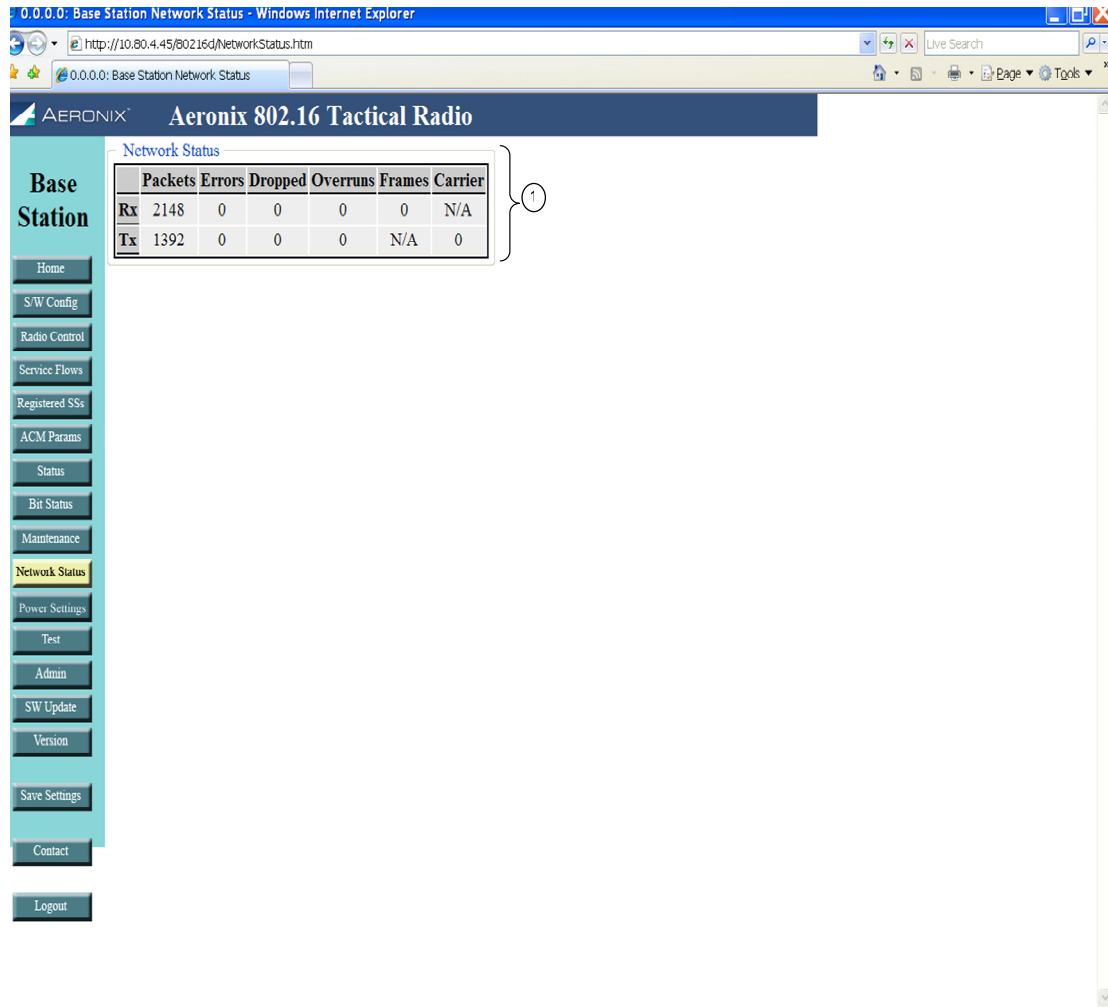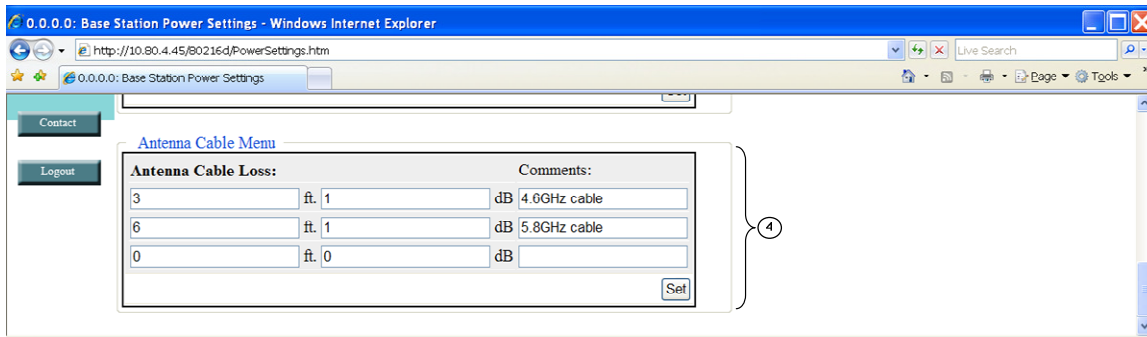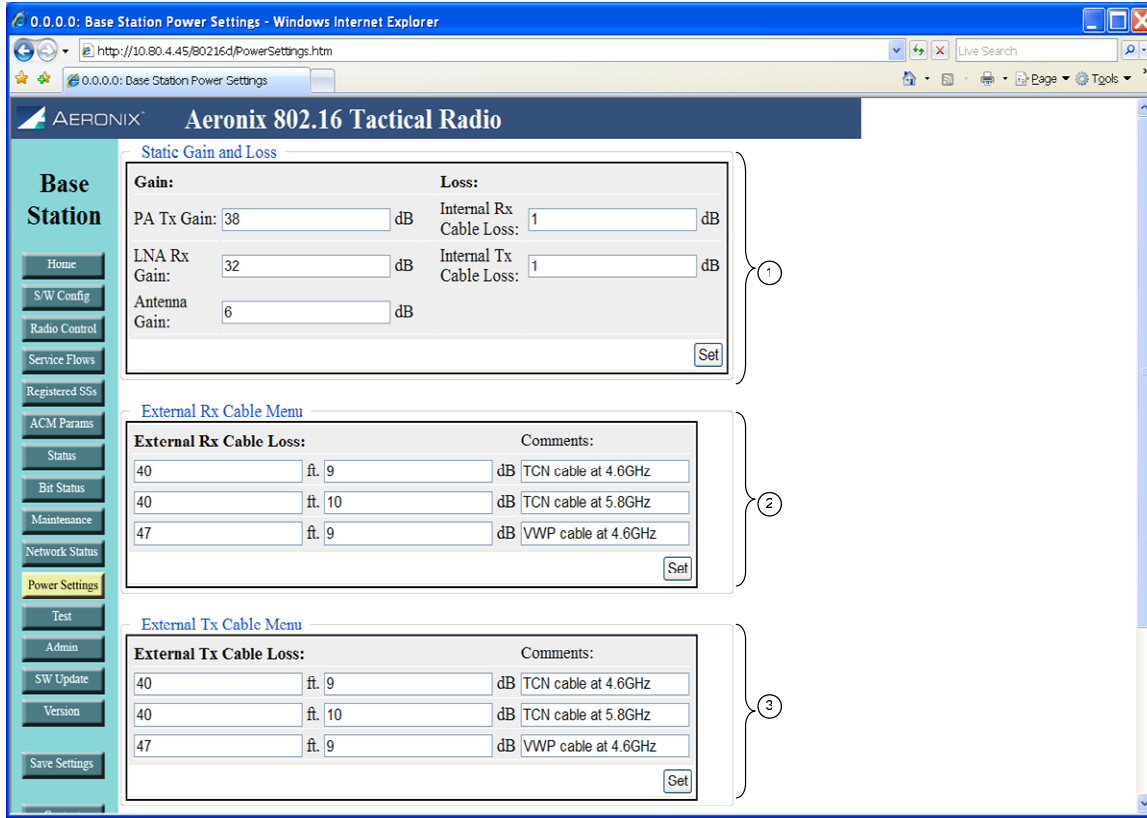| Table 0-9. Base Station Maintenance		
	Field/Control	**Description**
		frames. • Current RSSI – the instantaneous RSSI for the connection. • Average RSSI – the average RSSI of the connection over a period of received frames. • Current Leveled RSSI – the current leveled RSSI value for the connection. The leveled RSSI reflects the loss and gain values from the output of the PHY (including the transmit power attenuation value) to the PA/LNA. • Average Leveled RSSI – the average leveled RSSI value of the connection over a period of received frames. • Average Frequency Offset – the average frequency offset of the connection over a period of received frames. • FEC Corrected Bits – the instantaneous forward error correction corrected bits • Average FEC Corrected Bits – the average forward error correction corrected bits for the connection
③	Tx/Rx Maintenance Status	Provides the Tx and Rx frame counts and well as error counts for debugging. • Rx Frames – the number of frames received • Invalid Frames – the number of frames received that were invalid • CRCs Rx – the number of CRCs received • Reset Rx – the number of times the receive path has been reset • Tx Frames – the number of frame transmitted • Tx Drop – the number of transmit frames that were dropped by the classifiers
④	Ranging Environment	Provides the gain and loss settings used for ranging purposes and EIRP calculations. These settings are configured on the Power Settings and Radio Control pages.
⑤	PHY Temperature	Provides the temperature of the PHY card inside of the radio box.

