



Iridium Coaxial Repeater System

Operation Manual



© 2020, Foxcom. All rights reserved. Other trademarks referenced are the property of their respective owners.
All specifications are subject to change without prior notice. Rev A1/ May 2020

Israel Corporate HQ, 16 Hataasia Street, Har Tov A Ind. Zone, Beit Shemesh 99052. Tel: +972-2-589-9888 Fax: +972-2-589-9898
US Sales Office, 1315 Outlet Center Drive, Smithfield, North Carolina 27577. Tel: 609-228-8104/9 Fax: 201-289-7093
www.foxcom.com | sales@foxcom.com

Table of Contents

1	Important Information	5
1.1	Warranty and Repair	5
1.1.1	General Warranty	5
1.1.2	Specific Product Warranty Instructions	5
1.1.3	Returns	5
1.1.4	Limitations of Liabilities	5
1.1.5	Reporting Defects	6
1.1.6	Precautions	6
2	Introduction to the Iridium Repeater System	8
2.1	System Components	9
2.1.1	Indoor Equipment	9
	Outdoor Unit	10
2.2	Product Drawing	11
2.2.1	Power Amplifier Outdoor Unit	11
2.2.2	/ODU LED Description	11
2.2.3	ODU Connector and Module Identification	12
2.2.4	RF Connector Layout	13
2.3	Connection Diagram	14
2.3.1	System Diagram for Single Zone Version	14
2.3.2	System Diagram for Dual Zone Version	15
3	Installation	16
3.1	Setting Up the Indoor Equipment	16
3.1.1	Placing the Indoor Antenna	16
3.2	Setting Up the Outdoor Unit	16
3.2.1	Installing the Outdoor Unit	16
3.2.2	Connecting the Input/Output/Power Cables	18
3.2.3	Mounting the Outdoor Antennas	19
3.2.4	Powering the Outdoor Iridium Unit	19
3.3	Testing and Optimizing the System	20
3.3.1	Setting Up the Downlink at 3 Meters from the Indoor Antenna	20
3.3.2	Setting Up the Downlink at 5 Meters from the Indoor Antenna	21
3.3.3	Setting Up the Downlink at 10 meters from the Indoor Antenna	21
3.3.4	Setting Up the Uplink at 5 meters from the Indoor Antenna	22
4	Product Technical Description	23
4.1	System Specifications	23
4.2	Model Dimensions	24
4.2.1	Outdoor Unit	24
4.3	ODU DC Connector Assembly	25

5. Troubleshooting the Iridium Coaxial Repeater	26
5.1. Troubleshooting the Iridium Repeater	26

List of Figures

Figure 1: Omni Antenna.....	9
Figure 2: Hangar Antenna	9
Figure 3: Coax Cable.....	9
Figure 4: ODU System.....	10
Figure 5: Pole Mount	10
Figure 6: Coax Cable.....	10
Figure 7: Outdoor Repeater Unit – Top View	11
Figure 8: ODU Single Zone Internal Module with OD5 Housing	12
Figure 9: ODU Dual Zone Internal Module with OD5 Housing	13
Figure 10: System Diagram for Single Zone	14
Figure 11: System Diagram for Dual Zone	15
Figure 12: Hanging the Outdoor Unit on a Pole	17
Figure 13: Close-up of washer on pole mount	17
Figure 14: Grounding the Unit	18
Figure 15: Manual Gain Adjustment.....	20
Figure 16: Setting Up the Downlink at 3M	21
Figure 17: Setting Up the Downlink at 5M	21
Figure 18: Setting Up the Downlink at 10M.....	22
Figure 19: Setting Up the Uplink at 5M	22
Figure 20: Model Dimensions for Outdoor Unit.....	24
Figure 21: ODU DC Connector Assembly.....	25

1 Important Information

This is the Operation Manual for Iridium Coaxial Repeater system.

1.1 Warranty and Repair

Global Foxcom performs testing and inspection to verify the quality and reliability of our products. Global Foxcom uses every reasonable precaution to ensure that each unit meets specifications before shipment. Customers are asked to advise their incoming inspection, assembly, and test personnel as to the precautions required in handling and testing our products. Many of these precautions are to be found in this manual.

The products are covered by the following warranties:

1.1.1 General Warranty

Global Foxcom warrants to the original purchaser all standard products sold by Global Foxcom to be free of defects in material and workmanship for 24 months from date of shipment from Global Foxcom. During the warranty period, Foxcom will repair or replace any product that Global Foxcom proves to be defective. This warranty does not apply to any product which has been subject to alteration, abuse, improper installation or application, accident, electrical or environmental over-stress, negligence in use, storage, transportation or handling.

1.1.2 Specific Product Warranty Instructions

All Global Foxcom products are warranted against defects in workmanship, materials and construction, and to no further extent. Any claim for repair or replacement of units found to be defective on incoming inspection by a customer must be made within 30 days of receipt of shipment, or within 30 days of discovery of a defect within the warranty period.

This warranty is the only warranty made by Global Foxcom and is in lieu of all other warranties, expressed or implied. Global Foxcom sales agents or representatives are not authorized to make commitments on warranty returns.

1.1.3 Returns

In the event that it is necessary to return any product against above warranty, the following procedure shall be followed:

1. Return authorization is to be received from Global Foxcom prior to returning any unit. Advise Global Foxcom of the model, serial number, and discrepancy. The unit may then be forwarded to Global Foxcom, transportation prepaid. Devices returned collect or without authorization may not be accepted.
2. Prior to repair, Global Foxcom will advise the customer of our test results and any charges for repairing customer-caused problems or out-of-warranty conditions, etc.
3. Repaired products are warranted for the balance of the original warranty period, or at least 90 days from date of shipment.

