trangobroadband
W I R E L E S S

M5580M – FSU

Atlas Fox

Wireless Multi Mode Ethernet Bridge

Subscriber Unit

USER MANUAL

February 13, 2006

Revision 2
For
Firmware V.2p0r8

Table of Contents

Preface

This manual covers the basic configuration and installation of the M5580M-FSU Wireless Point to Point Subscriber Unit.

The M5580M-FSU consists of a radio with an internal 8 dBi. The M5580M-FSU may be used in conjunction with an optional FCC certified external reflector dish for extended transmission range. When using the reflector dish, professional installation is required. Contact your sales person for more information regarding the "Professional Installation Guide."

FCC Information

This device complies with Part 15 of the FCC Rules and Regulations. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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 these instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in any 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 correct the interference by one of more of the following measures:

1) Reorient the antenna.
2) Increase the separation between the affected equipment and the unit.
3) Connect the affected equipment to a power outlet on a different circuit from that which the receiver is connected to.
4) Consult the dealer and/or experienced radio/TV technician for help.

FCC ID: NCYM5580MFSU
Canada: 2945A-M5580FSU

IMPORTANT NOTE:
Intentional or unintentional changes or modifications must not be made unless under the express consent of the party responsible for compliance. Any such modifications could void the user's authority to operate the equipment and will void the manufacturer's warranty. To comply with FCC RF exposure requirements, the following antenna installation and device operating configurations must be satisfied. The antenna for this unit must be fixed and mounted on outdoor permanent structures with a separation distance of at least two meters from all persons. Furthermore, it must not be co-located or operating in conjunction with any other antenna or transmitter.

Warranty Information

Radios from Trango Broadband Wireless are warranted for one year from date of original purchase. Please see www.trangobroadband.com for a complete description of warranty coverage and limitations.

Chapter 1 Overview

Each M5580M-FSU acts as an endpoint in a point to multipoint wireless Ethernet transmission system, which provides network connectivity at, speeds up to 45 Mbps depending on the transmission distance, noise floor, and the antenna configuration. The M5580M-FSU uses either CCK or OFDM technology coupled with Automatic Repeat request (ARQ) for improved resistance to interference and noise. The M5580M-FSU product is comprised of the following items:

1) M5580M-FSU unit (With integrated dual polarization 8 dBi patch antenna)
2) 20 Volt power adapter for use with 120 VAC.
3) Power over Ethernet Junction Box.
4) Mounting hardware

The M5580M-FSU center frequency may be tuned from 5.736 to 5.836 GHz, allowing 6 non-overlapping channels to ease installation. The unit utilizes Power-over-Ethernet (PoE) and is designed for outdoor environments. The cable entry point can accommodate both Shielded twisted pair Cat5 (STP) and Unshielded twisted pair Cat5 (UTP), however STP is recommended.

Range vs. Throughput

The following table shows approximate maximum ranges (at recommended fade margins) achievable with the M5580M-FSU when associated with an M5830S-AP in CCK mode. Ranges for OFDM modes will be published when available.

Table – 1 Range & Throughput (CCK mode)

Antenna	3 miles	6 miles	10 miles
Integrated 8 dBi Patch	**9 Mbps (5 db fade margin)**	**NA**	**NA**
Attached to 18" Dish (AD5800-25)	**9 Mbps (22 db fade margin)**	**9 Mbps (15 db fade margin)**	**9 Mbps (10 db fade margin)**

System Contents

Each kit consists of one radio with integrated antenna, one power-over-Ethernet (PoE) injector, one AC adapter, One boot, and mounting hardware. A dual-polarized integrated antenna is located behind the radome of the M5580M-FSU. (Dish Mounting Hardware not included with the unit)
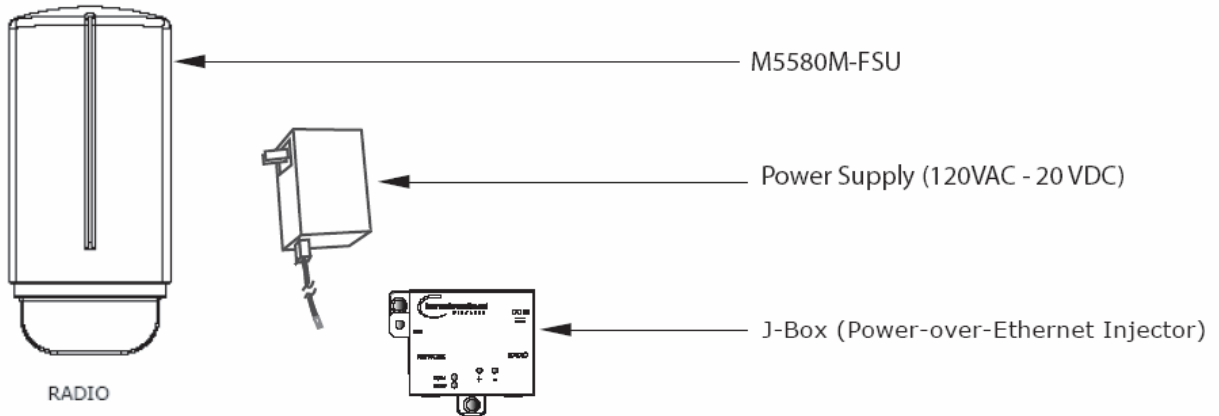
Figure 1

M5580M-FSU

Power Supply (120VAC - 20 VDC)

J-Box (Power-over-Ethernet Injector)

RADIO

Figure 2 (**NOT INCLUDED**)

DISH MOUNTING HARDWARE (FOX5800-D ONLY)

- BRACKET, REFLECTOR
- 10-32 X 1" HARDWARE
- 1/4-20 HARDWARE

Figure 3

MOUNTING HARDWARE (FOX5300 & FOX5800)
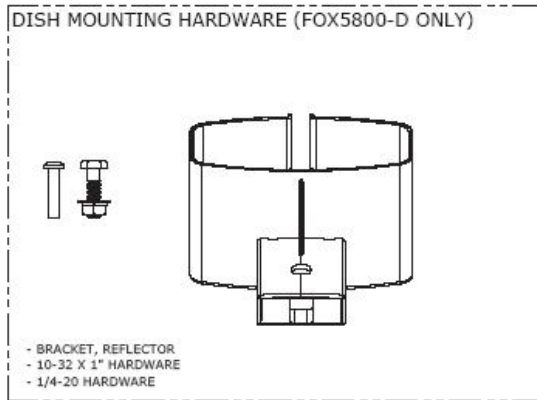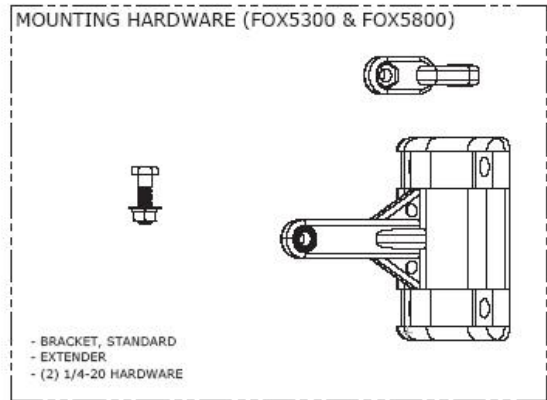
- BRACKET, STANDARD
- EXTENDER
- (2) 1/4-20 HARDWARE

Location of Serial Number & MAC Address

The serial number and MAC address label can be found on the back of each radio. The serial number and MAC address is also provided on the system information screen. (See figure 4 & 5 below)

