Access5830™

Wireless Broadband System

PROFESSIONAL INSTALLATION GUIDE

FOR

M5830S-SU-EXT

[draft]

1. Overview

This manual covers basic configuration and installation of the Access5830 Subscriber Unit M5830S-SU-EXT. Since this device requires manual power limit settings (for 5.25-5.35 GHz U-NII band operation only), it is classified by the FCC as a professional install device. To be in compliance with FCC requirements, the radio must be installed with one of several approved antennas listed in this document.

The M5830S-SU-EXT subscriber unit (SU) works in conjunction with the M5830S-AP-60 access point. Please see the Access5830 User Manual for general information on overall system implementation, configuration, and management of the access point. The Access5830 Users Manual also covers many important aspects of subscriber unit configuration and management which is applicable to the M5830S-SU-EXT.

For brevity, the M5830S-SU will be referred to as the SU-EXT in this text.

2. FCC Information

This device complies with Part 15 of 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: NCYM5830SSU
Canada: XXXXXXXXXX

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.

3. Warranty Information

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

4. General Information

4.1 Contents

Each M5830S-SU-EXT radio comes equipped with the radio itself, a power-over-Ethernet (POE) J-Box, an AC adapter, and mounting hardware for both pole and wall installation. The radio has two reverse-polarity SMA connectors on the side for attachment to an external antenna. The MAC ID and Serial # are printed on a label on the back of the radio.

4.2 Connections

See Access5830 User Manual for detailed diagram for connecting radio to network or PC utilizing the power over Ethernet (PoE) J-Box can cat-5 cables.

NOTE: DO NOT APPLY DC POWER TO THE M5830S-SU-EXT UNTIL THE ANTENNA IS ATTACHED OTHERWISE DAMAGE TO THE RADIO MAY OCCUR.

5. Setting the Maximum RF Power

When installing M5830S-SU-EXT there are several FCC certified antennas options available. Due to FCC restrictions the professional installer must manually set the maximum power for the 5.25 to 5.35 GHz U-NII band based upon which antenna is being used. The table below shows the maximum power the radio must have to achieve an EIRP of 1 watt (FCC limit). Only the antennas listed below are allowed to be used with the M5830S-SU-EXT.

Antenna Model	Antenna Gain (incl/cable loss)	Radio Max power setting
AD5830-23-D	+24 dBi	+6 dBm
AD5830-24-D	+24 dBi	+6 dBm
AD5830-27-D	+27 dBi	+3 dBm
SPD2-5.2	+27 dBi	+3 dBm
SPD3-5.2	+30 dBi	0 dBm
SPD4-5.2	+33 dBi	-3 dBm

Note that in all cases, Antenna Gain + Radio Max Power Setting = 30 dBm. Once set, the power leveling feature will still operate normally, but the maximum EIRP will never exceed 1 watt (30 dBm).

NOTE: IT IS THE RESPONSIBILITY OF THE INSTALLER TO ENSURE THAT THE FCC REQUIREMENTS DESCRIBED ABOVE ARE MET.

The telnet or serial port command to change the maximum power is:

uniimaxpower <max power in dBm>

The flash memory must be updated after running the command.

The command must be run on the M5830S-SU-EXT (via telnet or serial port session) prior to installing the antenna and while the Opmode is OFF.

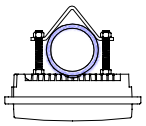
Example: To set the max power setting for the AD5830-23-D:

```
#> Uniimaxpower 6
#> Updateflash systemsetting
```

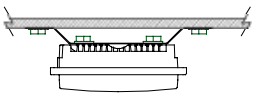
Note: The maximum RF power may be left at +22 dBm for the 5.725 to 5.85 GHz ISM band regardless of which antenna is used. No manual setting is required.

