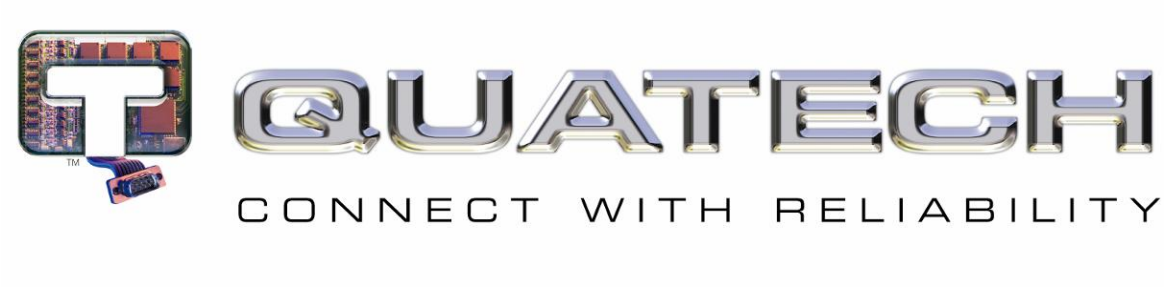

Users Guide

Airborne Enterprise Evaluation Kit
WLNG-SE/SP/AN/ET-DP500 Series

Revision X2

June 09

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The information in the document is believed to be correct at the time of print. The reader remains responsible for the system design and for ensuring that the overall system satisfies its design objectives taking due account of the information presented herein, the specifications of other associated equipment, and the test environment.

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1.0 Overview

This guide describes the Airborne™ Enterprise class Device Server Module Evaluation Kit from Quatech, Inc. The Module Evaluation Kit is intended as a testing and development platform for Quatechs' Airborne™ Enterprise Device Server Module. The Airborne Module offers significant advantages over other wireless solutions in terms of size, cost, power consumption, and performance. It is ideal for applications that require a reliable embedded IEEE 802.11b/g-compliant wireless engine.

This Kit is a complete package powered by the Airborne Module. It includes an Airborne™ Evaluation Board (EVB) that contains the Airborne Module along with connectors and headers that provide access to all of the modules interfaces. It also includes the Microsoft® Windows®-based Airborne Control Center (ACC) application you can use to observe, configure and evaluate the operation and performance of the Airborne Module. For a complete list of the contents provided with your Kit, refer to the Airborne Wireless Enterprise Device Server Module Quick Start Guide.

The Airborne EVB is a versatile, full-featured tool specifically designed for evaluating the Airborne Module. It incorporates all the circuitry, interfaces, push-buttons, and Light Emitting Diodes (LEDs) needed to observe and evaluate the Airborne Module. The portability of the Airborne EVB allows it to be observed and evaluated in variety of locations and conditions.

2.0 Conventions

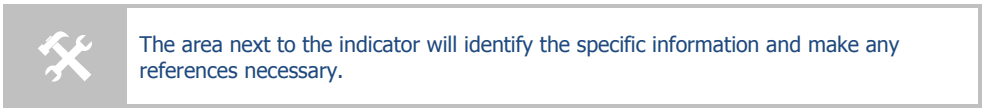
The following section outlines the conventions used within the document, where convention is deviated from the deviation takes precedence and should be followed. If you have any question related to the conventions used or clarification of indicated deviation please contact Quatech Sales or Wireless Support.

2.1 Terminology

Airborne Enterprise Device Server and AirborneDirect Enterprise Device Server is used in the opening section to describe the devices detailed in this document, after this section the term ***module*** will be used to describe the devices.

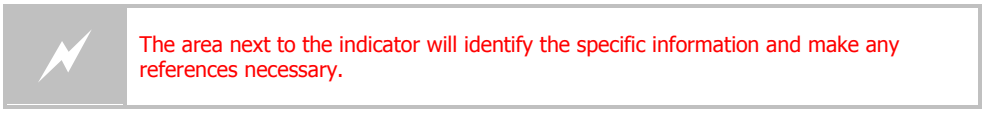
2.2 Notes

A note contains information that requires special attention. The following convention will be used. The area next to the indicator will identify the specific information and make any references necessary.



2.3 Caution

A caution contains information that, if not followed, may cause damage to the product or injury to the user. The shaded area next to the indicator will identify the specific information and make any references necessary.



2.4 File Format

These documents are provided as Portable Document Format (PDF) files. To read them, you need Adobe Acrobat Reader 4.0.5 or higher. For your convenience, Adobe Acrobat Reader is provided on the Radio Evaluation Kit CD. Should you not have the CD, for the latest version of Adobe Acrobat Reader, go to the Adobe Web site (www.adobe.com).

2.5 Courier Typeface

Commands and other input that a user is to provide are indicated with `Courier` typeface. For example, typing the following command and pressing the Enter key displays the result of a command:

```
wl-info <cr>
Module Firmware Version:        1.10
Radio Firmware Version:         5.0.21.p1-210
Link Status:                    Connected
SSID:                           Quatech_Connected
MAC Address:                    000B6B7783A3
BSSID:                          0016B637880D
Transmit Rate (Mb/s):           54
Signal Level (dBm):             -40
Noise Level (dBm):              -92
IP Address:                     192.168.1.100
Subnet Mask:                    255.255.255.0
Default Gateway:                192.168.1.1
Primary DNS:                    192.168.1.3
Secondary DNS:                  192.168.1.4
Up Time (Sec):                  48313
```

3.0 Supported Devices and Kits

This manual supports the Evaluation Kit for all devices and platforms listed in Table 1.

Table 1 - Model and Kit Part Numbers

Part No.	Description
WLNG-SE-DP5XX	802.11b/g to RS232/422/485 and UART Serial Device Server Module, Enterprise Class.
WLNG-AN-DP5XX	802.11b/g to UART Serial Device Server Module, Enterprise Class.
WLNG-SP-DP5XX	802.11b/g to SPI Serial Device Server Module, Enterprise Class.
WLNG-ET-DP5XX	802.11b/g to 10/100 Ethernet Bridge (NAT Level3) Module, Enterprise Class.
WLNG-EK-DP5XX	Enterprise Class Airborne Development and Evaluation Kit.
WLNG-EK-DP501	Evaluation Kit for 802.11b/g to UART Serial Device Server Module, Enterprise Class.
WLNG-EK-DP502	Evaluation Kit for 802.11b/g to SPI Serial Device Server Module, Enterprise Class.
WLNG-EK-DP503	Evaluation Kit for 802.11b/g to 10/100 Ethernet Bridge (NAT Level3) Module, Enterprise Class.

4.0 Evaluation Board Layout

Figure 1 - Evaluation Board Layout

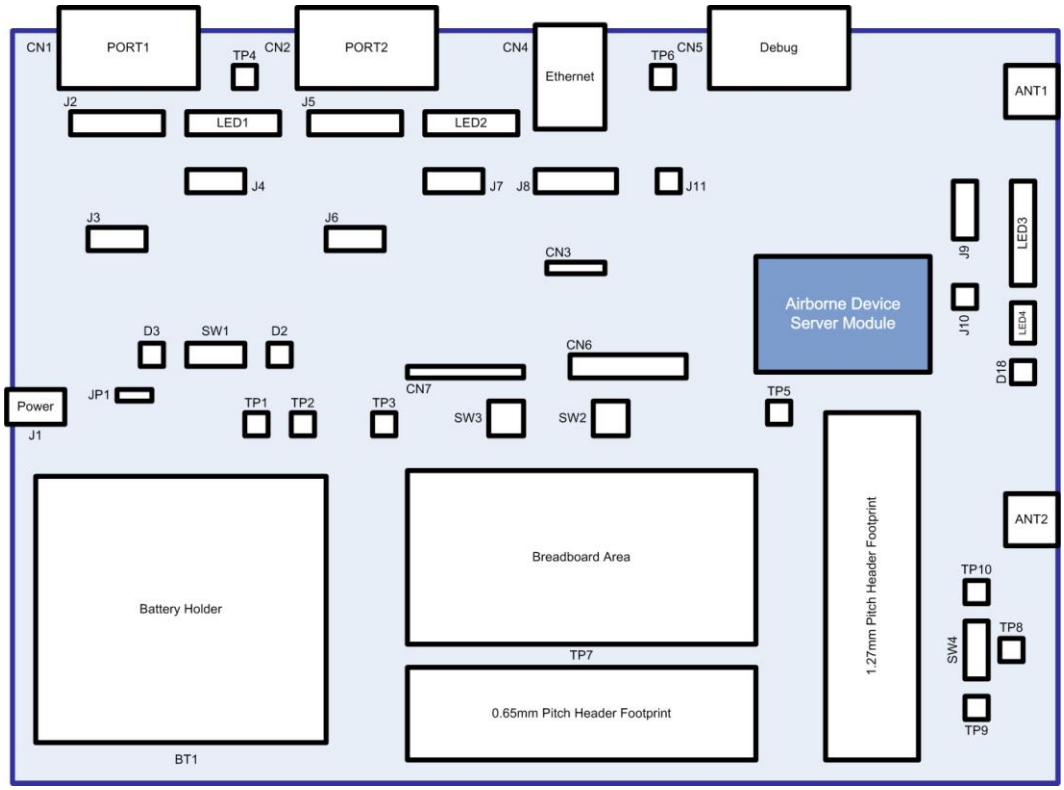


Table 2 - Summary Description of Evaluation Board

Designator	Description	Ref	Page
ANT1	Antenna connector	5.1	15
ANT2	Antenna connector	5.2	15
BT1	Battery holder	5.3	15
CN1	Primary UART Port connector (DE-9 Male)	5.4	16
CN2	Secondary UART Port connector (DE-9 Male)	5.5	16
CN3	Ethernet PHY connector (Header)	5.6	16
CN4	Ethernet RJ45 Socket (with Magnetics)	5.7	17
CN5	Debug Port connector (DE-9 Female)	5.8	18
CN6	JTAG connector (Header)	5.9	18
CN7	Primary SPI connector (Header)	0	19
D2	Power status indicator	5.11	20
D3	Battery Low indicator	5.12	20

5.0 Feature Description

The following section provides detailed descriptions of the various connections, switches and indicators provided by the Airborne Evaluation Board.

