



Installation

Version 1.0

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1. Purpose

This document describes the installation procedure for CrossFire Nano Power Remote Units.



Fig.1 NPRU Physical Appearance

■ Warnings

- CrossFire is not a consumer product. Please install and use CrossFire in accordance with the instructions.
- Before installing or modifying any equipment of CrossFire, the entire instruction should be read and fully understood.
- Only qualified personnel are authorized to install and maintain the CrossFire system.
- Changes or Modifications not expressly approved by the manufacturer responsible for compliance could void the user's authority to operate the equipment.
- Follow Electro Static Discharge precautions to avoid any damage of PCB, PSU etc.
- Keep equipment powered-off during installing or modifying.
- Low pathloss cables connected to antennas are highly recommended.

3. Site Considerations

- The distance between the Tx/Rx antennas and the coverage should correspond to LOS (Line of Sight) requirements for maximum area.
- NPRU complies with FCC RF exposure limits for an uncontrolled environment. This equipment must be installed and operated with a minimum distance of 30 cm between the antennas and any person's body.
- The maximum length between EU-E and NPRU is 100 meters with CAT-6A STP.
- The system delay should be taken into consideration when there are neighboring BTS sites overlapping in coverage.
- Pick an ideal easy-to-reach location for installation convenience.
- Verify that there is a minimum of a 20cm radius of space around CrossFire equipment for convenience of maintenance and on-site inspection.
- Install NPRU close to the service area for monitor and debugging.

4. Environmental

Humidity and temperature have adverse effects on reliability of the CrossFire system. Therefore, it is highly recommended to install the equipment in locations with stable humidity, temperature and ventilating.

The equipment has to operate at humidity level and temperature range as follow:

Maximum humidity: 85%

Temperature range: -10 ~ 40°C








5. Preparation

5.1. Unpacking and Inspection

Unpack and inspect the packages as the following procedure:

1. Open the shipping packages carefully for each unit from the protective packing sponge.
2. Ensure that all equipment and accessories have been delivered (See Table 3-1).
3. Ensure that all equipment and accessories have no damage. If there is any damage, contact your Sunwave service agent.







Description	Quantity	
NPRU	1	
Screws M3 X 6	6	
Screws M4 X 10	4	
Flat Washer M6	2	
Spring Washer M6	2	
Screws M6 X 70	2	

Nylon cable ties	1	
Plastic Expansion Nails	2	
Screws ST6.3 X 50	2	
Mounting Bracket I	1	
Mounting Bracket II	2	
Mounting Bracket III	1	
Mounting Bracket IV	1	

 Accessories List

5.2. Tools

Electric drill, cross screw, cutter, ladder and other tools are needed for NPRU installation which are not offered from Sunwave for now. All of these tools are for customers to prepare (see table 3-2).

Description	Quantity	
Electric drill	1	
Cross screw	1	
Hammer	1	
Cutter	1	
Flexible ruler	1	
Ladder	1	
Other tools	/	

 Tool list

5.3. Antenna

According to installation site conditions and coverage requirement, determine proper antenna installation configuration including distance of Tx and Rx antennas, antennas' angle and so on.

External antennas – No limitation for available external antennas with respect to requirement as follow:

Directional or Omni Directional

Wideband antennas supporting a range of 700 MHz to 2700 MHz or any single band class between 700 MHz and 2700MHz

Gain: not exceed 4 dBi

Impedance: 50 Ohm

The isolation between Tx and Rx antennas: ≥ 45 dB

Note: NPRU is capable to support up to 4 frequency bands. Therefore, MIMO (2 antennas – one for Tx port and another one for Rx port) is highly recommended.

■ Antenna Installation Guideline

The antennas should be deployed at proper location to avoid unexpected interference and metallic obstruction.

According to coverage requirement, install the antennas at designated height and turn them at appropriate angle to service area.

The antennas connected to NPRU must be installed protection distance over 30cm for human body safety which should meet FCC standard.

5.4. Network Cable

In the CrossFire system, NPRU is synchronized and POE powered by using network cable to be connect to EU-E at 10GE port. The maximum length between EU-E and NPRU is 100 meters with CAT-6A STP. STP cables are only specified, while UTP cables may cause reduced length and performance. The distance is end to end distance and assume the leads are connected to the EU-E at one end and the NPRU at the other end. The use of patch leads, patch panels or connectors will impact on the distance.

