Installation Instruction

The Remote Unit, Extension Unit or Master Unit must be mounted by proffessionel / special trained installer.

1.1. MECHANICAL INSTALLATION

1.1.1. Health and Safety for Mechanical Installation

Read and observe chapter *1.3 Health and Safety*.

General Mounting Cautions

The following cautions apply to all CAP MX installations; there may be other mounting cautions applicable to a specific mounting option, which will be defined in the applicable mounting procedure.

Attach all CAP MXs securely to a stationary object as described in this installation guide.

To maintain proper ventilation, keep at least 76 mm (3-inch) clearance around the CAP MX.

The installation site must be able to bear the weight of the CAP MX; see Table 9 on page 24.

Risk of injury by the weight of the unit falling. Ensure there is adequate manpower to handle the weight of the system.

The CAP MX must be mounted using the appropriate fastening system for the planned substrate and application location and be implemented according to all local codes and rules. The chosen fastening system must be corrosion resistant. The fastening system and substrate must provide maximal strength and provide resistance to failure due to tension, pull out/thru or shear. Substrate and total performance of the selected fastening system must provide no less than 5300 N (1200 lbs) resistance to tensile, pull out and shear forces.

Examples of fasteners for common substrates include the following:
Structural Wood - Lag Bolts (blind) / Machine Bolts, Nuts and Washers (thru)
Brick or Concrete - Masonry Screw Anchors / Lag Shield Anchors and Lag Bolts
Structural Steel - Machine Screws (blind threaded) / Machine Bolts, Nuts and Washers (thru)

Risk of serious personal injury by equipment falling due to improper installation. Installers must verify that the supporting surface will safely support the combined load of the electronic equipment and all attached hardware and components. For wall mounts, the screws and dowels (wall anchors) used should also be appropriate for the structure of the supporting wall.

If any different or additional mounting material is used, ensure that the mounting remains as safe as the mounting designed by the manufacturer. The specifications for stationary use of the CAP MX must not be exceeded. Ensure that the static and dynamic strengths are adequate for the environmental conditions of the site. The mounting itself must not vibrate, swing or move in any way that might cause damage to the CAP MX.

Mounting Orientation

CAP MXs are passively cooled and must therefore always be mounted with its ANT port pointing down, as shown in Figure 15.