5.1 ANT1

This is one of two antenna connections available on the Evaluation board.

Table 3 - ANT1 Connectors

Designator	Connector	Description
CN9	RP-SMA	Antenna connection requires antenna with RP-SMA connector. Impedance: 50Ω
CN10	U.FL	Coaxial connector to Airborne Device Server antenna connector. Requires U.FL to U.FL coaxial cable (included in kit). Must be connected to either J1 or J2 of Device Server Module. Impedance: 50Ω

5.2 ANT2

This is one of two antenna connections available on the Evaluation board.

Table 4 - ANT2 Connectors

Designator	Connector	Description
CN11	RP-SMA	Antenna connection requires antenna with RP-SMA connector. Impedance: 50Ω
CN12	U.FL	Coaxial connector to Airborne Device Server antenna connector. Requires U.FL to U.FL coaxial cable (included in kit). Must be connected to either J1 or J2. Impedance: 50Ω

5.3 BT1

This section allows four (4) 1.5VDC Type AA cells to be installed and used to power the evaluation kit for roaming and mobile tests.

To select the batteries as the Power Source use the correct setting for JP1.

A Low Battery status indicator is provided by D2.

5.4 CN1

This is the primary UART port and should be used for serial communication with the card during initial evaluation. The pin out for the connector is managed by the configuration of J2; it can support the following modes:

- RS232 DTE
- RS232 DCE
- RS422/485 4-wire
- RS422/485 2-wire

Table 5 - Primary UART Connector

Designator	Connector	Description
CN1	DE-9 Male	Requires a DE-9 female connector. Depending upon the configuration of J1 the following cable type should be used: DTE (Default): Straight through DCE: Null Modem

5.5 CN2

This is the secondary UART port. This port can only be used if enabled via firmware.

The pin out for the connector is managed by the configuration of J5; it can support the following modes:

- RS232 DTE
- RS232 DCE
- RS422/485 4-wire
- RS422/485 2-wire

Table 6 - Primary UART Connector

Designator	Connector	Description
CN2	DE-9 Male	Requires a DE-9 Female connector. Depending upon the configuration of J5 the following cable type should be used: DTE (Default): Straight through DCE: Null Modem

5.6 CN3

This header provides direct connections to the Airborne Device Server module Ethernet connections. The output of this header is provided by the embedded Ethernet PHY built in to the Airborne Device Server module. Please refer to the WLNG DP500 data book for details of this output.

This header allow for the implementation of external magnetic or a capacitive coupled circuit between the Evaluation board and a test system. The pin out for the header can be seen in Table 7.

Table 7 - Ethernet PHY Header Pin Out

Designator	Pin	Description
CN3	1	TxD+
	2	TxD-
	3	RxD+
	4	RxD-

A detailed description of the Ethernet circuit on the Evaluation board can be found in section 11.0.

5.7 CN4

This connector is a 10/100 Ethernet RJ45 Jack with integrated magnetic. The pin out is shown in Figure 2. It supports two integrated indicator LED's, the conditions for these indicators can be seen in Table 8.

Figure 2 - Ethernet Jack Pin Out

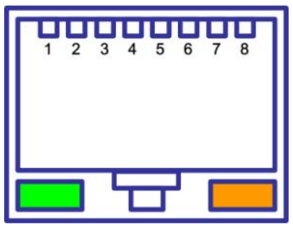


Table 8 - Ethernet Connector Pin Out

Designator	Pin	Description
CN4	1	TxD+
	2	TxD-
	3	RxD+
	4	NC
	5	NC
	6	RxD-
	7	NC
	8	NC
	Green LED	Valid TCP/IP connection made with Airborne Device Server: **Off** No TCP/IP connection **On** Valid TCP/IP Connection
	Yellow LED	Power-on Self Test (POST): **Off** Not powered or has failed POST **On** Passed POST

5.8 CN5

This connector provides access to the serial debug port available on the Airborne Serial Device Server module. The debug/console port is supported by a 2-wire serial interface defined in Table 10. This port is a bidirectional serial port intended for debug of the unit only; it does not support data transfer.

Table 9 - Debug Port Connector

Designator	Connector	Description
CN5	DE-9 Female	Requires a DE-9 Male connector. To connect to a laptop or desktop serial port a straight thru cable is required (included in kit).

The default settings for the debug port are 115200, 8, N 1, No Flow Control.

Table 10 - Debug Port Pin Out

Designator	Pin	Description
CN5	1	No Connect
	2	D_{OUT}
	3	D_{IN}
	4	No Connect
	5	GND
	6	No Connect
	7	No Connect
	8	No Connect
	9	No Connect

5.9 CN6

This header provides connectivity to the JTAG interface available on the Airborne Device Server Module. The pin out for the header can be seen in Figure 3 and Table 11.

Figure 3 - JTAG Header

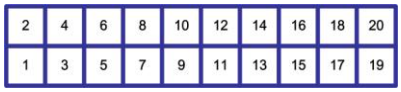


Table 11 - JTAG Header Pin Out

Designator	Pin	Description
CN6	1	3.3VDC
	2	3.3VDC
	3	NTRST: Test RESET
	4	GND

Designator	Pin	Description
	5	TDI: Test Data In
	6	GND
	7	TMS: Test Mode Select
	8	GND
	9	TCK: Test Clock
	10	GND
	11	RTCK: Return Test Clock
	12	GND
	13	TDO: Test Data Out
	14	GND
	15	/RESET (Active Low)
	16	GND
	17	No Connect
	18	GND
	19	No Connect
	20	GND

Use of this header requires that JTAG has been enabled on the Airborne Device Server Module. Production devices do not support this feature.

To enable JTAG a hardware change to the module must be made, please contact Quatech Technical Support if this feature is required.

5.10 CN7

This header is the primary SPI interface header; firmware selection of the SPI interface is required before the interface can be used.

The header pin out can be seen in Figure 4 and Table 11.

Figure 4 - SPI Header

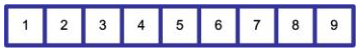


Table 12 - SPI Header Pin Out

Designator	Pin	Description
CN7	1	3.3VDC
	2	GND

Designator	Pin	Description
	3	SPI_INT: SPI Interrupt
	4	MISO: D_{OUT}
	5	SPI_CLK: SPI Clock
	6	SPI_SEL: SPI Select
	7	MOSI: D_{IN}
	8	GND
	9	GND

5.11 D2

This is a red indicator LED that provides feedback on the voltage level of the power supply. This indicator will light when a low voltage state is detected.

Table 13 - Low Voltage LED Indicator

Designator	Status	Description
D2	ON	Power supply is 3.3VDC or less
	OFF	Power supply is above minimum voltage

5.12 D3

This is a green indicator LED that provides feedback on the power status of the Evaluation board.

Table 14 - Power Status LED Indicator

Designator	Status	Description
D3	ON	Power supplied to the card, SW1 on ON position
	OFF	No power supplied to the card, SW1 on OFF position

5.13 D18

This indicator LED provides feedback on the association status of the radio. The indicator is provided by the RF_ACT output of the Airborne Device Server module.

Designator	Status	Description
D18	OFF	No valid Power to the module
	BLINKING	Searching for valid SSID
	ON	Associated with valid SSID

5.14 J1

This is the main power jack for the Evaluation board. It requires a 5VDC/1.0A minimum supply (supplied with kit).

Table 15 - Power Supply Jack

Designator	Connector	Description
J1	2.1mm Barrel Jack	5.0VDC +/-10%, 1.00A minimum. 

5.15 J2

This header configures the Primary UART port connector (CN1), selection of the headers allows the connector pin-out to be changed to support one of the following configurations:

- RS232 DTE
- RS232 DCE
- RS422/485 4-wire
- RS422/485 2-wire

For each of the configurations please note there is a pin out change and it may be necessary to alter the cable being used for connection to the serial host. The different configurations of jumpers and pin outs can be seen in Table 16.

It is not possible to independently select the transceiver type for each UART port (CN1 and CN2) consequently both ports must be the same type (RS232 or RS422/485).

Figure 5 - DE-9 Connector Pin-out

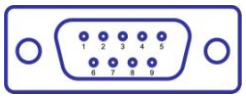


Table 16 - Primary UART Pin-out Header Configuration

Designator	Configuration	Header	Pin Out	
J2	RS232 DTE (Default)		1	No Connect
			2	RxD
			3	TxD
			4	No Connect
			5	GND
			6	No Connect
			7	RTS
			8	CTS
			9	No Connect
	RS232 DCE		1	No Connect

Designator	Configuration	Header	Pin Out	
			2	TxD
			3	RxD
			4	No Connect
			5	GND
			6	No Connect
			7	CTS
			8	RTS
			9	No Connect
	RS422/485 2-Wire		1	No Connect
			2	No Connect
			3	TxD+
			4	No Connect
			5	GND
			6	No Connect
			7	No Connect
			8	No Connect
			9	TxD-
	RS422/485 4-Wire		1	No Connect
			2	RxD+
			3	TxD+
			4	No Connect
			5	GND
			6	RxD-
			7	No Connect
			8	No Connect
			9	TxD-

Figure 6 - Primary UART Header

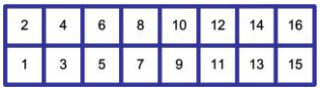


Table 17 - Primary UART Header Pin-out

Designator	Pin	Description
J2	1	RxD+
	2	TxD+
	3	CN1 Pin 2

Designator	Pin	Description
	4	RxD
	5	TxD
	6	CN1 Pin 3
	7	TxD-
	8	TxD+
	9	CN1 Pin 9
	10	CN1 Pin 6
	11	TxD-
	12	RxD-
	13	CN1 Pin 8
	14	CTS
	15	RTS
	16	CN1 Pin 7

5.16 J3

This header correctly enables the primary UART transceivers for the interface type selected by the configuration of J2. The available options are shown in Table 18.

