Access5830™

Wireless Broadband System

PROFESSIONAL INSTALLATION GUIDE

FOR

M5830S-SU-EXT

M5830S-AP-EXT

Overview

This manual covers basic configuration and installation of the Access5830 Subscriber Unit M5830S-SU-EXT and Access point unit M5830S-AP-EXT. Since these devices require manual maximum power limit, they are classified by the FCC as a professional install device. To be in compliance with FCC guidelines, the radio must be installed with one of several approved antennas listed in this document.

The M5830S-SU-EXT is currently FCC certified for use with three external antennas**.**

Antenna Part #	Descrition	Gain
AD5830-24-D	18" DSS Dish	24 dBi
AD5830-23-D	15" Flat Panel	24 dBi
SPD3-5.2	3' Dish from Radiowaves	31 dBi

The M5830S-AP-EXT is currently FCC certified for use with three external antennas**.**

Antenna Part #	Descrition	Gain
OD58-12	Vert. pol Omni from Pac Wireless	12 dBi
SAH58-120-16	120 degree Horiz. Pol sector from Pac Wireless	16 dBi
SEC-55D-90-16	90 degree H and V sector from Radiowaves	16 dBi

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

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: NCYM5830SSUEXT (Subscriber unit)
Canada: 2945A-M5830SUE (Subscriber unit)

FCC ID: NCYM5830SAP60 (Access point)
Canada: 2945A-M5830SAP (Access Point)

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 from one year from date of purchase. Please see www.trangobroadband.com for complete description of warranty coverage and limitations.

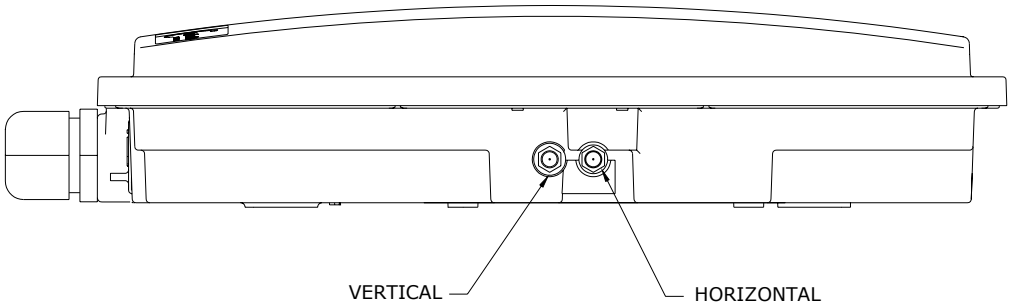
General Information

Contents

Each M5830S-SU-EXT/M5830S-AP-EXT 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 MAC ID and Serial # are printed on a label on the back of the radio.

Antenna Connections

The radio is equipped with two reverse-polarity SMA connectors on the side for attachment to an external antenna. Each SMA connector is labeled with either "V" for Vertical or "H" for Horizontal polarization.



Connect each cable to the appropriate vertical and horizontal ports on both the antenna and the radio.

Ethernet / Power Connections

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

! IMPORTANT: DO NOT APPLY DC POWER TO THE RADIO UNTIL THE ANTENNA IS ATTACHED OTHERWISE DAMAGE TO THE RADIO MAY OCCUR.

Setting the Maximum RF Power:

Model M5830S-SU-EXT

The FCC allows a maximum EIRP of 1 watt (30 dBm) for devices transmitting in the 5.25 to 5.35 U-NII band. The M5830S-SU-EXT's factory default maximum power setting for this band is +6 dBm. If the radio is to be equipped with Trango standard antennas AD5830-23-D or AD5830-24-D, no manual adjustment to the max power setting is required since radio power output plus antenna gain does not exceed 30 dBm.

However, due to FCC restrictions the professional installer must manually reduce the maximum power for the 5.25 to 5.35 GHz U-NII band if a higher gain antenna is to be used.

The table below shows the maximum power setting for the radio to achieve an EIRP of 1 watt (FCC limit). Only the antennas listed below are FCC Certified for use 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
SPD3-5.2	+30 dBi	0 dBm

NOTE: that in all cases, Antenna Gain – cable loss + Radio Power Setting = 30 dBm (UNII band. 1 dB cable loss is assumed . Once the max power is set, the power leveling feature will still operate normally, but the maximum EIRP will never exceed 1 watt (30 dBm).

