

VzW SOHO Installation Manual

2008. 04



Modified Manual LIST

Manual issue	DATE	Modified List	Remark
Ver 0.2	2007. 08. 02	First Draft	
		Added Information	
Ver 0.3	2007. 09. 11	Changed DIP S/W control method Appendix C. System Block Appendix D. Troubleshooting for the MPE25K	
		Added information	
Ver 0.4	2007. 10.22.	Added material name of each image	
Ver 0.5	2008. 04. 21	Changed Installation Bracket	
		Updated System Block	

► Safety Precautions:

- Use the power plug at the adaptor to turn the power on and off.
- Please make sure that a ground wire is installed to connect the Antenna Unit to an appropriate earth ground.
- Refer servicing to a qualified technician who is familiar with NEC (National Electrical Code) and a related regulation for installation to reduce the risk of electrical damage when the unit does not appear to operate normally or exhibits a marked change in performance.

Radio Regulation Conformance

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 instructions, may cause harmful and, if not installed and used in accordance with instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation.

This device complies with Part 15 of the FCC rules. 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 understand operation.

FCC RF Radiation Exposure Statement

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 80 cm for LINK Antenna and 20 cm for Coverage Antenna from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

WARNING

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

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1. Installation Flow Chart

This document will provide details on how to successfully install the Juni JR-10 SOHO Repeater system. The flow chart below shows the main steps involved in setting up the equipment.

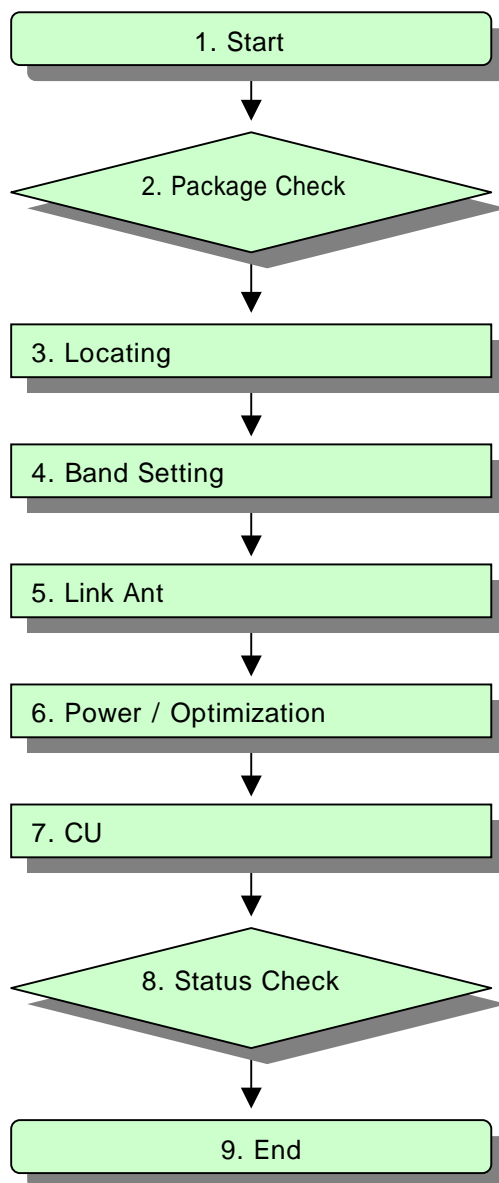


Fig. 1 Installation Flow Chart

2. Package Check

The first step when installing the repeater is to check if all components are present and that the parts do not contain any visible faults. The figure below illustrates the items included in the JR - 10 SOHO Repeater Kit.

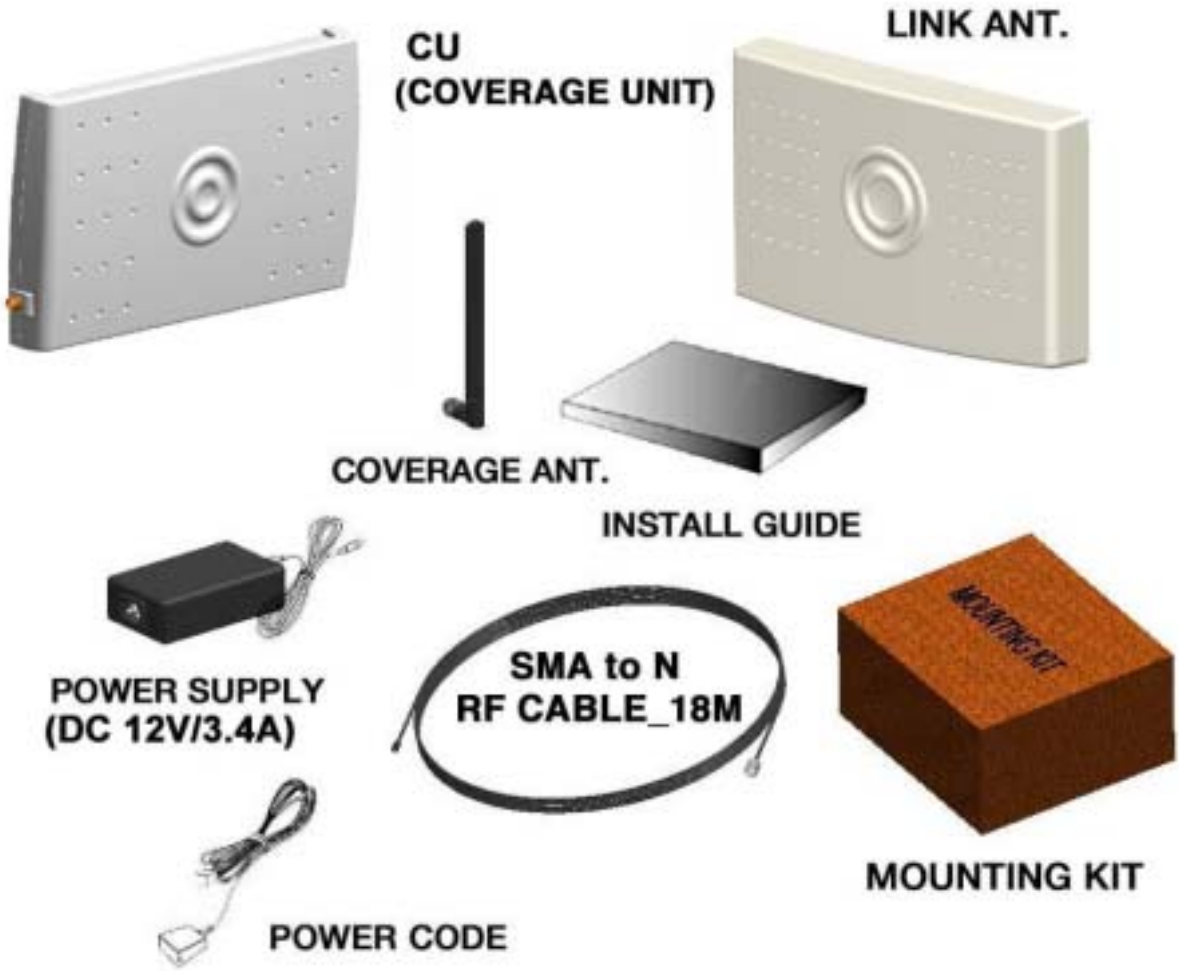


Fig. 2 List of all the Components in the System

2.1 LINK ANT

→ The role of the Antenna Unit is to communicate with the BTS. It is usually located outside the building where service is to be improved. The Antenna Unit can be mounted onto a wall or a pole, depending on the specific installation needs.



Fig. 3 LINK ANT

2.2 COVERAGE UNIT (CU)

→ The role of the Coverage Unit is to communicate with the mobiles within the building where needs improved coverage. It is intended for wall mounting.

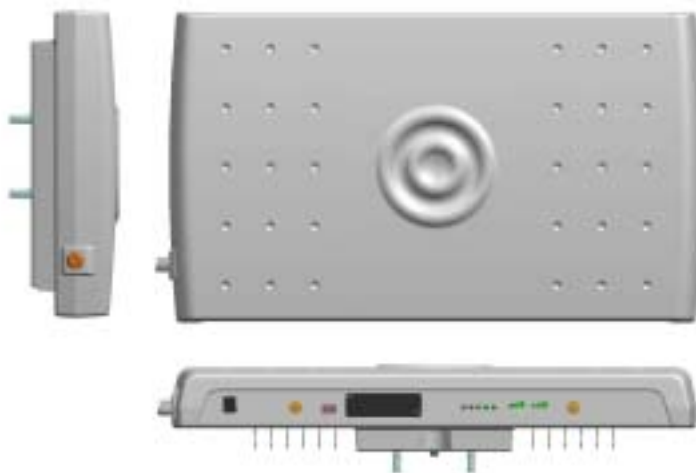


Fig. 4 COVERAGE UNIT (CU)

3. Preparing for Antenna Unit and Coverage Unit Installation

Determining the installation location of the unit is viewed as one of the most important choices, as the place of choice of the unit will heavily impact the overall performance of the repeater.

The first selection that needs to be made by the user is to determine if the units will be mounted to a wall or a pole. Once this decision has been confirmed, the choice of location can be arranged.

When determining the position of the Antenna Unit, the following points should be considered.

- Will the Antenna Unit be mounted on a Wall or a pole?
- Is a BTS visible near site location?
- Avoid areas where may possibly hinder the communication between the Antenna Unit and the BTS such as large walls.
- The Antenna Unit should be installed less than than10 feet away from the wall penetration or window which will provide access to the inside of the building.

The following points should be considered when determining the location of the Coverage Unit

- Attempt to position the Coverage Unit at the center of desired service region
- Attempt to position the Coverage Unit so that it is clearly visible.
- Make sure that the distance from the Coverage Unit to its power source is less than 20feet.

4. Frequency Band Setting



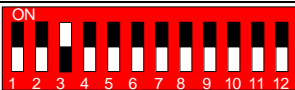
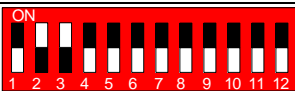








Once the location and positioning of the Antenna Unit and Coverage Unit are finalized, the authorized installer should proceed with installing the Antenna Unit and Coverage Unit. But first, the installer should set the appropriate operating frequency band(s) for the repeater, based on Verizon Wireless licenses. The figure and table below show the DIP Switch settings. Usually both PCS and Cellular bands have to be set up.