Table 18 - Primary UART Transceiver Configuration

Designator	Description	Configuration
J3	RS232	
	RS422/485	
	Software Select	

Figure 7- Primary UART Transceiver Header

Table 19 - Primary UART Transceiver Header Pin-out

Designator	Pin	Description
J3	1	RS422/485 Rx Enable (Active Low)
	2	RXEN
	3	GND
	4	RS232 Rx Enable (Active Low) with 10KΩ Pull-up
	5	3.3VDC

Designator	Pin	Description
	6	SER_MODE
	7	RS422/485 Tx Enable (Active High)
	8	/TXEN (Active Low)

Signal **RXEN** (Pin 2), **SER_MODE** (Pin 6) and **/TXEN** (Pin 8) are sourced from the Airborne Device Server module, please refer to the WLNG DP500 data book for a description of these signal.

5.17 J4

This header provides access to the Primary UART LED status indicators.

The default has all LED's connected.

Figure 8 - Primary UART LED Indicator Header

Table 20 - Primary UART LED Indicator Header Pin-out

Designator	Pin	Description
J4	1	RxD (EVB Signal Driver), D4 (Red LED)
	2	RxD (Airborne Device Server Module)
	3	TxD (EVB Signal Driver), D5 (Red LED)
	4	TxD (Airborne Device Server Module)
	5	CTS (EVB Signal Driver), D6 (Yellow LED)
	6	CTS (Airborne Device Server Module)
	7	RTS (EVB Signal Driver), D7 (Green LED)
	8	RTS (Airborne Device Server Module)

Removing the jumpers from this header will disconnect the signals to the Primary UART connector CN1.

Signals on Pins 1, 3, 5 and 7 are sourced directly from the Airborne Device Server module and are not buffered or driven by the Evaluation board.

5.18 J5

This header configures the Secondary UART port connector (CN2), selection of the headers allows the connector pin-out to be changed to support one of the following configurations:

- RS232 DTE
- RS232 DCE
- RS422/485 4-wire
- RS422/485 2-wire

For each of the configurations please note there is a pin out change and it may be necessary to alter the cable being used for connection to the serial host. The different configurations of jumpers and pin outs can be seen in Table 21.

It is not possible to independently select the transceiver type for each UART port (CN1 and CN2) consequently both ports must be the same type (RS232 or RS422/485).

Figure 9 - DE-9 Connector Pin-out

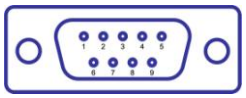


Table 21 - Secondary UART Pin-out Header Configuration

Designator	Configuration	Header	Pin Out	
J5	RS232 DTE (Default)		1	No Connect
			2	RxD
			3	TxD
			4	No Connect
			5	GND
			6	No Connect
			7	RTS
			8	CTS
			9	No Connect
	RS232 DCE		1	No Connect
			2	TxD
			3	RxD
			4	No Connect
			5	GND
			6	No Connect
			7	CTS

Designator	Configuration	Header	Pin Out	
			8	RTS
			9	No Connect
	RS422/485 2-Wire		1	No Connect
			2	No Connect
			3	TxD+
			4	No Connect
			5	GND
			6	No Connect
			7	No Connect
			8	No Connect
			9	TxD-
	RS422/485 4-Wire		1	No Connect
			2	RxD+
			3	TxD+
			4	No Connect
			5	GND
			6	RxD-
			7	No Connect
			8	No Connect
			9	TxD-

Figure 10 - Secondary UART Header

Table 22 - Primary UART Header Pin-out

Designator	Pin	Description
J2	1	RxD+
	2	TxD+
	3	CN1 Pin 2
	4	RxD
	5	TxD
	6	CN1 Pin 3
	7	TxD-
	8	TxD+
	9	CN1 Pin 9

Designator	Pin	Description
	10	CN1 Pin 6
	11	TxD-
	12	RxD-
	13	CN1 Pin 8
	14	CTS
	15	RTS
	16	CN1 Pin 7

5.19 J6

This header correctly enables the Secondary UART transceivers for the interface type selected by the configuration of J5. The available options are shown in Table 23.

Table 23 - Secondary UART Transceiver Configuration

Designator	Description	Configuration
J6	RS232	
	RS422/485	
	Software Select	

Figure 11- Secondary UART Transceiver Header

Table 24 - Secondary UART Transceiver Header Pin-out

Designator	Pin	Description
J6	1	RS422/485 Rx Enable (Active Low)
	2	RXEN
	3	GND
	4	RS232 Rx Enable (Active Low) with 10KΩ Pull-up
	5	3.3VDC
	6	SER_MODE
	7	RS422/485 Tx Enable (Active High)
	8	/TXEN (Active Low)

Signal **RXEN** (Pin 2), **SER_MODE** (Pin 6) and **/TXEN** (Pin 8) are sourced from the Airborne Device Server module, please refer to the WLNG DP500 data book for a description of these signal.

5.20 J7

This header provides access to the Secondary UART LED status indicators.

The default has all LED's connected.

Figure 12 - Secondary UART LED Indicator Header

Table 25 - Secondary UART LED Indicator Header Pin-out

Designator	Pin	Description
J4	1	RxD (EVB Signal Driver), D4 (Red LED)
	2	RxD (Airborne Device Server Module)
	3	TxD (EVB Signal Driver), D5 (Red LED)
	4	TxD (Airborne Device Server Module)
	5	CTS (EVB Signal Driver), D6 (Yellow LED)
	6	CTS (Airborne Device Server Module)
	7	RTS (EVB Signal Driver), D7 (Green LED)
	8	RTS (Airborne Device Server Module)

Removing the jumpers from this header will disconnect the signals to the Secondary UART connector CN2.

Signals on Pins 1, 3, 5 and 7 are sourced directly from the Airborne Device Server module and are not buffered or driven by the Evaluation board.

5.21 J8

This header controls the access to the Ethernet interface. The options available for this header can be seen in Table 26.

Table 26 - Ethernet Header Configuration

Designator	Description	Configuration
J8	Ethernet Jack (Default)	

Designator	Description	Configuration
	CN3 Header	

This header provides direct connections to the Airborne Device Server module Ethernet connections. The output of this header is provided by the embedded Ethernet PHY built in to the Airborne Device Server module. Please refer to the WLNG DP500 data book for details of this output.

Table 27 - Ethernet Header Pin-out

Designator	Pin	Description
J8	1	CN3 Pin 3
	2	CN3 Pin 1
	3	RxD+ (Airborne Device Server)
	4	TxD+ (Airborne Device Server)
	5	RxD+ (CN4)
	6	TxD+ (CN4)
	7	CN3 Pin 4
	8	CN3 Pin 2
	9	RxD- (Airborne Device Server)
	10	TxD- (Airborne Device Server)
	11	RxD- (CN4)
	12	TxD- (CN4)

5.22 J9

This header provides access to the status indicators generated by the Airborne Device Server module. The header provides a connection to the on board LED's in the LED3 section 5.28.

The default has all LEDs connected.

Figure 13 – Airborne Device Server Module Status Indicator Header

Table 28 - Airborne Device Server Module Status Indicator Header Pin-out

Designator	Pin	Description
J9	1	D12 (POST LED)
	2	LED_POST (Airborne Device Server Module)
	3	D13 (RF_LINK LED)

Designator	Pin	Description
	4	LED_RF_LINK (Airborne Device Server Module)
	5	D14 (WLN_CFG LED)
	6	LED_CFG_WLN (Airborne Device Server Module)
	7	D15 (CONN LED)
	8	LED_CON (Airborne Device Server Module)

Signals on Pins 2, 4, 6 and 8 are sourced directly from the Airborne Device Server module and are not buffered or driven by the Evaluation board.

5.23 J10

This header allows GPIO pins sourced from the Airborne Device Server module to be connected to LED's on the Evaluation board. These indicators can be used to demonstrate control of the G0 and G1 ports via the CLI or web interface.

Figure 14 - GPIO LED Header

Table 29 - GPIO LED Header Configuration

Designator	Description	Configuration
J10	LED's Connected	
	LED's Disconnected	

Table 30 - GPIO LED Header Pin-out

Designator	Pin	Description
J10	1	D16 (Yellow)
	2	Port G0 (Airborne Device Server Pin 22)
	3	D17 (Yellow)
	4	Port G1 (Airborne Device Server Pin 19)

5.24 J11

This header connects the Airborne Device Server module sources indicator signals to the Ethernet jack. A description of the signals can be seen in section 5.7.

Figure 15 – Ethernet Indicator LED Header

Table 31 – Ethernet Indicator LED Header Configuration

Designator	Description	Configuration
J11	LED's Connected (Default)	
	LED's Disconnected	

Table 32 – Ethernet Indicator LED Header Pin-out

Designator	Pin	Description
J11	1	CN4 (Green LED)
	2	LED_CON (Airborne Device Server Pin 23)
	3	CN4 (Yellow LED)
	4	Port F0 (Airborne Device Server Pin 25)

5.25 JP1

This jumper provides the ability to select the power source for the Evaluation Board. The options can be seen in Table 33.

Figure 16 - JP1 Pin-out

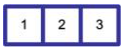


Table 33 - Power Source Selector

Designator	Description	Configuration
JP1	External power Supply. This selects J1 (5.14) as the source for power.	
	Battery power. This selects BT1 (5.3) as the source for power.	