Figure 4

FOX RADIO

FOAM INSERT

BOOT

Exploded View of Radio, Foam Insert, and Boot

TRANGO BROADBAND
WIRELESS
FOX5580(TM)
M5580M-FSU   REV xxxx
FCC
CANADA

Figure 5

MAC: 0001DE FF FF FF
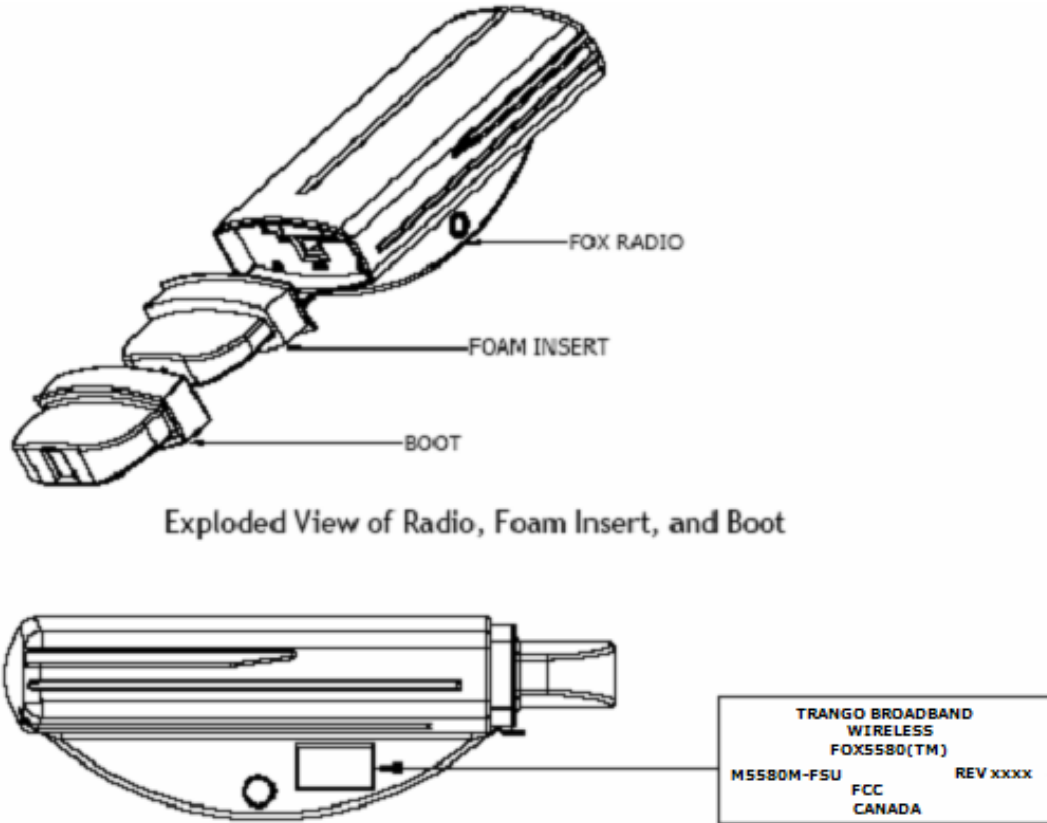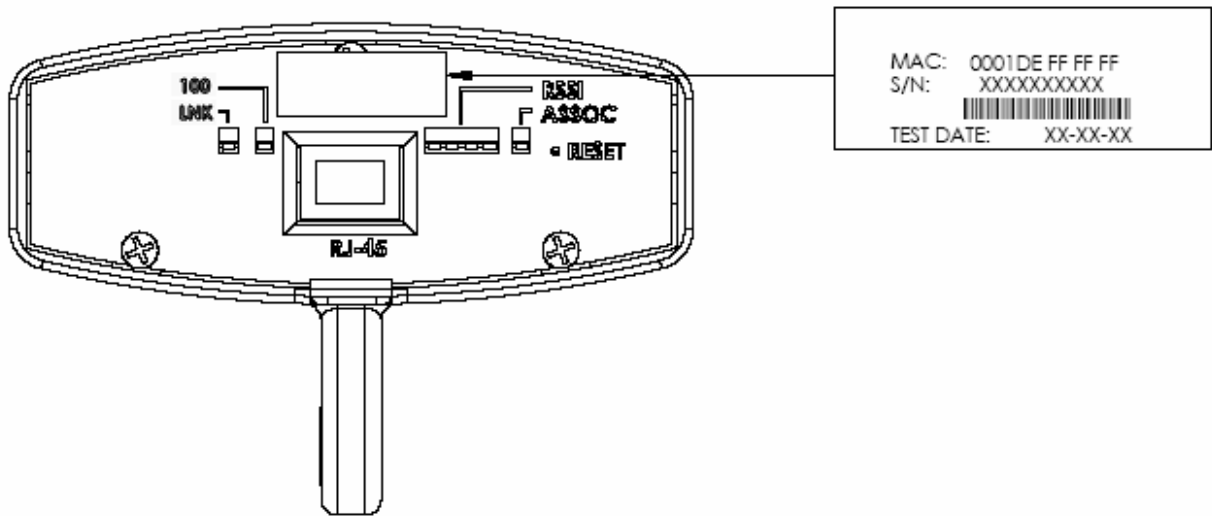S/N: XXXXXXXXXX

TEST DATE: XX-XX-XX

Location of RJ-45/LED Port

The RJ-45 connector, diagnostic LEDs, and reset button are located at the bottom of the radio. Functionality of the LEDs is described later in this text. The reset button, resets all configuration settings (including IP address and password) back to factory default. Hold the reset button down for 5 seconds (until amber lights flash) while unit is powered on.

Figure 6

Reset Button
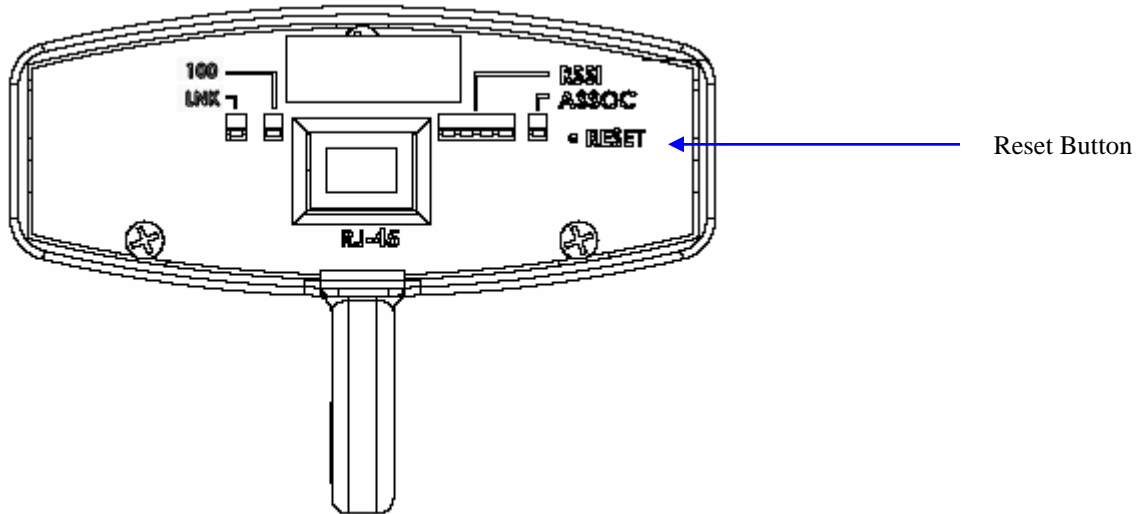
Chapter 2 Getting Started

It is recommended that you first provision and test your the radios on the bench before deploying them in the field. This is a particularly useful exercise for the novice user.

Connections and Power

- Connect a Cat-5 (straight through) Ethernet cable (we recommend shielded twisted pair) between the ODU (out door unit) port of the J-box and the RJ-45 connector on the radio. Note that this cable will carry power-over-Ethernet (PoE).

- If connecting to a COMPUTER, use a <u>Cross-Over</u> Ethernet cable from the NET port of the J-box to the computer's Ethernet port.

  If connecting to a HUB, SWITCH, or ROUTER, use a <u>Straight-Thru</u> cable.

- Plug the AC adapter into an AC outlet.