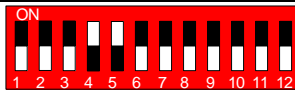
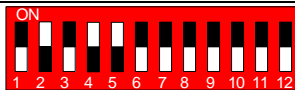
→ DIP Switch Functions


















Fig. 5 DIP S/W Setting

PIN NO.	FUNCTION	STATUS
1	Cellular Band Selection	ON : Cellular B Band OFF : Cellular A Band
2	PCS Band Selection	See the next tables below
3		
4		
5		
6		
7		
8	PCS EVDO OFFSET	ON : PCS Gain OFFSET 3dB(increase) ON OFF : PCS Gain OFFSET 3dB(reduction) OFF
9	Cellular EVDO OFFSET	ON : Cellular Gain OFFSET 3dB(increase) ON OFF : Cellular Gain OFFSET 3dB(reduction) OFF
10	Band Selection Mode	ON : Software Band Selection Mode OFF : Hardware Band Selection Mode
11	Uplink RF OFF	ON : Reverse RF Power OFF OFF : Reverse RF Power ON
12	Hardware Reset	ON : Reset OFF : Normal Operation
PIN NO.	FUNCTION	STATUS
1	PCS PATH HARDWARE ON/OFF	ON : PCS UL/DL PATH HARDWARE ON OFF : PCS UL/DL PATH HARDWARE OFF
2	CELLULAR PATH HARDWARE ON/OFF	ON : CELLULAR UL/DL PATH HARDWARE ON OFF : CELLULAR UL/DL PATH HARDWARE OFF

BW	UP LINK	DOWN LINK	DIP SWITCH	REMARK
5MHz	1850 ~ 1855	1930 ~ 1935		White color is switch.
	1855 ~ 1860	1935 ~ 1940		
	1860 ~ 1865	1940 ~ 1945		
	1865 ~ 1870	1945 ~ 1950		
	1870 ~ 1875	1950 ~ 1955		
	1875 ~ 1880	1955 ~ 1960		
	1880 ~ 1885	1960 ~ 1965		
	1885 ~ 1890	1965 ~ 1970		
	1890 ~ 1895	1970 ~ 1975		
	1895 ~ 1900	1975 ~ 1980		
	1900 ~ 1905	1980 ~ 1985		
	1905 ~ 1910	1985 ~ 1990		

BW	UP LINK	DOWN LINK	DIP SWITCH	REMARK
10MHz	1850 ~ 1860	1930 ~ 1940		
	1855 ~ 1865	1935 ~ 1945		

	1860 ~ 1870	1940 ~ 1950		
	1865 ~ 1875	1945 ~ 1955		
	1870 ~ 1880	1950 ~ 1960		
	1875 ~ 1885	1955 ~ 1965		
	1880 ~ 1890	1960 ~ 1970		
	1885 ~ 1895	1965 ~ 1975		
	1890 ~ 1900	1970 ~ 1980		
	1895 ~ 1905	1975 ~ 1985		
	1900 ~ 1910	1980 ~ 1990		

BW	UP LINK	DOWN LINK	DIP SWITCH	REMARK
15MHz	1850 ~ 1865	1930 ~ 1945		
	1855 ~ 1870	1935 ~ 1950		
	1860 ~ 1875	1940 ~ 1955		
	1865 ~ 1880	1945 ~ 1960		
	1870 ~ 1885	1950 ~ 1965		
	1875 ~ 1890	1955 ~ 1970		





	1880 ~ 1895	1960 ~ 1975		
	1885 ~ 1900	1965 ~ 1980		
	1890 ~ 1905	1970 ~ 1985		
	1895 ~ 1910	1975 ~ 1990		

Table 1 Band Setting

5. LINK ANT. Installation

5.1 BRACKET/MTG Image

5.1.1. LINK ANTENNA BRACKET – ANT Connection Image

1) The length unit is [mm].

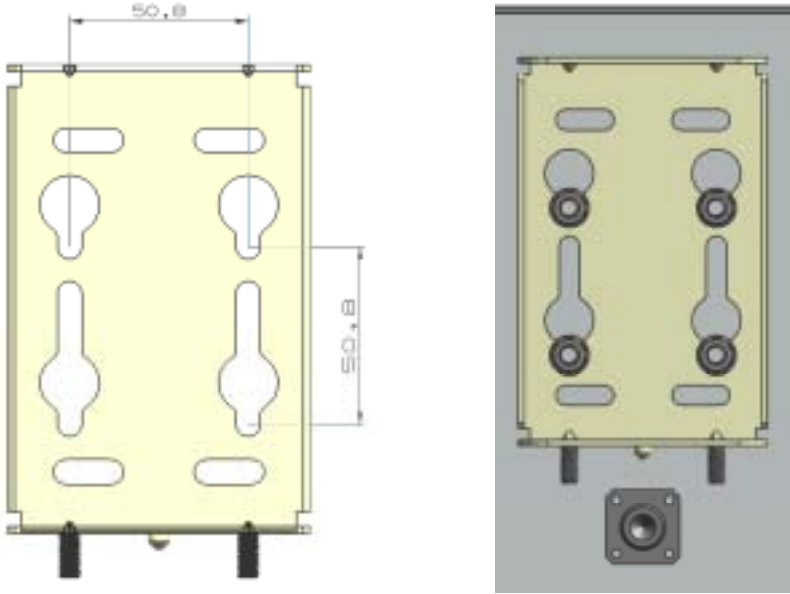


Fig. 6 LINK ANT MTG BRACKET_ANT Connection Image

5.1.2. BRACKET/MTG Connection Image to Installation Place(WALL or POLE)

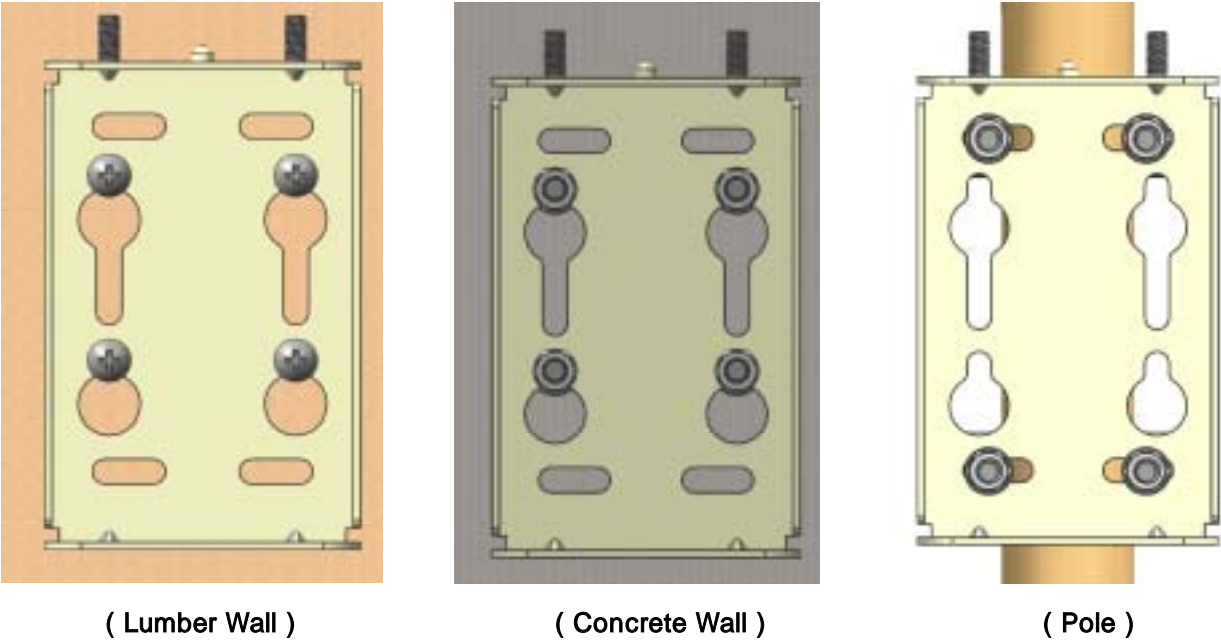


Fig. 7 WALL or POLE MTG BRACKET_ANT Connection Image

5.2 LINK ANT MTG Bracket Connection

1) APPLY 1/4" NUT, SPRING WASHER, PLATE WASHER to LINK ANT.

(Do not Connect Completely)

2) APPLY BRACKET -ANT TO LINK ANTENNA.

3) APPLY NUT COMPLETELY USING PROVIDED TOOL.

[1/4" NUT, 1/4" SPRING WASHER, 1/4" PLATE WASHER 4ea, BRACKER-ANT 1ea]