Table 34 - JP1 Power Selector Pin-out

Group	Pin	Description
JP1	1	J1 external 2.1mm Barrel jack.
	2	EVB Power Supply Input

Group	Pin	Description
	3	BT1 4 x AA cell holder

5.26 LED1

This is a group of LED's that indicate Primary UART's state of operation. A description of the LED's can be seen in Table 35. These LED's are connected via J4 (section 5.17), please refer to this section for more details.

Table 35 - Primary UART Indicator LED's

Group	Designator	Description
LED1	D7	Ready to Send (RTS), Green LED
	D6	Clear-to-Send (CTS), Yellow LED
	D5	Transmit Data (TxD), Red LED
	D4	Receive Data (RxD), Red LED

5.27 LED2

This is a group of LED's that indicate Secondary UART's state of operation. A description of the LED's can be seen in Table 36. These LED's are connected via J7 (section 5.20), please refer to this section for more details.

Table 36 - Secondary UART Indicator LED's

Group	Designator	Description
LED2	D11	Ready to Send (RTS), Green LED
	D10	Clear-to-Send (CTS), Yellow LED
	D9	Transmit Data (TxD), Red LED
	D8	Receive Data (RxD), Red LED

5.28 LED3

This is a group of LED's that indicate the state of the Airborne Device Server module. A description of the LED's can be seen in Table 37. These LED's are connected via J9 (section 5.22), please refer to this section for more details.

Table 37 – Airborne Device Server Module Indicator LED's

Group	Designator	Name	Description (w/ Power Applied)	
LED3	D15	CONN (Green)	OFF	No TCP/IP connection established
			ON	TCP/IP connection established with Device Server

Group	Designator	Name	Description (w/ Power Applied)	
	D14	WLN_CFG (Yellow)	OFF	The Device Server is not correctly configured for network communication (i.e. it does not have a valid IP address/subnet mask)
			ON	The Device Server is correctly configured for network communication (i.e. it has a valid IP address/subnet mask)
	D13	RF_LINK (Green)	OFF	Device Server has not authenticated with a wireless network
			ON	Device Server has successfully authenticated with a wireless network
	D12	POST (Yellow)	OFF	Passed Power-on-Self-Test
			ON	Failed Power-on-Self-Test

A more detailed description of these status indicators can be seen in section 13.0.

5.29 LED4

This group of LED's is available for use. They can be connected to and driven by GPIO G0 and G1, via the CLI of the Airborne Device Server module. It is possible to demonstrate I/O control using this combination.

They can be connected to the GO and G1 ports via J10 (section 5.23). Please refer to this section for more details.

Table 38 - LED4 Description

Group	Designator	Description
LED4	D17	G1 (Yellow LED)
	D16	G0 (Yellow LED)

5.30 SW1

This is the main power switch for the evaluation board. A valid power supply (included with kit) must be connected to J1 and JP1 must be configured for an external power supply (default set-up) or BT1 must have a valid set of cells and JP1 must be configured for Batteries before the switch is enabled.

If a valid power source is attached, D3 (section 5.12) will light. This will indicate the start of the Airborne Device Server boot cycle. The cycle may take several seconds; please allow enough time to complete the boot cycle before resetting the switch.

When the Airborne Device Server boot successfully you will see the POST (section 5.28) and RF_ACT LED (section 5.28) indicators light.

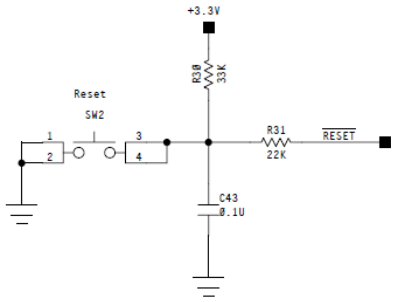
Figure 17 - SW1 Set-up

5.31 SW2

This push button switch restarts or reboots the Airborne Device Server module. If pressed for more than 100ms the module will initiate an internal power-on restart cycle. This switch is connected to pin 7 (/RESET) pin of the module; please refer to the WLNG DP500 Data-book for more details.

The /RESET behavior is not the same as a Power-on-restart; please refer to the WLNG DP500 Data-book for details.

Figure 18 - SW2 Reset Circuit

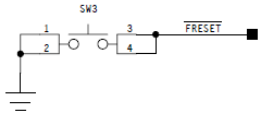


5.32 SW3

This push button switch allows the user to reset the Airborne Device Server module settings back to OEM default. The button cannot reset settings by itself; it requires either a power cycle or restart.

To reset the module configuration back to OEM defaults SW3 must be pushed and held while the restart or power cycle is initiated. It is required that SW3 be held for approximately 3 seconds after the restart or power cycle has been initiated, it can then be released. The module will then continue the boot cycle and the OEM parameter values will be reinstalled.

Figure 19 - OEM RESET Circuit



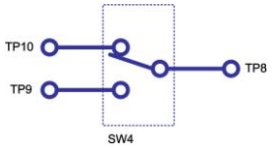
Doing an OEM reset will reset all parameters back to OEM default values; this may place the module in a state that will not allow the user to communicate with it.

IMPORTANT: Confirm that the OEM settings installed on the module will allow the user to communicate with the module after the reset has been completed.

5.33 SW4

This is an additional SPDT switch that may be used in conjunction with the test points (TP7, 8, 9, 10) to demonstrate functionality provided by the Airborne Device Server module.

Figure 20 - SW4 Configuration



5.34 TP1 – 6

Included on the Evaluation board is a number of test points; these are available for use by the user when evaluating or developing with the evaluation board. The set of test points provide measurement or sourcing points for the various power and ground options available on the board; Table 39 indicates the test point function.

Table 39 - TP1-6 Configuration

Group	Designator	Description
Test Point	TP1	Input Voltage: This test point provides access to the input voltage on J1.
	TP2	3.3VDC: This test point provides access to the regulated power supply output.
	TP3	GND
	TP4	GND
	TP5	GND
	TP6	GND

5.35 TP7

This section of the Evaluation board provides space for development of prototype application hardware directly on the board. The matrix provides access to the full interface of the Airborne Device Server module as well as an ample supply of power and ground signals.

Since the signal definition could change depending upon the type of module being used (UART, Serial, SPI, Ethernet) details of the signals and their characteristics can be found in the WLNG DP500 Data book. A translation of prototype area (TP7) designator to WLNG pin out can be seen in Table 40.

Figure 21 - TP7 Layout

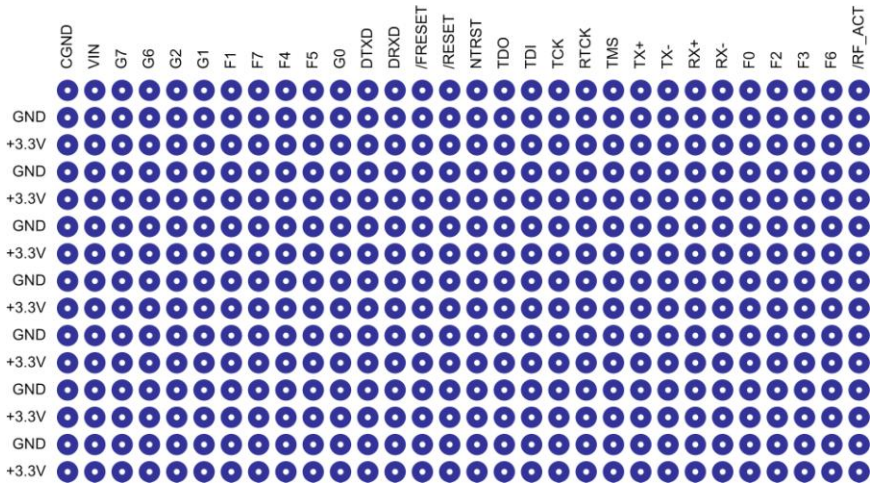


Table 40 - TP7 Label to WLNG Pin-out Table

TP7 Designator	WLNG Pin
+3.3V	3, 4, 33, 34
VIN	
CGND	
GND	1, 15, 16, 36
G7	21
G6	9
G2	17
G1	19
F1	28
F7	24
F4	18
F5	12
G0	22

TP7 Designator	WLNG Pin
DTXD	6
DRXD	8
/FRESET	11
/RESET	7
NTRESET	31
TDO	10
TDI	2
TCK	20
RTCK	5
TMS	32
TX+	30
TX-	29
RX+	13
RX-	14
F0	25
F2	27
F3	26
F6	23
/RF_ACT	35

5.36 TP8 - 10

These test points have been made available for prototyping using the Evaluation board; they are connected to SW4 (section 5.33). Please refer to this section for detail.

6.0 A Typical Development System

It is necessary to have additional equipment to get the most out of the Airborne™ Evaluation board and fully experience the power of the Airborne™ Device Server module.

A typical evaluation system includes:

- A host computer that communicates with the Airborne Device Server module, the interface options are:
  - WLNG-EK-DP501 via the EVB RS-232 interface (PORT 1, CN1)
  - WLNG-EK-DP502 via the EVB SPI interface (CN7)
  - WLNG-EK-DP503 via the EVB RJ-45 interface (ETHERNET, CN4)
- A host computer that communicates with the Airborne Device Server module via the network interface.
- An IEEE-compliant 802.11b/g AP or Wireless Router for which you know the association and authentication settings.
- A DHCP server (this may be resident in the Wireless Router).
- A terminal emulation program like HyperTerminal, PuTTy or TerraTerm

7.0 Getting Started

7.1 Unpack the Airborne™ Module EVB Kit

Unpack the Airborne Device Server Module EVB and compare the package contents with the items listed on the front of this User Guide. If any item is missing or damaged, contact Quatech immediately.