1.1.4 Limitations of Liabilities

Global Foxcom's liability on any claim, of any kind, including negligence for any loss or damage arising from, connected with, or resulting from the purchase order, contract, quotation, or from the performance or breach thereof, or from the design, manufacture, sale, delivery, installation, inspection, operation or use of any equipment covered by or furnished under this contact, shall in no case exceed the purchase price of the device which gives rise to the claim.

EXCEPT AS EXPRESSLY PROVIDED HEREIN, GLOBAL FOXCOM MAKES NO WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO ANY GOODS, PARTS AND SERVICES PROVIDED IN CONNECTION WITH THIS AGREEMENT INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. GLOBAL FOXCOM SHALL NOT BE LIABLE FOR ANY OTHER DAMAGE INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH FURNISHING OF GOODS, PARTS AND SERVICE HEREUNDER, OR THE PERFORMANCE, USE OF, OR INABILITY TO USE THE GOODS, PARTS AND SERVICE.

The Company's exclusive warranty and the remedy provided for breach there of shall not apply to:

1. Any Product used or operated other than pursuant to the Company's written instructions,
2. Damage or deficiencies resulting from accident, alteration, modification, misuse, tampering, negligence, improper maintenance, installation or abuse,
3. Use of any Product other than at the Installation Site,
4. Use of any Product that is defective or damaged due to misuse, accident, or neglect, or due to external electrical stress, lightning or other acts of nature,
5. Use of any Product by a person who is not any authorized employee of the Customer, or
6. Used other than as explicitly authorized in writing by the Company.

1.1.5 Reporting Defects

The units were inspected before shipment and found to be free of mechanical and electrical defects.

Examine the units for any damage which may have been caused in transit. If damage is discovered, file a claim with the freight carrier immediately. Notify Global Foxcom as soon as possible.

Note: Keep all packing material until you have completed the inspection.

1.1.6 Precautions

1.1.6.1 PERSONAL SAFETY

Applying power to the transmitter unit will create a laser energy source operating in Class I as defined by IEC 825-1. Use either an infrared viewer, optical power meter or fluorescent screen for optical output verification.

1.1.6.2 AC POWER HAZARD

The rackmount power supply line is EMI filtered. The chassis is connected to earth ground in compliance with safety requirements. Always use the 3-prong AC plug with earth ground to avoid possibility of electrical shock hazard to personnel.

1.1.6.3 GROUNDING

See **section 2.3.2 for instructions on how to connect** of the ODU's main grounding point. Do not attempt to install the ODU before grounding the unit at this point.

The unit should be installed according to NEC/CEC.

1.1.6.4 EQUIPMENT SAFETY

To avoid damaging your product, please observe the following:

1. The transmitter input and receiver output are DC coupled and can withstand external DC. Do not exceed 25V DC bias.

2. The input of the outdoor unit transmitter (L-Band uplink) and may have an optional built-in bias for inserting DC power up the coax to the LNB. Make certain any equipment or test equipment connected to the transmitter input can withstand this bias.
3. Do not allow any dirt or foreign material to get into the optical connector bulkheads. This may cause damage to the polished optical connector end faces.
4. The optical fiber jumper cable bend radius is 3 cm. smaller radii can cause excessive optical loss and/or fiber breakage.
5. If multiple chassis are installed in a Rack allow sufficient room for adequate ventilation; otherwise the units may overheat causing possible safety hazard or equipment damage.
6. Make sure the unit is grounded!

2 Introduction to the Iridium Repeater System

The Iridium satellite constellation is a large group of satellites providing voice and data coverage to satellite phones, pagers and integrated transceivers over the Earth's entire surface.

Iridium communication uses TDMA & FDMA together with DE-QPSK/DE-BPSK modulation to cover the frequency range of 1616-1626.5MHz.

Iridium terminals need open line-of-sight to the open sky to function. Units will not work consistently indoors, or under forest cover.

Iridium has a very powerful paging channel that can ring the phone indoors, but the customer may have to walk outdoors to take the call. [Wikipedia]

Global Foxcom's Coaxial repeater is a Bi-Directional repeater transport system that can be used for Iridium satellite signals.

Global Foxcom's Iridium repeater system helps create virtual Iridium satellite coverage inside a building, a bunker or an enclosed facility.

Global Foxcom offers a full SATELLITE repeater solution, which includes a separate or integrated GPS system as well as Inmarsat. For more information, contact Global Foxcom sales.

2.1 System Components

The Iridium coaxial repeater consists of the following components (images below):

2.1.1 Indoor Equipment

- Dual ceiling mount distribution Omni antennas [PN: 4700012] for non-hangar applications



Figure 1: Omni Antenna

OR

- Dual ceiling mount distribution Dome antennas [PN: 7505010] for hangar applications



Figure 2: Hangar Antenna

- Dual 20Meter (60 feet) low loss coax cable [PN: 4201843].



Figure 3: Coax Cable

Outdoor Unit

- ODU enclosure equipped with high power amplifier, LNA Amplifier, AC-DC Power supply and mounting kit [PN: I8012151].



Figure 4: ODU System



Figure 5: Pole Mount

- Dual Iridium antennas with pole mount kit [PN: 4700012].
 - 2 x 5M low loss N(M) to TNC(M) coax cables [PN: 4201835].
- Note: The Part Number is dependent on the connectors.