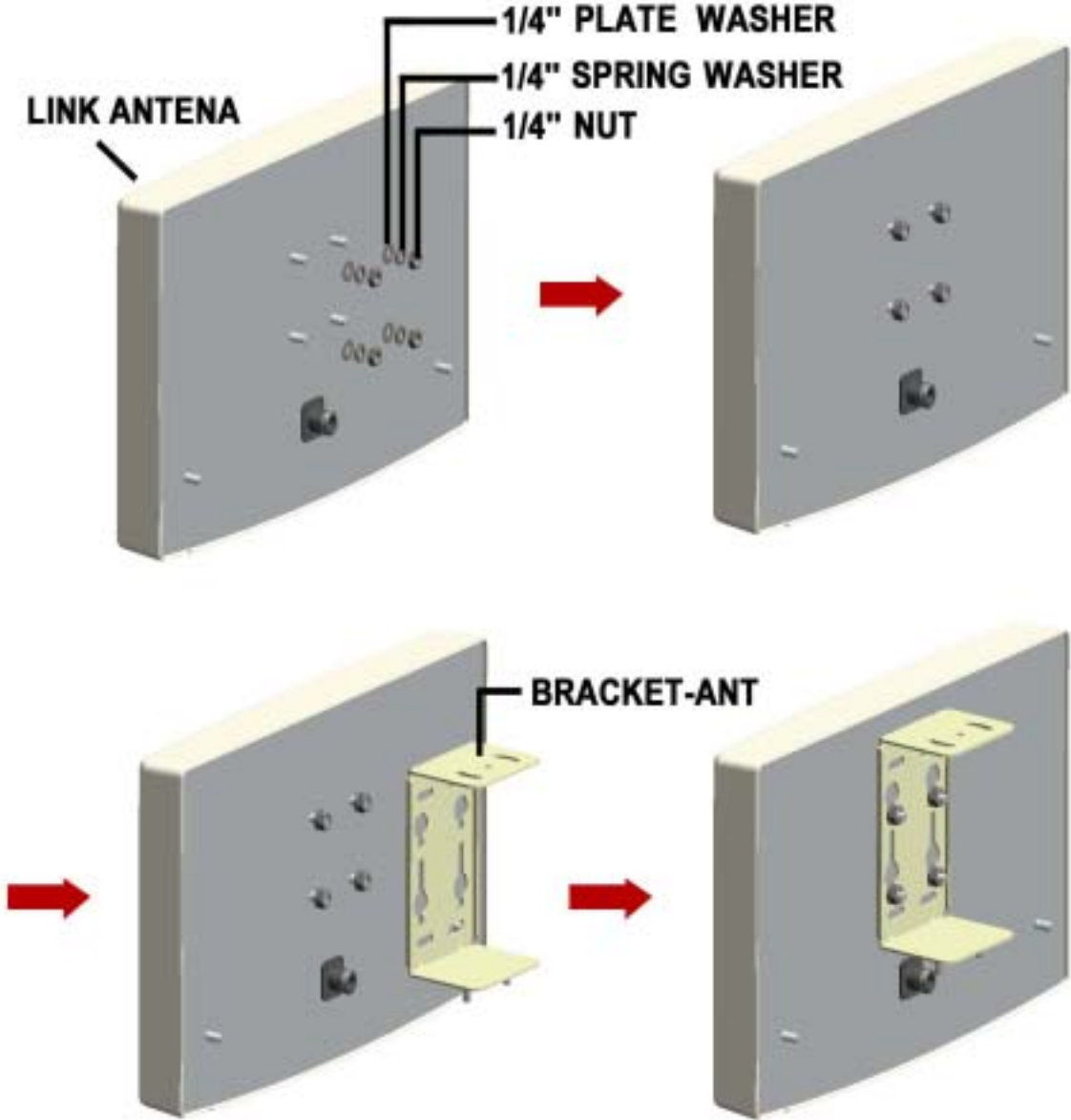


Fig. 8 LINK ANT MTG BRACKET_ANT Connection Image

5.3 BRACKET Connection depending on Installation Place

5.3.1. POLE MOUNTING

- 1) Secure DU to the pole using U-BOLT.
- 2) Insert U-BOLT to between BRACKET-POLE and BRACKET-DU
- 3) Apply the pole to the BRACKET-DU: use the nuts and u-bolts provided to fixate the bracket into the Pole.

[BRACKET-ANT 1ea, BRACKET-POLE 2ea, U-Bolt 2ea, 1/4" NUT, 1/4" SPRING WASHER, 1/4" PLATE WASHER each 4ea]

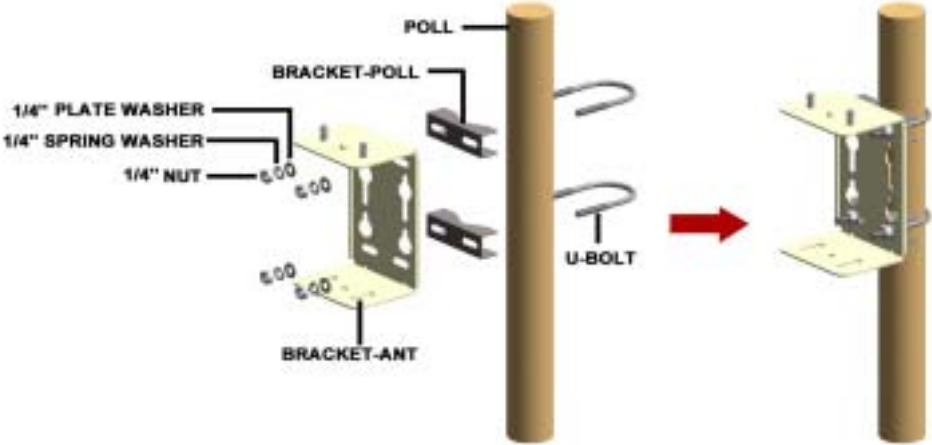


Fig. 9 POLE MOUNTING MTG BRACKET_ANT Connection Sequence

5.3.2. LUMBER WALL MOUNTING

- 1) Secure BRACKET-DU to the wooden wall. Using cross driver connect SCREW to wooden wall through BRACKET-DU.

[BRACKET-ANT 1ea, SCREW (TH+ TS-1 5x30L) 4ea]

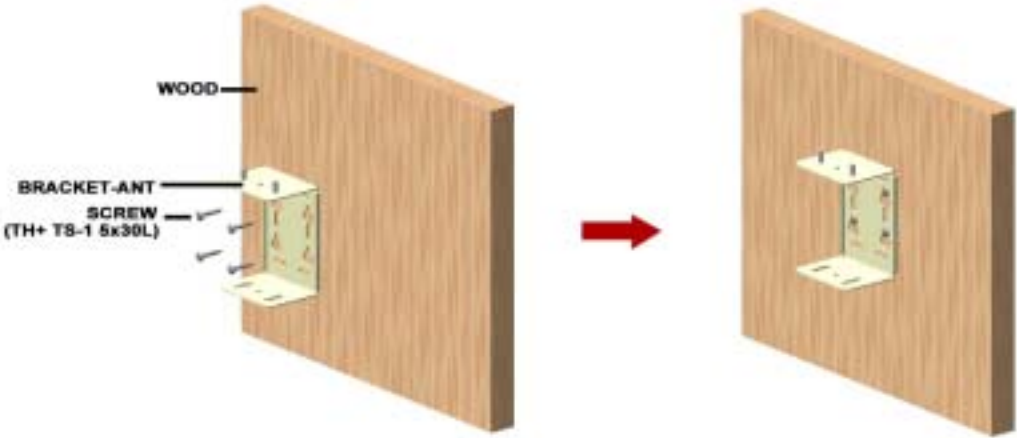


Fig. 10 LUMBER WALL MOUNTING MTG BRACKET_ANT Connection Sequence

5.3.3. CONCRETE WALL MOUNTING

- 1) Drill on the wall as the BRACKET-ANT distance.(for 10mm Hole depth to be 30 to 40 mm.
- 2) INSERT SET-ANCHOR TO DRILLED HOLE.
- 3) Secure BRACKET-DU to the Wall and fix the nut.
[SET-ANCHOR 4ea, BRACKET-ANT 1ea]

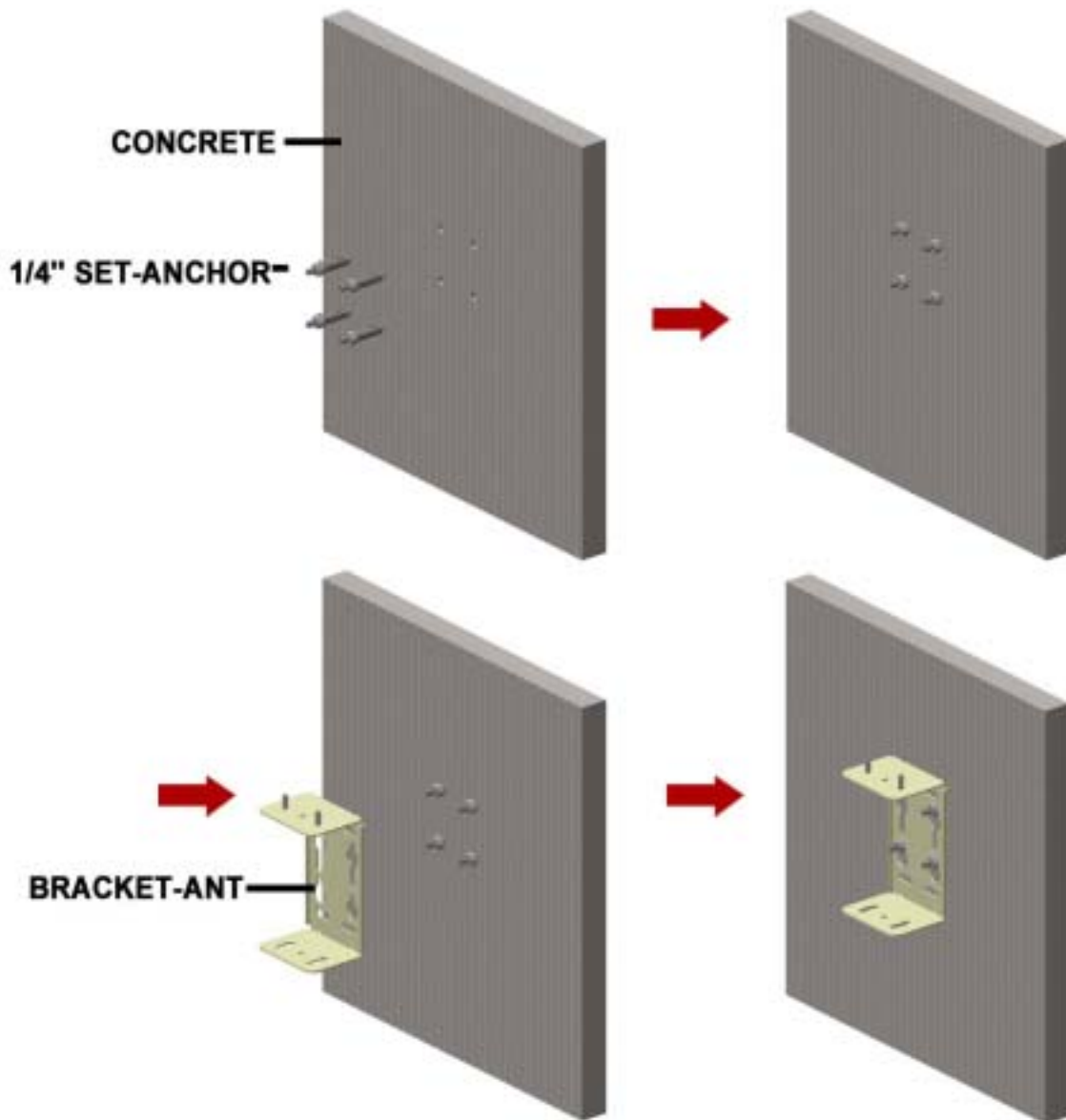


Fig. 11 CONCRETE WALL MOUNTING MTG BRACKET_ANT Connection Sequence

5.4 LINK ANTENNA Connection (same as 5.2) with BRACKET (same as 5.3)

- 1) APPLY LINK ANTENNA to the BRACKET.
- 2) Apply the NUT to the upside of BRACKET like below sequence. – Do not apply the NUT completely.
- 3) Set the receiving direction of the ANTENNA and apply the NUT completely using the provided tool.