The Evaluation kit contains the following items:

- One Airborne™ Device Server Module Evaluation Circuit Board Assembly (EVB)
- One WLNG-XX-DP501 module (mounted on the EVB)
- Two monopole Antennas (2dBi RP-SMA)
- One AC adapter (5VDC/500mA)
- One DB9-to-DB9 serial cable (Null Modem)
- USB to serial Adapter (SSU2-100)
- One CD containing drivers, evaluation software, PDF documents, and Adobe® Acrobat® Reader® for viewing the documents

Contact details can be found at www.quatech.com/support.

7.2 Attach Antenna and Power-up the EVB

Attach the supplied antenna to connector CN11 on the EVB. Connect the supplied AC adapter to the power (J1) connector on the Airborne EVB. Confirm that the EVB is receiving power by verifying that the Power LED (D3) is lit when POWER (SW1) is in the ON position.

7.3 Install Serial to USB Adapter (Optional)

If your host computer does not have a RS232 port the Evaluation Kit includes a USB to Serial adapter (SSU2-100). This adapter provides the ability to connect using a virtual serial port on the host to the EVB. Please refer to the enclosed CD and documentation for the installation of the adapter.

7.4 Connection to SPI Host

To connect and communicate with the EVB it will be necessary for an SPI based host to comply with the SPI host interface specification outlined in the WLNG DP500 Databook, please refer to this document before connecting an SPI host.

8.0 Serial Device Server Connection

If you have purchased the WLNG-EK-DP501 or WLNG-EK-DP502 kit please use the following instructions for connecting to and evaluating the Airborne Serial Device Server.

The following describes initial connection to an Airborne Device Server module loaded with UART (WLNG-AN-DP501) firmware; if you have a module loaded with Ethernet (WLNG-ET-DP501) firmware, please skip to section 9.0.

8.1 Connect a Host Computer

Use the supplied serial cable or USB adapter (see USB-to-Serial Adapter User's Manual for USB adapter installation) to connect the DB9 serial port (CN1) connector on the Airborne EVB to the Host computer. On the Host computer, start a terminal emulation program such as HyperTerminal. Configure the program for 9600 baud, 8 data bits, no parity, and no flow control. For COM Port, select the COM port that corresponds to the host's physical serial port connected to the EVB (or in the case of the USB adapter, the virtual COM port created by the adapter software).

If supplying your own cable when connecting to the Evaluation Kit please confirm it supports the default configuration (female DE-9, DCE) for connection to the Evaluation kit.

If you are unable to connect to the kit please refer to sections 5.4, 5.15 and 5.16 for details on the Evaluation kit CN1 requirements.

8.2 Interacting with the Airborne™ Module

On the Host computer, use the terminal emulation program to interact with the module by issuing Command Line Interface (CLI) commands. CLI commands let you request status or change parameter settings. Press the Enter key (<CR>) after each command line you type. After the module starts, type the following CLI command to log in (you must log in before CLI commands can be recognized):

Table 41 - UART Authentication

CLI Command	Description
`auth dpac dpac <CR>`	The module responds with OK, indicating that it executed the command successfully. (If you did not receive OK, check the settings in your terminal emulation program.

You will have to log into the module after any reset or restart.

8.3 Determine and Store the Access Point SSID

On the Host computer, use the terminal emulation program to type the following CLI commands in the order shown:

Table 42 - UART SSID & Authentication

CLI Command	Description
`wl-scan<CR>`	The module scans for APs and returns information on each one it discovers. Note the SSID value that is returned, as you will need to enter it in the next command
`wl-ssid [SSID]<CR>`	Associates the module with the AP whose [SSID] you specify. [SSID] is the value returned by the wl-scan command.
`commit<CR>`	Stores the information to flash memory.

If your access point has security enabled, you will also need to use the CLI to enter those parameters (See the Enterprise CLI Reference Guide for details). That setup is outside the scope of this user guide, which assumes that the AP being tested with has no security.

After issuing the commands, press the reset switch (SW2) on the EVB. The EVB restarts and the RF_ACT LED blinks to show that the module is searching for an AP. Once the module has found and associated to the AP entered using the `wl-ssid` command the RF_ACT LED will turn on continuously.

8.4 Determine the Module's IP address

On the Host computer, use the terminal emulation program to type the following CLI commands:

Table 43 - UART Determine Module's IP Address

CLI Command	Description
`auth dpac dpac <CR>`	Authenticate with the device server.
`wl-ip<CR>`	The module returns the IP address assigned to it by the DHCP server.

8.5 Accessing the Module Using Telnet

On the Remote computer, use HyperTerminal to start a Telnet session. In the first screen, name the session 'TCP <Module IP>' (for reference purposes only), click on any icon you want to associate with this Telnet session, and click OK. In the next screen, click TCP/IP (Winsock) for Connect Using. In the Host Address field, type the module's IP address. Leave the default Port Number value of 23 and click OK.

The HyperTerminal application will then attempt to open a TCP session with the module, *Connecting* is shown in the status bar at the bottom-left side of the

screen as HyperTerminal tries to make the Telnet connection. When the connection is made, *Connecting* is replaced by *Connected*. You can know interact with the Airborne Device Server, to authenticate with the module type `auth dpac dpac<CR>`.

After the connection is authenticated you can enter CLI commands e.g. type `wl-info` to view basic information on the module.

For more information on the full CLI command set please refer to the Command Line Reference Manuals.

The above process can be achieved by any of the available Terminal Emulation programs. Please follow the specific applications requirements to make the TCP/IP connection and authenticate with the module.

9.0 Ethernet Bridge Connection

If you have purchased the WLNG-EK-DP503 kit, please use the following instructions for connecting to and evaluating the Airborne Ethernet Bridge Module.

9.1 Connect a Host Computer

Using a Cat5 cable, connect the RJ45 port (CN4) connector on the Airborne EVB to the Ethernet port on the Host computer. First make sure the Host PC has the IP address of its Ethernet port set to be assigned by DHCP or assigned a static address of 192.168.2.100.

9.2 Interacting with the Airborne™ Module

On the Host computer, use HyperTerminal to start a Telnet session. In the first screen, name the session Wired Telnet (for reference purposes only), click on any icon you want to associate with this Telnet session, and click OK. In the next screen, click TCP/IP (Winsock) for Connect Using. In the Host Address field, enter the IP address 192.168.2.1. Leave the default Port Number value of 23 and click OK. Use the terminal emulation program to interact with the module by issuing command Line Interface (CLI) commands. CLI commands let you request status or change parameter settings. Press the Enter key (`<CR>`) after each command line you type. After the module starts, type the following CLI command to log in (You must log in before CLI commands can be recognized):

Table 44 - Ethernet Authentication

CLI Command	Description
`auth dpac dpac <CR>`	The module responds with OK, indicating that it executed the command successfully. (If you did not receive OK, check the settings in your terminal emulation program.

You will have to log into the module after any reset or restart

9.3 Determine and Store the Access Point SSID

On the Host computer, use the terminal emulation program to type the following CLI commands in the order shown:

Table 45 - Ethernet SSID & Authentication

CLI Command	Description
wl-scan<CR>	The module scans for APs and returns information on each one it discovers. Note the SSID value that is returned, as you will need to enter it in the next command
wl-ssid [SSID]<CR>	Associates the module with the AP who's [SSID] you specify. [SSID] is the value returned by the wl-scan command.
commit<CR>	Stores the information to flash memory.

If your access point has security enabled, you will also need to use the CLI to enter those parameters (See the CLI Reference Guide for details). That setup is outside the scope of this user guide, which assumes that the AP being used has no security.

After issuing the commands, press the reset switch (SW2) on the EVB. The EVB restarts and the RF_ACT LED turn on solid to show that the module has connected to the AP. You will need to reconnect the Telnet session after each reset or restart.

9.4 Determine the Module's IP address

On the Host computer, use the terminal emulation program to type the following CLI commands:

Table 46 - Ethernet Determine Modules IP Address

CLI Command	Description
auth dpac dpac <CR>	Authenticate with the firmware
wl-ip<CR>	The module returns the IP address assigned to it by the DHCP server.

9.5 Accessing the Module Using Telnet

On the Remote computer, use HyperTerminal to start a Telnet session. In the first screen, name the session 'TCP <Module IP>' (for reference purposes only), click on any icon you want to associate with this Telnet session, and click OK. In the next screen, click TCP/IP (Winsock) for Connect Using. In the Host Address field, type the module's IP address. Leave the default Port Number value of 23 and click OK.

The HyperTerminal application will then attempt to open a TCP session with the module, *Connecting* is shown in the status bar at the bottom-left side of the screen as HyperTerminal tries to make the Telnet connection. When the connection is made, *Connecting* is replaced by *Connected*. You can know interact with the Airborne Device Server, to authenticate with the module type `auth dpac dpac<CR>`.

After the connection is authenticated you can enter CLI commands e.g. type `wl-info` to view basic information on the module.

For more information on the full CLI command set please refer to the Command Line Reference Manuals.

The above process can be achieved by any of the available Terminal Emulation programs. Please follow the specific applications requirements to make the TCP/IP connection and authenticate with the module.

10.0 Using the Web Interface

The Airborne Device Server includes a web interface that provides access to module status, parameter modification and certificate and configuration file management. To use the web interface follow the steps outlined in section 8.0 to establish the IP address of the module. Once the IP address is known open a web browser and enter the IP address of the module in the URL window.

The web interface currently supports Internet Explorer v6.0 thru 8.0, Firefox v3.x, Opera v9.6+ and Chrome v1.0+.

When the authentication request is returned enter:

Figure 22 - Website Login

Username: dpac
Password: dpac

After successfully authenticating with the module, you will be logged into the web server and allowed to browse and update module settings if required. A quick overview of the web interface follows.