Base Station Network Status Page

Table 0-10. Base Station Network Status		
	Field/Control	**Description**
①	Network Status	Displays the number of transmitted and received frames on the network side of the radio. This reflects the eth0 interface in a non-bridging configuration and the mybridge interface in a bridging configuration.

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Base Station Power Settings Page

Table 0-11. Base Station Power Settings Page		
	Field/Control	**Description**
①	Static Gain and Loss	• PA Tx Gain – the transmit gain of the power amplifier located outside of the radio • LNA Rx Gain – the receive gain of the low noise amplifier located outside of the radio • Antenna Gain – the gain of the antenna located outside of the radio • Internal Rx Cable Loss - the loss of the cable and any other components in the receive path inside of the radio box but external to the PHY • Internal Tx Cable Loss – the loss of the cable and any other components in the transmit path inside of the radio box but external to the PHY • Attenuation – the change in transmit power of the PHY
②	External Rx Cable Menu	• Contains up to three entries for external receive cable loss values. This value represents the receive cable between the radio unit and the receive LNA. The user inputs the length of the cable in feet and the loss value in dB. The comment field is optional. The first value entered will be the default value that gets used initially for ranging, leveled RSSI and EIRP calculations. To change the values used go to the Radio Control page.
③	External Tx Cable Menu	• Contains up to three entries for the transmit cable loss values. This value represents the cable between the radio unit and the transmit power amplifier. The user inputs the length of the cable in feet and the loss value in dB. The comment field is optional.
④	Antenna Cable Menu	• Contains up to three entries for the antenna cable loss values. This value represents the cable between the power head and the antenna. The user inputs the length of the cable in feet and the loss value in dB. The comment field is optional.

➢ The Set button in each section is used to place the current values entered into the database.
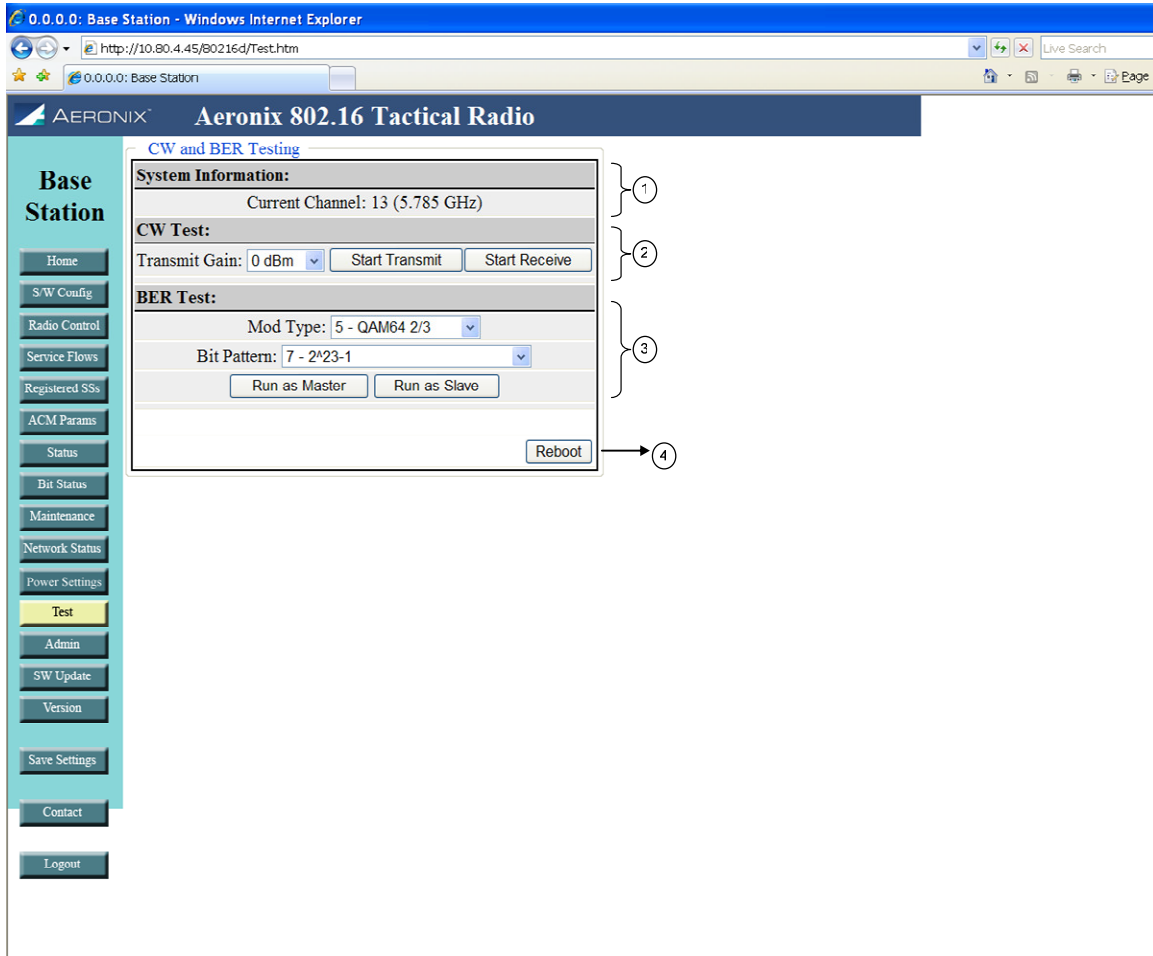
Base Station Test Page

Table 0-12. Base Station Test Page		
	Field/Control	**Description**
①	System Information	Provides the current channel information of the radio
②	CW Test	Provides the capability to execute a continuous waveform test. • Transmit Gain – Selection of the transmit gain desired from the pull down menu. • Start Transmit – Starts the transmission of a CW • Start Receive – Starts the receive of a CW
③	BER Test	Provides the capability to execute a bit error rate test. • Mod Type – Defines the modulation type used during the test. • Bit Pattern – Define the bit patter used during the test.