6.0 INSTALLATION INSTRUCTIONS

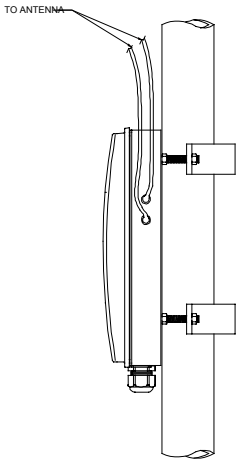
The M5830S-SU-EXT radio unit may be installed on a pole or a flat surface per the drawing below:

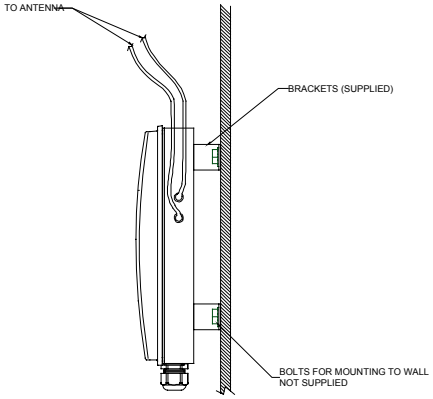


POLE MOUNTING



WALL MOUNTING

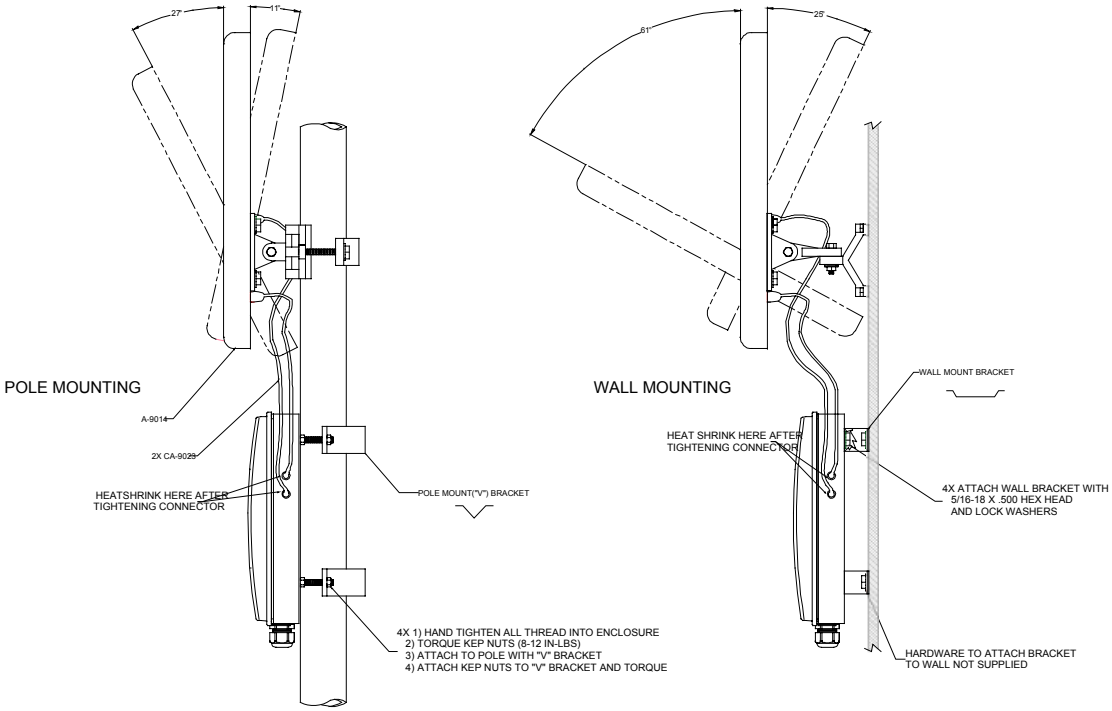




Please see the Access 5830 User Manual for instruction on grounding and weatherproofing the installation. In addition to the guidelines listed in the Access5830 User Manual, installers must cover cable-SMA connectors with heat shrink tubing to provide weatherproofing of the RF cable connectors.