10.1 Navigation Bar

Figure 23 - Website Navigation Bar

Table 47 - Navigation Bar Items

Title	Description
Status	Provides status and performance characteristics for the network interfaces available. Includes connection status, radio and Ethernet statistics.
Configuration	Allows viewing and configuration of all the interface settings including wireless LAN, network connectivity, security, FTP client, serial port and web server. Includes the interface for delivery of OEM and user configuration files, as well as management and viewing of current configurations.
Certificates	This menu items provides the interface for certificate delivery and management. Included in this section are the abilities view resident certificates, upload and delete certificates.
Network	With this section it is possible to locate other Airborne Device Server modules on the current network. It is also possible to scan for available Access Points.
Maintenance	This section allows the updating of the modules firmware. You can also OEM reset and also restart the module remotely. The module locate function is also enabled in this section.

10.2 Navigating the Website

A standard web page looks like Figure 24. The navigation bar runs along the top of the page, page specific feature groups are list in the left hand pane of the page and the specific parameters are shown in the main display pane.

Figure 24 - Airborne Web Page

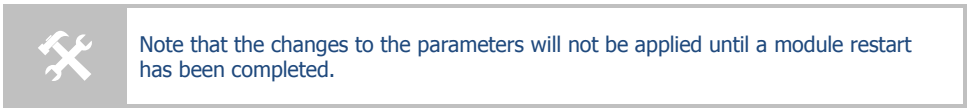
To select any of the items, move your cursor over the item and press the Left Hand mouse button. The items in the Navigation bar and the Feature bar are hyperlinks and will cause the mouse cursor to change form an arrow pointer to a finger pointer when placed over them.

To find out what a specific field does move the cursor over the field and hold of approximately a second. A help balloon will appear and will provide details on the function of the field and its valid range of values.

10.3 Updating a Field

To update a field, select the field by pressing the Left Hand mouse button. Then either type in the appropriate content or select form the pull down menu.

Once you have finished modifying parameters, scroll to the bottom of the page and press the **Commit** button. The page will then indicate the changes have been completed successfully, you can then return to the configuration page by pressing the **Reload** button or restart the module by pressing the **Reboot** button.



Note that the changes to the parameters will not be applied until a module restart has been completed.

Before the **Commit** button has been pressed, all modified fields can be returned to their original state by pressing the **Cancel** button.

10.4 Uploading Certificates

Adding certificates to the Airborne Device Server module is very easy when using the web interface.

Figure 25 - upload Certificate Web page

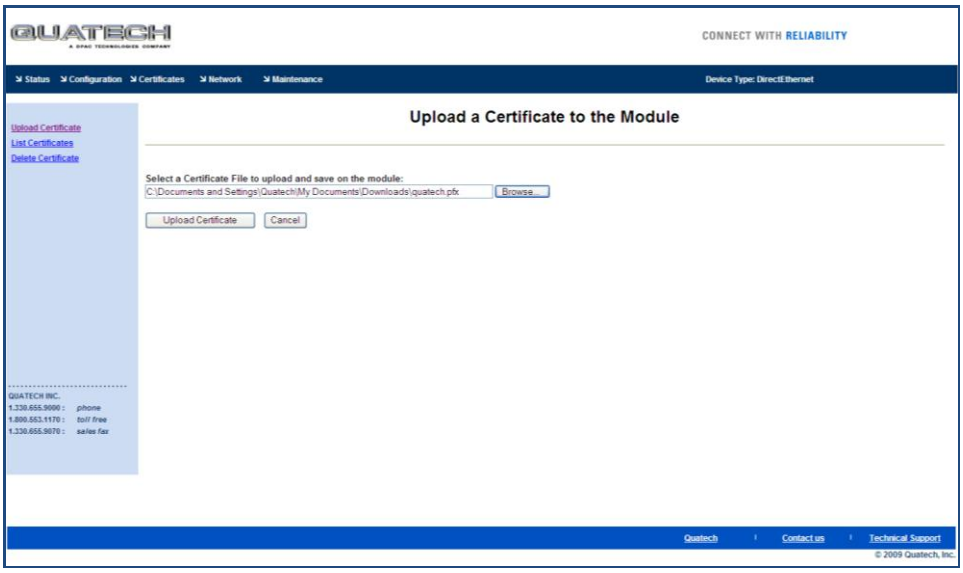


Table 48 - Uploading Certificates

Step	Description
Navigation Bar Select **Certificates**	You will see a list of certificates currently resident on the module when you enter the Certificate File List window.
Feature Bar Select **Upload Certificates**	You will see a window open with field to enter the location of the certificate you want to upload.
Press **Browse...** Button	This will open a dialog box in which you can locate the certificate you wish to upload to the module. Select the Certificate file and press **Open**. This will return you to the Certificate Upload window and will have entered the location and file name of the certificate you wish to upload in the field next to the **Browse...** button.
Press **Upload Certificate**	You will then see a notice that the certificate has been successfully uploaded to the module.
Press **List certificates Files**	This will show the current certificates resident on the module and will include the file just uploaded.

10.5 Upload Configuration Files

The Airborne Device Server module supports both OEM and User configuration files for provisioning the module. Delivery of these configuration files can be performed through the web interface. A full description of these files can be found in the Airborne CLI manual.

To upload configuration files follow the steps in Table 49.

Figure 26 - Upload Configuration Web Page

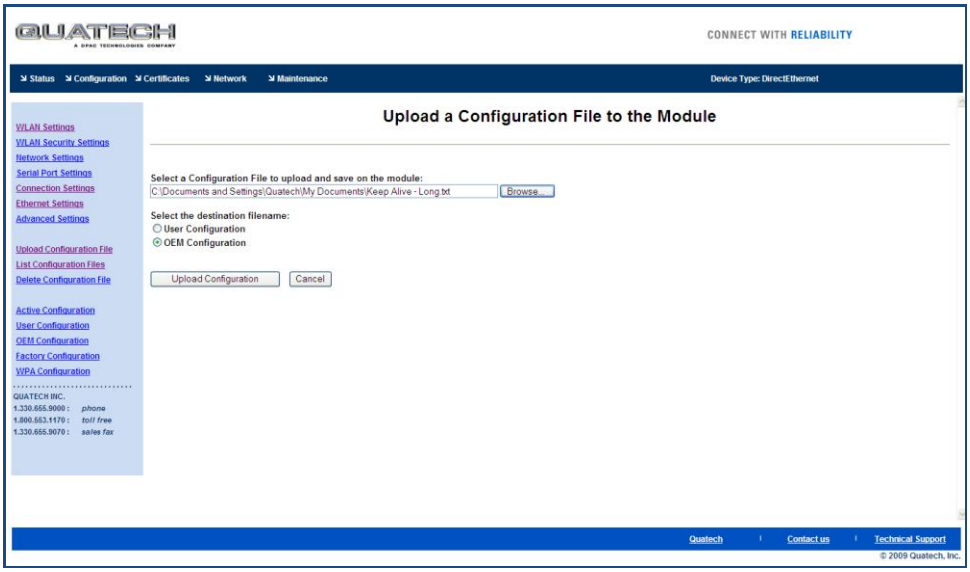


Table 49 - Uploading Configurations

Step	Description
Navigation Bar Select **Configuration**	You will see major WLAN parameters displayed.
Feature Bar Select **Upload Configuration File**	You will see a window open with field to enter the location of the configuration you want to upload, along with a choice of OEM or User Configuration.
Press **Browse...** Button	This will open a dialog box in which you can locate the certificate you wish to upload to the module. Select the configuration file and press **Open**. This will return you to the Configuration Upload window and will have entered the location and file name of the certificate you wish to upload in the field next to the **Browse...** button.
Select **User** or **OEM Configuration**	This defines the configuration you are installing. OEM Configurations will survive a factory reset, User will not.
Press **Upload Configuration**	You will then see a notice that the configuration has been successfully uploaded to the module.
Press **List Configuration Files**	This will show the current configuration files resident on the module and will include the file just uploaded.

Uploading a configuration file will overwrite any configuration file already stored on the module. This will cause a change in configuration when a module restart is performed.

IMPORTANT: Confirm that the OEM or USER settings in the configuration files will allow the user to communicate with the module after the upload and a restart has been completed.

10.6 Updating Firmware

The module's firmware may be updated using the web interface; please refer to Table 50 for the procedure to do this.

Updating the firmware will not alter any existing configuration files or certificates loaded on the module.

You will first need to obtain the version of firmware you wish to install from the Quatech website or Quatech technical support. The firmware will be a binary image file (.img) and indicate the version of the firmware in the file name.

Once you have obtained the firmware, save the firmware image to a location on the system you are browsing the module from, or a location accessible to the system you are browsing the module from.