The Max Power Setting command is only accessible from the command line and is not available on the HTTP Browser interface.

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. ***save systemsetting***

The command must be run 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
#> save 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 FCC Certified antenna is used. No manual setting is required.

Model M5830S-AP-EXT

The FCC allows a maximum EIRP of 1 watt (30 dBm) for devices transmitting in the 5.25 to 5.35 Ghz U-NII band and 4 Watts (+36 dBm) for devices transmitting in the 5.725 to 5.85 GHz ISM band. The M5830S-AP-EXT's factory default maximum power setting for the UNII band is +16 dBm, and +22 dBm for the ISM band. Depending on the antenna used the power output maximum must be adjusted per the following table.

Antenna Model	Ant Gain (incl/cable loss)	Radio Max power	
		UNII Band	ISM Band
OD58-12	+11 dBi	NA	+22 dBm
SAH58-120-16	+15 dBi	NA	+21 dBm
SEC-55D-90-16	+15 dBi	+15 dBm	+21 dBm

NOTE: that in all cases, Antenna Gain – cable loss + Radio Power Setting = 30 dBm (UNII band) or +36 dBm (ISM band). 1 dB cable loss is assumed.

NOTE: The Omni and 120 degree sector antennas are not designed for use in the UNII band.

The Power Set command is accessible from the command line or the HTTP Browser interface.

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

power setunii <power in dBm> for the UNII band channels
or
power setism <power in dBm> for the ISM band channels

The flash memory must be updated after running the command. ***save systemsetting*** or ***save ss.***

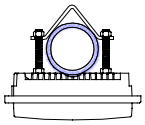
The command must be run prior to installing the antenna.

Example: To set the power setting for the SEC-55D-90-16:

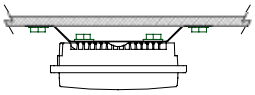
```
#> power setunii 15
#> save systemsetting
```

Radio Hardware Installation

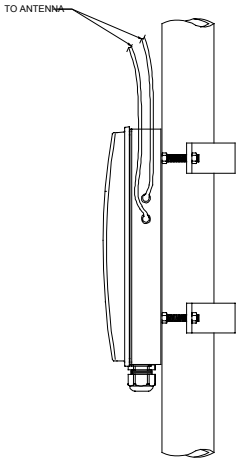
The M5830S-SU-EXT/ M5830S-AP-EXT may be installed on a pole or a flat surface per the drawings below:

