Alcatel-Lucent 9764

Compact Metro Cell Outdoor B41 2x6W

Hardware Installation
3MN-02026-0002-RJZZA
Issue 0.01 | April 2015

Alcatel·Lucent

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About this document

Purpose

This document provides hardware installation instructions for an Alcatel-Lucent 9764 CMCO B41 2X6W

Procedures are provided for MCO handling, mounting, grounding, powering, and cabling.

What's new

The major changes introduced in this issue of the document are described in the following paragraphs.

Document changes from the previous software release

Location	Reissue	Issue
entire document	Created the first draft	issue 0.01, April 2015

Safety information

For your safety, this document contains safety statements. Safety statements are given at points where risks of damage to personnel, equipment, and operation may exist. Failure to follow the directions in a safety statement may result in serious consequences.

Intended audience

This document is intended for customers installing an Alcatel-Lucent 9764 Compact Metro Cell Outdoor product(MCO) B41 2X6W .

Supported systems

This document assumes that a continuous stream of connected devices already delivers secure connectivity to the public network from one or more reachable places in the venue. With this assumption, the scope of the document is only the 9764 Compact Metro Cell Outdoor product B41 2X6W and what is required to connect it to the network, meet its power needs, and ensure that it can be placed into reliable service.

Safety labels

The safety alert symbol is used on product labels and in this document to alert the user to important safety instructions.

How to use this document

Start with the first chapter and work through the manual to the end. Once you have done this, you will have carried out the hardware installation completely and in the proper sequence.

Prior to installing the MCO, the installer should be familiar with the safety precautions, warnings, and product conformance statements. Required tools and materials recommended for installation, and a process checklist, are listed in Chapter "Pre-installation information" .

Conventions used

In this document, all parts are described as they are shipped. Metric parts are specified in metric units. Non-metric parts are specified in non-metric units.

Lengths and other measurements are given in metric units, with non-metric units given as equivalents for use in non-metric markets.

For manufactured parts, the following system of conventions is used:

- Metric sizes of nuts, bolts, flat washers, and lock washers are identified by an uppercase letter M followed immediately by a size in millimeters (example: M10)

- American fractional sizes of nuts, bolts, anchor bolts, and washers are identified by a number followed immediately by a double apostrophe (example: 3/8"). In the case of lengths measured in feet, "2 feet" is used rather than "2'" so that the single apostrophe is not overlooked.

The illustrations in this document do not contain all details and exceptions, but are rather intended to highlight main points. Dimensions are usually shown in millimeters, with inches in parenthesis. As an example, 680.0 (26.77) equals 680 millimeters or 26.77 inches.

Wire gauges are specified in metric units. Equivalent sizes in the American Wire Gauge (AWG) system are given in the following table.

Standard cross-sections and wire diameter of round copper conductors

The following table is from CEI/IEC 60947-1:2004, *Table 1, Standard cross-sections of round copper conductors and approximate relationship between mm^2 and AWG/kcmil sizes* for reference. Additional wire sizes are included in this document as appropriate for the topic.

ISO rated cross-sectional area (mm^2)	AWG/kcmil size
0.2	24
0.34	22
0.5	20
0.75	18
1	-
1.5	16
2.5	14
4	12
6	10
10	8
16	6
25	4
35	2
-	1
50	0 (1/0)
70	00 (2/0)
95	000 (3/0)
-	0000 (4/0)
120	250 kcmil
150	300 kcmil
185	350 kcmil
-	400 kcmil
240	500 kcmil
300	600 kcmil

NOTE: The dash, when it appears, counts as a size when considering connecting capacity (see 7.1.7.2 in the standard).

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Typographical conventions

The typographical conventions used in this document are described in the following table.

Appearance	Description
emphasis	Text that is emphasized
document titles	Titles of books or other documents
graphical user interface text	Text that is displayed in a graphical user interface
`variables`	A value or command-line parameter that the user provides

Systems supported

This document applies to the Alcatel-Lucent 9764 CMCO B41 2X6W.

Related documentation

For information on subjects related to the content of this document, refer to the following documents listed

Alcatel-Lucent documents

The following documents may provide additional useful information:

- *Alcatel-Lucent 9764 CMCO B41 2X6W Site Preparation,* 3MN-02026-0001-RJZZA
- *Alcatel-Lucent 9764 CMCO B41 2X6W Maintenance and Troubleshooting,* 9YZ-06340-0315-REZZA
- *Alcatel-Lucent 9764 CMCO B41 2X6W Maintenance and Troubleshooting,* 9YZ-06340-0314-DEZZA

Other documents

- Standard for Installation of Lightning Protection Systems, NFPA
- Recommended Practices on Surge Voltages in Low Voltage AC Power Circuits, IEEE C62.41 (Latest Edition)
- GR-487-CORE, Telcordia.

Related training

Safety training in the following areas is required for personnel installing Alcatel-Lucent products and associated equipment:

- Hazard Communication
- Lift Safety
- Hoist Safety

- Lock Out/Tag Out
- Accident/Incident Reporting.

Other related training is for:

- Integration into the cell site
- Operation, Administration, and Maintenance (OA&M)

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PRELIMINARY

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1 Safety

Overview

Purpose

This chapter covers safety precautions.

Contents

Structure of safety statements

Overview

This topic describes the components of safety statements that appear in this document.

General structure

Safety statements include the following structural elements:
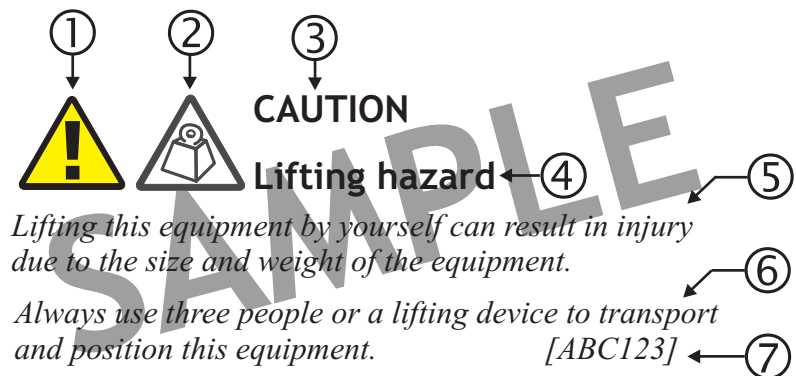
Item	Structure element	Purpose
1	Safety alert symbol	Indicates the potential for personal injury (optional)
2	Safety symbol	Indicates hazard type (optional)
3	Signal word	Indicates the severity of the hazard
4	Hazard type	Describes the source of the risk of damage or injury
5	Safety message	Consequences if protective measures fail
6	Avoidance message	Protective measures to take to avoid the hazard
7	Identifier	The reference ID of the safety statement (optional)

Signal words

The signal words identify the hazard severity levels as follows:

Signal word	Meaning
DANGER	Indicates an extremely hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a hazardous situation not related to personal injury.