Figure 7
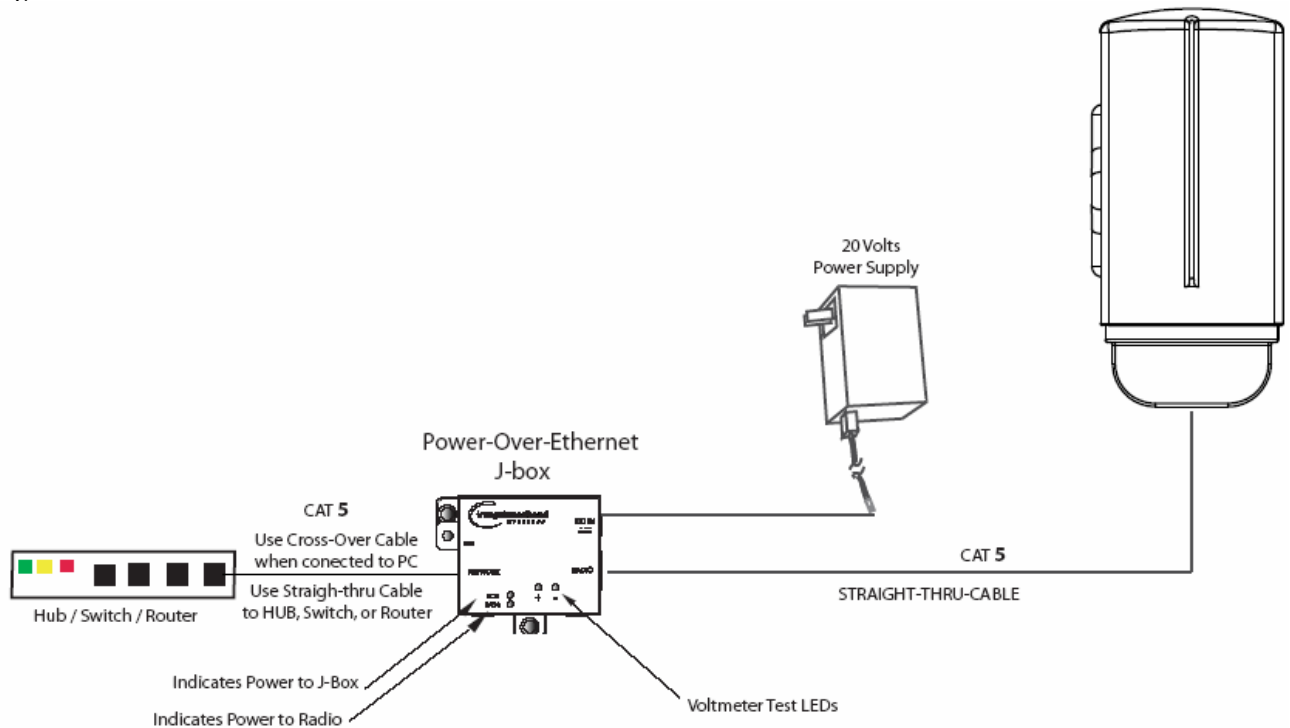
Both green LEDs on the J-box should be lit, indicating power is present at the PoE box as well as at the radio. The Radio's Power LED may take several seconds before lighting. It will require approximately 45 seconds for the radio to boot and be ready for configuration via the Ethernet port.

✎ Note: If voltage falls below 16 volts, the power LED will go off but the Radio LED will stay on. The radio can operate down to 10.5 volts.

Configuration Tools

M5580M-FSU radios can be configured using either the Command Line Interface (CLI), or the Web Browser (HTTP) interface. Although both methods are comprehensive and powerful, the CLI method provides slightly more functionality.

This text covers configuration through the CLI. For HTTP configuration please see **Chapter 4** on page 18.

Telnet
Open a command prompt (DOS) session on your PC. Next, open a Telnet session by typing:

telnet <ip address of radio>

Example:
```
C:>telnet 192.168.100.100
```

✎ Note: All Trango radios are pre-configured at the factory with a default IP address of 192.168.100.100, Subnet Mask 255.255.255.0, and Default Gateway 192.168.100.100.

✎ Note: The M5580 can handle up to 4 telnet sessions.

You will be greeted with current hardware and firmware information and prompted for a password. Type in the password and press enter. The factory default read/write password is **trango**.

```
Welcome to Trango Broadband Wireless, M5580M 2p0r8D06011801
Password:
```

✎ Note: Type *help* for a listing of all CLI commands. Type *help [<command>]*, for the syntax of a particular command.

✎ Note: If you cannot access the radio management functions via the Ethernet port, check all cable connections and ensure that your PC is set up with a correct IP scheme.

Troubleshooting Ethernet Connections
If you cannot telnet into the radio or open an HTTP browser session, check your cable connections to ensure proper use of cross-over vs. straight-through cable, and ensure your PC's subnet is routable to the radio's IP address.   You can also, try pressing and holding the reset button on the unit to ensure default IP address and password.

System Information (sysinfo) Page

To display system configuration and status information type the command *sysinfo* at prompt.

#> *sysinfo*
[Hardware Version] 5580
[MVC Version] 3893mvc_4p5_050913.arm
[Firmware Version] 2p0r8D06011801
[Device ID] 00 01 DE 00 04 47 [Base ID] 1 [AP ID] 1 [SU ID] 1
[System Up Time] 0 day(s) 00:22:51
[Opmode] off [Default Opmode] off [Opmode Start] 30 sec
[IP] 192.168.100.100 [Subnet Mask] 255.255.255.0 [Gateway] 192.168.100.1
[Httpd Port] 80 [Httpd Status] listen
[Telnetd Port] 23 [Telnetd Status] connected
[Telnet Client #1] 192.168.100.111,1093
[Telnet Client #2] 192.168.100.111,1092
[Telnet Client #3] 192.168.100.111,1088
[Telnet Client #4] 192.168.100.111,1087
[Tftpd] disabled
[RF Tx Power] 21 dBm
Channel Table: (MHz)
[Ch#01] 5736 [Ch#02] 5756 [Ch#03] 5776 [Ch#04] 5796 [Ch#05] 5816 [Ch#06] 5836
[Ch#07] 5736 [Ch#08] 5736 [Ch#09] 5736 [Ch#10] 5736 [Ch#11] 5736 [Ch#12] 5736
[Ch#13] 5736 [Ch#14] 5736 [Ch#15] 5736 [Ch#16] 5736 [Ch#17] 5736 [Ch#18] 5736
[Ch#19] 5736 [Ch#20] 5736 [Ch#21] 5736 [Ch#22] 5736 [Ch#23] 5736 [Ch#24] 5736
[Ch#25] 5736 [Ch#26] 5736 [Ch#27] 5736 [Ch#28] 5736 [Ch#29] 5736 [Ch#30] 5736

[Channel Scan Sequence] 5 v
[Active Channel] 5 v Disconnected
[Broadcast Packet] on [Auto Scan AP] on [TCP/IP for AP] off [TCP/IP for Local Et
h] off
[Remarks] Remarks
[ARQ] on

[RF Rx] 0 Kbps [RF Tx] 0 Kbps [Eth Rx] 3 Kbps [Eth Tx] 101 Kbps

[Eth Rx] 51,723 bytes [Eth Tx] 64,975 bytes
[RF Rx] 0 bytes [RF Tx] 0 bytes

Success.
#>

✎   *Note: Four open Telnet sessions indicated in bold within the sysinfo displayed above*

For more information, see table #3 below.

Chapter 3 Configuration

Key Concepts

Prior to configuring the radios, it is important to understand several key concepts:

Access Point (AP)   The AP is typically considered the primary radio within the link. It is recommended to install the AP closest to the head-end of the network.

Subscriber Unit (SU) The SU is typically installed at the customer premise.   The primary distinction between the AP and SU is that when the radios are not associated, the AP will transmit and the SU will listen until the wireless link is established.

Authentication   Authentication is controlled by the AP via BASEID, SU ID and the MAC address of each SU

Opmode   Operation mode (on or off).   The radio will only transmit while set to Opmode ON.

Default Opmode   Opmode (on or off) which the radio enters after reboot.

> ✎ *Note: if you telnet into a radio within 30 seconds after reboot, the radio will remain in opmode OFF even if the default opmode is ON.*

Essentials to Establish a Wireless Link

Configuration of the M5580M-FSU system is simple and at a minimum requires the following settings:
1. Set BASEID
2. Designate the SU ID.
3. Program SU ID, Mac and CIR/MIR settings on the AP.
4. Set AP and SU to same channel and antenna polarization
5. Set default Opmode to "ON", the radio will automatically enter opmode on after a reboot.
6. Turn Opmode "ON", both AP and SU.

If all of these parameters are met, and if the AP and SU are within range and properly aligned, the wireless link will automatically establish itself and Ethernet traffic will begin to pass between the radios.