Figure 6: Coax Cable

2.2 Product Drawing

2.2.1 Power Amplifier Outdoor Unit



Figure 7: Outdoor Repeater Unit – Top View

2.2.2 ODU LED Description

LED Name	LED Function
P.S 1	Indicates that Power supply unit is receiving AC and is putting out DC

2.2.3 ODU Connector and Module Identification

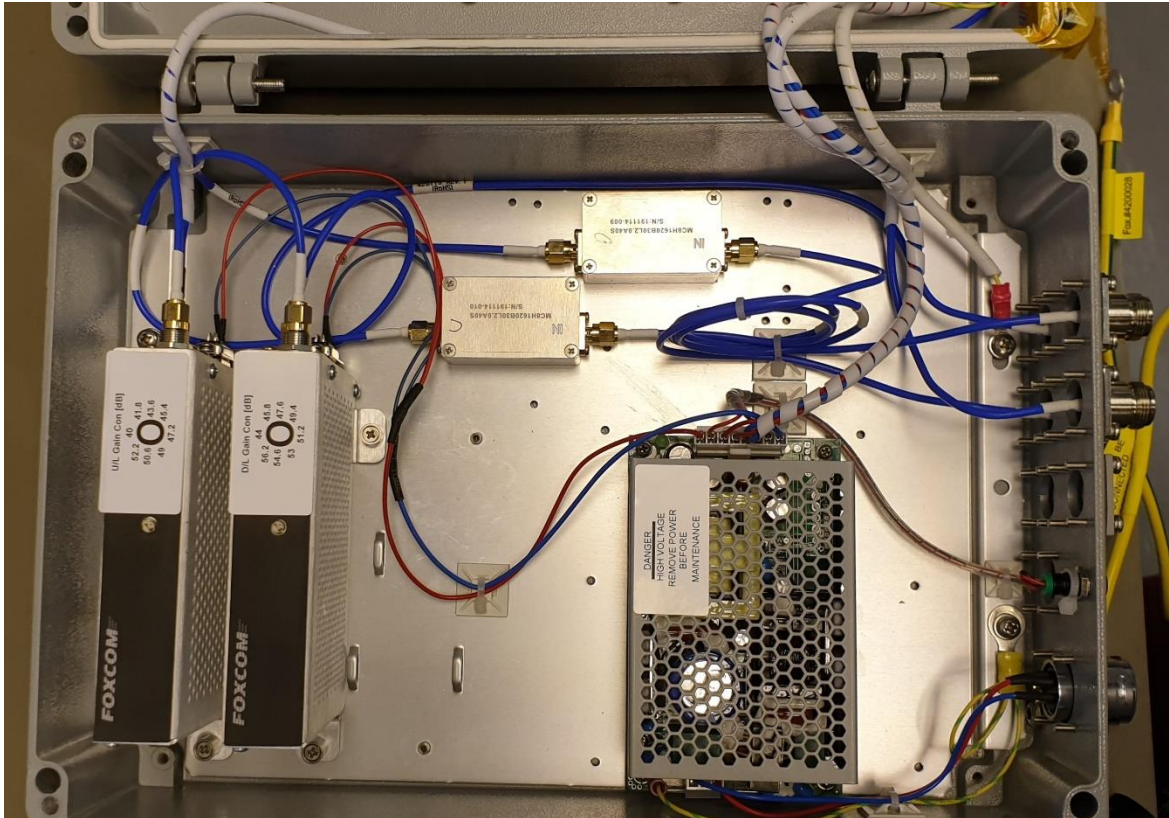


Figure 8: ODU Single Zone Internal Module with OD5 Housing

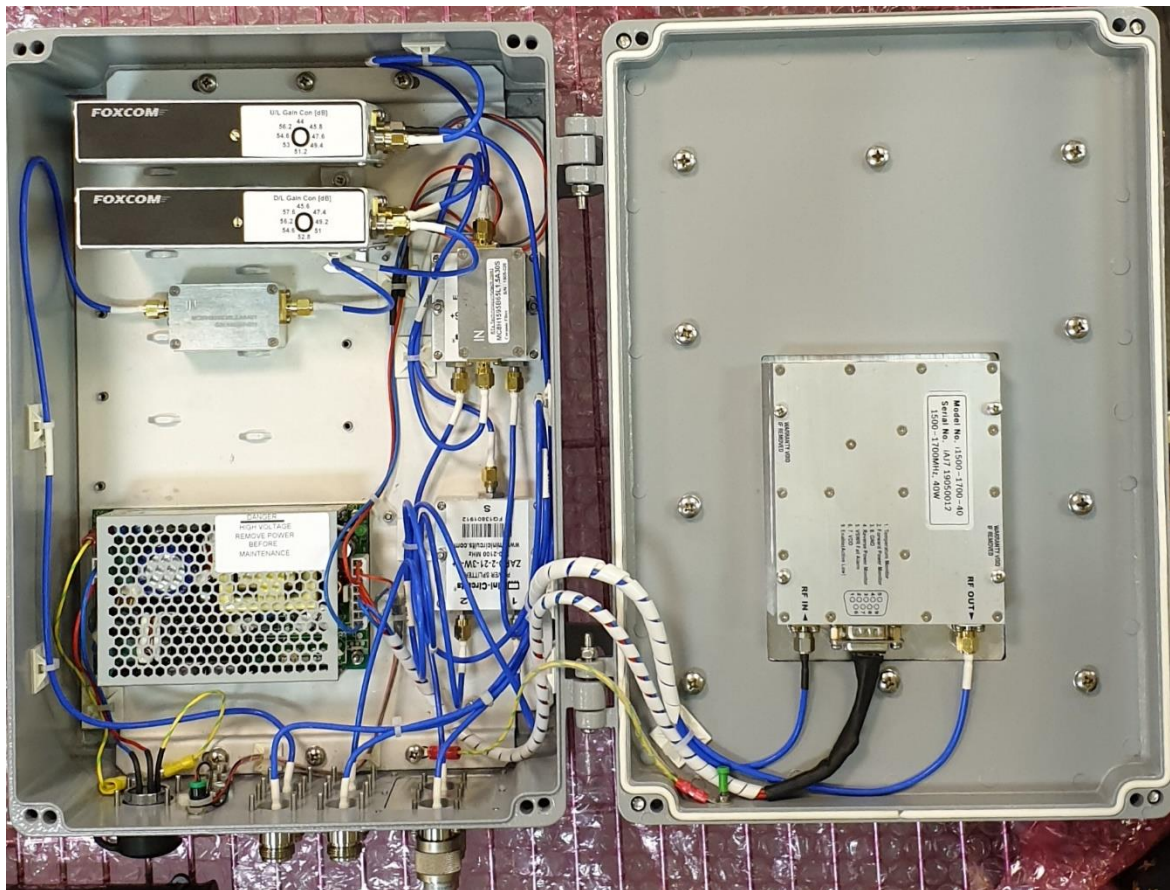


Figure 9: ODU Dual Zone Internal Module with OD5 Housing

The Iridium outdoor repeater contains Uplink and Downlink LNA & Post amplifier, Power amplifier, BP RF filters and AC to DC PS.

2.2.4 RF Connector Layout