[1/4" NUT, 1/4" SPRING WASHER, 1/4" PLATE WASHER 4ea]

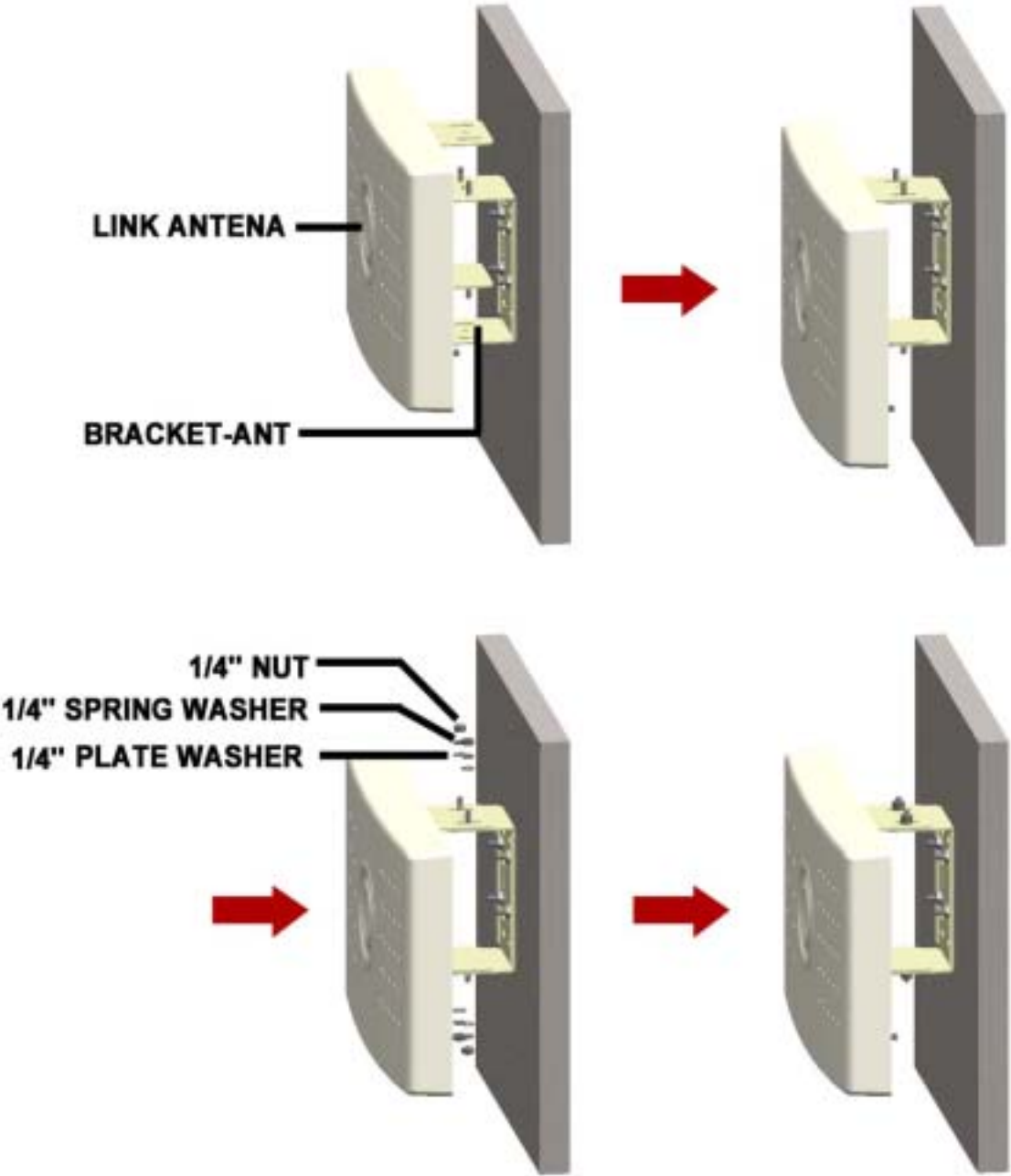


Fig. 12 LINK ANT Connection Sequence to Installed MTG BRACKET-ANT

5.5 Installation Completion.

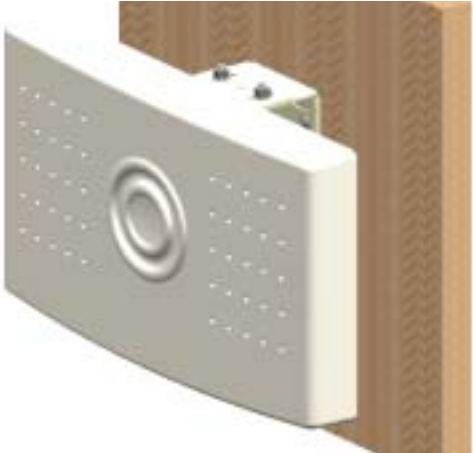


Fig. 13 LUMBER WALL MOUNTING

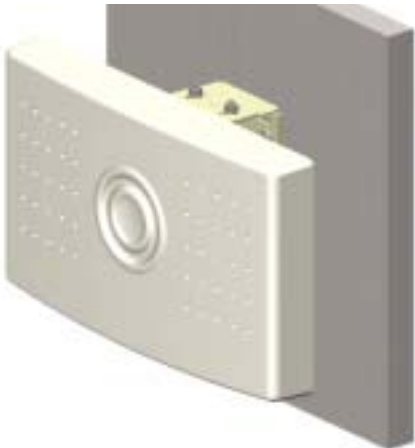


Fig. 14 CONCRETE WALL MOUNTING



Fig. 15 POLE MOUNTING

6. Power Connection and Optimization SETTING

Once the Antenna Unit, RF Cable and Coverage Unit have been successfully installed, the authorized installer should connect the Power Adaptor and AC power to the equipment and make the correct system settings. The Coverage Unit LED indicator is needed when proceeding with the optimization setting.

1) Connect the RF Cable between the Antenna Unit and the Coverage Unit as shown in the diagram below. The Power Adaptor should also be connected to the appropriate location on the Coverage Unit.

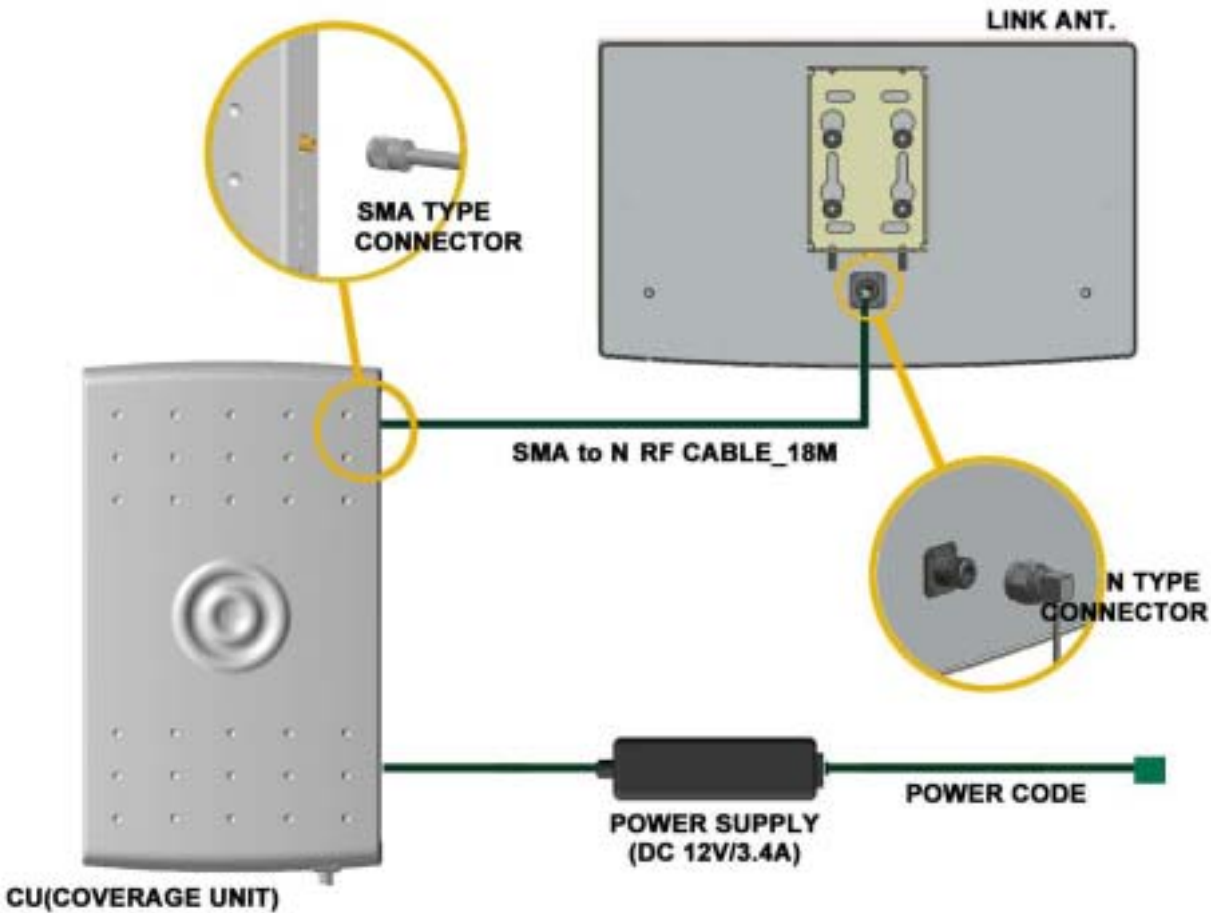


Fig. 16 Power PORT Connection

2) Once the power has been successfully connected (this can be verified by checking the LEDs on the Coverage Unit), the Antenna Unit has to be positioned so that maximum signal level is being received from the BTS. This can be monitored via the Coverage Unit LEDs which indicate the signal strength (RSSI) reading.

(It is recommended for the RSSI LEDs show at least 3 bars)