Figure 27 - Firmware Update Page

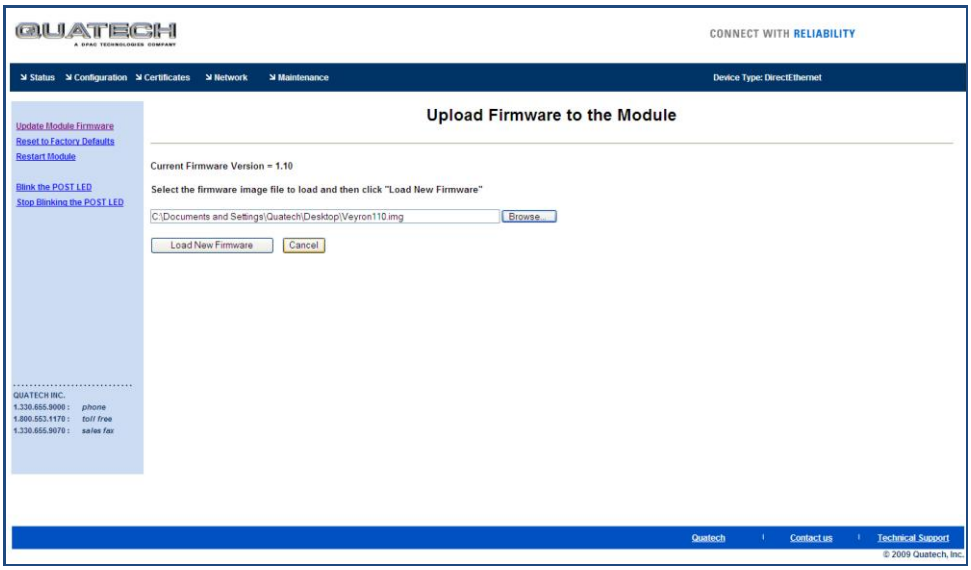


Figure 28 - Firmware Update in Progress

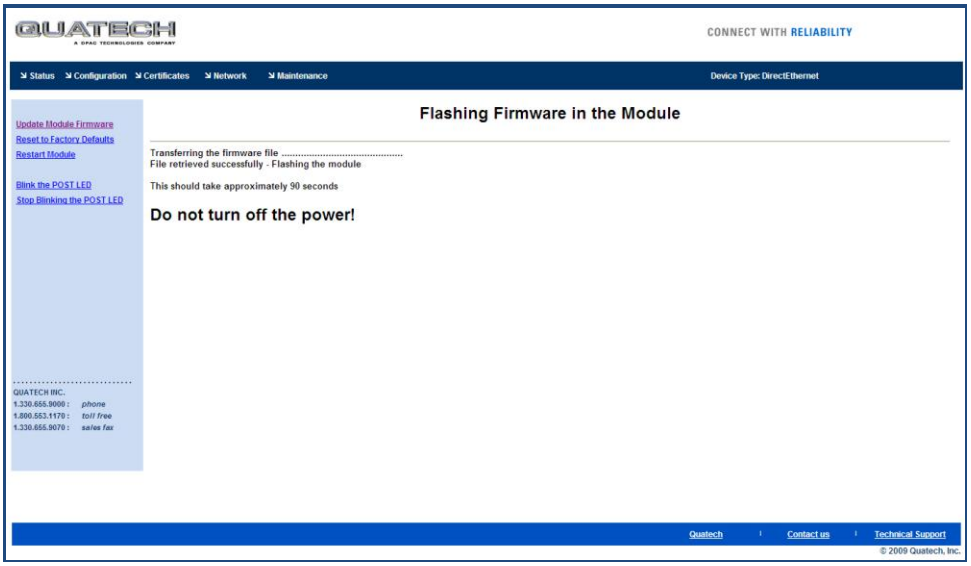


Figure 29 - Firmware Update Complete

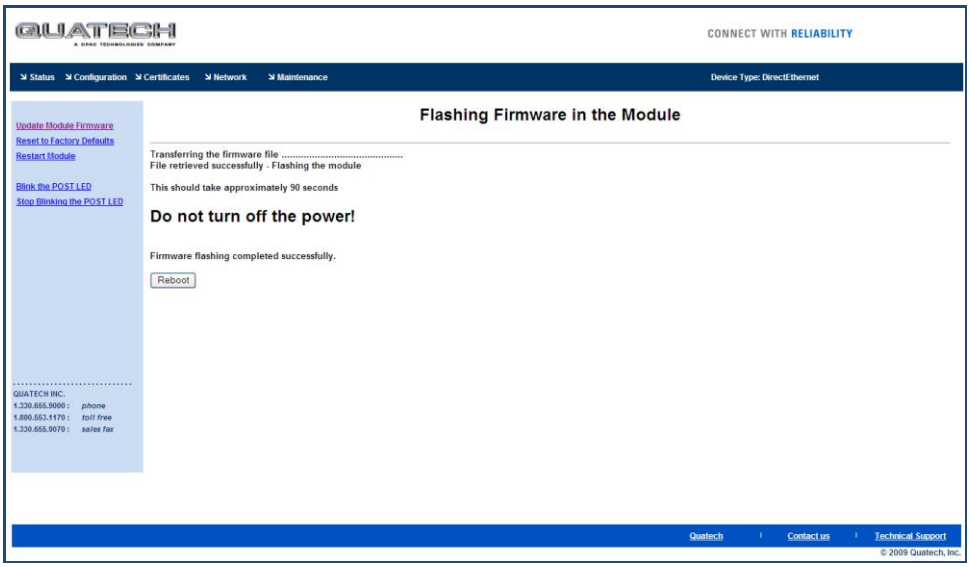


Table 50 - Updating Firmware

Step	Description
Navigation Bar Select **Maintenance**	This will open a window showing the current module status.
Feature Bar Select **Update Module Firmware**	You will see a window open with field to enter the location of the module firmware you want to upload. The current firmware version number is displayed at the top of the page.
Press **Browse...** Button	This will open a dialog box in which you can locate the firmware image you wish to upload to the module. Select the firmware image file and press **Open**. This will return you to the Upload Firmware window and will have entered the location and file name of the firmware image you wish to upload in the field next to the **Browse...** button.
Press **Load New Firmware**	You will then see a notice that the firmware upload has begun (Figure 28). When the upload has been completed successfully and the firmware updated w window indicating this will be shown (Figure 29).
Press **Reboot**	This will restart the module and the new firmware will be loaded.

DO NOT REMOVE POWER FROM THE MODULE DURING THE FIRMWARE UPDATE CYCLE.

This may cause the device to become non-operational. If this happens please contact Quatech Technical Support.

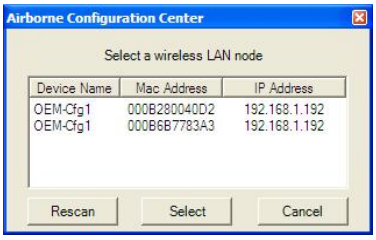
11.0 Using the ACC Application

The Airborne Control Center (ACC) application is supplied on the Airborne Evaluation Kit CD. The application provides device location and management capabilities from a Windows based network computer.

Once you have installed the Evaluation Kit CD run the ACC by locating the **Airborne DP50X Evaluation Kit** program directory and selecting the **Airborne Control Center** item.

You will see the window shown in Figure 30. This window shows search results for the location service, you will see discovered devices listed in specific order. Use the listed MAC address to identify the device you want to manage.

Figure 30 - ACC Device Discovery Results



11.1 Logging In

The login to an Airborne Device Server

Figure 31 - ACC Login Window

11.2 Menu Bar

Once logged in the first windows presented shows the status of the module along with other information about firmware version and network settings. Across the top of this window is a menu bar, this is the main navigation tool for th application and the following provides an overview of its function.

Figure 32 - ACC Navigation Menu Bar

Figure 33 - ACC Navigation Bar Description

Title	Description
Log in	Returns you to the Discovery window and displays all located devices.
Status	**Status** Provides feedback on the current status of the Device Server including its association status, signal strength and network configuration. This is the default page.
Services	**Network Services Configuration** Provides access to the HTTP, telnet and NAT services setting for the module.
Misc	**Miscellaneous OEM Settings** This section allows the OEM configuration and authentication settings to be changed. Support for power management is also provided on the page.
Network	**Wireless Network Configuration** This page provides access to the wireless, network, DHCP, security and discovery settings. This is the main configuration page.
Security	**Security Configuration** Provides the ability to manage the user access level through username and password configuration. (Network security is set in the **Network** page)
Reset	**Reset** Provides ability to restart or factory reset the module. It is important to note that restarting the module retains ALL saved or committed changes to the module and installs them after the cycle. If the Defaults option is used the OEM settings will be installed after the device server is restarted, these settings may prevent the module from associating to a wireless network and may provided limited to no connectivity.
About	Opens a dialog window indicting the version of the ACC being used.

11.3 Updating a Field

To update a field, select the field by pressing the Left Hand mouse button. Then either type in the appropriate content or select form the pull down menu.

Once you have finished modifying parameters, scroll to the bottom of the page and press the **Save** button. A dialog window will then indicate the Parameters have been successfully saved, you can then return to the configuration page by pressing the **No** button or restart the module by pressing the **Yes** button.

Follow the directions on restarting and reconnecting to the module. Upon a successful restart you will be returned to the **Status** page, you will not be required to login.

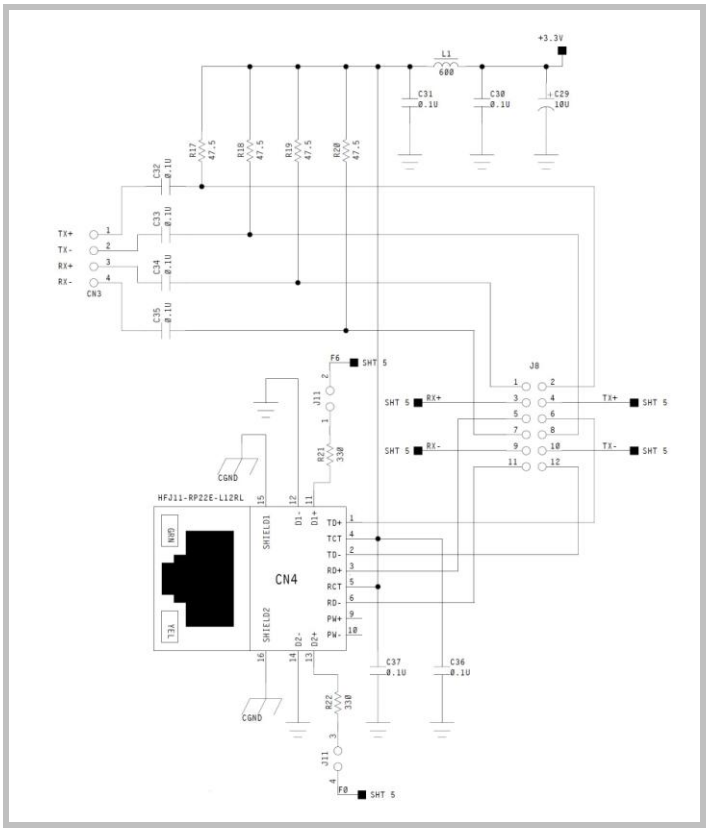
Note that the changes to the parameters will not be applied until a module restart has been completed.

