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Preinstallation

This chapter gives checklists and guidelines for preinstallation of Fiberless System hardware.

Note When updating or building facilities to accommodate Ensemble equipment, observe all building codes and regulations.

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Site Preparation

Site preparation time varies, depending on the particular site. For example, installation in a new location may require building modifications, while an existing building would not.

Licenses and Permits

Verify all licensing and permit issues. Such issues may include:

- Import/export licenses for the site country
- Radio licenses, both station license and frequency license

Other permits may also be required, depending on location. Some typical examples include:

- Landlord approval of plans for the pending construction
- Construction permits
- Electrical permits
- Zoning or use permits for the proposed facility and examination of possible impact on neighboring areas

Note When placing antennas near airports, it may be necessary to obtain authorization from the appropriate aviation authorities.

Location Guidelines

- Verify that the selected locations are accessible to installers and equipment.
- Verify that all utilities and services, including AC power, are available.
- Verify that lightning protection and grounding systems are available and comply with local building codes.
- If prime AC power needs to be installed, use a licensed electrical contractor. Verify all components are installed in accordance with local electrical codes.

Installation
Requirements

Size and access

The base station chassis mounts in a standard 19-inch (48-cm) rack or cabinet and requires 10 rack units (RUs) of space (17.5 inches (44 cm)), 24 inches (60 cm) deep. Allow adequate clearance around the base station to permit access for installation of cards, assemblies, and modules. Verify there is sufficient room to route and attach cables to the rear of the unit. The unit requires clearance of at least 30 inches (76 cm) in the front and 24 inches (60 cm) in the rear.

Floor loading

A fully equipped base station cabinet with a -48 VDC power system and batteries can weigh up to 800 pounds (360 kg). Verify the cabinet and power plant do not exceed the floor loading limits.

Temperature allowances

Verify the indoor location meets the following temperature allowances, including ventilation enough to dissipate heat loads of up to 1750 watts per fully equipped base station chassis:

Storage	-40° to 60° C (-40° to 140° F)
Operation	0° to 50° C (32° to 122° F)
Recommended	10° to 30° C (50° to 86° F)

Power Requirements

The base station requires a -48 VDC power source, which can be supplied by either a -48 VDC power distribution system or a local -48 VDC power supply. The local power source should be capable of supplying a minimum of 50 amps.

For redundancy, each base station chassis requires two power bus connections (A and B). These connections are on the backside of the chassis in the Power Distribution Frame (PDF).

Note *The 50 amp power supply requirement is based on the power required for a single chassis, fully populated, in an ATM configuration.*

Installation Tips Installers are responsible for determining the proper attachment method. The following are suggestions regarding cabinet and rack installations.

 WARNING

Do not place any equipment in the cabinet or rack without first securing it to the floor.

- For concrete floors, use threaded rods with washers and nuts or the proper length and diameter machine bolts with concrete insert anchors.
- Move the cabinet or rack into position and mark the attachment location in each corner on the floor. Move the cabinet or rack out of the way, then drill the appropriate size hole in the floor for the anchor being used.
- Install four anchors into the floor following manufacturer instructions.
- Vacuum the floor to remove all dust and debris.
- Move the cabinet or rack back into place and secure the four corners.

- ODU Guidelines**
- Verify that the mounting mast was installed according to construction drawings and local construction codes and practices. Mounting masts are typically a section of 2-inch (5 cm) to 4-inch (10 cm) pipe.
 - Verify cable route from the base station or CPE to the ODU. It can be no longer than 1,000 feet (300 meters). This may be a duct or conduit. If required, install a dedicated conduit between the ODU and base station location. A 1-inch (2.5 cm) to 2-inch (5 cm) conduit is recommended, depending on the number of ODU cables being installed.
 - Install a ground plate and lightning suppressor at the building entry point and at the ODU.
 - Prepare all mounting hardware for the base station.
 - Verify the power system and wiring for the base station, including the cabling, grounds, circuit breakers, and fuses.

- For safety and performance, mount ODUs at least seven feet (2.1 meters) above the roof so people are able to walk on the roof without interfering with the antenna's beam. Clearance should also be adequate enough to permit the following activities:
 - Antenna unit installation and maintenance
 - Antenna alignment
 - Window washing
 - HVAC maintenance
 - Maintenance of other antennas

Antenna Screening Some building owners or local regulations require that antennas be hidden from view. In such cases, consider the attenuation characteristics of the material being used to hide the antennas when calculating paths. Consider factors such as the angle of incidence between the antenna and the screening material as well as the antenna's polarization.

Roof Penetration If installation of antenna unit cables or antenna unit mountings requires penetrating a roof, engage only contractors familiar with accepted practices for ensuring weather-tight seals to make the penetrations. This issue is of particular concern when installing on buildings with a continuous roofing membrane.