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Safety

General precautions for installation procedures

⚠️ **WARNING**

Failure to observe these safety precautions may result in personal injury or damage to equipment.

- *Read and understand all instructions.*

- *Follow all warnings and instructions marked on this product.*

- *Installation and maintenance procedures must be followed and performed by trained personnel only.*

- *The equipment must be provided with a readily accessible disconnect device as part of site preparation.*

- *Grounding and circuit continuity is vital for safe operation of the equipment. Never operate the equipment with grounding/bonding conductor disconnected.*

- *Install only equipment identified in the product's installation manual. Use of other equipment may result in an improper connection which could lead to fire or injury.*

- *Use caution when installing or modifying telecommunications lines.*

- *The product has multiple power inputs. Before servicing, Disconnect all inputs to reduce the risk of energy hazards.*

- *For continued protection against risk of fire, all fuses used in this product must be replaced only with fuses of the same type and rating.*

- *Never install telecommunications wiring during a lightning storm.*

- *Never install telecommunications connections in wet locations.*

- *Never touch uninsulated wiring or terminals carrying direct current or ringing current, and never leave this wiring exposed. Protect and tape uninsulated wiring and terminals to avoid risk of fire, electrical shock, and injury to personnel.*

- *Never spill liquids of any kind on the product.*

- *To reduce the risk of an electrical shock, do not disassemble the product. Opening and removing covers and/or circuit boards may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.*

Safety - specific hazards

⚠️⚡ **DANGER**

Electric-shock hazard

Working in severe weather can result in personal injury or death and damage to the equipment.

Never install or perform maintenance during severe weather (high winds, lightning, blizzards, hurricane etc.).

⚠️✖️ **DANGER**

Noxious-substance hazard

Use of unspecified cleaning agents can result in personal injury.

Use only specified cleaning agents. Never use flammable solvents.

Always ensure there is adequate ventilation in the work area and wear the appropriate personal protective equipment.

⚠️⚡ **WARNING**

Electric-shock hazard

Some parts of all electrical installations are energized. Failure to observe this fact and the safety warnings may lead to bodily injury and property damage.

For this reason, only trained and qualified personnel (electrical workers as defined in IEC 60215 + A1 or EN 60215) may install or service the installation.

⚠️⚡ **WARNING**

Electric-shock hazard

The power supply lines to the network element are energized. Contact with parts carrying voltage can cause health problems, possibly including death, even hours after the event.

Open and lockout the load disconnect switch in the distribution box to completely de-energize the network element.

WARNING
Electric-shock hazard

This product may be connected to an AC main power supply and may contain an internal battery supply. Disconnecting one power source may not de-energize the system, and can lead to serious injury.

Disconnect and lock out the AC main power supply, if present, and the internal battery supply, if present, before servicing the equipment.

WARNING
Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof, etc.) follow safe work practices and wear appropriate fall protection equipment.

CAUTION
RF hazard

RF exposure in excess of applicable limits can result adverse health effects.

Metro Cells are designed and installed in order to comply with the international exposure guidelines laid down by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and/or the Institute of Electrical & Electronics Engineers (IEEE) C95.1. ICNIRP guidelines have been implemented by the European Commission and a number of other countries. IEEE guidelines have been implemented in North America and some other countries.

Workers that are required to work in close proximity to the equipment, for example maintenance personnel, should strictly follow instructions provided by their employer.

Workers equipped with personal medical electronic devices, such as pacemakers and hearing aids, shall consult the manufacturer's instructions and consult their occupational health practitioner.

NOTICE

ESD hazard

Semiconductor devices can be damaged by electrostatic discharges.

The following rules must be complied with when handling any module containing semiconductor components:

- *Wear conductive or antistatic working clothes (for example, coat made of 100% cotton).*
- *Wear the grounded wrist strap.*
- *Wear shoes with conductive soles on a conductive floor surface or conductive work mat.*
- *Leave the modules in their original packaging until ready for use.*
- *Make sure there is no difference in potential between yourself, the workplace, and the packaging before removing, unpacking, or packing a module.*
- *Hold the module only by the grip without touching the connection pins, tracks, or components.*
- *Test or handle the module only with grounded tools on grounded equipment.*
- *Handle defective modules exactly like new ones to avoid causing further damage.*

NOTICE

Condensation

Sudden changes in the weather may lead to the formation of condensation on components. Operating the unit when condensation moisture is present can destroy the unit.

Units which show signs of condensation must be dried before installation.

CAUTION

Laceration hazard

The RRH may have sharp edges and burrs and contact may cause cuts and lacerations.

Wear appropriate personal protective equipment.

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Tools

Tools left in the working area can cause short circuits during operation which can lead to the destruction of units.

Make sure after finishing your work that no tools, testing equipment, flashlights, etc., have been left in or on the equipment.

NOTICE

Inadequate circulation

Inadequate circulation of cooling air can cause some units to become too warm. This can lead to operational impairment.

Cover all installation slots for unequipped units with blanking panels.

CAUTION
Hot-surface hazard

The surfaces of the MRO can become hot enough to cause burns on unprotected skin. On the product label, the universal symbol for Hot Surface *(shown here) emphasizes this hazard.*

Before handling the unit, wait until its surfaces have cooled and, where the following conditions apply, ensure that it is mounted out of the public's reach.

The 9768 MRO B38 shall operate normally with an ambient air temperature as low as -40ºC and as high as 55ºC under a solar load of up to 1120 mW/m2.

NOTICE
Corrosive-substance hazard

Cleaning plastic containers and lids with abrasive and aggressive cleaning agents may cause permanent damage.

Do not use solvents, paraffin, abrasive or aggressive cleaning fluids, abrasive or aggressive antiseptic agents or abrasive or aggressive materials.

⚠ **NOTICE**

Service-disruption hazard

Cleaning with water or a high-pressure cleaner may damage the components in the RRH.

The washing down of the equipment with water or a high-pressure cleaner is not permitted.

Product safety

Equipment safety

Safety information for this equipment can be found on various Caution, Warning, Danger, information labels or instructions affixed to or included with the product or included within this document. Informational and cautionary labels may appear near the item they address or may be grouped in a single location on the equipment. Warnings are typically adjacent to the hazard that is noted on the label. The instructions, cautions and warnings found on these labels must be understood and observed by all personnel involved with the equipment installation and maintenance.

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2   Product overview

Overview

Purpose

This chapter provides an overview of the Alcatel-Lucent 9764 Compact Metro Cell Outdoor hardware and product functionality.

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Functional description

General description

As a key component of high capacity networks, Alcatel-Lucent Metro Cells fill coverage gaps between macro cells and provide indoor (and outdoor) coverage from indoor or outdoor locations, enabling mobile network operators (MNOs) to deliver cost-effective capacity to urban spots, as well as affordable coverage to suburban and rural locations. Their essential usage is to deliver significantly higher capacity in places that need it, contributing to enhancement of the quality of experience (QoE) for end users. It can also complement or improve significantly the LTE macro layer coverage.