10GBase-T is sensitively interfered by external noise. Therefore, it must be extremely cautious to handle wiring deployment and cable tension, bending radius, cable strapping and cable placing management should be under consideration before installing NPRU.

■ Cable Strapping

The tightness and density of strapping network cable have an obvious effect on cable performance. Thus the following items should be taken in consideration for cable wiring:

- Use nylon cable ties to bundle up network cables and avoid that network cables shall not be wiring as right angle.
- Bundle up network cables in a proper tightness and place the cable bunch on protect sponge.
- PSANEXT occurs in a bundle of network cables. The more quantities of cables is, the more PSANEXT arise. The quantities of cables shall not be over 12 in a bunch.
- Cables should be bent at any radius exceeding approximately four times the outside diameter of the cable without any heavy load.
- Marking each cable is a great help for wiring deployment.

6. Installation of the AU

6.1. Mount the AU in the Rack

➤ Attach AU handle

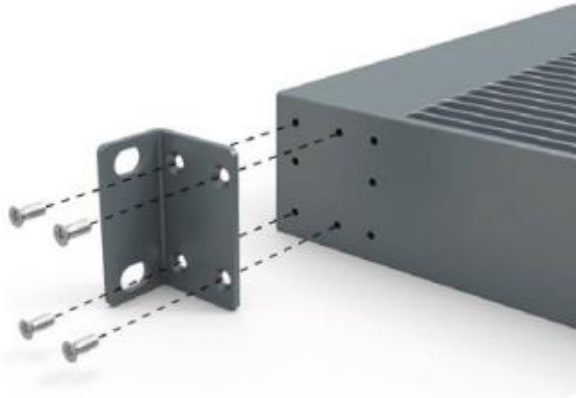


Fig.2 Attaching a 19" Mounting Bracket

1. Attach the 19" mounting brackets at the AU front, using 4 screws M3×16 per bracket and the Phillips screwdriver. Observe the orientation of the brackets (Fig.2).

➤ Attach sliding rails and AU to rack

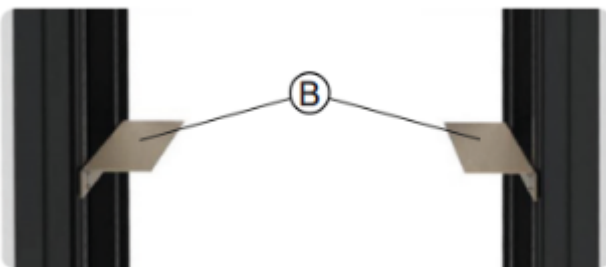


Fig.3 Attached Sliding Rails

1. Attach the sliding rails **B** to the rack (Fig.3)
Note: the sliding rails is not included in delivery.



Fig.4 Place AU in Rack

2. Place the AU in the rack (Fig.4)



Fig.5 Fix AU with Screws

3. Fix the AU using 2 screws M6×16 on both side and the Phillips screwdriver (Fig.5).

Note: For rack installation, the separation of adjacent AUs shall be over 3U (1U = 44mm) without fan or 2U with fan occupied in middle.