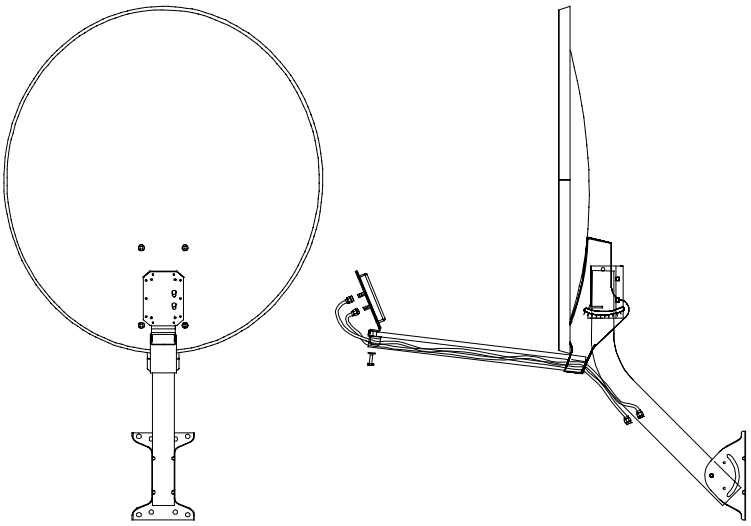
6.1 AD5830-23-D PANEL ANTENNA

To install the AD5830-23-D Panel antenna please see the drawing below



6.2 AD5830-24-D and AD5830-27-D DSS STYLE ANTENNAS

To install the AD5830-24-D or AD5830-27-D DSS Style Dish antennas, please follow the instructions below. These antennas are for low rise building installation only. Do not install in an area where high (>70 mph) winds are expected.



6.3 RADIOWAVES SPD5.2-X PRIME FOCUS DISH ANTENNAS

To install the SPD2-5.2, SPD3-5.2, or SPD4-5.2 Prime Focus Dish antennas, please follow the instructions supplied with the antenna.

The Cable Kit CBLCOAX-7 (ordered separately) must be used with these antennas so that the Antenna may be mated to the SMA Reverse Polarity connector on the Radio. The kit contains two Cable adapters and heat shrink tubing.

These antennas are designed for superior performance in tower installations that may be subject to high winds.

Radomes are available for installations in areas that receive heavy snowfall.

7. SU Antenna Alignment

To align the SU antenna for optimal performance, follow the procedure below.

Once the SU is installed and aimed in the general direction of the AP, it is time to perform an RSSI test to determine the signal strength from the AP, and to precisely align the SU antenna for maximum signal strength.

SU Antenna Alignment Procedure

1. Ensure AP is in opmode AP
2. Telnet into the SU (while in opmode "OFF") or access the radio via hyperterminal/serial port.
3. Type command ***RSSI <channel> <polarization>*** - Example ***RSSI 3 V*** (chan. 3, vertical polarization)
4. Telnet session screen will begin a continuous readout of the received signal strength.
5. As you view the RSSI reading, move the antenna in the horizontal and vertical planes until the maximum RSSI reading is achieved. For short links you can expect an RSSI of –60 dBm or better. For longer links and RSSI of –75 dBm is acceptable. Any RSSI of less than –80 dBm may be too weak for the radios to reliably associate and pass data.
6. If it is not possible to receive an adequate RSSI reading, it may be necessary to reorient the AP (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.

Once you are satisfied with the RSSI reading, tighten down the antenna in the optimum position. To stop the RSSI continuous readout, hit SPACE, then ENTER.

Note: The amber light on the bottom of the SU will also indicate RSSI according to the following parameters:

RSSI≤ -80dBm	not lit
RSSI > -80dBm	blinking.
RSSI ≥ -65dBm	solid. (blink rate increases with signal strength.)

This concludes the installation process.

8.0 Specifications

8.1 TRANSMITTER SECTION

Radio Section

Frequencies:

Storable Channels:	30 memory locations
Channel spacing:	Low Band: 5.260 to 5.340 GHz in 1 MHz increments High Band: 5.736 to 5.836 GHz in 1 MHz increments
Default Channels-	Channel 1: 5.736 GHz Channel 2: 5.756 GHz Channel 3: 5.776 GHz Channel 4: 5.796 GHz Channel 5: 5.816 GHz Channel 6: 5.836 GHz Channel 7: 5.260 GHz Channel 8: 5.280 GHz Channel 9: 5.300 GHz Channel 10: 5.320 GHz Channel 11: 5.340 GHz Channels 12-30: Unprogrammed

RF Conducted Power:	SU:	Low Band:	Max: +13 dBm +/- 2 dB Min: -8 dBm +/- 2 dB
	SU-EXT:	Low Band:	Max: +6 dBm +/- 2 dB Min: -8 dBm +/- 2 dB
	All models	High Band:	Max: +22 dBm +/- 2 dB Min: -8 dBm +/- 2 dB