Alcatel-Lucent Metro Cells when used as components of heterogeneous networks (HetNets), are compatible with both Alcatel-Lucent macro cells and 3rd party vendor macro cells and integrate easily into any LTE network, without impacting the current RAN deployment. The combination of macro eNodeB and 9764 MCO advanced interference management features minimize any impact on macro network performance.

Product capabilities

The product capabilities in this release are:

- Supports LTE TDD
- Full B41, 2500 MHz frequency band.
- Optional directional or omnidirectional external antennas or Single or Dual Element Antenna Module enabling higher throughput, lower interference and greater power efficiency.
- Standard 2x2 MIMO configurations, 2 transmit and 2 receive diversity.
- The hardware is ready is ready for up to 3 LTE carriers.
- Supports traffic backhauled through the standard IP network. The product supports two different SFP backhaul modules for different installation use-cases: one for daisy chaining or one with PoE+ capability to power and backhaul any PoE+ compatible external device.
- An individual field-replaceable unit (FRU) - as is the optional 9764 MCO Wi-Fi AP module.
- Connecte to 3GPP EPC through standard S1 interfaces and can be connected to other base stations using standard X2 interface.

Main characteristics

The MCO is designed as a small, lightweight unit virtually invisible to be used outdoor and can be integrated in urban furniture or mounted on a lamppost, pole, or wall.

It is secured and plug-and play (allowing initial and on-going self-configuration).

The main characteristics are:

Performances	Characteristics
Transmit power	2 x 37.8 dBm (2x6W)
Typical antenna gain	7.5 dBi (Single Element Antenna module), 9.5 dBi (Dual Element Antenna module)
Number of users supported	200 Simultaneous Active Users per carrier, up to 3 carriers
Supported bandwidth	Up to 3 carriers of 10, 15 or 20 MHz
Throughput/Data rate speed in Mbps (20 MHz)	HW capability: 112.45 DL / 9.6 UL L2 Frame throughput, Frame Configurations 2 Special Sub Frame 7

Deployment scenarios

The 9764 CMCO may be deployed indoors or outdoors in public places and can be mounted on walls, lamp posts, poles, or even on the side of a building in a vertical orientation thanks to the Metro Compact Mounting Frame.

It can also be integrated in urban furniture such as bus shelter and information panels.

Optional tilt mounting brackets allow for the 9764 CMCO to be adjusted in vertical and/or horizontal directions at same time, supporting:

- Up to +/- 30° vertical tilt (up/down) (from a purely mechanical perspective) (CAVEAT: thermal specifications dictate maximum adjustment of +/- 20° vertical tilt).
- Up to +/- 45° azimuth (side-to-side) adjustments.

Physical description

Product overview

The Compact Metro Cell Outdoor concept targets to provide a common look and feel as well as simplified installation and upgrade procedures. It brings new deployment flexibility with its small dimensions and volume and its modular approach in RF and GPS antennas, Wi-Fi access point (AP) and backhaul. Alcatel-Lucent's innovative service module design separates out.

Figure 2-1   9764 Compact Metro Cell Outdoor

The 9764 CMCO with solar shield and attached antennas

back view with the RF components and
Baseband Unit into the 9764 CMCO module

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Figure 2-2 9764 Compact Metro Cell Outdoor with 9764 Wi-Fi AP

9764 Wi-Fi AP

9764 Wi-Fi AP

9764 MCO front view
with 9764 Wi-Fi AP

In order to simplify configurations the backhaul access function and the radio part functions are separated, with a common interface as defined:

Unit	Function	Description
9764 CMCO	Radio part function	Radio functions Digital processing functions Power supply functions
Backhaul module	Backhaul access function Provides power to a remote Powered Device (PD) for PoE+ case.	Two backhaul module variants: • Dual SFP • 1 SFP/PoE+ RJ45 note: The RJ45 port of the backhaul module PoE+ can only be used for electrical backhaul connectivity. In a future release, this port could be available to connect a POE+ device (WI-FI AP).
9764 MCO Wi-Fi AP module	Wi-Fi function	Wi-Fi network access function Refer to Alcatel-Lucent Small Cell Wi-Fi AP Technical Description, 3MN-01840-0004-DEZZA for Wi-Fi AP product details. note: 9764 MCO Wi-Fi AP V1.0 does not support B7 and B41 Compact Metro Cell.

Alcatel-Lucent 9764 Compact Metro Cell Outdoor overview

The Alcatel-Lucent 9764 Compact Metro Cell Outdoor is made up of three main units which are responsible for radio, digital processing and power supply functions.

Unit	Function
Modem board	Digital part: • Giga Ethernet switch • Processors to provide modem and controller functionality • Internal GPS/GLONASS Receiver for localization synchronization • 9764 MCOWi-Fi AP interface
Radio Board	Radio part: • LTE Band 41 • Two external RF antenna connectors (Type N)
PSU (Power Supply Unit)	Power supply part: • Internal power module unit provides AC/DC conversion (5.3 V output) to the Modem board (MEMO). • The Modem board (MEMO) distributes 5.3 V output and provides secondary DC-DC conversion to generate all other (lower) voltages needed within the board.

Notes:

1. The 9764 CMCO is hardware ready for GLONASS satellite synchronization. Software support for GLONASS synchronization will be added in a future release.

9764 CMCO connection interfaces

The following figure shows the connection interfaces for the 9764 CMCO :

Type N RX/TX antenna connector 1 | QMA GPS antenna port | Power supply | Type N RX/TX antenna connector 2 | SFP cage for backhaul | Blind mate connection to 9764 MCO Wi-Fi AP module
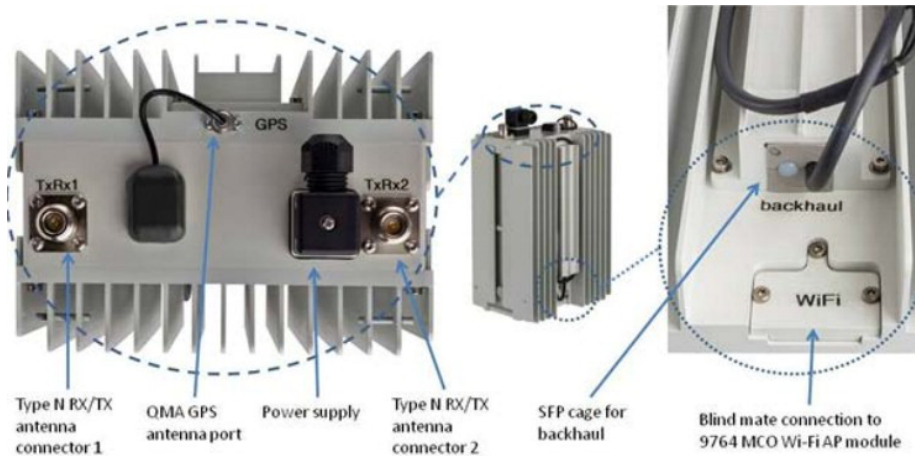
Connection location	Description
9764 CMCO (top)	Power supply connector
	RF antenna connectors
	QMA to external GPS antenna
9764 CMCO (bottom)[1]	A blind mate connection to 9764 MCO Wi-Fi AP
9764 CMCO (back)	Backhaul and daisy chaining ports via a backhaul module, either
	• Dual SFP backhaul module
	• SFP/PoE+ RJ45 backhaul module

Notes:

1. The RJ45 port of the backhaul module PoE+ can only be used for electrical backhaul connectivity. In a future release, this port could be available to connect a POE+ device (WI-FI AP).