A sticker on the right side of the repeater unit provides information on each of the RF connectors used.

RF 1	U/L output to outdoor antenna	Gain D/L	RF 3	U/L input from indoor antenna
RF2	D/L input from outdoor antenna	Gain U/L	RF 4	D/L output to indoor antenna

2.3 Connection Diagram

2.3.1 System Diagram for Single Zone Version

The following diagram shows a single zone version with one set of indoor antennas.

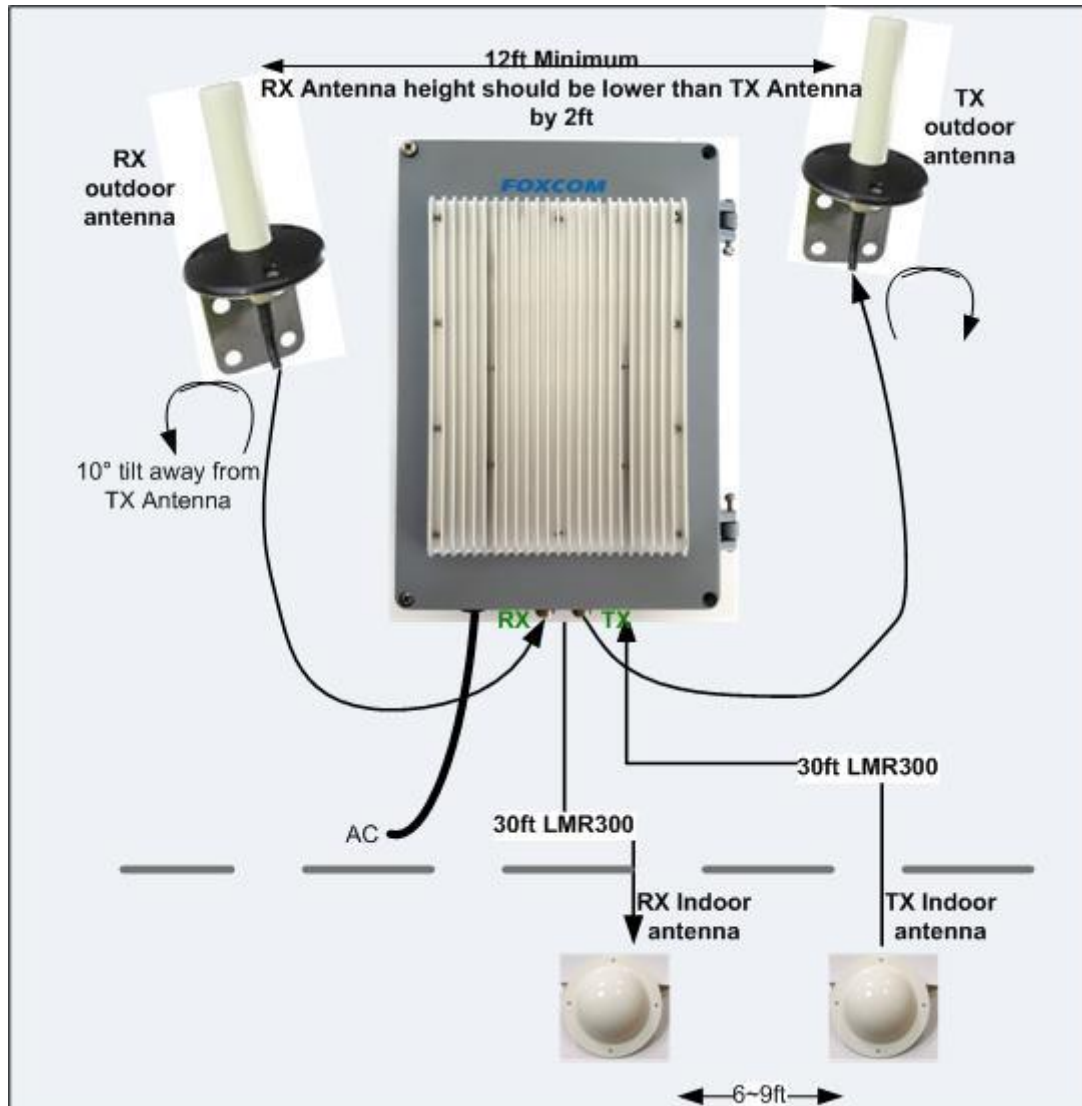


Figure 10: System Diagram for Single Zone

2.3.2 System Diagram for Dual Zone Version

The following diagram shows a dual zone version with two sets of indoor antennas. Installation and operation of the dual zone version is similar to the single zone system.