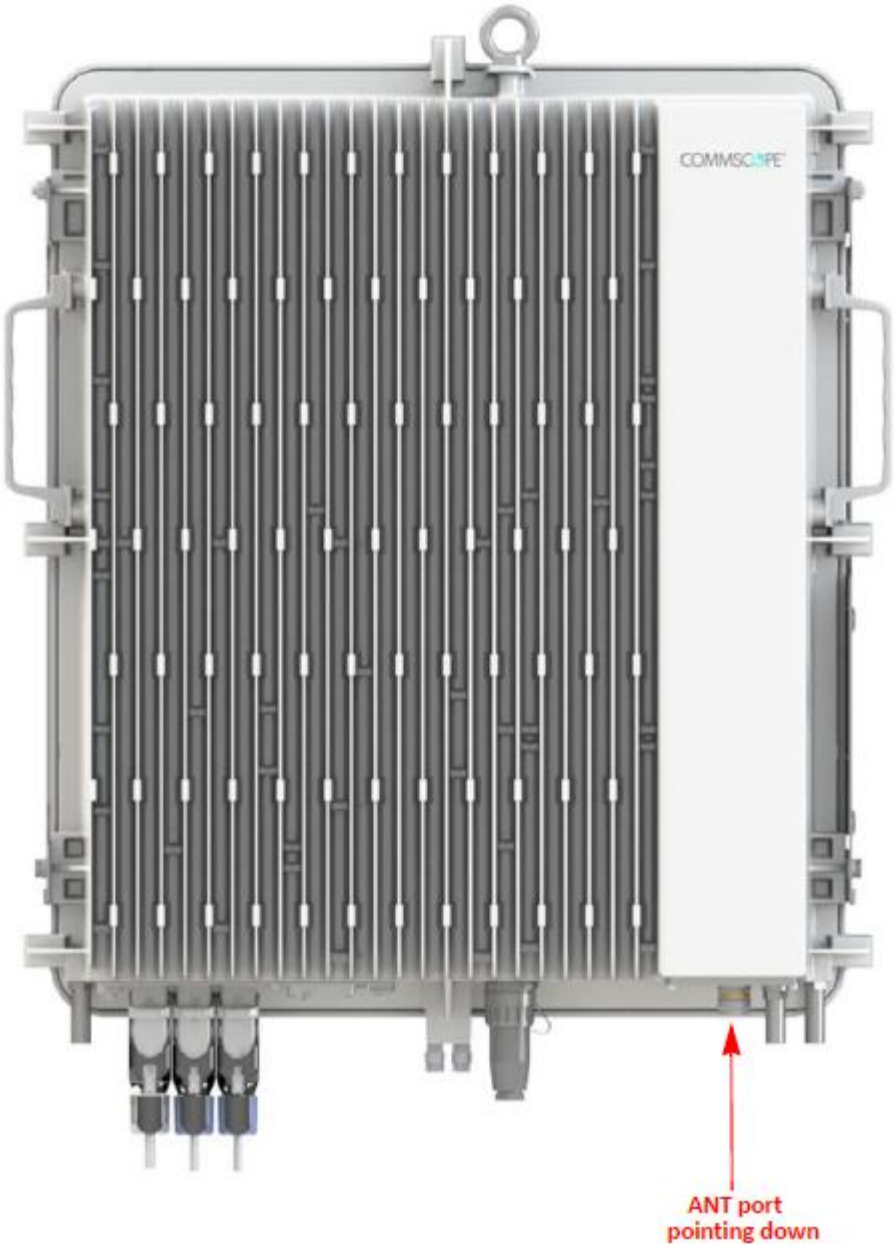

Figure 15. Mounting Orientation for a CAP MX

1.2. ELECTRICAL INSTALLATION

1.2.1. Health and Safety for Electrical Installation

Read and observe chapter *1.3 Health and Safety*.

General Installation Safety Requirements

Wet conditions increase the potential for receiving an electrical shock when installing or using electrically powered equipment. To prevent electrical shock, never install or use electrical equipment in a wet location or during a lightning storm.

This system is a RF Transmitter and continuously emits RF energy. Maintain a minimum 8-inch (20 cm) clearance from the antenna while the system is operating. Whenever possible, shut down the RAN before servicing the antenna.

Do not remove caps from any of the connectors until instructed to do so.

The CAP MX is to be used only with CommScope (NEC Class 2) or Limited Power Source Era Subrack, or equivalent.

Read and observe all the warning labels attached to the unit. Make sure that all warning labels are kept in a legible condition. Replace any missing or damaged labels.

Guard Against Damage from Electro-Static Discharge

Electro-Static Discharge (ESD) can damage electronic components. To prevent ESD damage, always wear an ESD wrist strap when working with Era hardware components. Not all Era hardware requires grounding. For those hardware components for which grounding is required, connect the ground wire on the ESD wrist strap to an earth ground source before touching the component. Wear the wrist strap the entire time that you work with the hardware.

Power the CAP MX

The CAP MX is powered on as soon as power is connected to it. The CAP MX must therefore be grounded before you connect any electrical power to it. If you have not completed the steps in "Grounding the CAP MX" on page 52, stop and do so before proceeding.

CAP MX APs require a minimum 120 Volt / 15 Amp or 240 Volt / 13 Amp, single-phase, 50 / 60 Hz AC service. MAINS power must be interruptible with an external delay-actions mains breaker. CommScope recommends external AC breakers capable of at least 15 Amps maximum for 120-Volt service or at least 13 Amps for 240-Volt service. One type B breaker can support up to two CAP MX units, and a type C breaker can support up to four CAP MX units.

For the AC power supply connection, a minimum cross section of 1.5 mm2 is required and for the DC power supply connection, a minimum cross section of 2.5 mm2 is required. Each wire must observe the applicable local regulations regarding loop impedance, voltage drop, and methods of installation. Make sure to connect the correct voltage to the CAP MX.

For the CAP MX to operate, the Mains power must be connected to the CAP MX Mains connector. Either an AC or a DC power cable is delivered with each CAP MX—the type of power cable delivered is dependent on the type of power supply in the CAP MX.

1.3. HEALTH AND SAFETY

Health and Safety Precautions

A high leakage current ground (earth) connection to the Power Supply Unit (PSU) is essential before making any other connections to the PSU.

Laser radiation. Risk of eye injury in operation. Do not stare into the laser beam; do not view the laser beam directly or with optical instruments.

High frequency radiation in operation. Risk of health hazards associated with radiation from the antenna(s) connected to the unit. Implement prevention measures to avoid the possibility of close proximity to the antenna(s) while in operation.