2. The Alcatel-Lucent 9764 Compact Metro Cell Outdoor can also support the Alcatel-Lucent 9764 MCO Wi-Fi Access Point, with restrictions: 9764 MCO Wi-Fi AP V1.0 does not support B7 and B41 Compact Metro Cell.

Power supply

The 9764 CMCO product is orderable as an option to support either AC or DC power input.

9764 CMCO	Power supply details
AC variant	AC power supply that operates from a single phase, three wire voltage source in the 85 to 270 Volt range. Product rated voltage range is 110 to 240 Volt. The AC power is surge-protected and conforms to ETSI EN 301-489-1 V1.9.2 section 9.8 and GR-1089-CORE Issue 6 port type 7. Fully configured and operating at maximum levels, the product dissipates less than 150 W
DC variant	-48 V DC power supply that operates over the voltage range from -40 V DC to -57 V DC. For first start-up -45 Volts +/- 3 Volts is required. Fully configured and operating at maximum levels, the product dissipates less than 150 W

Backhaul interface

The following two backhaul (BH) configurations are supported on the 9764 CMCO:

- Dual SFP, where
  - Each SFP can be either GigE (electrical or optical) or GPON
  - Can be used for daisy chain configurations, where the SFP in the 2nd BH port must be optical
- SFP and Power over Ethernet (PoE)+ (IEEE 802.3at), where
  - The single SFP can be either GigE (electrical or optical) or GPON
  - The PoE+ backhaul module powers a PoE+ capable Powered Device (PD), e.g. a wireless backhaul. This interface provides up to 25.5 W of power to the remotely connected PD.
  - It can support a daisy chain configurations to other MCOs in the SFP port when the PoE+ port is used for wireless backhaul.

Note: if the CMCO is the 2nd module of a daisy-chain, the first port SFP is not used for BH connection but used for daisy-chain and then it supports only GBE or CPRI optical.

Up to two 9764 CMCOs may be daisy-chained. If two 9764 CMCO are daisy-chained, the BH module POE+ can be used for "Head-CMCO" only

Note: Backhaul module POE+ is not supported by 9764 CMCO B41 2x6W units.

Figure 2-3 Backhaul module variants
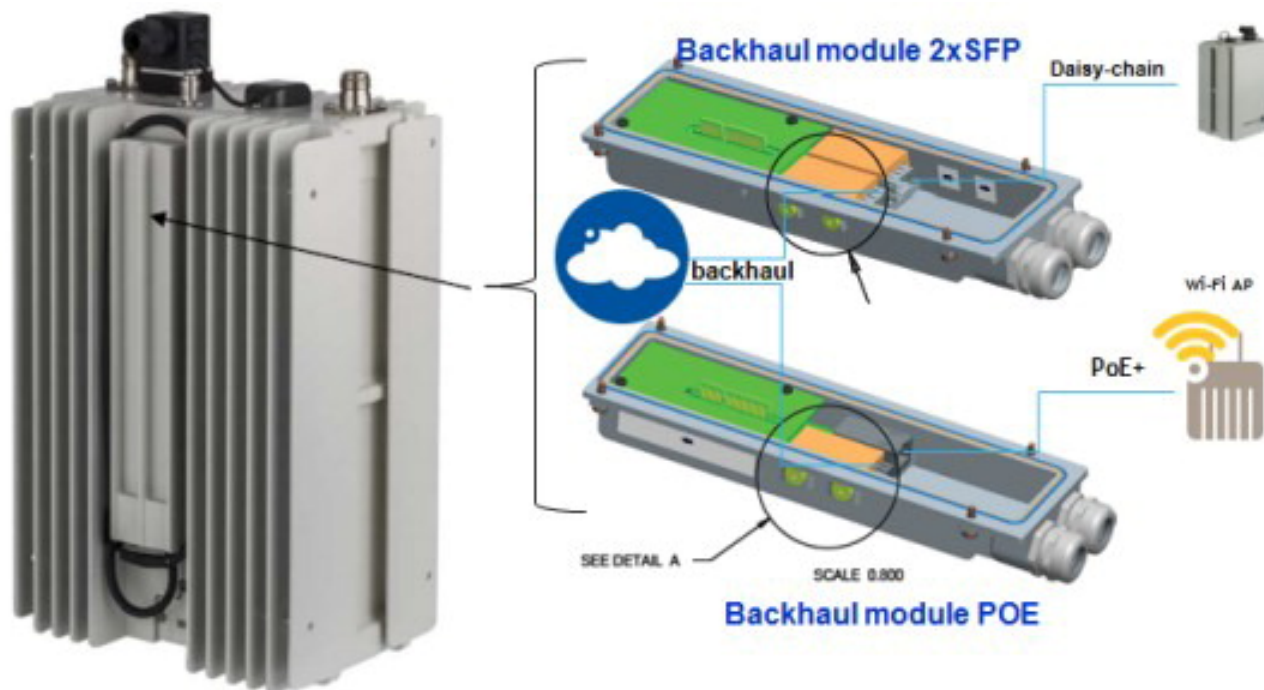
RF antenna

The 9764 CMCO supports two external antenna connectors (Type N) on the top of the enclosure supporting an antenna module in the following configurations:

- Attached RF antennas mounted on the side of the 9764 CMCO
- Cabling to external remote RF antennas

    Note: When deploying a 9764 CMCO with remote LTE antennas and a Wi-Fi AP module, antenna isolation between the remote external LTE antennas and the Wi-Fi AP module antennas must be at least -42 dB.

Refer to the *RF antennas* part of the *System architecture* topic of the *Alcatel-Lucent 9764 Compact Metro Cell Outdoor Technical Description* for more RF antenna information.

GPS/GLONASS Antenna

The 9764 CMCO supports an external GPS/GLONASS antenna connector (QMA) on the top of the enclosure allowing the following GPS/GLONASS antenna configurations:

- Attached GPS/GLONASS antenna mounted on the top of the 9764 CMCO
- Cabling to an external remote GPS antenna

This attached GPS/Glonass antenna is connected via a 70cm long cable to the QMA connector located on the top or the MCO housing. In case the 9764 CMCO shall be mounted up side down the antenna can be relocated to a position visible to the satellites.

Note: The 9764 CMCO is hardware ready for GLONASS satellite synchronization. Software support for GLONASS synchronization will be added in a future release.