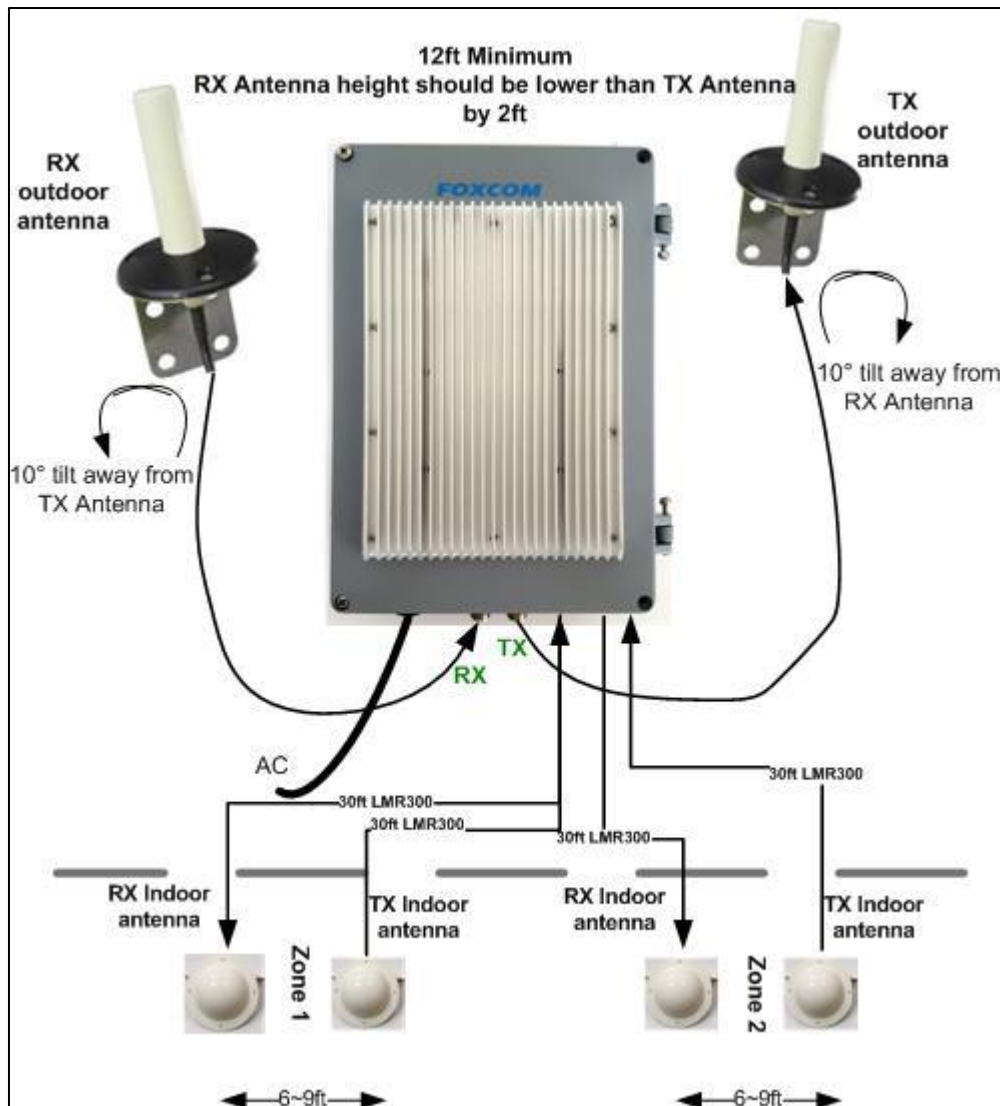


Figure 11: System Diagram for Dual Zone

3 Installation

3.1 Setting Up the Indoor Equipment

3.1.1 Placing the Indoor Antenna

- Indoor antennas must be installed with a minimum distance of 2 meters between them.
- Max cable length between the outdoor unit and the indoor antennas is dependent on the cable type used.
When using LMR 300 the max length supported is 20meters (60 feet).
When using LMR 400 the max length supported is 40meters (120 feet).

3.2 Setting Up the Outdoor Unit

The repeater unit is equipped with a built-in AC-DC power supply. The power supply accepts 100-220VAC 50-60Hz and provides stable 24VDC to the internal components.

AC current consumption is below 1Amp.

3.2.1 Installing the Outdoor Unit

3.2.1.1 Hanging the Outdoor Unit on a Pole

- The ODU is normally installed on a wall but can also be installed on a pole using the supplied pole mounting kit. The pole diameter must be between 2" to 6" (51–150mm).
- Depending on your box, connect the two brackets at the edge of the box or 1.5" from the edge of the box with bolts and a large washer. See Figure 12 and Figure 13.
- Using a Philips screwdriver, screw each bracket to the ODU.
- Open the round bracket with a Philips screwdriver. Thread the round bracket through the bracket already attached to the ODU.
- Close the round bracket around the pole with the screw provided.