Access Point Basic Settings

For the Access Point basic configuration, see the M5830 User Manual

Subscriber Unit Basic Settings

Log into the SU. To receive a comprehensive snapshot of the system's configuration info and status, type the command *sysinfo*.

```
#> sysinfo
[Hardware Version] 5580
[MVC Version] 3893mvc_4p5_050913.arm
[Firmware Version] AFSU 2p0r8D06011801
[Device ID] 00 01 DE 00 04 3F [Base ID] 1 [AP ID] 1 [SU ID] 1
[System Up Time] 0 day(s) 00:00:39
[Opmode] off [Default Opmode] off [Opmode Start] 30 sec
[IP] 192.168.100.100 [Subnet Mask] 255.255.255.0 [Gateway] 192.168.100.1
[Httpd Port] 80 [Httpd Status] listen
[Telnetd Port] 23 [Telnetd Status] connected
[Telnet Client #1] 192.168.100.177,1637
[Tftpd] disabled
[RF Tx Power] 17 dBm
Channel Table: (MHz)
[Ch#01] 5736 [Ch#02] 5756 [Ch#03] 5776 [Ch#04] 5796 [Ch#05] 5816 [Ch#06] 5836
[Ch#07] 5736 [Ch#08] 5736 [Ch#09] 5736 [Ch#10] 5736 [Ch#11] 5736 [Ch#12] 5736
[Ch#13] 5736 [Ch#14] 5736 [Ch#15] 5736 [Ch#16] 5736 [Ch#17] 5736 [Ch#18] 5736
[Ch#19] 5736 [Ch#20] 5736 [Ch#21] 5736 [Ch#22] 5736 [Ch#23] 5736 [Ch#24] 5736
[Ch#25] 5736 [Ch#26] 5736 [Ch#27] 5736 [Ch#28] 5736 [Ch#29] 5736 [Ch#30] 5736

[Channel Scan Sequence] 5 v
[Active Channel] 5 v  Disconnected
[Broadcast Packet] on [Auto Scan AP] on [TCP/IP for AP] off [TCP/IP for Local Eth] off
[Remarks] Remarks
[ARQ] on

[RF Rx] 0 Kbps [RF Tx] 0 Kbps [Eth Rx] 0 Kbps [Eth Tx] 0 Kbps

[Eth Rx] 1,629 bytes [Eth Tx] 2,812 bytes
[RF Rx]  0 bytes [RF Tx]  0 bytes

Success.
```

Many of these parameters can be changed by the user. A description of each of these changeable parameters, along with the related command, is shown in table #3 below.

Table 2: Reference Table of Basic SU System Information

SU SYSTEM INFORMATION PARAMETERS AND RELATED COMMANDS		
SU Parameter	Description	Related CLI Command
Device ID	MAC Address of the SU	N/A
Base ID	Specifies the cell or cluster to which the SU belongs.	*set baseid <baseid>* Example: #>Set baseid 10
SU ID	Together with Base ID, it is the unique identifier of this SU used in association. It is used	*set suid <suid>* Example:

	to execute commands from the AP to this specific SU.	#>Set suid 3
AP ID	Informational parameter that shows to which AP the SU is associated. Please note that AP ID is not used by the system for SU authentication.	Informational Parameter
Opmode	Current Opmode of radio.	*opmode su [< y>] / off* This sets the radio in Opmode "SU." Or OFF
Default Opmode	Determines the Opmode ("SU" or "OFF") of the radio after reboot/power cycle. When the parameter is set to "SU," the radio will progress into Opmode "SU" automatically fter reboot/power cycle.	*set defaultopmode <su / off>* Example: #>set defaultopmode ap
IP Subnet Gateway	IP, Subnet, and Gateway address of radio.	*ipconfig [<new ip> <new subnet mask> <new gateway>]* Example: #>ipconfig 10.1.1.3 255.0.0.0 10.1.1.1
TFTPD	TFTPD status (on or off). TFTPD should be turned on to import file into radio (such as new firmware). Default is off. TFTPD will revert to off after reboot/power cycle.	*tftpd [<on / off>]*
RF TX Power	Current transmit power of the SU not including antenna gain. This is controlled during the association process.	*power set <dBm> (Range is 7..21)*
Channel Scan Sequence	Shows the various channels (in sequence) that the SU will scan while searching for an AP.	*freq scantable (displays scan table)* *freq scantable 5 v (sets Scan table to 5 v)*
Active Channel	Shows the channel used in the current association, and "Associated" or "Disconnected" depending on the association status.	Information Parameter
Broadcast Packet Filter	This software switch (0) enables/disables the blocking of Ethernet control packets, except ICMP and ARP, to reduce the amount of unnecessary overhead introduced to the wireless link.	*sw 0 [<on / off>]* (default is on) Example: #>sw 0 on

AP Autoscan	Software switch (1) is to turn AP autoscan on or off.	*sw 1 [<on / off>]* (default is on)
TCP/IP for AP	Software switch (2), when on, allows users at the AP side of the network to telnet or HTTP into the SU.	*sw 2 [<on / off>]* (default is on)
HTTP services TCP/IP for Local Ethernet	Software switch (5), when on, allows local access via the browser This software switch (switch 6) when on, allows users on the wired side of the SU to telnet or HTTP into the SU.	*sw 5 [<on/off>] (default is on)* *sw 6 [<on / off>]* (default is on)
Remarks	User definable radio information (i.e. customer name, address of installation, and so on). Stores a maximum of 28 characters can be stored.	*remarks [<remarks>]* Example: #>remarks 678 Oak Ave
Counters: RF TX RF RX Eth TX Eth RX	These are averages of wired and wireless, transmit and received, traffic in Kbps.	Informational Parameter

Establishing a Wireless Link

If the AP and SU are properly configured and in opmode "ON", the two radios will automatically begin the authentication process and become connected. To determine if the two radios are connected, type the **sysinfo** command.
Example:
#> sysinfo
[Hardware Version] 5580
[MVC Version] 3893mvc_4p5_050913.arm
[Firmware Version] FSU 2p0r8D06011801
[Device ID] 00 01 DE 00 04 47 [Base ID] 1 [AP ID] 1 [SU ID] 1
[System Up Time] 0 day(s) 00:34:15
[Opmode] off [Default Opmode] off [Opmode Start] 30 sec
[IP] 192.168.100.100 [Subnet Mask] 255.255.255.0 [Gateway] 192.168.100.1
[Httpd Port] 80 [Httpd Status] listen
[Telnetd Port] 23 [Telnetd Status] connected
[Telnet Client #1] 192.168.100.111,1092
[Tftpd] disabled
[RF Tx Power] 21 dBm
Channel Table: (MHz)
[Ch#01] 5736 [Ch#02] 5756 [Ch#03] 5776 [Ch#04] 5796 [Ch#05] 5816 [Ch#06] 5836
[Ch#07] 5736 [Ch#08] 5736 [Ch#09] 5736 [Ch#10] 5736 [Ch#11] 5736 [Ch#12] 5736
[Ch#13] 5736 [Ch#14] 5736 [Ch#15] 5736 [Ch#16] 5736 [Ch#17] 5736 [Ch#18] 5736
[Ch#19] 5736 [Ch#20] 5736 [Ch#21] 5736 [Ch#22] 5736 [Ch#23] 5736 [Ch#24] 5736
[Ch#25] 5736 [Ch#26] 5736 [Ch#27] 5736 [Ch#28] 5736 [Ch#29] 5736 [Ch#30] 5736

[Channel Scan Sequence] 1 h
[Active Channel] 1 h Disconnected
[Broadcast Packet] on [Auto Scan AP] on [TCP/IP for AP] off [TCP/IP for Local Eth] off

[Remarks] Remarks
[ARQ] on

[RF Rx] 0 Kbps [RF Tx] 0 Kbps [Eth Rx] 3 Kbps [Eth Tx] 92 Kbps

[Eth Rx] 66,191 bytes [Eth Tx] 79,526 bytes
[RF Rx] 0 bytes [RF Tx] 0 bytes

Success.
#>

The [Active Channel] field indicates whether the AP and SU are connected or disconnected. If connected, the AP and SU will automatically start passing Ethernet traffic over the wireless link.

Changing IP Address

Use the *ipconfig* command to change the radio's ip address, subnet mask and gateway.
Syntax: *ipconfig [<ip> <subnet> <gateway>]*

```
Example:
#> ipconfig 192.168.100.101 255.255.255.0 192.168.100.1
New configuration: [ip] 192.168.100.101 [subnet mask] 255.255.255.0
[gateway] 19
2.168.100.1

save and activate ? (y/n) y
The new configuration will be saved and activated in 10 seconds.
Success.
#>
```

LEDs

LEDs are visible on the unit's PCB between the reset button and the RJ-45 connector. The function of each LED is described below:

LNK (green)
Green: On solid for an established 10BaseT or 100BaseT Ethernet Link.