Status indicators

The 9764 CMCO supports a single bi-color LED (red/green) which is located on the rear lower portion of the casing. The LED is not intended for use during normal operation of the equipment; however, it can provide a visual status of the equipment during initial installation and commissioning.

Product labelling

A 9764 CMCO product label provides the following information:

- Model name
- Part number
- Serial number
- MAC address
- Power input range
- CE Approval marking
- Environmental marking (WEEE/RoHS) applicable to the device

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9764 CMCO weights and dimensions

Weights and dimensions

This topic covers the 9764 CMCO weights and dimensions.

Standard MRO weights and dimensions

The following table provides weights and dimensions for the 9764 CMCO.

9764 CMCO configuration	Volume litres	Weight kg	Sizes (LxWxD) mm
9764 CMCO	<7.5 L	7.3 kg	265 x 180 x 156.5mm

Hardware and ancillary items

Overview

The following section describes the supported installation options for the 9764 CMCO product. These include:

- Standard installation options for all 9764 CMCO products
- Daisy chain installation options where two 9764 CMCO modules are daisy chained together and share the same backhaul port

Standard installation options

9764 MCO products are designed to be deployed outdoors and close to the users, usually on light poles or lamp posts in streets or on building walls, with a vertical profile.

Figure 2-4 Installation examples

Examples of pole and wall deployments

In addition, the 9764 CMCO can be fitted with an optional Alcatel-Lucent 9764 Metro Cell Outdoor Wi-Fi AP.

Note: 9764 MCO Wi-Fi AP V1.0 does not support B41 Metro Cells.

Refer to *Alcatel-Lucent Small Cell Wi-Fi AP Technical Description,* 3MN-01840-0004-DEZZA for Wi-Fi AP product details.

Figure 2-5   9764 MCO Wi-Fi AP module attached to 9764 CMCO (front view)

Wi-Fi AP ⟶
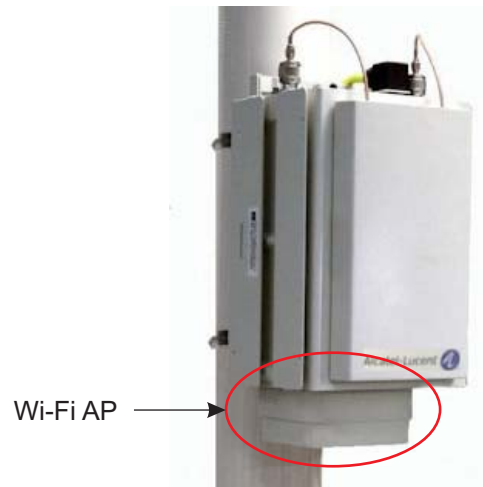
Ethernet daisy chain installation options

In a daisy chain installation configuration two 9764 MCOs can be daisy chained together, where they share the same backhaul port, thus reducing the investment cost needed to connect the 9764 MCO s to the backhaul network and aggregating the uplink and downlink traffic. Daisy chained 9764 MCO s may be co-located or separated by some distance. The actual distance depends upon the SFP and Ethernet cable configuration used for the daisy chain. Maximum distance is 100 m when using electrical Ethernet cable and 300 m when using optical Ethernet cable. Refer to, "Hardware and ancillary items" for supported SFPs and Ethernet cable types and lengths.

If a 9764 MCO is to be included in the daisy chain configuration, the following Wi-Fi AP configurations are supported:

- A 9764 MCO can be attached to each daisy chained 9764 MCO when the daisy chained MCOs are installed in separate locations (e.g., not co-located on the same pole).

- If the daisy chained 9764 MCO are co-located, only one 9764 MCO can be used, and the 9764 MCO can be attached to either MCO.

Figure 2-6 9764 MCO daisy chain installation example

Street furniture installation

The 9764 MCO can be installed as part of street furniture, for example, bus stops and advertising boards, to further improve the quality of service provided to users in high density areas such as city centers.

9764 CMCO base items

The product packaging contains the following base items:

- 9764 CMCO (including "attached" GPS/GLONASS antenna)
- 9764 CMCO configured backhaul module variant (not attached to the 9764 CMCO)
- 9764 CMCO mounting bracket
- 9764 CMCO basic installation kit

    Note: The 9764 CMCO is hardware ready for GLONASS satellite synchronization. Software support for GLONASS synchronization will be added in a future release.

9764 MCO Wi-Fi AP base items

The Alcatel-Lucent 9764 Metro Cell Outdoor Wi-Fi AP is an option product. It supports the Alcatel-Lucent 9764 MCO Wi-Fi Access Point with restrictions:

- 9764 MCO Wi-Fi AP V1.0 does not support B7 and B41 Compact Metro Cell.

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Ancillary items

The following tables list the ancillary items that are available for order from Alcatel-Lucent in support of the defined equipment installation and configuration options.

Installation kits

The following table list the installation kits that are available for order from Alcatel-Lucent in support of the equipment installation options.

Installation kit	Description	Use
Vertical tilt installation kit	Vertical tilt bracket	Mandatory: • pole mount with tilt • wall mount: with vertical only • wall mount: with vertical and horizontal tilt
Horizontal tilt installation kit	Horizontal tilt bracket	Mandatory: • wall mount: with horizontal tilt only • wall mount: with horizontal and vertical tilt
Banding kit	Stainless steel bands Band buckles (Ear-Lokt)	Mandatory: • pole mount only
Banding tool	Standard BAND-IT® Banding Tool (CR00169), including operating instructions	Mandatory: • use with the Banding kit for pole mount only

Power

Item	Description	Use
Power connector (AC)	AC power connector	Required for 9764 CMCO module with AC power (International markets)
Power connector (DC)	DC power connector	Required for 9764 CMCO module with DC power (International markets)
Power cable	Power cable IN/OUT 3G1,5mm², 100m roll or multiples of 1m length (as needed)	Required for 9764 CMCO module (International markets)
Power cable (AC)	Power cable pre-assembled with AC power connector, various lengths (2m. 4.5m, 9m, 12m)	Required for 9764 CMCO module with AC power (North America Regional markets)
Power cable (DC)	Power cable pre-assembled with DC power connector, various lengths (2m. 4.5m, 9m, 12m)	Required for 9764 CMCO module with DC power (North America Regional markets)

Grounding

Item	Description	Use
Ground cable	Ground cable,Y/G 10mm² in 100m roll	Required for International markets
Ground cable	Ground cable, 8 AWG	Required for North America Regional markets

Backhaul modules

Item	Description	Use
Dual SFP	2 x SFP, where each SFP can be either GigE (electrical or optical) or GPON	Mandatory One backhaul module variant required per 9764 CMCO
SFP/PoE+	SFP and Power over Ethernet (PoE)+, where the single SFP can be either GigE (electrical or optical) or GPON and the PoE+ port powers a PoE+ capable Powered Device (PD)	