➤ Connect power and ground cable to AU



 Connect Power Cable at Rear Side



Fig.7 Connect Ground Cable at Rear Side

1. Connect and lock the power cable at the AU rear side (Fig.6).

2. Connect and screw the ground wire at the AU rear side (Fig.7).

➤ **Connect power and ground cable to AU**

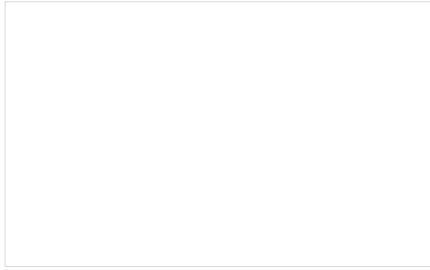


■ Connect power cable at rear side

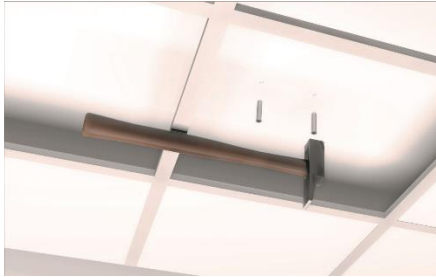
■ Connect ground cable at rear side

1. Connect and lock the power cable at the AU rear side; see Fig.11.

2. Connect and screw the ground wire at the AU rear side; see Fig.12.



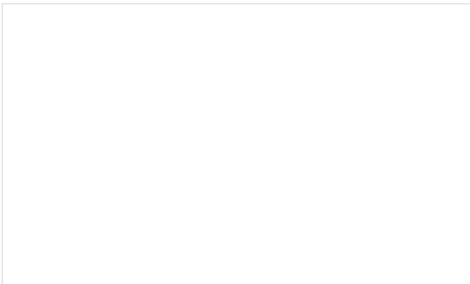
Drilling Holes Diagram 2



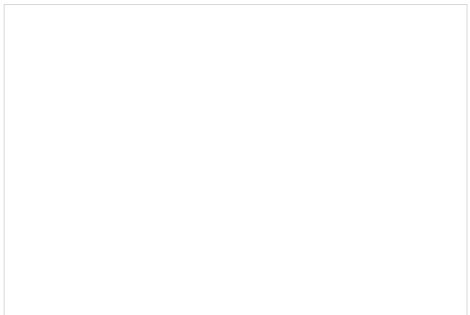
Insert Plastic Expansion Nails

3. Insert plastic expansion nails into holes by hammer

➤ **Assemble Mounting Bracket**



Assembling Bracket III Diagram 1



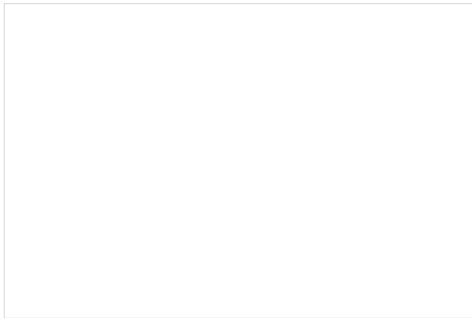
Assembling Bracket III Diagram 2

1. Assemble Mounting Bracket III to roof wall using ST6.3 X 50 screws.



Bracket VI to NPRU top panel 1

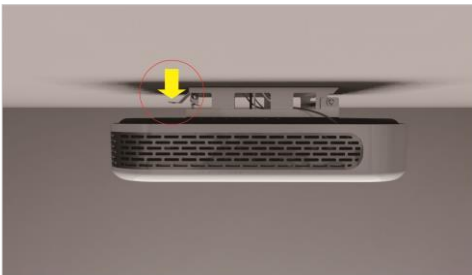
2. Assemble Mounting Bracket VI to top panel of NPRU with 4 X M4 X 10 screws.



Installation Completed Diagram

6. Buckle the rotary hook side of Mounting Bracket IV to Mounting Bracket III

➤ **Unlock Rotary Hook**



Unlock Rotary Hook Diagram 1

1. Press the button of hook at Bracket IV to expose top panel of NPRU for debugging and maintenance



Unlock Rotary Hook Diagram 2

Antennas Isolation Detector

The NPRU provides antennas isolation detector to optimize the antennas deployment to meet the signal coverage requirement.

Use the following procedures to detect antennas isolation:

1. Log into the NPRU WebOMT. See *Crossfire NP User Guide, Chapter 3.2.3* for details.
2. Go to **Maintenance > Engineering > Isolation Detector**



Engineering Info			
Engineering Info			
Beacon Info			
ALC Indicator			
Device Led Blink			
Isolation Detector			
<input type="checkbox"/>	Isolation ANT Switch	Tx1	
<input type="checkbox"/>	Detecting Frequency	100	MHz
<input type="checkbox"/>	Isolation Detector Switch	Off	
<input type="checkbox"/>	Rx1 Isolation between Tx and Rx	>50	dB
<input type="checkbox"/>	Rx2 Isolation between Tx and Rx	>50	dB

Isolation Detector

3. Select Tx option in **Isolation ANT Switch** to choose which antenna transmits RF signal.
4. Enter frequency in **Detecting Frequency** for testing frequency band.
5. Enable **Isolation Detector Switch** to start isolation test.
6. Check the **Rx1/2 Isolation between Tx and Rx** which shall over 45 dB for good performance in MIMO scenario. Otherwise change the antennas deployment – the distance of Tx/Rx and the antennas' angle – to meet the requirement.
7. Select another Tx option in **Isolation ANT Switch** and repeat step 4 to 6.