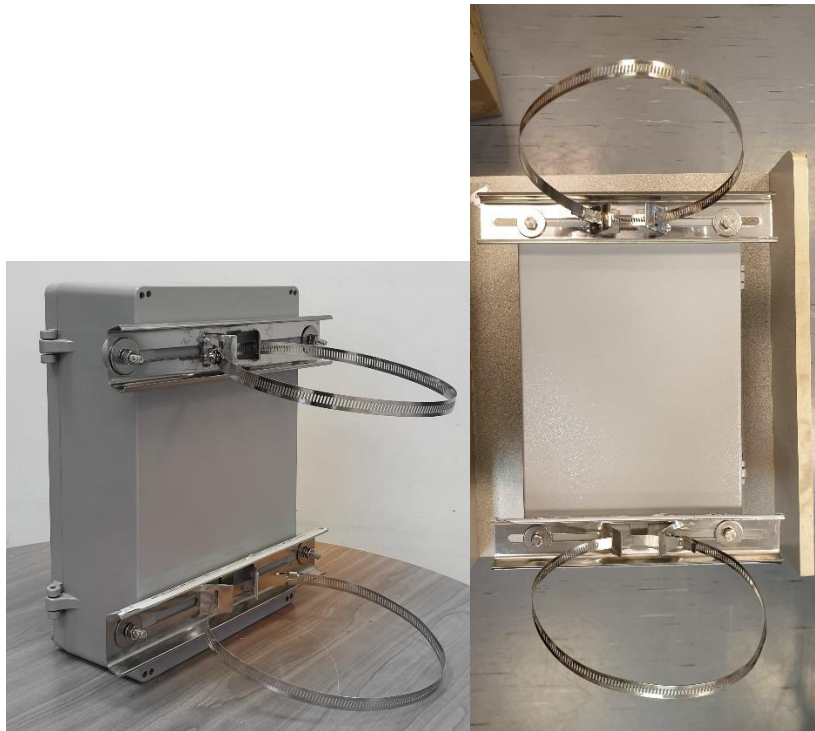


Figure 12: Hanging the Outdoor Unit on a Pole



Figure 13: Close-up of washer on pole mount

3.2.1.2 Hanging the Outdoor Unit on a Wall

Caution: The ODU is heavy! Make sure that the wall can support its weight (5 kg.). Suitable bolts must be used. Global Foxcom recommends that the ODU be installed on a concrete wall.

1. Verify the holes on the provided drill sheet match the wall ears on your box.
2. Using the drill sheet, drill four holes (5/16") through the markings indicated on the paper.
3. Using the drilled holes as a guide, place the ODU on the wall.
4. Using four screws, secure the ODU to the wall.

3.2.2 Connecting the Input/Output/Power Cables

WARNING: UNIT MUST BE GROUNDED BEFORE APPLYING POWER

To ground the unit, assemble the ground assembly.

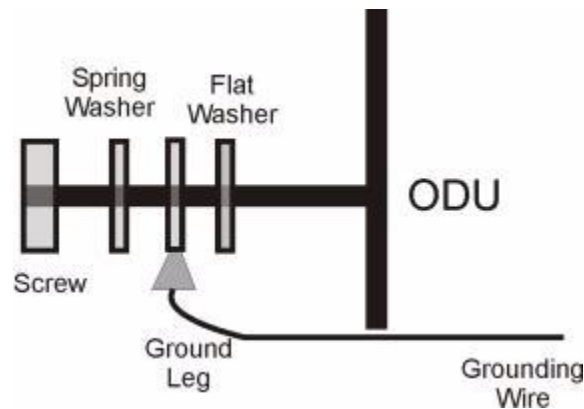


Figure 14: Grounding the Unit

3.2.3 Mounting the Outdoor Antennas

WARNING: ANTENNA MUST BE CONNECTED BEFORE APPLYING POWER

- Using one supplied 5Meter RF COAX cable, connect the receiver (Downlink) antenna to Downlink input RF port (RF2).
- Using a second supplied 5Meter RF coax cable connect the transmitting (Uplink) antenna to the Uplink Output RF port (RF1).
- Using the supplied 20Meter RF coax cable connect the transmitting indoor (Downlink) antenna to the Downlink Output RF port (RF4).
- Using the supplied 20Meter RF coax cable connect the receiving indoor (Uplink) antenna to the Uplink Input RF port (RF3).

Note 1: Outdoor antennas must be installed with a minimum of 6 meters from one another.

Note 2: It is recommended to place the Outdoor transmitting antenna 2 feet higher than the height of the Outdoor receiving antenna.

Note 3: The outdoor antennas **MUST** be tilted from each other by 10 degrees

Note 4: Make sure that outdoor unit is installed in an area that does not include any radiating antennas.

A radiating antenna placed nearby (below 10 meters) can affect system performance.

3.2.4 Powering the Outdoor Iridium Unit

1. Apply AC power.
2. The ODU PS1 PWR LED should be "ON".

3.3 Testing and Optimizing the System

Use a hand held Iridium device to check signal level.

The Iridium repeater unit is equipped with two gain adjustment knobs. The U/L (Uplink) signal is what the indoor phone is sending to the Iridium Satellite. The D/L (Downlink) is the signal from the Iridium Satellite coming into the building.

The knobs have several settings allowing modification to system gain. When the knob is in the 5 O'clock position the system is at its default factory optimized position for both U/L (45.4) and D/L (49.4).



Figure 15: Manual Gain Adjustment

- The units are pre-set from the factory for optimal gain and performance. Because ceiling height and size of the room are all different, the manual gain adjustment will make it easy to set up and get the best out of the units for your room.
- First, try the units without changing the settings.
- Second, whenever aligning a system, ALWAYS start with the Downlink path. After that, adjust the Uplink, where the goal is to achieve the best possible Up:Down ratio.

3.3.1 Setting Up the Downlink at 3 Meters from the Indoor Antenna

1. Stand about 3 meters (approximately 9–10 feet) from the Indoor Antenna.
2. Check the signal quality on your Iridium phone.
3. Wait 30–60 seconds to verify levels.