SFP modules

Item	Description	Use
SFP module	SFP GBE 10/100/1000BaseT (copper)	Optional Electrical backhaul only
SFP module	SFP GBE 1000BaseLX (Single mode)	Optional Optical backhaul, Daisy chaining
SFP module	SFP GBE 1000BaseLX / CPRI (Single mode)	Optional Optical backhaul, Daisy chaining
SFP module	SFP GBE 1000BaseSX / CPRI (Multi mode)	Optional Optical backhaul, Daisy chaining
SFP module	GPON SFP	Optional Optical backhaul only

RF antenna

Item	Description	Use
2.6 GHz RF antenna	2.6 GHz (Band 7), 70° x 35° HPBW, gain 10-11 dBi	Optional Use for attached RF antenna configuration
1.7 to 2.1 GHz RF antenna	1.7 to 2.1 GHz (Band 3), 70° x 70° HPBW, gain 7-8 dBi	Optional Use for attached RF antenna configuration

External antenna - GPS

Item	Description	Use
GPS antenna	External GPS Antenna, 1575 MHz*26 dBi	Used if 9764 CMCO is configured for external GPS antenna and cable loss <10dBi @ 1575MHz
GPS antenna	External GPS Antenna, 1575 MHz*40 dBi	Used if 9764 CMCO is configured for external GPS antenna and cable loss >10dBi @ 1575MHz
Jumper cable	External GPS Antenna jumper cable (2m, 5m, 15m)	Mandatory 1 cable per 9764 CMCO if external GPS antenna is used (International markets)
Jumper cable	External GPS Antenna jumper cable (36ft, 60ft)	Mandatory 1 cable per 9764 CMCO if external GPS antenna is used (North America Regional markets)
Adapter cable	External GPS Antenna adaptor cable	Mandatory 1 cable per 9764 CMCO if external GPS antenna is used

Surge arrestor

Item	Description	Use
Surge arrestor	External Ethernet surge arrestor	Optional Highly recommended if GBE 1000BaseT backhaul connection is provided
Surge arrestor kit	External Ethernet surge arrestor kit, including: • mounting bracket • pole bands and buckle • Ethernet cable, 0.6 m (2 ft)	Required for External surge arrestor

Ethernet cable - Electrical

Item	Description	Use
Electrical Ethernet cable	2m, 25m, 100m outdoor, 4 pairs, 2 RJ45 (plus 1 spare)	Optional Use with SFP GBE 10/100/1000BaseT (International markets)
Electrical Ethernet cable	2m, 25m, 100m outdoor, 4 pairs, 2 RJ45 (plus 1 spare)	Optional Use with SFP GBE 10/100/1000BaseT (North America Regional markets)

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Electrical Ethernet cable – Specifications

When selecting Ethernet cables, the following requirements must be taken into account:

Item	Description	Use
Electrical Ethernet cable	Cathegory: CAT5e and CAT6 support 1 Gigabit/s Shielding types: S/UTP and SF/UTP:	Optional Use with SFP GBE 10/100/1000BaseT

Ethernet cable - Optical

Item	Description	Use
Fiber Optic cable	SMDF LC-LC 2SM 1m	Optional
Fiber Optic cable	SMDF LC-LC 2SM 2.5m	Single mode fiber duplex. 80mm/80mm Breakout, Outer diameter: 5.5mm
Fiber Optic cable	SMDF LC-LC 2SM 5m	Use for Single Mode link (select cable length)
Fiber Optic cable	SMDF LC-LC 2SM 15m	
Fiber Optic cable	SMDF LC-LC 2SM 30m	
Fiber Optic cable	SMDF LC-LC 2SM 50m	
Fiber Optic cable	SMDF LC-LC 2SM 70m	
Fiber Optic cable	SMDF LC-LC 2SM 85m	
Fiber Optic cable	SMDF LC-LC 2SM 100m	
Fiber Optic cable	SMDF LC-LC 2SM 150m	
Fiber Optic cable	SMDF LC-LC 2SM 200m	
Fiber Optic cable	SMDF LC-LC 2SM 250m	
Fiber Optic cable	SMDF LC-LC 2SM 300m	

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Item	Description	Use
Fiber Optic cable	MM LC-LC 2MM 1m	Optional
Fiber Optic cable	MM LC-LC 2MM 2.5m	Multi Mode fiber duplex. 80mm/80mm Breakout, Outer diameter: 5.5mm
Fiber Optic cable	MM LC-LC 2MM 5m	Use for Multi Mode link (select cable length)
Fiber Optic cable	MM LC-LC 2MM 10m	
Fiber Optic cable	MM LC-LC 2MM 15m	
Fiber Optic cable	MM LC-LC 2MM 30m	
Fiber Optic cable	MM LC-LC 2MM 50m	
Fiber Optic cable	MM LC-LC 2MM 70m	
Fiber Optic cable	MM LC-LC 2MM 85m	
Fiber Optic cable	MM LC-LC 2MM 100m	
Fiber Optic cable	MM LC-LC 2MM 150m	
Fiber Optic cable	MM LC-LC 2MM 200m	
Fiber Optic cable	MM LC-LC 2MM 250m	
Fiber Optic cable	MM LC-LC 2MM 300m	

Solar shield

Item	Description	Use
Solar shield	Solar Shield for Compact MCO	Optional

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PRELIMINARY

PRELIMINARY

PRELIMINARY

3   Pre-installation

Overview

Purpose

This chapter provides pre-installation information (including required tools and materials and installation clearances) as well as outlining the possible daisy chain deployment scenarios and requirements for the Alcatel-Lucent 9764 Compact Metro Cell Outdoor product.

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Pre-installation information

Verify site preparation

The following site preparation requirements should be checked and met before the installation of the equipment can begin. If some of the requirements are not met, the installer must do so now:

- Ensure equipment is planned to be installed as high as possible to avoid obstructions.
- Consider nearby sources of interference. Also check possibility of future obstructions.
- Ensure adequate clearance is provided for service access.
- Ground, power and backhaul cabling has been routed and is in place.
- Ensure any site specific fixing materials (screws, washers, wall plugs) for pole/wall mounting the equipment are available.

Product delivery contents

Unpack and examine the product packaging contents. If you notice any damage, or missing items as listed in the Packing List, immediately notify the carrier that delivered the unit and contact your Alcatel-Lucent representative.