EIRP Max:	+40 dBm High band with internal 18 dBi patch antenna (-SU) +45 dBm High band with 24 dBi DSS dish or Patch (-SU-EXT) +48 dBm High band with 27 dBi DSS dish (-SU-EXT) +49 dBm High band w/28 dBi dish (-SU-EXT with SPD2-5.2) +52 dBm High band w/31 dBi dish (-SU-EXT with SPD3-5.2) +55 dBm High band w/34 dBi dish (-SU-EXT with SPD4-5.2) +30 dBm Low band Maximum with all antenna configurations (professional install required)
Freq. Stability:	.00025 % PLL Stabilized (2.5 ppm) over temp
Freq. Plan:	Single upconversion, 480 MHz IF
Modulated BW:	22 MHz (null to null, 20 dB)
2nd Harmonic atten:	Per CFR47 part 15.205
LO Supression:	Per CFR47 part 15.205
Symbol Rate:	1.375 MSPS
Error Correction:	None
Modulation:	1 MBPS DBPSK for header, 11 MBPS CCK spread spectrum for payload

Data Input Section

Data Rate (User):	Up to 10 MBPS Sustained throughput
Format:	10/100 BaseT IEEE 802.3 Ethernet compliant
Ethernet packet:	Up to 1600 byte long packets

Power

Input Voltage:	Input voltage range at unit is 10.5 VDC to 24 VDC max Power is supplied on Ethernet cable using junction box provided with up to 330 foot 24 AWG STP cable.
Current Cons.:	575 mA in transmit mode at max power using 20 V standard adapter (11.5W) 500 mA in receive mode using 20 V standard adapter (10 W)

8.2 RECEIVER SECTION

Radio Section

Frequencies:

Storable Channels:	30 memory locations
Channel spacing:	Low Band: 5.260 to 5.340 GHz in 1 MHz increments High Band: 5.736 to 5.836 GHz in 1 MHz increments
Default Channels-	Channel 1: 5.736 GHz Channel 2: 5.756 GHz Channel 3: 5.776 GHz Channel 4: 5.796 GHz Channel 5: 5.816 GHz Channel 6: 5.836 GHz Channel 7: 5.260 GHz Channel 8: 5.280 GHz Channel 9: 5.300 GHz Channel 10: 5.320 GHz Channel 11: 5.340 GHz Channels 12-30: Unprogrammed

Cascade Noise Figure:	< 6 dB
Sensitivity:	- 83 dBm typical-1600 byte packet
(1E10-6 BER)	- 87 dBm typical-64 byte packet
Adj. Channel Rejection:	> +20 dB for 10 % PER
Image Rejection:	> +60 dB for 10% PER
Frequency Plan:	Single conversion, IF at 480 MHz
LO stability:	.00025% PLL stabilized (+/-2.5ppm) over temperature range
Input compression point:	> -15 dBm P1dB

Data Output Section

Data Rate (User):	10 MBPS Maximum sustained throughput
Format:	10/100 BaseT IEEE 802.3 Ethernet compliant
Ethernet Protocols:	TCP/IP, Telnet, TFTP, UDP, HTTP

8.3 MECHANICAL AND ENVIRONMENTAL

General

Material:	Powdercoated Aluminum base with polycarbonate radome
Size:	12.5”x5”x8” including mounting studs
Weight:	4 lb
Mounting:	Custom mounting bracket with azimuth-elevation adjustment.

Connectors/Indicators

RF Output:	-SU: Integral internal patch antenna per Part 15C, 15.203. -SU-EXT: Reverse Polarity SMA per Part 15C, 15.203

FCC Compliance:

The transceiver shall comply with the following regulations:

FCC 15.247 Spread Spectrum transmitter - 5.725 to 5.85 GHz – EIRP = unlimited
FCC 15.407(2) U-NII Band 2 transmitter - 5.25 to 5.35 GHz – EIRP = 30 dBm max

Subpart B
Class B Digital device verification

Subpart C
FCC 15.203 Antenna connection requirement – non-standard connection
FCC 15.209 Unwanted emissions below 1GHz -
FCC 15.207(a) AC conducted emissions 450Khz to 30 MHz
FCC 15.205 Restricted bands of operation (LO and harmonics) - 54 dBuV @3 meters