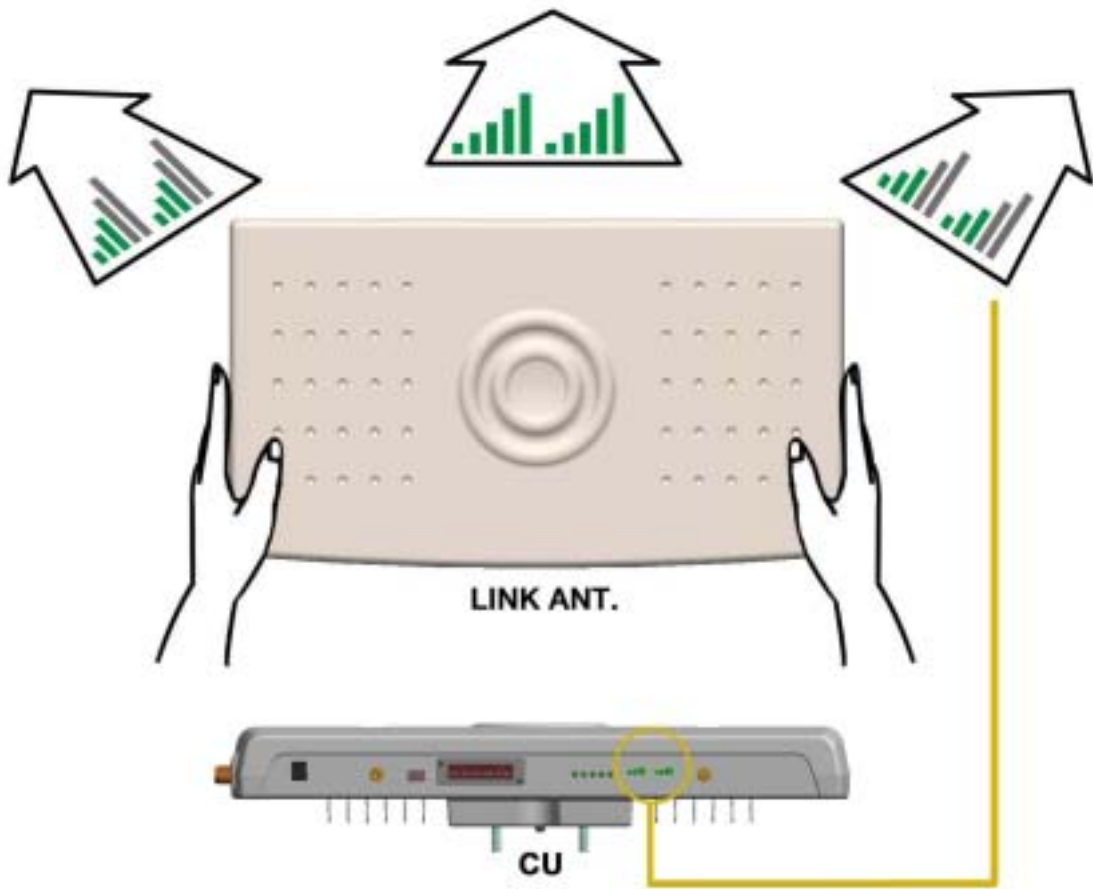


Fig. 17 Verifying reception status

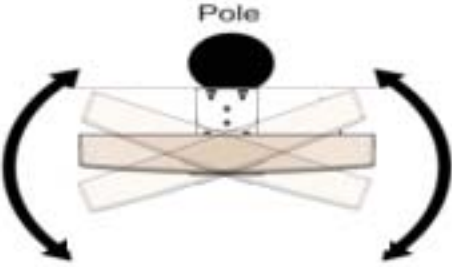

Outdoor LINK ANT. on a Roof (Pole mount)	Outdoor LINK ANT. (Wall mount)
 <p data-bbox="188 1742 836 1928">Once the Antenna Unit is mounted onto the pole, it is capable of being rotated 20° in either direction. The Antenna Unit can also be mounted anywhere around the pole.</p>	 <p data-bbox="951 1877 1423 1906">Can be rotated 20° in either direction</p>

Fig. 18 LINK ANT Tilting

3) The type of mounting method used will determine how much flexibility it has in revolving from its position.

7. RF UNIT(CU) Installation (Wall & Ceil Mount)

- 1) Using the Coverage Unit Mounting Bracket as a drilling template, drill Coverage Unit Mounting Bracket holes into the wall for the appropriate mounting hardware, depending on the type of wall (concrete, drywall, plaster, wood, veneer). Install the appropriate mounting hardware and the install Coverage Unit Mounting Bracket as shown in the diagram below.
- 2) Use the nuts and flat washers to attach the Outer Bracket to the Coverage Unit. The Coverage Unit is then secured to the Coverage Unit Mounting Bracket with 2 screws provided.
- 3) Connect the Coverage Antenna to the Coverage Unit.

7.1 CU INSTALL BRACKET Image

7.1.1. BRACKET – CU SET Connection with CU Image

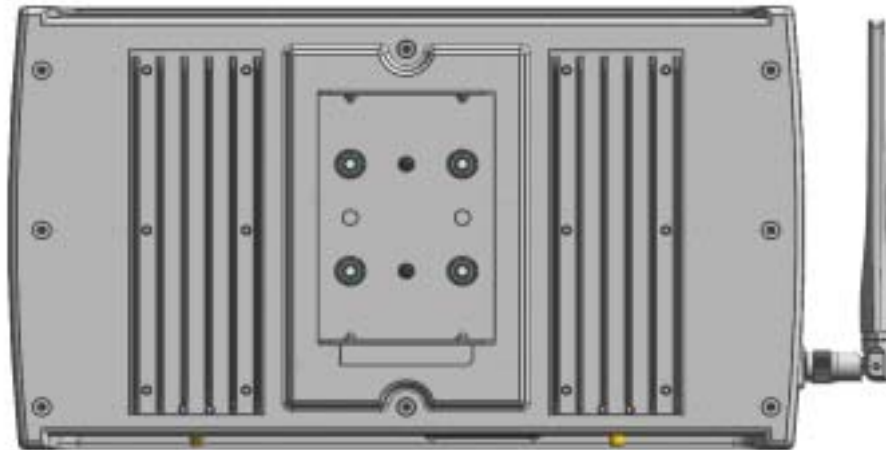


Fig. 19 MTG BRACKET – CU SET Connection Image

7.1.2. BRACKET - CU MTG Connection to Wall Image

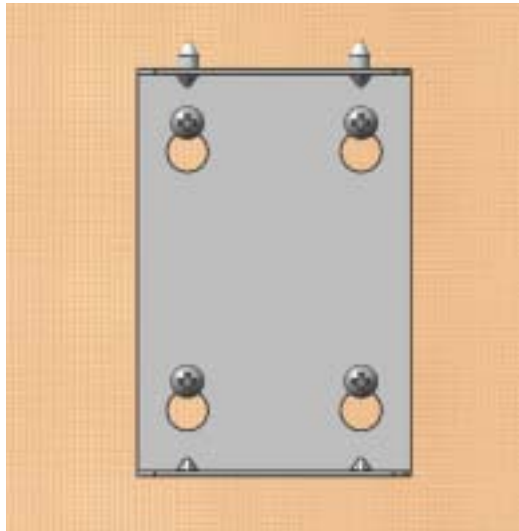
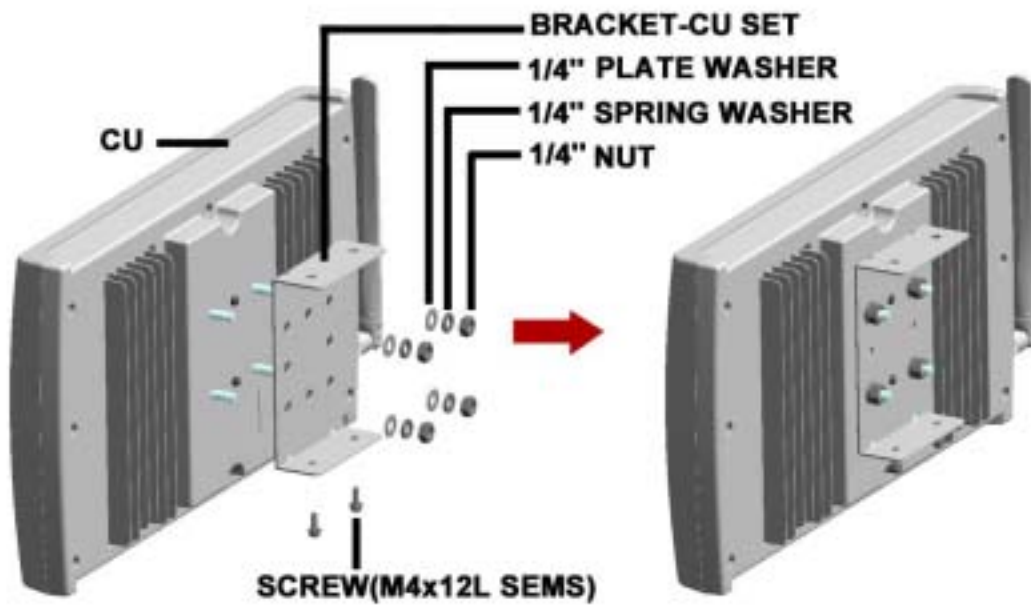


Fig. 20 MTG BRACKET – CU Connection Image

7.2 INSTALL BRACKET Connection to CU

- 1) Apply BRACKET – SET to CU completely using NUT, SPRING and PLATE WASHER.
- 2) Apply SCREW to BRACKET – SET suitably. (not completely)

[CU BRACKET-SET 1ea, BRACKET SCREW 2ea, NUT, SPRING WASHER,
PLATE WASHER 4ea]



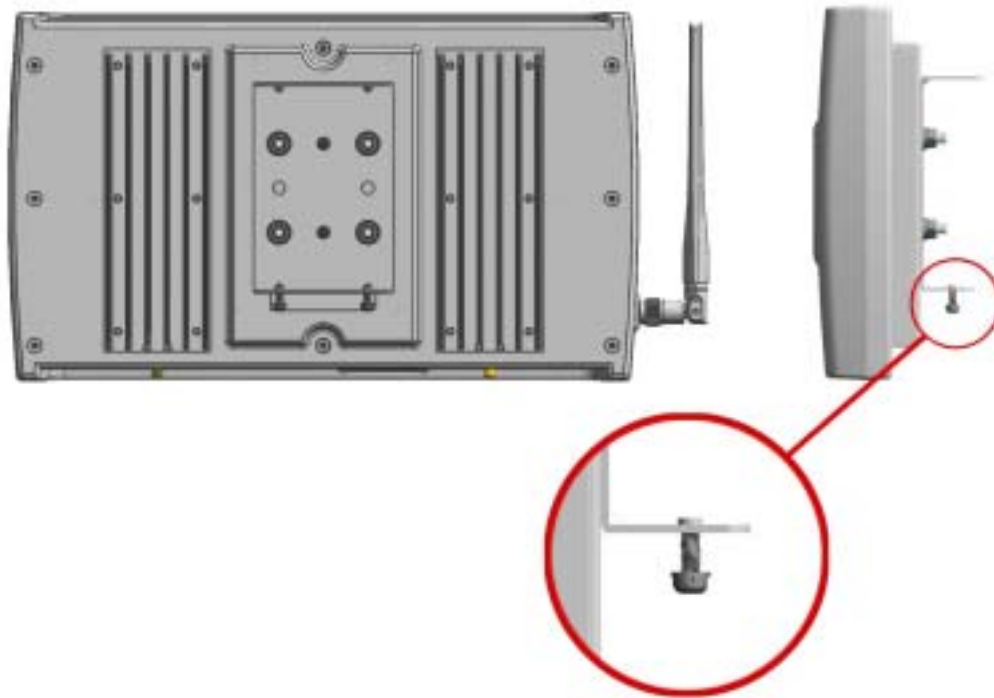


Fig. 21 MTG Bracket – CU SET Connection Sequence

7. BRACKET Connection depending on Installation Place

7.3.1. LUMBER WALL MOUNTING

- 1) Secure BRACKET-CU MTG to the wooden wall. Using cross driver, connect completely SCREW to wooden wall through BRACKET-MTG.