RF Safety Cautions

This system is a RF Transmitter and continuously emits RF energy. Maintain a minimum clearance from the antenna as specified in Table 5 on page 19 while the system is operating. Whenever possible, power down the
CAP MX before servicing the antenna.

Only license holders for the respective frequency range are allowed to operate this unit.

Property Damage Warnings

Keep operating instructions within easy reach and make them available to all users.

Only license holders for the respective frequency range are allowed to operate this unit.

Read and obey all the warning labels attached to the unit. Make sure that all warning labels are kept in a legible condition. Replace any missing or damaged labels.

Make sure the unit's settings are correct for the intended use (refer to the manufacturer product information) and regulatory requirements are met. Do not carry out any modifications or fit any spare parts, which are not sold or recommended by the manufacturer.

Due to power dissipation, the CAP MX may reach a very high temperature. Do not operate this equipment on or close to flammable materials. Use caution when servicing the CAP MX.

Only authorized and trained personnel are allowed to open the unit and get access to the inside.

Only suitably qualified personnel are allowed to work on this unit and only after becoming familiar with all safety notices, installation, operation and maintenance procedures contained in this installation guide.

Although the unit is internally protected against overvoltage, it is strongly recommended to ground (earth) the antenna cables close to the antenna connectors of the unit for protection against atmospheric discharge. In areas with strong lightning, it is strongly recommended to install additional lightning protection.

Compliance

1 **Notice:** For installations, which have to comply with FCC RF exposure requirements, the antenna selection and installation must be completed in a way to ensure compliance with those FCC requirements. Depending on the RF frequency, rated output power, antenna gain, and the loss between the repeater and antenna, the minimum distance D to be maintained between the antenna location and human beings is calculated according to this formula:

$$D_{[cm]} = \sqrt{\frac{P_{[mW]}}{4 * \pi * PD_{[mW/cm^2]}}}$$

where

- P (mW) is the radiated power at the antenna, i.e. the max. rated repeater output power in addition to the antenna gain minus the loss between the repeater and the antenna.
- PD (mW/cm^2) is the allowed Power Density limit acc. to 47 CFR 1.1310 (B) for general population / uncontrolled exposures which is
  - f (MHz) / 1500 for frequencies from 300MHz to 1500MHz
  - 1 for frequencies from 1500MHz to 100,000MHz

RF exposure compliance may need to be addressed at the time of licensing, as required by the responsible FCC Bureau(s), including antenna co-location requirements of 1.1307(b)(3).

2 **Notice:** For installations which have to comply with European EN50385 exposure compliance requirements, the following Power Density limits/guidelines (mW/cm^2) according to ICNIRP are valid:

- 0.2 for frequencies from 10 MHz to 400 MHz
- F (MHz) / 2000 for frequencies from 400 MHz to 2 GHz
- 1 for frequencies from 2 GHz to 300 GHz

3 **Notice:** Installation of this equipment is in full responsibility of the installer, who has also the responsibility, that cables and couplers are calculated into the maximum gain of the antennas, so that this value, which is filed in the FCC Grant and can be requested from the FCC data base, is not exceeded. The industrial boosters are shipped only as a naked booster without any installation devices or antennas as it needs for professional installation.

4 **Notice:** For installations which have to comply with FCC/ISED requirements:

English:

This device complies with FCC Part 15. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

This device complies with Health Canada's Safety Code. The installer of this device should ensure that RF radiation is not emitted in excess of the Health Canada's requirement. Information can be obtained at http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct-eng.php.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

1 This device may not cause interference.

2 This device must accept any interference, including interference that may cause undesired operation of the device.

Antenna Stmt for ISED:

This device has been designed to operate with antennas that are selected for the location-specific use. The required antenna impedance is 50 ohms. The maximum Antenna Gain is specified in Table 5 on page 19. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least the minimum distance calculated in Table 5 from all persons and must not be co-located or operating in conjunction with any other antennas or transmitters. Users and Installers must be provided with antenna installation instructions and transmitter operating conditions to ensure RF exposure compliance.