100 (green)
Green: Solid if 100BaseT, Blinks only if there is activity (TX or RX) on the network when a 100 MBit connection is established. Off if a 10BaseT connection is established or if there is 10BaseT activity.

RSSI (4 Amber LEDs)
In all modes except "Survey", the unit's four yellow LEDs indicate the level of RF signal being received from a VALID AP or SU as appropriate.

Yellow LED 1 : Begins blinking when RSSI is greater or equal to –90 dBm. On continuously at –85 dBm. This is the Leftmost LED

Yellow LED 2 : Begins blinking when RSSI is greater or equal to –80 dBm. On continuously at –75 dBm.

Yellow LED 3 : Begins blinking when RSSI is greater or equal to –70 dBm. On continuously at –65 dBm.

Yellow LED 4 : Begins blinking when RSSI is greater or equal to –60 dBm. On continuously at –55 dBm. This is the rightmost LED.

If no VALID AP or SU signal is detected the LEDs will not be on at all.

In addition, these 4 LEDs shall flash ON for 2 seconds, then OFF for 2 seconds to indicate the 'factory reset' button has been activated and the reset successful.

ASSOC (association LED (green)):
The ASSOC led blinks at the following rates:
- Once every second when unit is powered on but opmode is OFF.
- Twice per second while in opmode ON and scanning for an AP or SU.
- Solid after unit is associated with the SU or AP.

Power Settings

Users may change the radio's conducted output power using the ***power set*** commands or allow the AP to control the output power. The following sample demonstrates how to manually set the power.
(Power range from 7 – 21)

In this example, the user sets the power to 19dBm:
#> ***power set 19***
Tx Power = 19 dBm
Success.

Chapter 4 Using the HTTP Interface

This section describes a few more basic concepts and how to establish a basic wireless link with the AP, using the Browser (HTTP) Interface. This section addresses only the most basic steps in establishing a link in the lab, or a bench-top environment. It is highly recommended that you read the Access 5830 Users Guide to gain understanding of all important configuration parameters and procedures prior to deploying any wireless equipment.
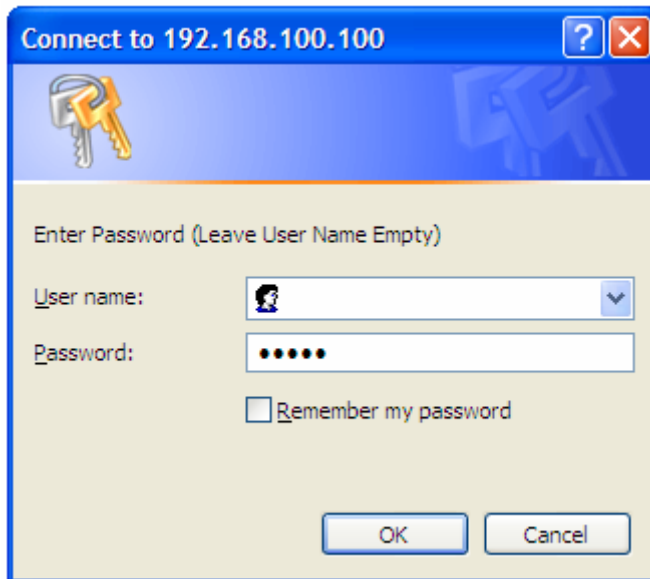
Configure Basic Parameters

Each SU must be set up with basic information to communicate with the AP. At a minimum the Base ID must match the Base ID of the AP, the SU ID must match the SU ID in the AP.s SUDB, and the AP.s active channel must exist in the SU.s AP Scan Sequence.

To set up the SU, complete the following steps:

1. Connect to the SU (see Chapter two "Getting Started"), and open the Configuration page.

2. Open a browser session and type the IP address of the radio at the address bar of the browser. Default IP address is 192.168.100.100.

3. Leave the User name field blank and enter read write or read only Password. Press or Click OK. Default password is **trango**. After logging on, the system information screen will be displayed.
Figure 8

Configure Basic Cont.
Figure 9

Navigation links are shown on the left side of the browser screen. Navigable links include:

System Information
Configuration
Site Survey
Help

The lower left portion of the screen shows the unit's current opmode, connection, channel, and antenna status. The main body of the System Information displays most of the key parameters. To view description of System Information entries within the radio, click the Help link.

4. Click on Configuration
Figure 9

Configure Basic Cont.

5. Entered Base ID , AP ID (not required for establishing a link), and SU ID
   (This settings must match those entered on the AP for this unit.)

Figure 10

6. Click on "Change IDs"
7. Configured Default Opmode to "SU" (This will ensure that your SU will establish a link when the power is cycle.)
8. Enter Channel(s) and Polarization(s) "Scan AP Sequence."
   (The SU will use these entries to look for an AP to link up to)

Figure 11

9.   Click on "Save and Activate Settings"
10. Click on Activate Opmode.

Figure 12

Configure Basic Continuo

If all settings are entered correctly, and if AP is within operating range, the SU will establish a wireless connection and Ethernet traffic will begin to pass across the wireless link. The "Current Status" section can help you verify connection status. The signal strength (RSSI) received from the AP is also provided under this section.

Figure 13

M5580M AFSU

System Information

System Information

Installation

Configuration
Site Survey

Help

Current Status

Opmode SU

Base ID 1
AP ID 1
SU ID 1
Channel   1 h
Associated RSSI -36 dBm

Web Ver   2p0D05112301

Trango Broadband Wireless

Hardware Version 5580
MVC Version 3893mvc_4p5_050913.arm
Firmware Version 2p0r3D05120701
Device ID 00 01 DE 00 04 47
Base ID 1 **AP ID** 1 **SU ID** 1
Opmode SU **Default Opmode** off
System Up Time 00:02:00
IP 192.168.100.100 **Subnet Mask** 255.255.255.0 **Gateway** 192.168.100.1
Telnetd Port 23 connected
Tftpd disabled
Active Channel 1 h **Tx Power** 13 dBm
Channel Table (MHz) (Lined out frequencies not available on this unit)
Ch#01 5736 **Ch#02** 5756 **Ch#03** 5776 **Ch#04** 5796 **Ch#05** 5816 **Ch#06** 5836
~~**Ch#07** 5260~~ ~~**Ch#08** 5280~~ ~~**Ch#09** 5300~~ ~~**Ch#10** 5320~~ ~~**Ch#11** 5340~~ **Ch#12** 5736
Ch#13 5736 **Ch#14** 5736 **Ch#15** 5736 **Ch#16** 5736 **Ch#17** 5736 **Ch#18** 5736
Ch#19 5736 **Ch#20** 5736 **Ch#21** 5736 **Ch#22** 5736 **Ch#23** 5736 **Ch#24** 5736
Ch#25 5736 **Ch#26** 5736 **Ch#27** 5736 **Ch#28** 5736 **Ch#29** 5736 **Ch#30** 5736
Scan AP Sequence 1 h
Broadcast Packet block
Auto Scanning AP enabled
TCP/IP Service for AP disabled
TCP/IP Service for Ethernet port (opmode SU) enabled
Remarks 1234567890-=qwertyuiop[]asdfghj

Eth In 7,358 bytes **Eth Out** 19,832 bytes
RF In 0 bytes **RF Out** 0 bytes

Trango Broadband Wireless, a division of Trango Systems, Inc.
http://www.trangobroadband.com
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Chapter 5 Deployment & Installation

Once you are familiar with the basic operations of the M5580M-FSU, you are ready for deployment in the field. The deployment process consists of the following steps:

- Site Selection
- Site survey at AP and SU sites
- AP installation
- SU installation and antenna alignment
- Link test

Site Selection

Proper site selection for your AP will help ensure a successful deployment. Site selection will depend on a wide variety of factors, but from the radio's performance standpoint, please consider the following:

- Path from AP to SU should provide unobstructed line-of-sight (LOS), thus it is advisable to place AP as high as possible on a tall building or tower.
- Ethernet cable limit is 100 meters from Ethernet device (router, switch) to radio.
- Radios should never be deployed without proper grounding.
- Consider nearby sources of interference that could degrade the performance of the radio. Mount radios as far from sources of interference as possible.