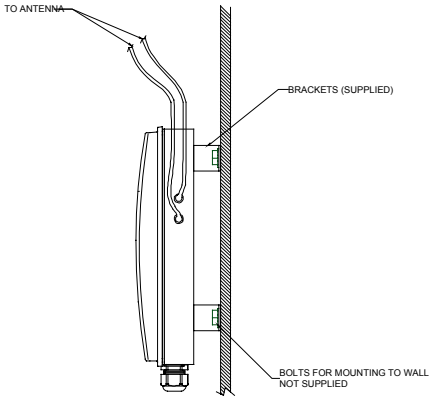


POLE MOUNTING



WALL MOUNTING

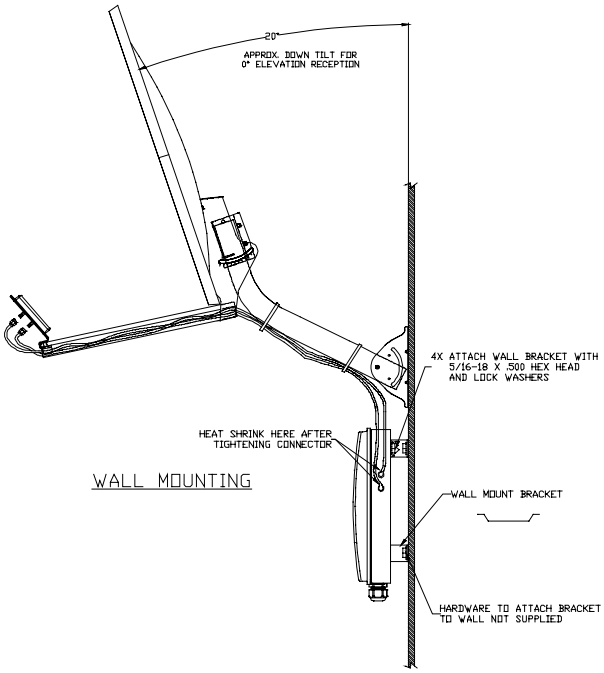


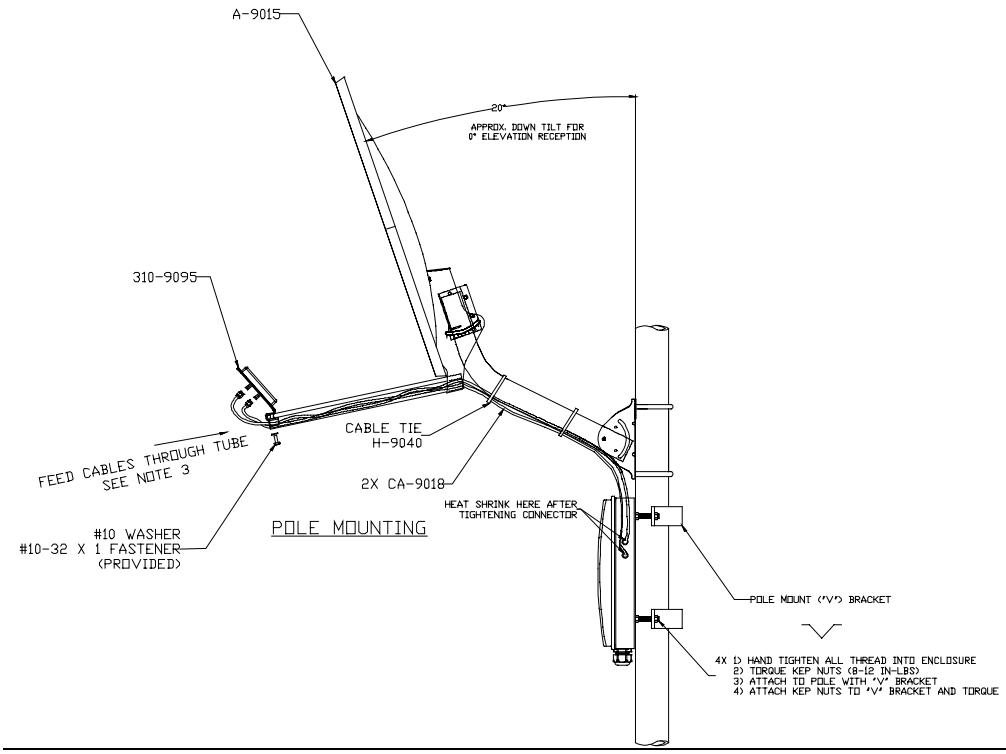


Radios should always be mounted with Ethernet and RJ11 ports at the bottom. See the Access 5830 User Manual for grounding and additional weatherproofing guidelines. In addition to the guidelines listed in the Access5830 User Manual, installers must cover cable-SMA connectors (both ends) with heat-shrink to provide weatherproofing of the RF cable connectors.