Multiple Antenna Configuration

In multiple antenna configurations, each sector must be separated by a prescribed space to prevent interference from adjacent sectors. The size of this space depends primarily on the amount of interference a sector's receiver can tolerate and whether the sectors are operating synchronously or nonsynchronously.

Antenna Separation for Synchronous Transmission

For configurations using synchronous transmission (that is, each sector associated with a base station transmits at the same time and receives at the same time), multiple sectors must be separated by at least 0.5 meters (1.65 feet) vertically and horizontally (see Figure 3-1 and Figure 3-2).

Antenna Separation for Asynchronous Transmission

For configurations using asynchronous transmission (that is, some sectors may be transmitting simultaneously while others are receiving), multiple sectors must be attenuated so the receiver's SNR does not fall below the minimum level required to demodulate the signal. Based on the horizontal antenna patterns for the Andrew BCA Mark II antenna, Table 3-1 provides minimal horizontal spacing to isolate sectors that are separated by one, two, three, and four channels from each other. For distances within the near field range, the antennas act as radiating point sources

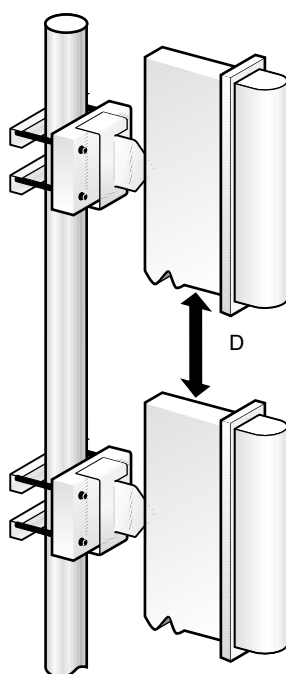
Table 3-1: Minimum Horizontal Spacing for Nonsynchronous Sectors

Antenna Beam Width in Degrees	Angular Separation in Degrees	N+1 Spacing (Meters/ Feet)	N+2 Spacing (Meters/ Feet)	N+3 Spacing (Meters/ Feet)	N+4 Spacing (Meters/ Feet)
45	0	20.33	3.57	0.36	0.36
45	45	20.33	3.57	0.36	0.36
45	90	20.33	3.57	0.36	0.36
45	180	20.33	3.57	0.36	0.36
60	0	20.33	3.57	0.36	0.36
60	60	20.33	3.57	0.36	0.36
60	90	20.33	3.57	0.36	0.36
60	120	20.33	3.57	0.36	0.36
60	180	20.33	3.57	0.36	0.36
90	0	79.80	3.57	0.36	0.36
90	45	20.33	3.57	0.36	0.36
90	60	20.33	3.57	0.36	0.36
90	90	20.33	3.57	0.36	0.36

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90	180	20.33	3.57	0.36	0.36

Figure 3-1, Figure 3-2, and Figure 3-3 show recommended spatial separation for various multiple-antenna mounting scenarios.



Assumptions:
Gain at $\pm 90^\circ$ vertical is -10 dBi
Perfect vertical alignment
Skirt from Interferer limited to -94 dBm beneath threshold of -93 dBm for QAM64.

For synchronous transmission,
 $D = 0.5$ m (1.65 ft)