The product packaging contains the following items:

- The Alcatel-Lucent 9764 Compact Metro Cell Outdoor

Installation materials

In addition to the standard product deliverable ensure the appropriate mounting brackets, installation kits and ancillary items are available to support the product mounting options.
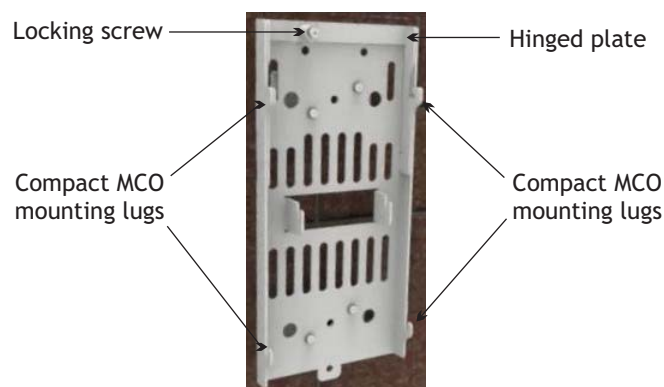
Figure 3-1 Mounting bracket

Table 3-1   Recommended wall anchor materials

Surface structure	Recommended anchor materials	Recommended screw torque
Wood	Screw Hex T M8x70 stainless steel (x4) Washer plain M8x16x1.6 stainless steel (x4)	7.0 N.m (62.0 lb.in).
Concrete	Screw CHC M6x80 stainless steel (x4) Washer plain M6x12x1.6mm stainless steel (x4) Washer spring M6x12x1.2mm stainless steel (x4) Plug expansion Rawlnut M6x50 (x4)	7.0 N.m (62.0 lb.in).

Tools required for installation

The following tools may be used during installation:

- Drill (pneumatic hammer) and assorted drill bits
- Pliers
- Adjustable spanners
- M17 socket wrench
- Screwdrivers (power and/or manual):
  - Phillips (flat blade)
  - Torx (T-25 and T-40)
- HRS (Hirose) HT206/TM21p-88p crimping tool (for RJ45 cable)
- Data cable tester for shielded RJ45 (optional)
- Measuring tape
- Digital compass (to aid establishing product orientation)
- Marker, to mark wall mounting holes
- Vacuum cleaner or equivalent (required for clearing debris from wall mounting holes)
- Spirit level
- Hammer
- PIB (self-amalgamating) tape and 3M Super 33+ vinyl tape
- Ear protectors and safety goggles/glasses
- Assorted cable ties (various lengths)
- Heavy duty tape
- Adjustable straps

Installation clearances

Minimum installation clearances

The following provides the minimum wall mount clearances recommended around the 9764 CMCO B41 2x6W.

Figure 3-2   9764 CMCO B41 2x6W installation clearances
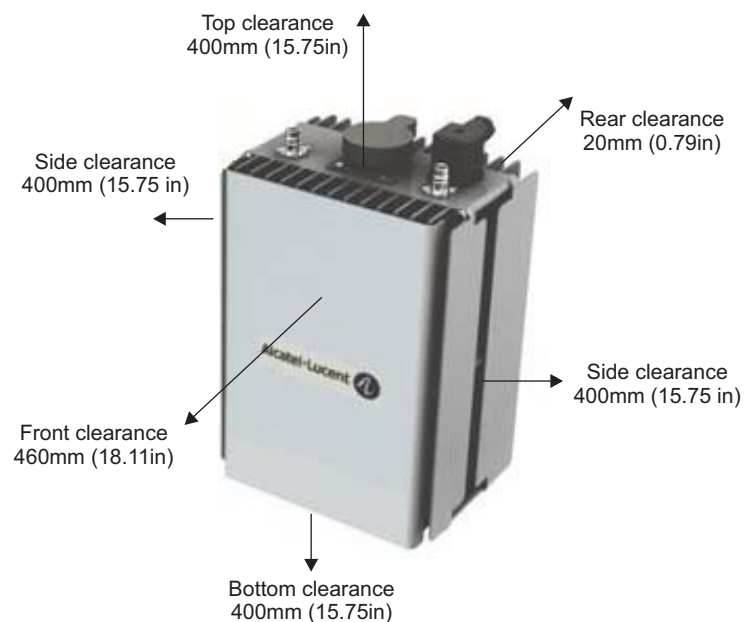
Metro Cell Outdoor	Clearances mm (inches)	Comment
Side(s)	400 mm (15.75 inch)	Access to secure the solar shield cover.
Top	400 mm (15.75 inch)	Access to cable connections and cable bending radius. To aid natural air convection.
Bottom	400 mm (15.75 inch)	Access to connections (Wi-Fi AP). To aid natural air convection.
Front	460 mm (18.11 inch)	Access to secure the solar shield cover.
Rear	20 mm (0.79 inch)	For the wall mounting space. To aid natural air convection.

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Pole mount installation requirements

Purpose

This topic outlines the basic requirements, installation kits and recommended anchor materials when mounting the Alcatel-Lucent 9764 Compact Metro Cell Outdoor directly onto a pole, onto tilt brackets or onto a pair mount bracket.

Pole mount options

The 9764 CMCO can be easily mounted onto a pole for the following installation options:

- 9764 CMCO banded onto a pole (without the tilt option).

  The 9764 CMCO mounting bracket and pole band installation kit is used.

- 9764 CMCO attached to the vertical tilt bracket. Vertical tilt bracket is banded onto a pole.

  The vertical tilt bracket, 9764 CMCO mounting bracket and pole band installation kit is used.

Pole mount installation kits and brackets

The following table provides the installation kits and brackets that can be used, depending on the deployment scenario, for 9764 CMCO pole mounting.

Table 3-2   Pole mount installation kits and brackets

Item	Description
9764 MCO Compact mounting bracket	Required for attaching the 9764 CMCO directly onto a pole or vertical tilt bracket
Vertical tilt bracket	Provides +/- 30° vertical tilt (up/down) adjustment
Banding kit	Required when directly attaching the 9764 CMCO or vertical tilt bracket to a pole (diameter 50 to 300 mm) using stainless steel bands. Stainless steel bands and buckles (Ear-Lokt)
Banding tool	Standard BAND-IT® Banding Tool (CR00169), including operating instructions Required in order to tighten stainless steel metal bands

The following figure shows the brackets used for pole mount installation, depending on the deployment scenario.

Figure 3-3 Pole mount banding and brackets

Pole mount no tilt   Pole mount with tilt

Wall mount installation requirements

Purpose

This topic outlines basic requirements, installation kits and recommended anchor materials when mounting the Alcatel-Lucent 9764 Compact Metro Cell Outdoor onto a solid concrete wall or flat surface or onto tilt brackets.

Wall mount options

The 9764 CMCO can be easily mounted onto any flat, sturdy wall for the following installation options:

- 9764 CMCO attached directly onto a wall or flat surface.
- 9764 CMCO attached to the vertical/horizontal tilt bracket(s). Vertical/horizontal tilt bracket(s) are attached to a wall.

Wall mount installation brackets and kits

The following table lists the installation brackets that can be used, depending on the deployment scenario, for 9764 CMCO wall mounting.