[CU BRACKET-MTG 1ea, SCREW 4ea]

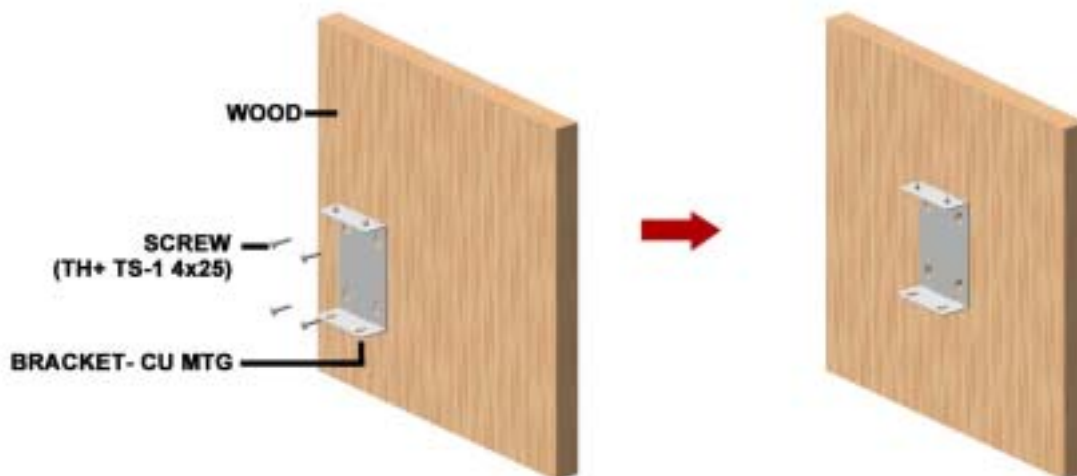


Fig. 22 LUMBER WALL MTG Bracket MOUNTING

7.3.2. GYPSUM BOARD WALL MOUNTING

- 1) Secure DRYWALL anchor to the GYPSUM BOARD WALL using cross driver completely.
- 2) Secure DRYWALL anchor screw to BRACKET – CU MTG using cross driver completely.
[BRACKET-CU MTG 1ea, Drywall Anchor 4ea, Screw 4ea]

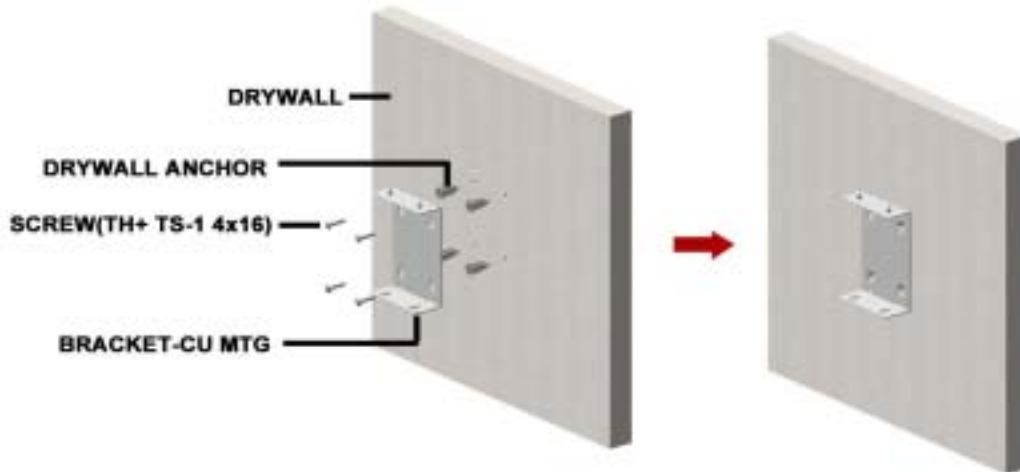


Fig. 23 GYPSUM BOARD WALL MTG Bracket MOUNTING

7.3.3. CONCRETE WALL MOUNTING

- 1) Secure PLASTIC ANCHOR TO WALL. (Removal is impossible after connection.)
: INSERT PLASTIC ANCHOR after drill 6mm Hole in the wall by 30~40mm depth
[CU BRACKET-MTG 1ea, PLASTIC ANCHOR 4ea]

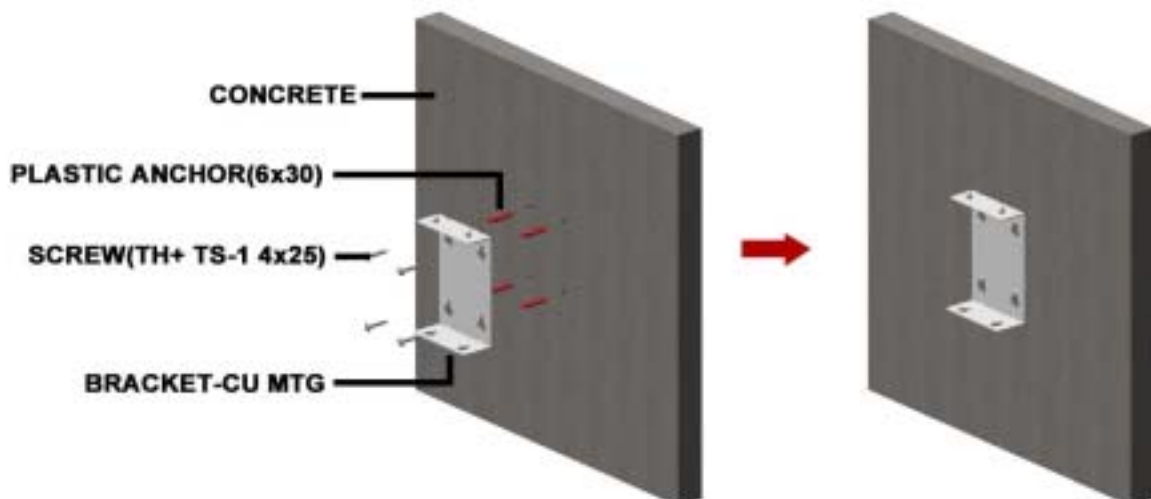


Fig. 24 CONCRETE WALL MTG Bracket MOUNTING

7.4 Connection CU(same as 7.2) with CU BRACKET -MTG(same as 7.3)

- 1) APPLY CU to BRACKET -CU MTG.
 - 2) After securing CU to Wall, connect the SCREW (M4X12L SEMS) to the BRACKET.
- [SCREW(M4X12L SEMS) 2ea]

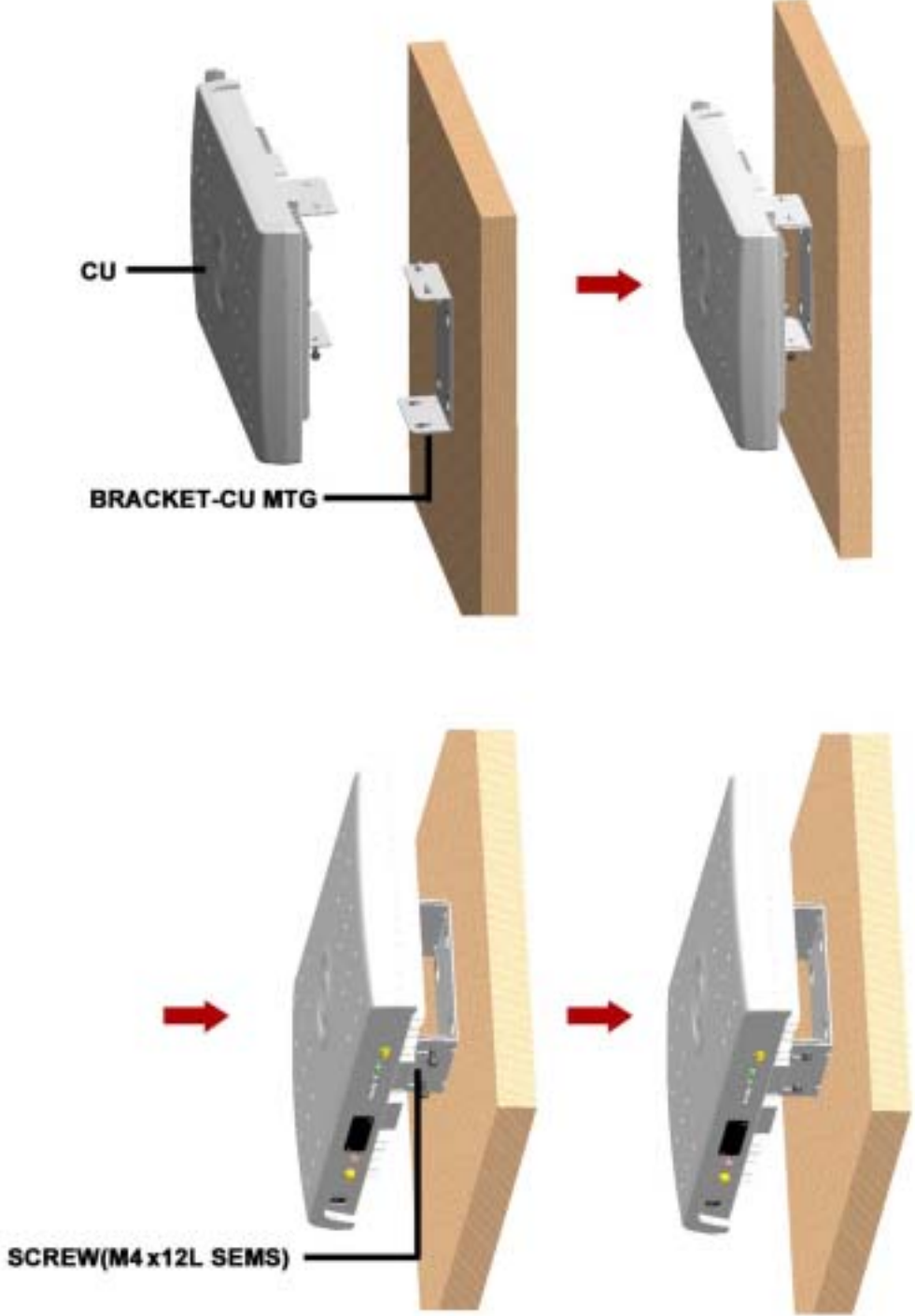


Fig. 25 CU Connection to Installed BRACKET –CU MTG Sequence

7.5 Installation Completion.

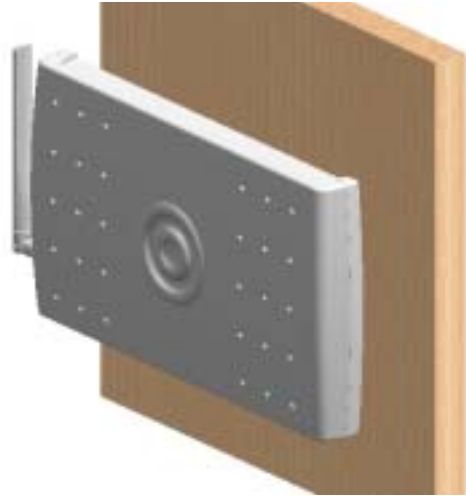


Fig. 26 CU SET Installation Completion Image

5) Once the positioning of the Coverage Unit has been finalized, use the DIP Switch to activate the Uplink path.