French:

Cet appareil est conforme avec Santé Canada Code de sécurité 6. Le programme d'installation de cet appareil doit s'assurer que les rayonnements RF n'est pas émis au-delà de l'exigence de Santé Canada. Les informations peuvent être obtenues:
http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct-eng.php

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1 L'appareil ne doit pas produire de brouillage;

2 L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Antenne Stmt pour ISDE:

Cet appareil a été conçu pour fonctionner avec des antennes sélectionnées pour une utilisation spécifique à l'emplacement. L'impédance d'antenne requise est de 50 ohms. Le gain d'antenne maximum est spécifié dans le tableau 5. La ou les antennes utilisées pour cet émetteur doivent être installées de manière à fournir une distance de séparation d'au moins la distance minimale calculée dans le tableau 5 de toutes les personnes et ne doivent pas être colocalisées ou fonctionner dans en conjonction avec toute autre antenne ou émetteur. Les utilisateurs et les installateurs doivent recevoir les instructions d'installation de l'antenne et les conditions de fonctionnement de l'émetteur pour garantir la conformité à l'exposition RF.

5 **Notice:** The unit complies with Overvoltage Category II. It also complies with the surge requirement according to EN 61000-4-5 (fine protection); however, installation of an additional medium (via local supply connection) and/or coarse protection (external surge protection) is recommended depending on the individual application in order to avoid damage caused by overcurrent.

For Canada and US, components used to reduce the Overvoltage Category shall comply with the requirements of IEC 61643-series. As an alternative, components used to reduce the Overvoltage Category may comply with ANSI/IEEE C62.11, CSA Certification Notice No. 516, CSA C22.2 No. 1, or UL 1449. Suitability of the component for the application shall be determined for the intended installation.

6 **Notice:** Corresponding local particularities and regulations must be observed. For national deviations, please refer to the respective documents, which are available from CommScope.

7 **Note:** For a Class B digital device or peripheral:

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 the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a 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 try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

8 **Notice:** For a Class A digital device or peripheral.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

9 **Note:** This unit complies with European standard EN60950-1 / EN62368-1.

Equipment Symbols Used / Compliance

Please observe the meanings of the following symbols used in our equipment and the compliance warnings listed in Table 4.

Table 4. *Compliance Labels*

Symbol	Compliance	Meaning
—	FCC	For industrial (Part 20) signal booster: WARNING: This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.
		For (Part 90) signal booster: WARNING: This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at www.fcc.gov/signal-boosters/registration. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.

Table 4. Compliance Labels

Symbol	Compliance	Meaning
—	ISED	WARNING: This is NOT a CONSUMER device. It is designed for installation by an installer approved by an ISED licensee. You MUST have an ISED LICENCE or the express consent of an ISED licensee to operate this device. AVERTISSEMENT: Ce produit N'EST PAS un appareil de CONSOMMATION. Il est conçu pour être installé par un installateur approuvé par un titulaire de licence d'ISDE. Pour utiliser cet appareil, vous DEVEZ détenir une LICENCE d'ISDE ou avoir obtenu le consentement exprès d'un titulaire de licence autorisé par ISDE.
CE	CE	To be sold exclusively to mobile operators or authorized installers - no harmonized frequency bands, operation requires license. Intended use: EU and EFTA countries.
		Indicates conformity with the RED directive 2014/53/EU and/or RoHS directive 2011/65/EU.
CE 0700	CE	Indicates conformity with the RED directive 2014/53/EU and RoHS directive 2011/65/EU certified by the notified body no. 0700.

Required Antenna Distances

Table 5. Required Antenna Distances

Model	Antenna gain without cable loss [dBi]	Minimum Distance DL			
		FCC		ISED	
		m	inches	m	inches
CAP MX	9	0.938	36.93	1.319	51.93

Maximum Output Power Levels

Table 6 lists the frequencies and maximum output power for bands supported in the CAP MX variants.

Table 6. Maximum Power Output by Frequency

Band	DL Frequency Range	Frequency	Power Output [dBm]
6	617-652 MHz	617	29
7E	728-746 MHz	728	29
	746-756 MHz	746	
	758-768 MHz	758	
80	862-869 MHz	862	29
85	869-894 MHz	869	
17E	2110-2180 MHz	2110	33
	2180-2200 MHz	2180	
19	1930-1995 MHz	1930	33
	1995-2020 MHz	1995	
23	2350-2360 MHz	2350	30
25TDD	2496-2690 MHz	2496	32

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT RECYCLING

Country specific information about collection and recycling arrangements per the Waste Electrical and Electronic Equipment (WEEE) Directive and implementing regulations is available on CommScope's website.

To access information on the CommScope recycling program, do any of the following:

- Scan the QR Code to the right.
- If viewing this document online as a PDF, click on the following URL link:

  http://www.commscope.com/corporate-responsibility-and-sustainability/environment/weee-customer-recycling/
- Enter the preceding URL into your web browser, and then press **ENTER** on your keyboard.