Figure 3-1. Two Antennas with a Single Mounting Pole

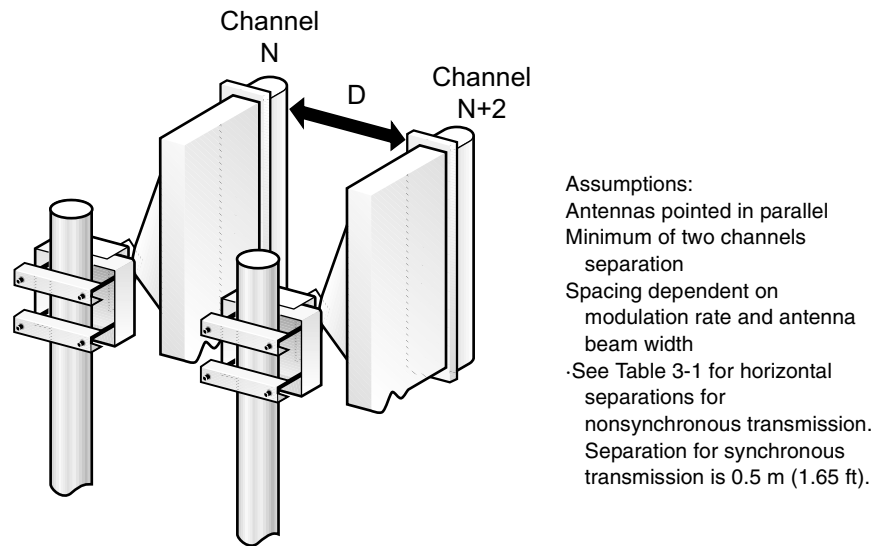


Figure 3-2. Proper Mounting of Two Antennas on Separate Poles

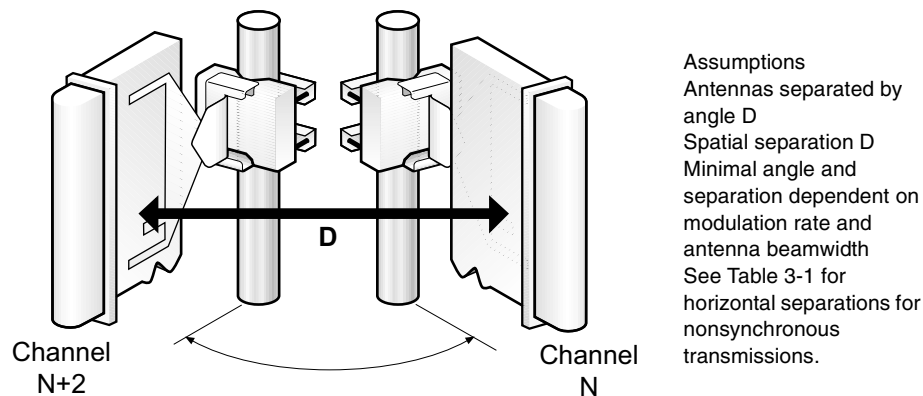


Figure 3-3. Minimum Angle Separation

Use Table 3-2 and the following figures to calculate roof-mount requirements to clear the first Fresnel zone for nearby obstructions.

Table 3-2: Minimum Roof Clearance

Frequency	D1 (meters)	Minimum R (cm)
24	1	~0
24	10	1.12
24	100	3.53
41	1	~0

Table 3-2: Minimum Roof Clearance

Frequency	D1 (meters)	Minimum R (cm)
41	10	0.85
41	100	2.70

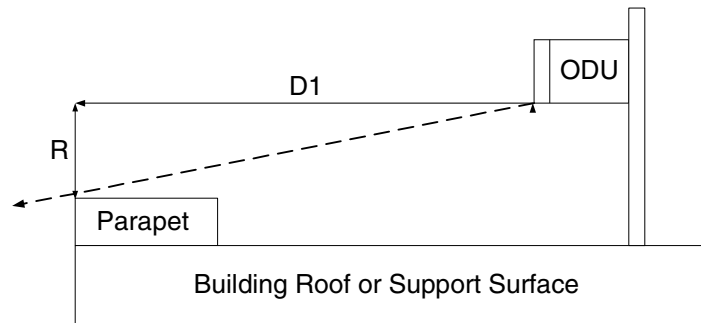


Figure 3-4. Roof-mount Clearance Requirements

Ancillary Equipment

Note Although Ensemble recommends manufacturers, the Fiberless System supports most standard-manufactured ancillary equipment.

Table 3-3: Ancillary Equipment Requirements

Equipment	Recommendation or Requirement	Manufacturer and Part Number
Required ODU cables	Standard cable – RG-6	Part No. Belden 9248
	Plenum Cable – RG-6 Not suitable for outside use	Part No. Belden 82248
Required ODU connectors	TNC crimp connector for Belden 9248 cable	Trompeter Electronics Part No. UPL 240-020
	TNC crimp connector for Belden 82248 cable	Trompeter Electronics Part No. 105-1457-10
Connector crimp tools	TNC crimp tool	Trompeter Electronics Part No. CT4L
	TNC crimp tool die	Trompeter Electronics Part No. CD3-3
	8 point center pin tool	Trompeter Electronics Part No. 010-0055
Lightning suppressors	Suppressor Kit – Outdoor Unit	PolyPhaser Part No. 097-0619T-B.3
	Suppressor – Indoor Unit	PolyPhaser Part No. 097-0619T-B.4
	Mounting Plate (12 indoor units)	PolyPhaser Part No. 100-0501S-A
Base station power supply– 48 VDC 50 Amps (depending on configuration)	Telephony-type modular power systems	Power Conversion Products Twin-pack Plus series
CPE power – 120 VAC	Protection: small UPS (Uninterruptible Power System)	APC
Racks	19-inch or 23-inch.	Any manufacturer
Base station routers	DS-3 ATM interface and fast Ethernet card	Cisco 7200 series
CPE routers	v.35 interface	Cisco 1601R
	Dual 10BaseT ports	Cisco 1605R
Tower mounts	2-4-inch pipe Wall mount available	Microflect; Andrews, Tower Structures