Site survey

The radios provide an on-board site survey tool to measure the average and peak noise levels on any given channel.

To use the survey tool, the radio must be in Opmode "OFF." The survey can be performed for any specified amount of time (in seconds), and for either the horizontal or vertical polarization.

Prior to performing the site survey, place the radio in the installation spot, and aim the radio in the desired direction.

After the specified period, the results of this command will provide you with a listing of each channel in the band, the average signal received, and the maximum signal received during the survey period.

Example:
```
#> survey 10 h
Press 'q' to stop.
                          noise floor        rssi by pkt
                        (peak / avg dBm)   (peak / avg dBm)
Freq 5724 MHz             -98 / -98          -99 / -99
Freq 5728 MHz             -98 / -98          -99 / -99
Freq 5732 MHz             -98 / -98          -99 / -99
Freq 5736 MHz Ch 1        -98 / -98          -99 / -99
Freq 5740 MHz             -98 / -98          -99 / -99
Freq 5744 MHz             -98 / -98          -99 / -99
Freq 5748 MHz             -98 / -98          -99 / -99
Freq 5752 MHz             -98 / -98          -99 / -99
Freq 5756 MHz Ch 2        -98 / -98          -99 / -99
Freq 5760 MHz             -98 / -98          -99 / -99
Freq 5764 MHz             -81 / -98          -99 / -99
Freq 5768 MHz             -90 / -98          -99 / -99
Freq 5772 MHz             -89 / -98          -99 / -99
Freq 5776 MHz Ch 3        -98 / -98          -99 / -99
Freq 5780 MHz             -81 / -98          -99 / -99
Freq 5784 MHz             -97 / -98          -99 / -99
```

```
Freq 5788 MHz          -98 / -98         -99 / -99
Freq 5792 MHz          -85 / -98         -99 / -99
Freq 5796 MHz Ch 4     -79 / -98         -99 / -99
(Survey Cont.)
Freq 5800 MHz          -80 / -98         -99 / -99
Freq 5804 MHz          -98 / -98         -99 / -99
Freq 5808 MHz          -98 / -98         -99 / -99
Freq 5812 MHz          -77 / -98         -99 / -99
Freq 5816 MHz Ch 5     -98 / -98         -99 / -99
Freq 5820 MHz          -79 / -98         -99 / -99
Freq 5824 MHz          -98 / -98         -99 / -99
Freq 5828 MHz          -98 / -98         -99 / -99
Freq 5832 MHz          -98 / -98         -99 / -99
Freq 5836 MHz Ch 6     -98 / -98         -99 / -99
Freq 5840 MHz          -98 / -98         -99 / -99
Success.
#>
```

The results will display signal levels for each frequency in intervals of 4MHz for each channel. Select the channel with lowest signal levels.

✎ *Note: Each Channel is 20MHz wide.*

When selecting a channel, make sure to review 10MHz above and 10MHz below. As an example, Ch 5 covers frequencies 5806 to 5826. This channel is not clear. Frequency 5812 has a noise level of -77dBm. This noise level will interfered with your signal resulting in poor performance. Chanel 6 is a better choice.

Channel Planning

Based on the results of the site survey at each end of the link, choose a channel with the lowest noise floor. A clean spectrum is essential for proper performance. It is recommended to maintain a 10dB fade margin or separation from the noise floor for best performance.

RSSI Command and Antenna Alignment

Once the site survey is completed, you are ready to install your radios. Typically it is best to install the AP first.
To properly align the radios, use the built-in RSSI tool to achieve maximum signal strength.
1. Ensure SU is in Opmode "ON"
2. Connect to the SU.
3. Login and type the command *rssi*. As you read the RSSI, move the antenna in the horizontal and vertical planes until the maximum RSSI reading is achieved
4. If it is not possible to receive an adequate RSSI reading, it may be necessary to reorient the SU (up/down, left/right), to increase the output power of the AP, or to move the SU to a location with better line-of-sight conditions to the AP.
5. Once you are satisfied with the RSSI reading, tighten down the SU in the optimum position.

Example:
```
#> rssi
Press any key to stop.
  0> AP  -75 dB     SU  -75 dB      Connected
  1> AP  -75 dB     SU  -75 dB      Connected
  2> AP  -73 dB     SU  -73 dB      Connected
  3> AP  -72 dB     SU  -71 dB      Connected
  4> AP  -70 dB     SU  -70 dB      Connected
  5> AP  -70 dB     SU  -69 dB      Connected
  6> AP  -69 dB     SU  -70 dB      Connected
  7> AP  -70 dB     SU  -70 dB      Connected
  8> AP  -70 dB     SU  -70 dB      Connected
  9> AP  -67 dB     SU  -68 dB      Connected
 10> AP  -67 dB     SU  -67 dB      Connected
```
Success.

Users can also view the RSSI LEDs on the bottom of the radio. See the figure14 and Table 3 below for more information.
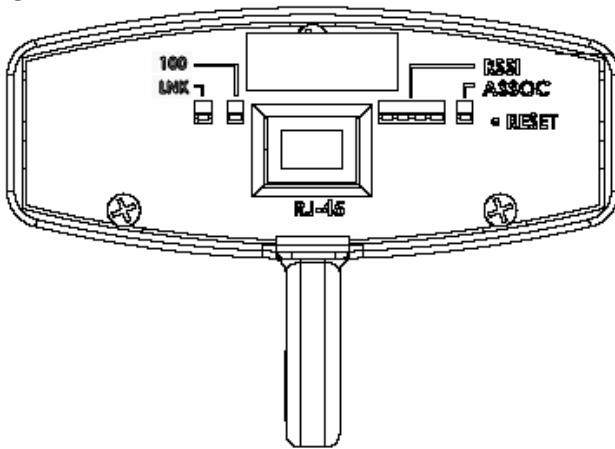
Figure 14   **Table 3**

FOX Series Radio LED Guide

100 –   This LED lights when connected to a 100BaseT network. The LED remains unlit when connected to a 10BaseT network

LINK –   Indicates Ethernet Receive/Transmit activity

RSSI – Relative Signal Strength Indicator.

Lit LEDs	Signal Strength
0 LED	-80 dBm
1 LED	-75 dBm
2 LED	-70 dBm
3 LED	-65 dBm
4 LED	-60 dBm

ASSOC - This LED indicates one of four status:
1. Off – when there is no power at the radio
2. Blinks once every second – unit is powered on, but in Opmode "OFF"
3. Blinks twice per second – unit is in Opmode "SU", and is scanning for an AP
4. Solid On – Unit is associated with an AP.

RF Link Loopback Test (linktest command)

The *linktest* command provides over-the-air throughput and packet error rate (PER) statistics for the wireless link.   This command also provides RSSI at both the AP and SU.   For more information and how to execute this command see the M5830 user manual.

Strain relief and boot installation

Prior to deployment, insert a properly terminated Cat-5 Cable through Boot and the Foam strain relief. Connect the Cable into the M5580M-FSU's port opening.   Last, clip the front end of the boot into the unit and then clip the back end of the boot into to the unit, as shown in the photographs below.