Serial Interface:	Shielded RJ11 connector
LAN Interface:	Shielded RJ45 connector
Power:	Carried on 4 unused pins of Ethernet cable

Environmental

Operating Temp:	-40 to 60 deg C
Storage:	-40 to 85 deg C
Humidity:	100 % When sealed properly
NEMA Rating:	NEMA 4
Shock:	Sustain 3 axis drop from 5 feet

8.4 STANDARD EXTERNAL POWER SUPPLY

20 Volt DC Power adapter and J-Box supplied with product.

Type:	Linear wall mount transformer
Input:	120 VAC
Output:	20 VDC +/- 1 V
Max current:	1200 mA

8.5 STANDARD ANTENNA FOR M5830S-SU-EXT (model AD5830-24-D)

The unit is designed to operate with the Trango Boadband model AD5830-24-D dual linear polarized dish antenna.

Type:	18" DSS Style Dish Antenna
Polarization:	Vertical, Horizontal electrically selectable
Frequency:	5.7 to 5.9 GHz
Gain:	+24 dBi
Az Beamwidth:	9°
El Beamwidth:	9°
Cross Pol:	> 15dB
Front/Back Ratio:	> 30dB
VSWR:	2:1
Wind Loading:	80 mph operational

8.6 Optional DSS dish antenna for SU-EXT

The unit is designed to operate with the Trango Boadband model AD5830-27-D dual linear polarized dish antenna.

Type:	24" DSS Style Dish Antenna
Polarization:	Vertical, Horizontal electrically selectable
Frequency:	5.7 to 5.9 GHz
Gain:	+27 dBi
Az Beamwidth:	7°
El Beamwidth:	7°
Cross Pol:	> 15dB
Front/Back Ratio:	> 30dB
VSWR:	2:1
Wind Loading:	70 mph operational

8.7 Optional Panel Antenna for SU-EXT

The unit is designed to operate with the Trango Boadband model AD5830-23-D flat panel patch supplied with 2 x 24" long cables and mount.

Frequency range:	5250-5850 MHz
Gain:	23 dBi +/- 1 dB
Front/Back Ratio	>35 dB
E-Plane Beamwidth:	> 9 degrees typical
H-Plane Beamwidth:	> 9 degrees typical
Polarization:	Vertical and Horizontal
Port/Port Isolation:	40 dB typ
Cross Pol Rejection:	25 dB typ
VSWR:	<1.7:1
Package:	Alumininum backplate with plastic radome.

Dimensions:	14.6”x 14.6”x 1.58” (371mm x 371mm x 40mm)
Weight:	5.5 lbs (2.5 kg)
Connector:	SMA female connectors (2)
Cable:	24” SMA-M to SMA-RP double braided RGS142 cable
Mounting Provisions:	Mounting kit supplied for up to 3”diam pole or flat surface
Azimuth/El Adjust:	+/-30 degrees
Sealing:	Water tight to 1 meter IEC 529/IP67
Temp Range:	-40 deg F to +160 deg F (-40 deg C to +60 deg C)
Wind speed oper:	100 mph (160 km/hr)
Wind speed survival :	140 mph (220 km/hr)

8.8 Optional 2’, 3’, and 4’ DIAM PRIME FOCUS DISH ANTENNAS FOR SU-EXT

Radiowaves Models:

SPD2-5.2	Diameter:	2 feet
	Gain:	28.1
	Beamwidth:	6.2 degrees
	Xpol Rej:	28 dB
	F/B Ratio:	36 dB
	VSWR:	1.5:1
SPD3-5.2	Diameter:	3 feet
	Gain:	31.1
	Beamwidth:	4.2 degrees
	Xpol Rej:	30 dB
	F/B Ratio:	38 dB
	VSWR:	1.5:1
SPD4-5.2	Diameter:	4 feet
	Gain:	34.4
	Beamwidth:	3.1 degrees
	Xpol Rej:	30 dB
	F/B Ratio:	42 dB
	VSWR:	1.5:1

Note:24 inch cable will reduce net gain by approximately 1.5 dB.

See Radiowaves, Inc. for additional specifications.