AD5830-24-D DSS STYLE ANTENNA

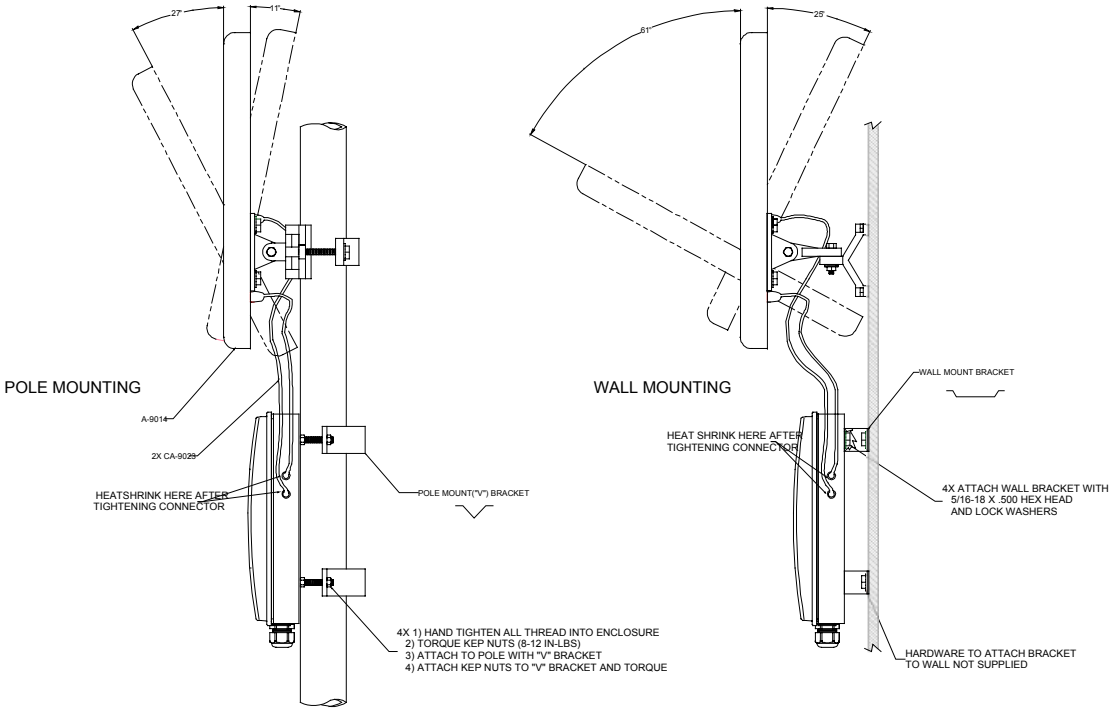
See diagram below for proper installation of the AD5830-24-D These antennas are designed primarily for low rise building installations only. Do not install in an area where high (>70 mph) winds are expected. **NOTE: Optimal alignment of this dish (to AP at horizon) is 20° below vertical.**





AD5830-23-D PANEL ANTENNA

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



RADIOWAVES SPD3-5.2 PRIME FOCUS DISH ANTENNAS

The SPD3-5.2 from Radiowaves, Inc. is a parabolic prime focus dish antenna designed for long range applications and tower installations. These antennas are designed for superior performance in long range applications and tower installations that may be subject to high winds. Radomes are available from Radiowaves for installations subject to extreme weather. Contact Radiowaves, Inc. (www.radiowavesinc) for more information.

The SPD3-5.2 is equipped with a standard "N" Female RF Connector interface. A special cable assembly is required to connect this antenna to the Trango M5830S-SU-EXT's reverse polarity SMA Female connector.

Recommended Cable Assembly:

REVERSE POLARITY SMA MALE TO STANDARD N MALE
50 OHM, RG142B/U COAX, DOUBLE SHIELDED. Length: 24" – 48".

Note: To minimize loss, use the shortest cable length possible.

Pre-Assembled Cable Assemblies are available from Pasternack Enterprises www.pasternack.com.

Model No. PE34361-24 24" REVERSE POLARITY SMA MALE TO STANDARD N MALE

Model No. PE34361-36 36" REVERSE POLARITY SMA MALE TO STANDARD N MALE

Model No. PE34361-48 46" REVERSE POLARITY SMA MALE TO STANDARD N MALE

See the Radiowaves SPD3-5.2 User's Manual for detailed hardware installation instructions.

SU Antenna Alignment

To align the SU antenna for optimal performance, follow the procedure outlined in the Access5830 User Manual. This procedure is also included below for your convenience. The same procedure applies to both the M5830S-SU and the M5830S-SU-EXT.

Once the SU's antenna is mounted 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 read 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 ENTER.

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

RSSI $\leq$ -80dBm	not lit
RSSI > -80dBm	blinking.
RSSI $\geq$ -65dBm	solid. (blink rate increases with signal strength.)