Figure 15

Figure 16

Mounting Hardware

Radios are supplied with mounting hardware for pole and antenna dish installations. See figure 17 - 21 below for proper use of the mounting hardware.
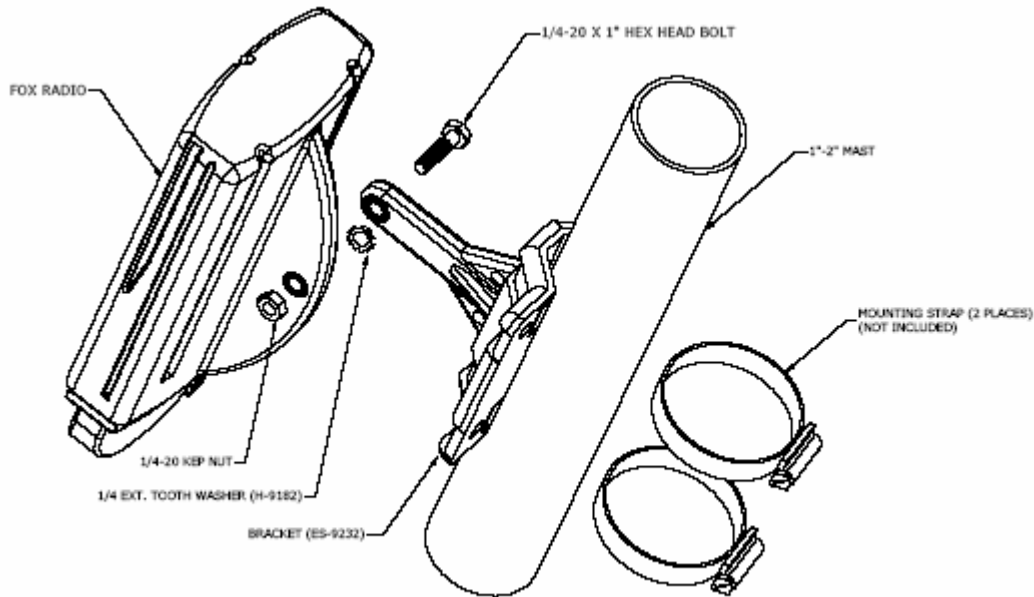
Figure 17

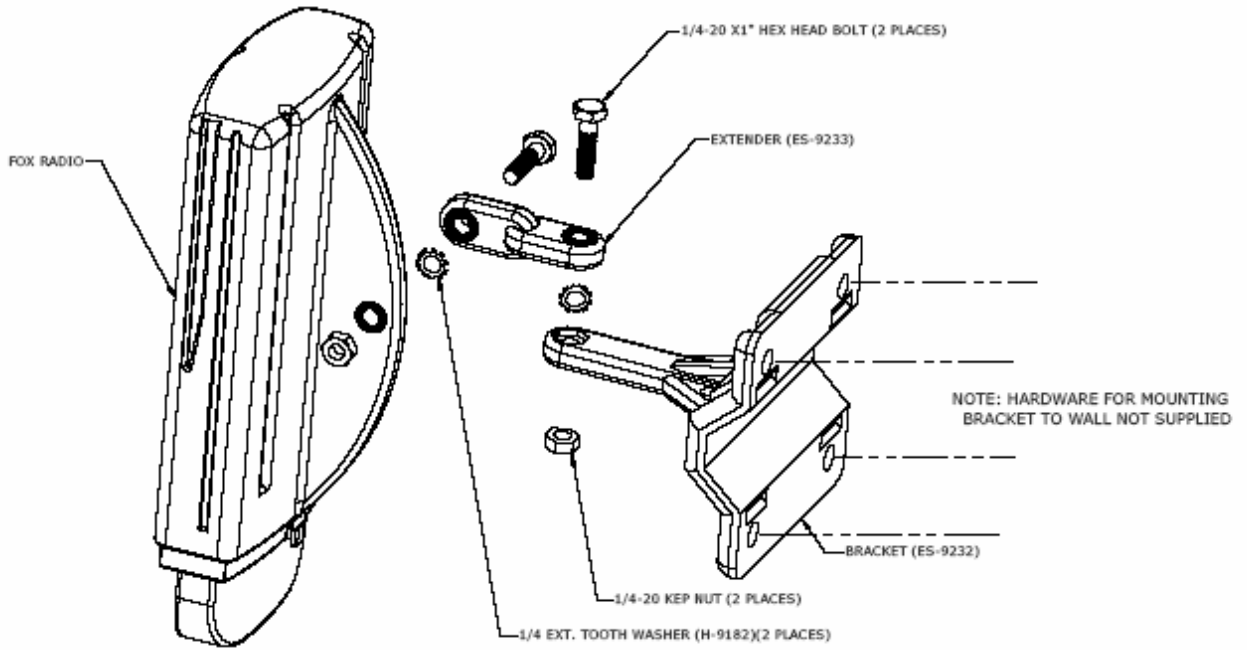**Figure 17**: M5580M – FSU Series SU Pole Mount (1" – 2" Diameter)

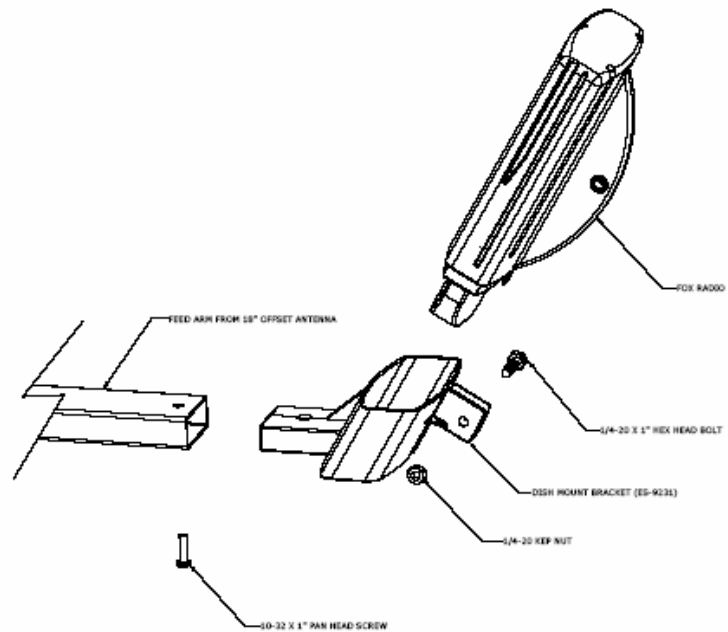**Figure 18**: M5580M-FSU Series SU Wall Mount

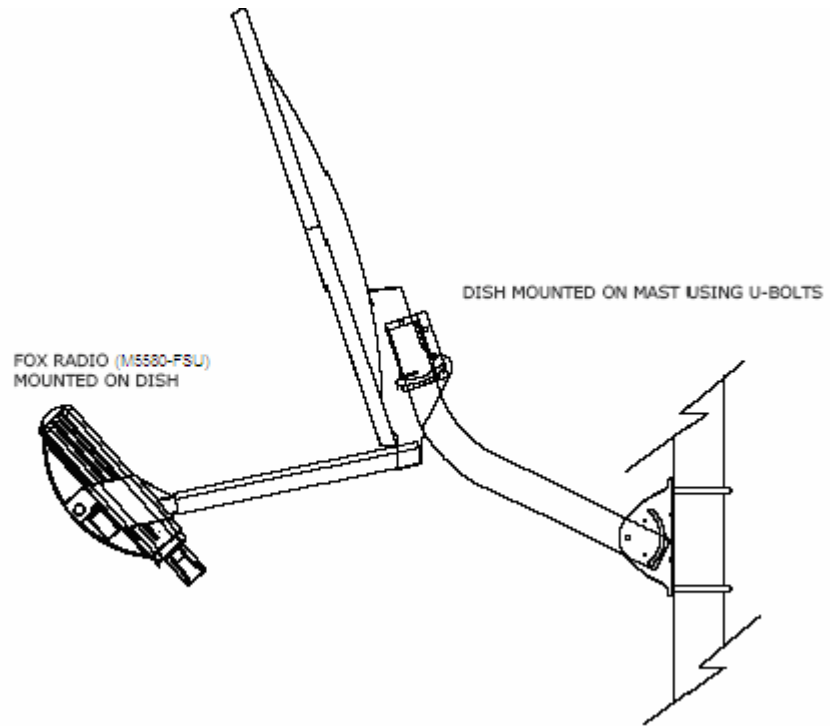**Figure 19**: Mounting M5580M-FSU with Mounting Cradle for AD5800-25 Reflector Dish