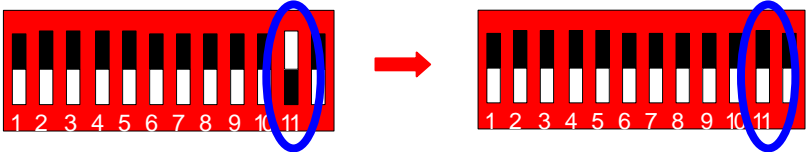


Fig. 27 DIP S/W Diagram

8. Status Check

8.1 Coverage Unit Alarm LEDs

If any Alarm LED is activated:

A red LED will indicate that the equipment is not functioning properly. Each of the LEDs represents the status of a specific section of the system as shown below

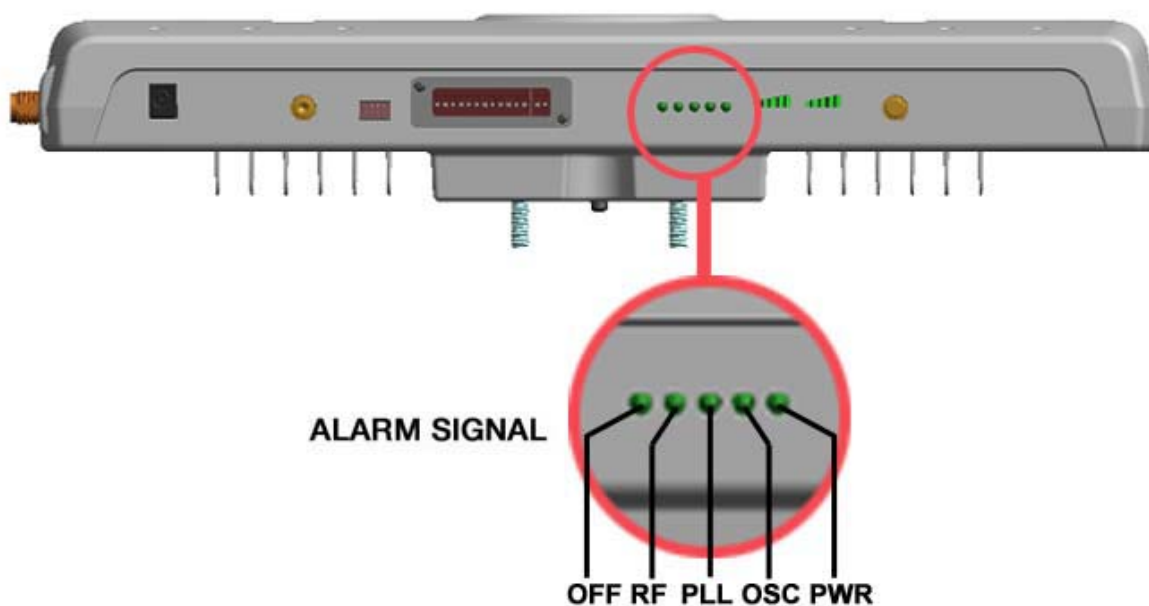


Fig. 28 Coverage Unit LED

MANUAL OFF – If the authorized installer decides to turn off the system, this LED will turn red.

RF – If the output RF power level exceeds the pre-set limit or if oscillation is present, the equipment will automatically shut down and the RF LED will turn RED.

PLL – Malfunction of the Frequency setting circuitry will cause this LED to turn RED.

OSC – Will turn RED when it detects oscillation

POWER – If the RF input level is not within the range set by the authorized installer or the system identifies a problem during operation, this LED will turn RED.

Appendix A. Product Introduction

A.1 1 Overview

The Juni JR-10 SOHO Repeater system is an RF repeater which provides coverage for indoor locations within a BTS coverage area. The repeater is intended to serve indoor locations where there is very little or no RF coverage. The system supports both US Cellular and PCS bands. Verizon Wireless-authorized installation personnel are able select to bands via the internal band selection function. The Juni JR-10 SOHO Repeater is intended for indoor environments of up to 2500 sq.ft. The system configuration includes an Antenna Unit which is typically located outside the building and a Coverage Unit which is positioned at the approximate center of the indoor space requiring better coverage. The role of the Antenna Unit is to provide the link between the repeater system and the BTS. The Coverage Unit is intended to communicate with Mobiles located indoors.

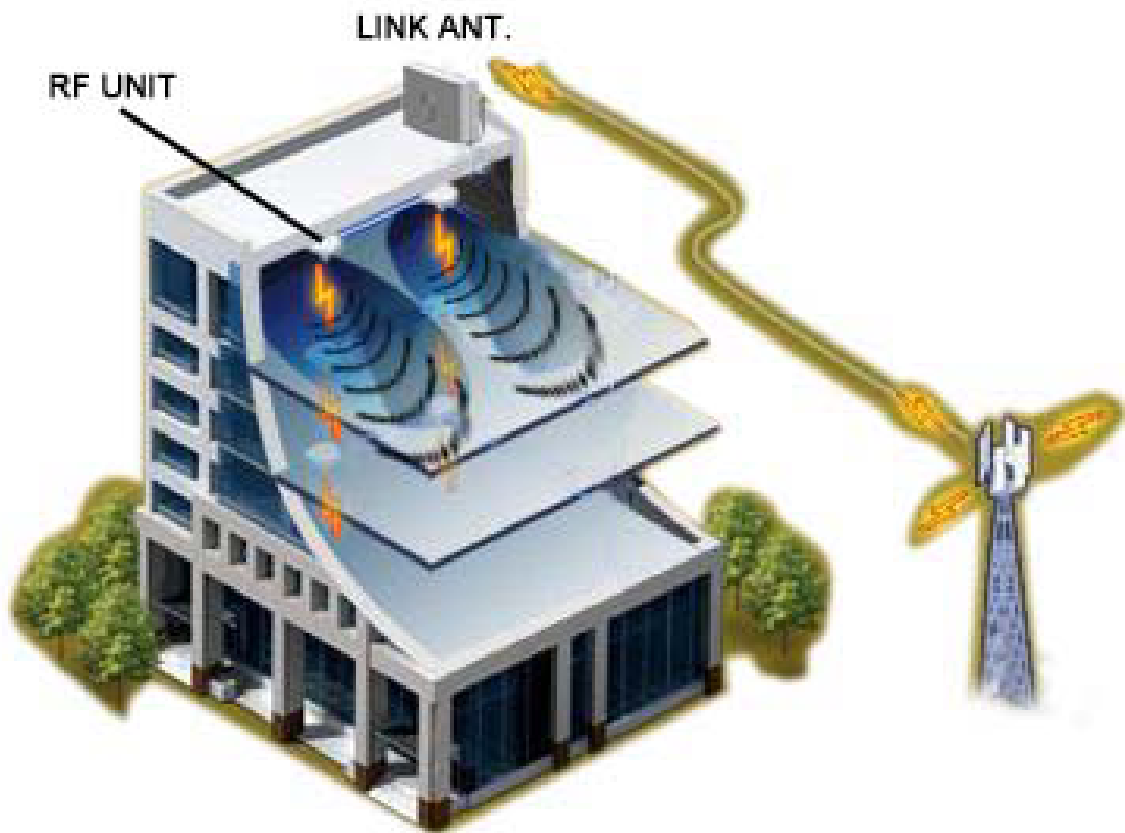


Fig. 29 System Configuration

The diagram below shows the basic system configuration. It can be seen that the RF cable connects the LINK ANT to the CU. The power cable is also connected to the CU.

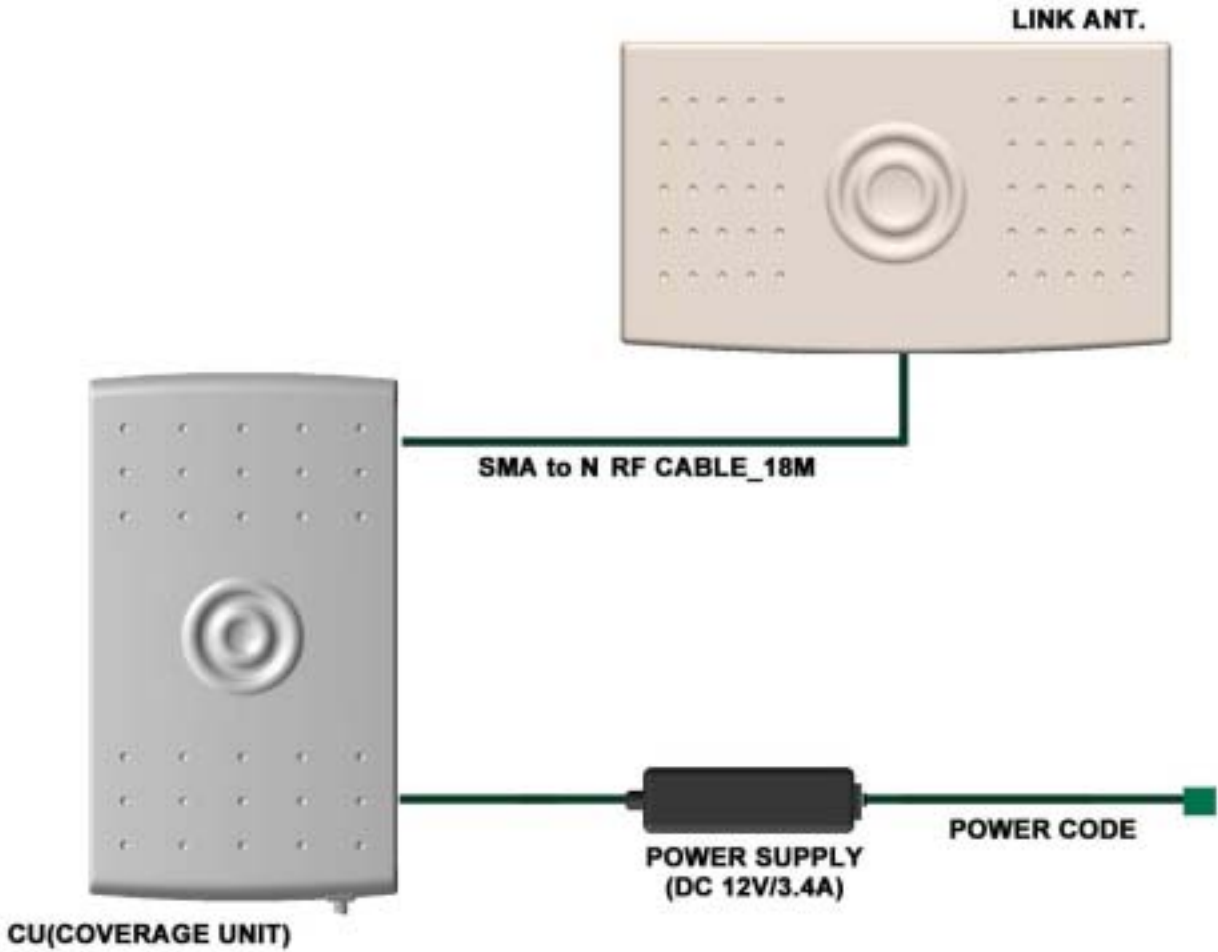


Fig. 30 Basic Connection

A.2 Requirements and limitations when installing the Repeater system

Operator : Verizon Wireless

Frequency Band in Use : CELLULAR or PCS

→ CELLULAR Frequency Range

→ Cellular Band: (B1 and B2) or (A1 and A2) depending on Verizon Wireless' Cellular Band license for the area where the repeater is to be installed.