How many bars do you have _____? You should be seeing 4–5 bars. If the signal is lower, change the “DOWNLINK” knob one position Clockwise.

For example, if the knob was at “0” move it to “+2”.

4. Check the signal quality on your Iridium phone. Wait 30–60 seconds to verify levels. Do this until you get 5 bars.

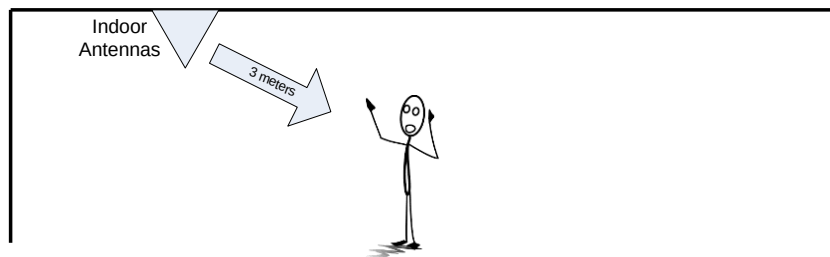


Figure 16: Setting Up the Downlink at 3M

3.3.2 Setting Up the Downlink at 5 Meters from the Indoor Antenna

1. Stand about 5 meters (approximately 15–16 feet) from the Indoor Antenna.
2. Check the signal quality on your Iridium phone.
3. Wait 30–60 second to verify levels.

How many Bars do you have _____? You should be seeing 4–5 bars. If the signal is lower, change the “DOWNLINK” knob one position Clockwise.

For example, if the knob was at “0” move it to “+2”.

4. Check the signal quality on your Iridium phone. Wait 30–60 second to verify levels. Do this until you get 5 bars.

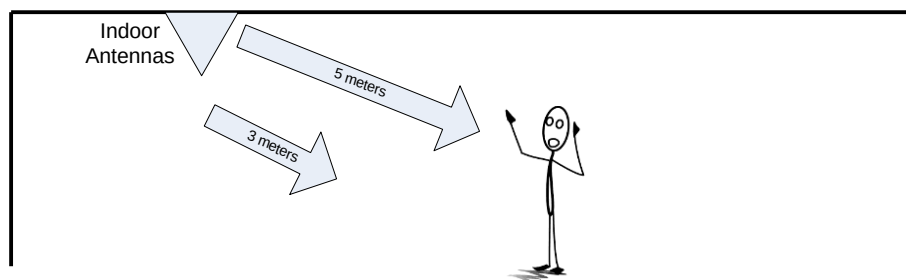


Figure 17: Setting Up the Downlink at 5M

3.3.3 Setting Up the Downlink at 10 meters from the Indoor Antenna

1. Stand about 10 meters (approximately 30 feet) from the Indoor Antenna.
2. Check the signal quality on your Iridium phone.
3. Wait 30–60 second to verify levels. How many Bars do you have _____? By this point we should see 3–4 bars.

You should NOT adjust the gain level for the downlink at this point.

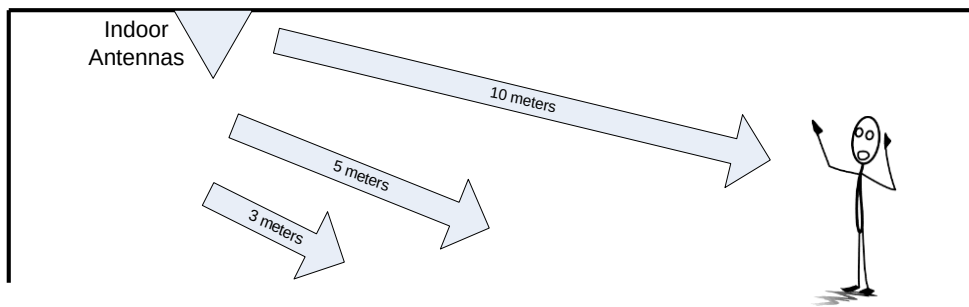


Figure 18: Setting Up the Downlink at 10M

3.3.4 Setting Up the Uplink at 5 meters from the Indoor Antenna

1. Go back to the 5 meter mark.
2. Check the signal quality on your Iridium phone.
3. Wait 30–60 second to verify levels. You should see 4–5 bars.
4. Make a call while looking at the phone.
Do the bars drop drastically? If so, we need to **decrease** power on the Uplink.
5. Change the knob one position Counter-Clockwise.
For example, if the knob was at “0” move it to “-2”.
6. Check the signal quality on your Iridium phone.
Wait 30–60 second to verify levels. Do this until you get 5 bars.

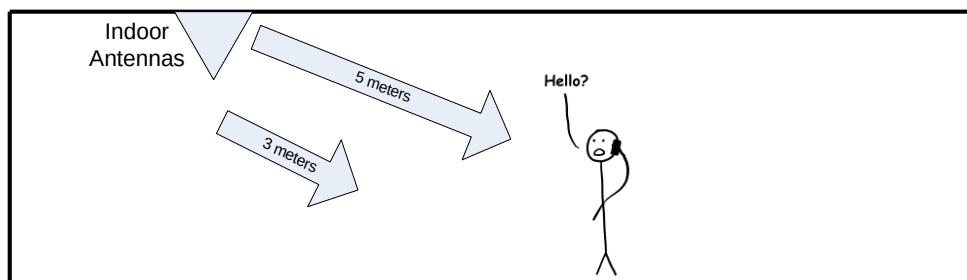


Figure 19: Setting Up the Uplink at 5M

At this point all levels should be adjusted and you will be able to use the phones at least 10 meters from the Indoor Antenna.