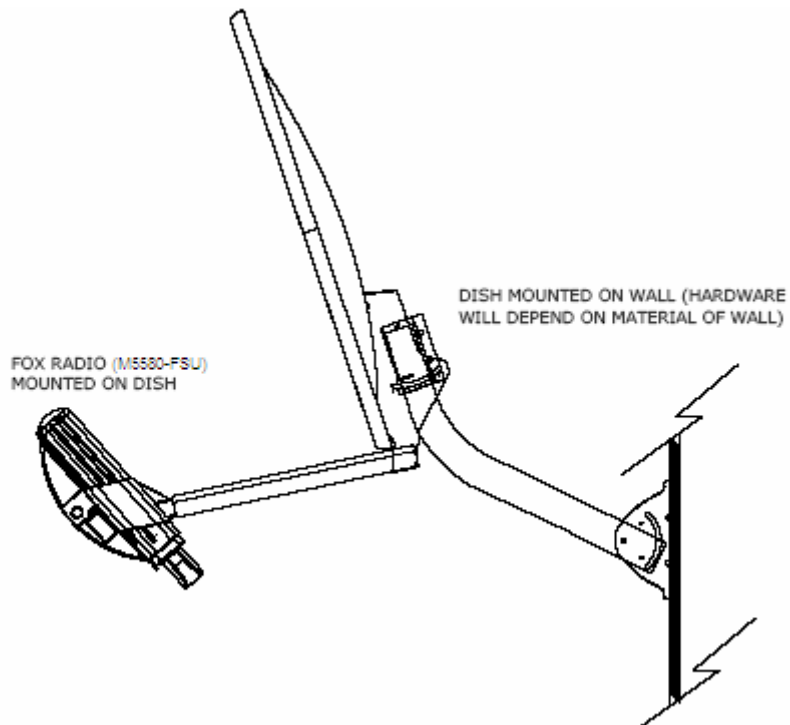**Figure 20**: M5580M – FSU / AD5800 -25 Reflector Dish on Pole

Figure 21: M5580M-FSU / AD5800-25 Reflector Dish on Wall

Chapter 6 Cabling and Weather Considerations

Shielded twisted pair Cat-5 cable is recommended for all installations. The shield within the Cat-5 cable does need to be grounded. The casing is made out of plastic and mounting it on a pole will not ground the radio. It is important to consider that most Cat-5 cable will deteriorate over time if exposed to the weather (especially direct sunlight). It is recommended that installers place all Cat-5 cables inside conduit. Plastic conduit is sufficient. If metal conduit is used, it is not necessary to use shielded Cat-5 cable.

Weatherizing

⚠ **Important! Please note that the silicon strain relief has a small gap when the cable is installed. This is normal .**

⚠ **It is important to provide strain relief and drip loop for STP Cat-5 cables. Do not mount the radio upside down as water will enter the bottom of the radio and cause permanent damage**

⚠ **Important! The Power-over-Ethernet injector is not a weatherized device and must be located either indoors or in a weather-protected cabinet.**

Chapter 7 SNMP

All current SUs support SNMP via the AP. All poll most be done through the AP. See the Access 5830 User Guide for further information on SNMP.

Chapter 8 Firmware Upgrade Procedure

Before beginning, make sure that you have adequate TCP access to the unit. When upgrading through the wireless, ensure that your link is not experiencing any packet lost or packet corruption. If the link is experiencing packet lost or corruption, we recommend doing the upgrade via the Ethernet port at SU side instead.

The following example uses MS windows operating system.
After downloading the correct firmware and properly extracting it to a folder on your C or local drive, execute the following:
1. From a command or DOS prompt, Open a telnet session to the unit.
> *Example: C:>telnet 192.168.100.100*
> *(This sample uses the default IP address, you must use the correct IP address of your SU.)*

2. At the login enter your password. The default password is trango.
3. Enable the tftp demon with the tftpd command
> *Example: #>tftpd on*
4. Open a second MS-DOS window, access the correct folder where the firmware files where extracted to.
> *Example: C:> cd Trango Firmware*
> > *C:\Trango Firmware>_*
5. Using windows TFTP utility, upload the firmware to the radio.
> *Example: C:\Trango Firmware>tftp 192.168.100.100 put FSU58_2p0r3D05120701.s19*

6. A "transfer success" will displayed. Return to the telnet session and verified the successful transfer of the file with the tftpd command
> *Example: #> tftpd*
> *[Tftpd] listen [File Name] FSU58_2P0r3D05120701.S19 [File Length] 564606 bytes*
> *[File Checksum] 73*
>
> *Success.*

> ✎ Note: *After the upload, the radio will activate the firmware automatically*

7. To verified if the upgrade was successful, run the ver command and validate the new version.
> Example: #>ver
> *[Hardware Version] 5580*
> *[MVC Version] 3893mvc_4p5_050913.arm*
> *[Firmware Version] FSU 2p0r3D05120701*
> *Success.*

Appendix B Command Set Summary

Command	Description	Remarks
ver	Displays current firmware version, MVC and hardware version	
Apsearch	Search for near by APs.	
arq [on|off]	enable or disable ARQ	default on
Bye	Terminate or exit telnet/serial session	
Exit	Terminate or exit telnet /serial session	
freq [<ch#> <antenna>]	set or display channel settings	default 1 h
freq scantable	Displays current scan table	
freq channeltable	Displays current channel table	
freq writescan <ch> <h/v> …	Creates channel scan table	
freq writechannel <ch#> <freq>…	modify channel table, up to 30 channels	Opmode off only
help [<command>]	display commands and proper usage	
ipconfig [<ip> <subnet> <gateway>]	change ip configuration <ip> = ip address <subnet> = subnet mask <gateway> = gateway ip address	default: IP 192.168.100.100 SN 255.255.255.0 GW 192.168.100.100
log [<# of entries, 1..179>		
log <sum> <# of entries, 1..179>		
Logout	Exit telnet session	
opmode [off|su [y]]	set or display opmode	default off
password <ro|rw|upgrade>	Change password <ro> = for read-only <rw> = for read-write <upgrade> = for upgrading firmware	default trango
ping <ip address>	Ping ip address	
polar <h/v>	Sets antenna polarization	Default: h
power [<dBm>]	set or display tx power <dBm>	Default 21
pppoeonly <on/off>	Set radio to allow pppoe traffic only	Default off
Reboot	reboot unit	
remarks [<str>]	remarks, up to 80 characters	
reset [all|0..2]	reset all parameters to factory defaults reset 0 XXXX parameters only reset 1 XXXX parameters only	
Rssi	display RSSI for AP / SU and association status	Opmode on only
set apid <id>	Sets AP ids	Default: 1
set baseid <id>	Sets unit base id (Numeric Characters only 0 – 9) up to 999	Default: 1
set suid <id>	sets SUs id	Default: 1
set httpport [<1…65534>]		
set telnetport [<1…65534>]		
ssrssi [ch, h/v>]	Search for best signal on a channel while in opmode off	
survey <time, sec> <h/v>	Survey for a clean non-interfered channel	
sw [<sw #> <on/off>]	Sets switches on or off	
Sysinfo	Displays system current information	
syslog [<0/1> | clear]		
tftpd [on|off]	enable or disable tftpd	default = off enable for firmware upgrade
tm		

Appendix A   Specifications

All specifications apply to M5580M-FSU unless otherwise noted.

Data Parameters

Modulation Format	CCK
Certification/Compliance	FCC Part 15.247, 15.407: ETSI/EN301 489-1 (7.2) (pending)
Receiver Sensibility	–83 dBm (1600 byte packet) to –87 dBm (64 byte packet)
EIRP	29dBm (8dBi Internal Antenna
User Data Throughput	10Mbps
Format 10/100 BaseT	10/100 BaseT
Network Protocols	All IEEE 802.3 / 802.3u compliant protocols
Configuration and Management	Telnet, TFTP, HTTP, SNMP (via AP only)
Upstream/Downstream Throughput	CIR/MIR (Control by the AP)

Physical Interfaces

Ethernet Speed (via RJ45 shielded)	10/100 BaseT, Auto-sensing
Ethernet Packet	Up to 3600 byte long packets (supports VLAN/VPN pass through)

POWER PARAMETERS

Power Method	Power-over-Ethernet (PoE). DC Voltage injected at PoE J-Box
Voltage input limits into PoE J-Box	10.5 VDC - 20 VDC, 20 VDC Nominal
Voltage input limits into Radio	10.5 VDC – 20 VDC
Standard Power Supply (included)	120 VAC to 20 VDC
PoE Cat-5 Max Cable length	100 meters on 24 AWG STP Cat-5 Cable
Current Draw/Power	600 mA max. (12 W), using 20V standard adapter

Environmental

Radio Enclosure	All-weather, powder coated, aluminum case/back with UV stabilized ABS radome
Temperature Range	-40° to 60° C (-40° to 140° F)
NEMA Rating	NEMA 4
Radio Dimensions	14.5 in. x 14.5 in. x 3.75 in. (INT) / 6.5 in. x 6.5 in. x 1.5 in (EXT)
Radio Weight	1 Lbs. (45 Kg)
User Interfaces	RJ45 (shielded)