Before the **Save** button has been pressed, all modified fields can be returned to their original state by pressing the **Cancel** button.

12.0 Ethernet Section

The Evaluation board provides two options for Ethernet connectivity, a direct connection through an RJ-45 jack which provides a 10/100 compatible interface capable of being attached to an Ethernet network or the ability to directly connect to the embedded Ethernet PHY on the Airborne Device Server module. The Ethernet circuit can be seen in Figure 34.

Figure 34 - Ethernet Schematic



The direct connection is available through CN3 (5.6) and requires J8 (5.21) to be configured correctly. If CN3 is used the most common connection method is capacitive coupling directly to a second PHY.

A 10/100 Ethernet PHY interface is supported when the Ethernet device type is selected in firmware. This interface is a 10/100Mbps interface that supports auto negotiation and cross-over cabling. The interface also supports both half and full duplex for 10Mbps and 100Mbps.

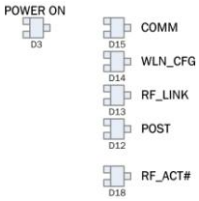
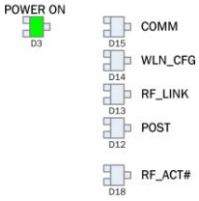
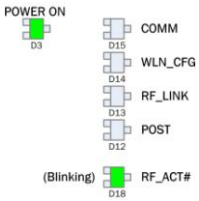
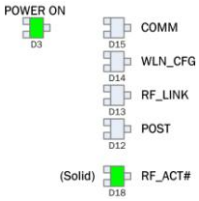
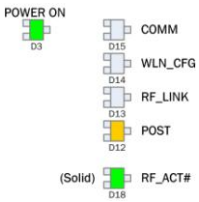
The interface uses a Broadcom BCM5241A Ethernet PHY, please refer to the manufacturers datasheet for interface details and appropriate design guidelines for both capacitive coupling and magnetic interface.

13.0 Indicator LED's

The Airborne Evaluation Board includes a set of indicator LED's that provide important feedback on the state of the module and its ability to communicate with the network. Understanding these LED's can help not only in debugging the evaluation board but also on deciding how you will implement them in your design.

Table 51 provides a description of the normal LED sequence and the module state for the combinations of these LED's. The table also provides some possible causes for failure and suggests appropriate remedies.

Table 51 - Indicator LED Status Description

LED Configuration	State	Description
	Evaluation Board is OFF	No power has been applied to the evaluation board and SW1 is in the OFF state.
	Evaluation Board is powered	The power has been applied to the Evaluation board and SW1 is in the ON position. The Airborne Device Server Module has initiated the boot cycle. The boot cycle may take 10-12 seconds.
	802.11b/g radio is enabled and searching for a wireless network	When the RF_ACT# LED starts to blink the Airborne Device Server Module has enabled the radio and it is actively scanning for a wireless network that matches the installed configuration. The RF_ACT LED will continue to blink until a network has been found.
	802.11 network located and radio is attempting to associate	The Airborne Device Server module has located a wireless network that matches its installed configuration and has initiated authentication. The RF_ACT# LED turning solid can happen both before and after the POST LED turning ON. If authentication fails the LED will return to blinking after several seconds.
	Airborne Device Server Module has passed Power-on Self Test (POST)	The Airborne Device Server Module has passed POST and has started to run network and device services.

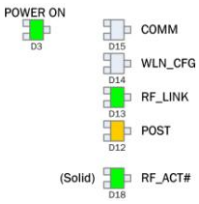
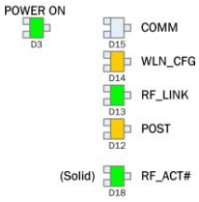
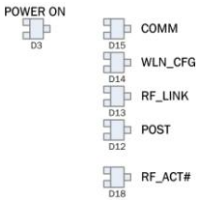
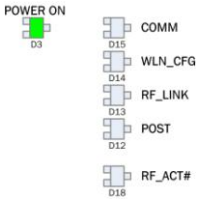
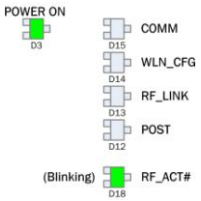
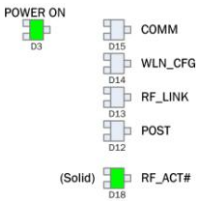
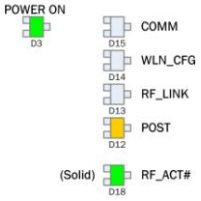
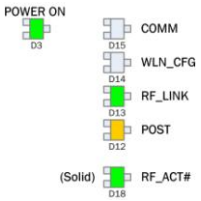
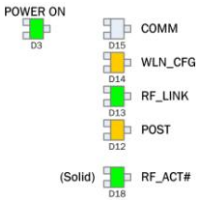
LED Configuration	State	Description
	Device Server has Authenticated with a wireless network	When the RF_LINK LED is on the Airborne Device Server module is associated to a wireless network. If DHCP is enabled the module will request an IP address, subnet, gateway and DNS server addresses.
	Device Server configured for network communication	The WLN_CFG LED ON indicates the Airborne Device Server module has installed a valid IP address and is available for network communication. It may take several seconds for the WLN_CFG LED to turn ON after the RF_LINK LED is ON, this delay is due to the DHCP lease process. If static IP addressing is being used the WLN_CFG LED will turn ON after network services are available on the module. This will be a few seconds after POST has turned ON.
	TCP/IP connection has been established with the Airborne Device Server Module	The COMM LED turning ON indicates that a TCP/IP connection has been established between the Device Server and a network device. This connection could be a web interface, CLI interface or a data tunnel connection. The COMM LED will turn ON whether the TCP/IP connection has been initiated by the Device Server or from the network. If initiated from the Device Server this indicates a successful connection with the target Server has been made.

Table 52 - Indicator LED Debug Answers

LED Configuration	Issue	Description
	Plugged in the power supply and turned on SW1 and D3 does not turn ON	Check the outlet plugged into is powered. Try a second outlet.
		Check the Airborne power supply is connected correctly, reseat the power cable to the power brick.
		Check that JP1 is configured to use the external power supply.
	Populated BT1 with 4 x AA cells and turned on SW1 and D3 does not turn ON	Check that JP1 is configured to use batteries.
		Make sure D2 is not ON. If D2 is ON replace the batteries.
	Power is applied but after 10-12 seconds RF_ACT# or POST do not turn ON	Make sure the Device Server Module (Ref Figure 1) is attached to the Evaluation board. Confirm the module is seated correctly by pushing lightly down on the units using the edges of the device. Avoid pushing on the label.

LED Configuration	Issue	Description
	RF_ACT# continuously blinks	This means the Airborne Device Server cannot locate a wireless network that matches the module configuration. For a association to occur both the SSID and security settings must match exactly the settings on the target Access Point or Wireless Router. Please refer to the Enterprise Command Line Interface manual for information on how to configure the module.
		This means the Airborne Device Server cannot locate a wireless network that matches the module configuration. It is possible that the target network is not in range, this may be due to the location of the Evaluation board or that the target network AP or WR are not powered. Confirm availability of wireless network.
	RF_ACT# is Blinking but POST does not turn ON	The system failed POST. It is recommended the evaluation board is RESTARTED by pressing SW2 or using SW1 to power the board down and up.
		Make sure the Device Server Module (Ref Figure 1) is attached to the Evaluation board. Confirm the module is seated correctly by pushing lightly down on the units using the edges of the device. Avoid pushing on the label.
	RF_ACT# is Solid but POST does not turn ON	The system failed POST. It is recommended the evaluation board is RESTARTED by pressing SW2 or using SW1 to power the board down and up.
		Make sure the Device Server Module (Ref Figure 1) is attached to the Evaluation board. Confirm the module is seated correctly by pushing lightly down on the units using the edges of the device. Avoid pushing on the label.
	POST is ON and RF_ACT# is solid but RF_LINK does not turn ON after a few seconds	This means the module is failing to associate/authenticate with the a wireless network that matches the installed SSID. The cause of this is incorrect configuration of the security settings; please refer to the Enterprise Command Line Interface manual for details. If WPA2-Enterprise is being used please confirm that the Certificates and Private Keys have been installed on the Device Server and that the correct file names are being used for authentication.
	The Device Server has associated with the network but WLN_CFG does turn ON after a few seconds	If DHCP is being used this indicates a failure in the DHCP service, this can be caused by there being no DHCP server on the network. Confirm there is a DHCP server available for the module to lease an IP address from.
		If a static IP address is being used this indicates either an illegal IP address has been stored on the device or an incomplete network configuration has been provided. Please refer to the Enterprise Command Line Interface manual for details on installing a valid WLN_CFG configuration.

LED Configuration	Issue	Description
	Attempt to communicate with the Device Server	If an attempt has been made to connect to the Device Server and the COMM LED does turn ON, this indicates that the connection was not completed successfully. There are many potential causes for this, please make sure the following are true: • Confirm the network host attempting to connect is on the same subnet as the Device Server. This is done by making sure the IP addresses for both are in the same subnet. • Confirm the network is not blocking traffic to the device by using device type specific filters (Check with IT for this information). Make sure there is no policy on the network that restricts access to the module. • The Device Server can be PINGED from the network host. • The Network Host can be PINGED by the Device Server. • The telnet port number on the module (default 23) matches the one being used to connect to.

14.0 Change Log

The following table indicates all changes made to this document:

Version	Date	Section	Change Description	Author
1.0	06/15/2009	-	Preliminary version	ACR

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