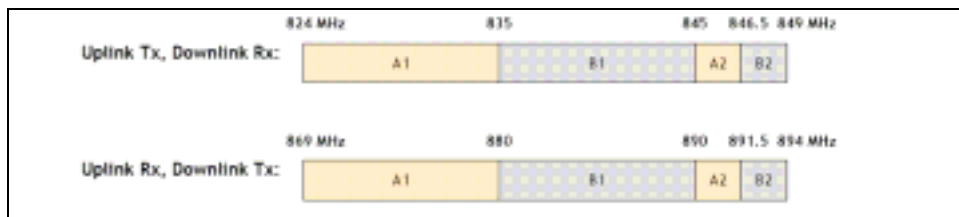


Table 2 Cellular Frequency

→ PCS Frequency Range

→ Cellular Band (1850-1990) : 1 tunable, non-contiguous PCS band of 5, 10 or 15 MHz depending on Verizon Wireless' PCS band license for the area where the repeater is to be installed.

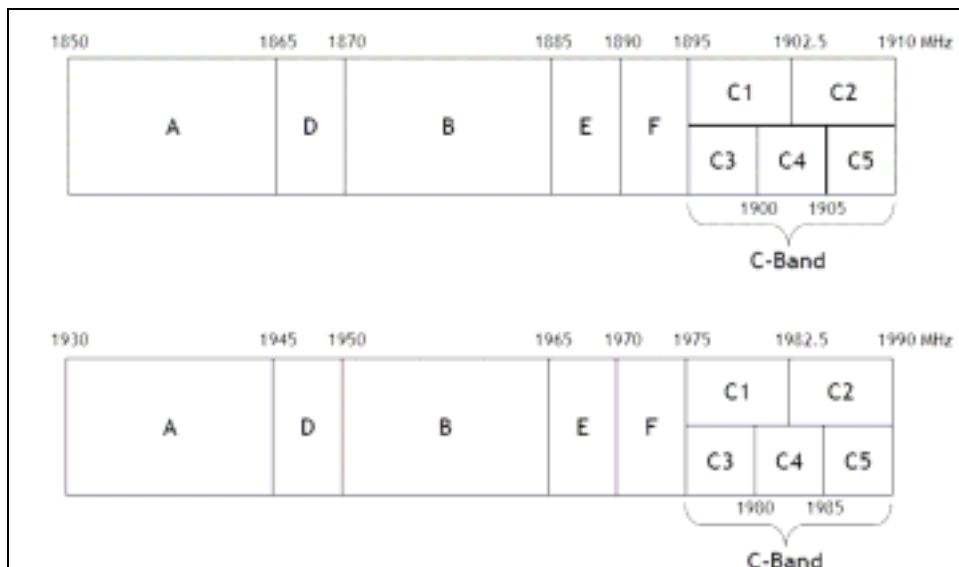


Table 3 PCS Frequency Band

Appendix B. System Specifications

Frequency Bands	PCS Uplink : 1850 – 1910MHz Downlink : 1930 – 1990MHz CELL Uplink : 824 – 849MHz Downlink : 869-894 MHz
Sub-Bands	Cell : A+A', B+B' PCS : 5 , 10 , 15 MHz
Formats Supported	IS-95 / CDMA / 1X EVDO
Typical Coverage Area	2,500 sq. ft
System Gain(Eirp)	CEL Up link : 63dB , CEL Down link : 67dB PCS Up link : 69dB , PCS Down link : 73dB
Downlink Operating Range	~ -55dBm (Receive isotropic power)
Output Level(MAX Eirp)	CEL UPLINK : +20dBm, CEL DOWNLINK : -6dBm PCS UPLINK : +17dBm, PCS DOWNLINK : +2dBm
Third Order Intercept(Eirp) - typical	CEL DL : 10dBm , CEL UL : 38dBm PCS DL : 17dBm , PCS UL : 33dBm
Power Consumption	< 40W
가	AGC FUCNTION, BRING DOWN, OVERDRIVE, OVERPOWER

Table 4 RF Specifications

	LINK ANT.	COVERAGE UNIT
OPERATING TEMPERATURE	-20 ~ 50	0 ~ 40
SIZE	389(W) X 236(H) X 58.5 (D)	360(W) X 210(H) X 60 (D)
WEIGHT	1.6Kg	1.4Kg
RF CONNECTORS	N TYPE	LINK ANT: SMA COVERAGE ANT : TNC TYPE
POWER SUPPLY	< 40W	

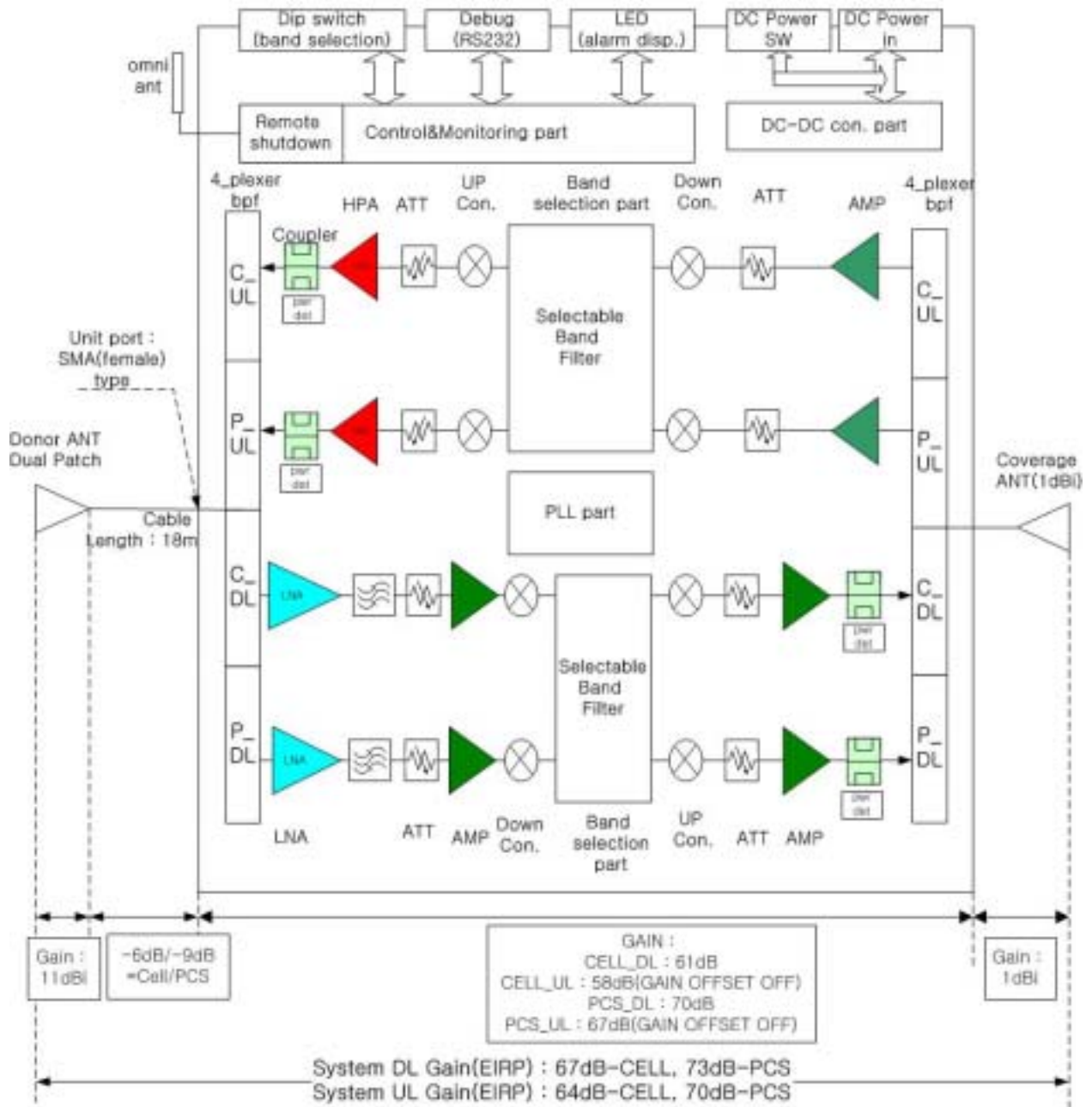
Table 5 Physical Specifications

	CELL		PCS	
	LINK ANT. ANT	CU ANT	LINK ANT. ANT	CU ANT
GAIN(dBi)	10	0	10	0
Elevation Beamwidth - typical(dg)	65°	>90°	50°	>90°
Azimuth Beamwidth - typical(dg)	40°	NA	30°	NA
Front-to-Back Ratio(dB)	> 15dB	NA	> 15dB	NA
Polarization	Vertical			

Table 6 Antenna Specifications

Appendix C. System Block

SOHO Repeater Block diagram



Appendix D. Troubleshooting for JR- 10 SOHO Repeater

Alarm	LED Color	Possible Reason	Action Required	Action
MANUAL OFF	Green -> Red	When service provider forces the System OFF	Check Alarm -> Call Juni Technical Support	Juni Technical Support
RF	Green -> Red	Shutdown by Excessive Output Power or System Oscillation	- Excessive Output Power: Automatically Recovered. Call Juni Technical Support if repeated	
PLL	Green -> Red	Repeater Failure	Check Alarm -> Power ON/OFF Call Juni Technical Support if not improved	
OSC	Green -> Red	SYSTEM SHUT DOWN DUE TO OSCILLATION	- Oscillation: Wrong Antenna Unit direction or Antenna Unit and Coverage Unit installed too close to one another - Call Juni Technical Support if not improved	
Power	Green -> Red	Input Power – Out of Range Operating Current – Out of Range	Check Alarm -> Check the AC Power Adaptor -> Call Juni Technical Support if not improved	