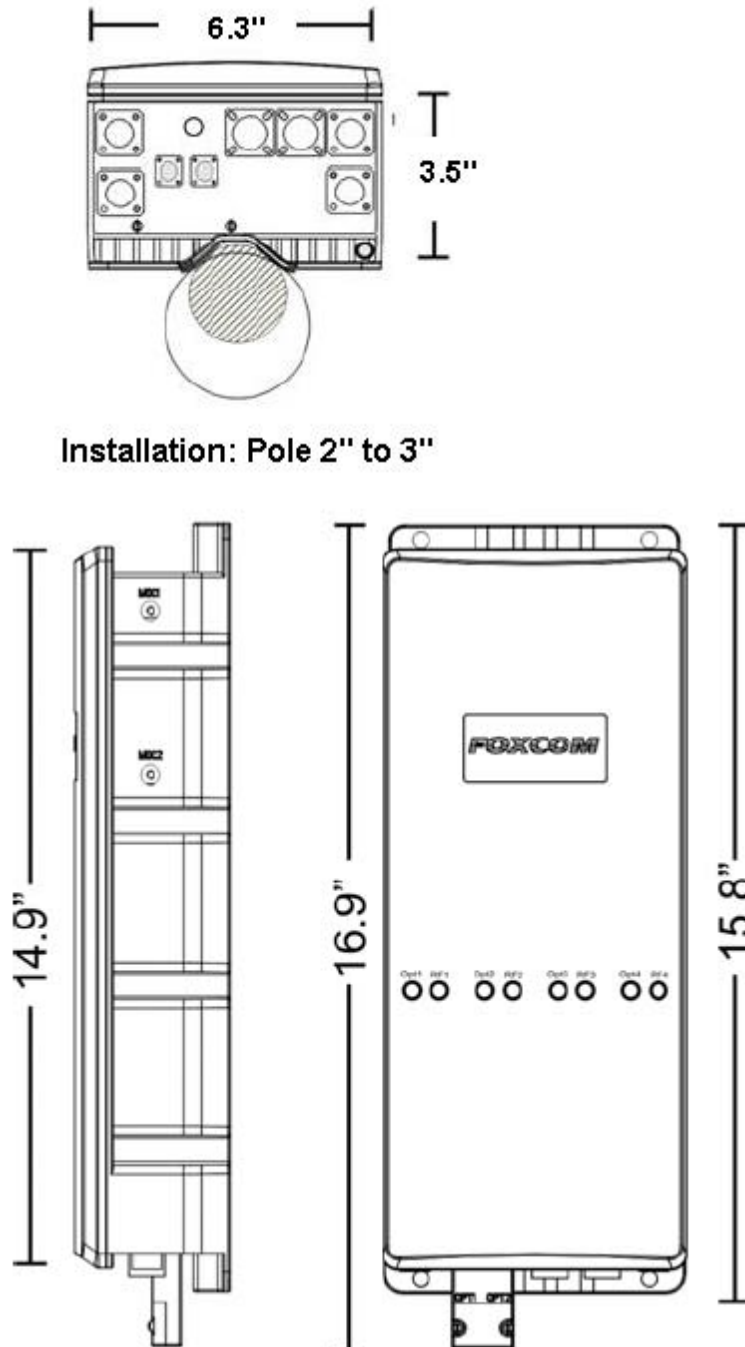
4 Product Technical Description

4.1 System Specifications

Iridium Coaxial Repeater Specifications	
Downlink	
Frequency range	1616-1626.5MHz
ODU input/IDU output VSWR	1:1.6
ODU RF input signal range [total power]	up to -20dBm
Downlink gain	(±10dB Adjustable)
Noise figure	<5dB
Uplink	
Frequency range	1616-1626.5MHz
IDU input/ODU output VSWR	1:1.6
IDU RF input signal range [total power]	up to -20dBm
Uplink gain	(±10dB Adjustable)
Noise figure	<5dB
Indoor coax length support	10m
Physical Specifications	Repeater unit
RF connectors	Dual N-Type Female
Dimensions	14" x 6" x 3"
Operating temperature	-30 to +55° C
Electrical Specifications	
Power	24 V DC

4.2 Model Dimensions

4.2.1 Outdoor Unit



Installation: Pole 2" to 3"

Figure 20: Model Dimensions for Outdoor Unit

4.3 ODU DC Connector Assembly

Pin	Function
A	+24 VDC
B	Negative
C	Ground

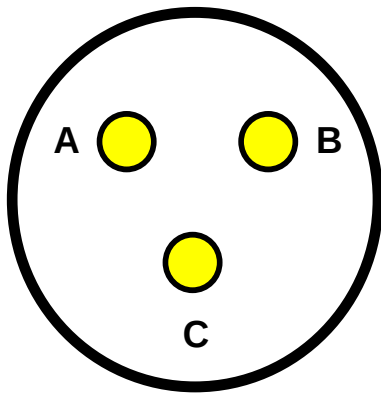


Figure 21: ODU DC Connector Assembly

5. Troubleshooting the Iridium Coaxial Repeater

5.1. Troubleshooting the Iridium Repeater

Problem	Possible Cause
Unable to put out a call with a good signal bar (Phone reset itself when trying to dial)	1. Bad cable connections 2. Uplink Gain is too high or too low
Signal bar show low signal level	1. Bad cable connection 2. Low gain on downlink path.

Note: Make sure a cellular transmitting antenna is not mounted in close proximity to the Iridium antenna system (<10Meter)

Note: Make sure transmitting and receiving outdoor antennas are mounted at least 4 meters from each other.