Specifications

Radio Transmit Specifications

Frequencies:
Storable Channels: 30 memory locations
Channel spacing: Low Band: 5.260 to 5.340 GHz in 1 MHz channel increments
High Band: 5.736 to 5.836 GHz in 1 MHz channel 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 (DO NOT USE FOR M5830S-AP-EXT)
Channel 12-30: Un-programmed

SU RF Conducted Power:	Low Band:	Max: +6 dBm +/- 2 dB
		Min: -8 dBm +/- 2 dB
	High Band:	Max: +22 dBm +/- 2 dB
		Min: -8 dBm +/- 2 dB
AP RF Conducted Power:	Low Band:	Max: +16 dBm +/- 2 dB
		Min: -8 dBm +/- 2 dB
	High Band:	Max: +22 dBm +/- 2 dB
		Min: -8 dBm +/- 2 dB

SU EIRP Max: +52 dBm High band with SPD3-5.2 antenna, +46 dBm with 24 dBi antenna.
+30 dBm Low band Maximum (all antennas)

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

Receiver Section

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

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)

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

Physical Interfaces

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

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.

Environmental

Operating Temp:	-40 to 60 deg C
Storage:	-40 to 85 deg C
NEMA Rating:	NEMA 4

Standard 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

FCC Compliance

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 (LO and harmonics)= 54 dBuV average @3 meters
EN 301 489-1 Part 7.2 - RF Immunity

AD5830-24-D DSS Style dish for M5830S-SU-EXT

Type	DSS Offset (Satelite TV style) 18" (see drawing)
Polarization	Vertical, horizontal electronically selectable
Range	10 Miles from Access5830 AP with 10 dB fade martin (High Band), 2 miles range in low band.
Frequency	5.2 to 5.9 GHz
Gain	+24 dBi
Azimuth Beamwidth	9 degrees
Elevation Beamwidth	9 degrees
Mount	Standard DSS Style U-Bolt Mount

AD5830-23-D Patch Antenna for M5830S-SU-EXT

Type	Patch - 15" Square
Polarization	Vertical, horizontal electronically selectable
Range	10 Miles from Access5830 AP with 10 dB fade martin (High Band), 2 miles range in low band.
Frequency	5.2 to 5.9 GHz
Gain	+24 dBi
Azimuth Beamwidth	9 degrees
Elevation Beamwidth	9 degrees
Mount	Heavy Duty Universal Mount.

Radio Waves SPD3-5.2 Parabolic Dish for M5830S-SU-EXT

Type	Parabolic Prime Focus 36" Dish
Polarization	Vertical, horizontal electronically selectable
Range	18 Miles from Access5830 AP with 12 dB fade margin (High Band), 2 miles range in low band.
Frequency	5.2 to5.9 GHz
Gain	+31 dBi (30 dBi with Cable Loss)
Azimuth Beamwidth	4.2 degrees
Elevation Beamwidth	4.2 degrees
Cross Polarization	30 dB
Front/Back Ratio	40 dB

Antennas certified for use with M5830S-AP-EXT

90 degree Sector Dual Polarized Antenna: RadioWaves model SEC-55D-90-16 5.250 - 5.850

Specification: H and V polarization, 16 dBi gain across 5.25 to 5.85 bands.

Connect H and V ports on antenna to H and V ports on radio using two coaxial cables. (Trango part number CA-9028 or equivalent)

Requires professional install to set max power output of radio at +20 dBm for frequencies between 5.736 and 5.836 GHz and +14 for frequencies between 5.26 to 5.32 GHz . Operation on 5.34 GHz is not allowed.

120 Degree Sector Horizontally Polarized Antenna: Pacific Wireless model SAH58-120-16

Specification: Horizontally polarized, 16 dBi gain

Connect to H port of radio.*

Requires professional install to set max power output of radio at +20 dBm for frequencies between 5.736 and 5.836 GHz and +14 for frequencies between 5.26 to 5.32 GHz . **Operation on 5.34 GHz is not allowed.**

Omnidirectional Antenna: Pacific Wireless model OD58-12

Specification: Vertically polarized, 12 dBi gain

Connect to V port of radio.*

No change in max power setting that radio ships with. This antenna only works with 5.736 to 5.836 GHz center frequencies.

*All antennas require the cable adapter (Trango part number CA-9028) N to reverse SMA.