Table 3-3   Wall mount installation brackets

Item	Description
9764 CMCO mounting bracket	Required when attaching the 9764 CMCO directly to a wall or flat surface or onto tilt brackets.
Vertical tilt bracket	Provides +/- 30° vertical tilt (up/down) adjustment **Note:** Can be used in combination with the horizontal installation kit to provide: • +/- 30° vertical tilt (up/down) adjustment, and • +/-45° horizontal tilt (left/right) adjustment
Horizontal tilt bracket	Provides +/-45° horizontal tilt (left/right) adjustment **Note:** Can be used in combination with the vertical tilt installation kit to provide: • +-45° horizontal tilt (left/right) adjustment, and • +/- 30° vertical tilt (up/down) adjustment

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Recommended wall anchor materials

Surface structure	Recommended anchor materials	Recommended screw torque
Concrete	Screw CHC M6x80 stainless steel (x3)	7.0 N.m (62.0 lb.in).
	Washer plain M6x12x1.6mm stainless steel (x3)	
	Washer spring M6x12x1.2mm stainless steel (x3)	
	Plug expansion Rawlnut M6x50 (x3)	

Wall mount installation examples

The following figures show examples of 9764 CMCO wall mount installation and wall mount installation with horizontal/vertical tilt.

Figure 3-4   9764 CMCO wall mount examples

Wall mount no tilt

Wall mount horizontal tilt only

Wall mount horizontal and vertical tilt

Daisy chain requirements

Overview

Two 9764 MCOs can be daisy chained together to share the same backhaul port, thus reducing the investment cost needed to connect the 9764 MCOs to the backhaul network and aggregating the uplink traffic. Daisy chain connectivity scenarios support 9764 MCOs that are co-located and connected together or 9764 MCOs that are separated by some distance.

Daisy chaining configurations

A maximum of two 9764 MCO modules and a single Wi-Fi Access Point may be daisy chained together.

The 9764 MCO supports the following daisy chain configurations:

- A 9764 MCO connected to the backhaul network plus a 9764 MCO connected to the daisy chain port of the "head" 9764 MCO.
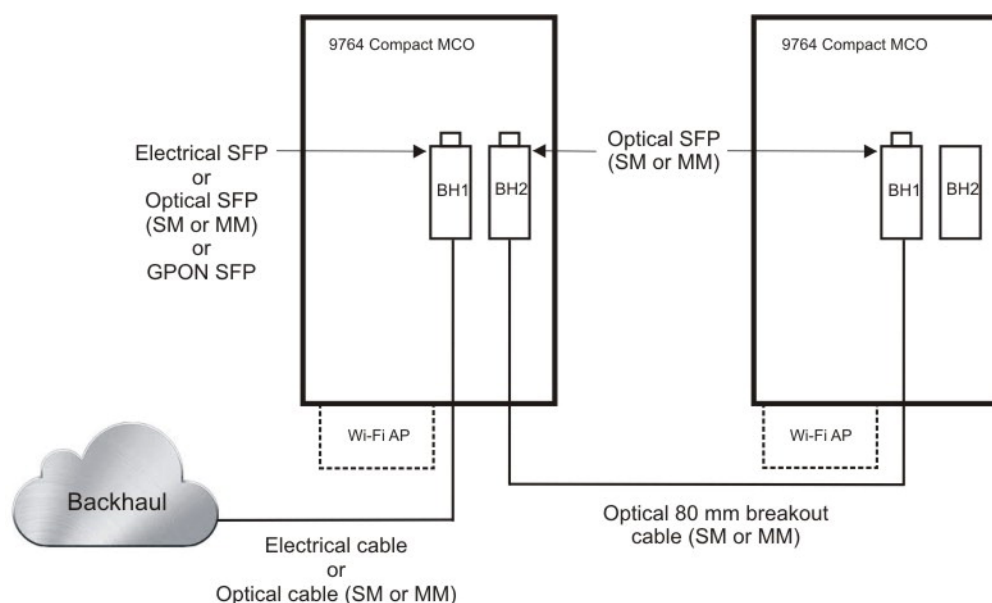
- A 9764 MCO connected to the backhaul network plus a 9764 MCO WCDMA module connected to the daisy chain port of the "head" 9764 MCO.

Note: An optional single Wi-Fi Access Point may be attached to either the MCO connected to the backhaul network or the MCO that is daisy chained.

4 Installation

Overview

Purpose

This chapter provides the instructions for:

- Cabling the MCO Compact backhaul module before installing the Alcatel-Lucent 9764 Compact Metro Cell Outdoor.

- Mounting the 9764 CMCO onto either a pole or wall with or without the optional tilt mechanism.

Contents

Pre-installation cabling

Overview

Purpose

This section provides instructions for routing and connecting the following cables to the MCO Compact backhaul module, depending on the network configuration, **before** the Alcatel-Lucent 9764 Compact Metro Cell Outdoor is mounted onto a surface:

- Fiber optic cable (for optical backhaul), or
- Electrical cable (for electrical backhaul)

If the backhaul module is to be cabled **after** the Alcatel-Lucent 9764 Compact Metro Cell Outdoor is mounted onto a surface then, in order to gain access to the backhaul module, the 9764 CMCO must firstly be placed in the "service position". Once the cabling is complete the 9764 CMCO should then be moved back to it's " normal position" . See, Appendix A, "9764 CMCO service position"

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Ethernet cabling - fiber optic

Purpose

This topic describes the procedures to be followed when connecting the optical Ethernet cable to the Alcatel-Lucent 9764 Compact Metro Cell Outdoor. The 9764 CMCO may either be in a single configuration, or daisy chained to a second 9764 CMCO.

Cabling ancillary items

The following backhaul cabling related ancillary items can be ordered from Alcatel-Lucent:

- SFP transceiver for backhaul (depending on network configuration):
  - SFP GBE 1000BaseLX SFP module (SM or MM). See "SFP modules" (p. 2-16)
  - GPON SFP transceiver for daisy chaining (for day chain configurations only)
- Fiber optic Ethernet cable with LC connector to optical SFP module. See "Ethernet cable - Optical" (p. 2-18)

Before you begin

Before you begin the following should be noted:

- Equipment cabling should only be carried out by suitably trained or qualified personnel and must comply with local and national electrical codes.
- As a prerequisite, backhaul cable has been routed from the backhaul system to the 9764 CMCO.
- One SFP port may be cabled for backhaul to the network while the other SFP port may be cabled for daisy chaining to another 9764 CMCO.
- If the backhaul module is to be cabled **after** the 9764 CMCO is mounted onto a surface then, in order to gain access to the backhaul module, the 9764 CMCO must firstly be placed in the "service position". Once the cabling is complete the 9764 CMCO should then be moved back to its " normal position" . See, Appendix A, "9764 CMCO service position"

Install SFP transceiver module

Before the Ethernet cable can be connected the 9764 CMCO, the SFP port(s) must be equipped with the appropriate SFP transceiver (either 1000Base-X GigE optical transceiver or 10/100/1000Base-T electrical transceiver), according to the network specifications.

To install an SFP transceiver module into the 9764 CMCO SFP port:

1 Firstly, carry out the following to attach the ESD wrist strap:

- Attach the ESD strap over your wrist so that is in contact with your bare skin.

- Momentarily touch the ESD clip onto a bare (unpainted) metal spot so that any built up static charge is dissipated.

- Attach the ESD clip to the MCO ground lug screw (the ground lug screw can be unscrewed slightly for easier ESD clip attachment).

2 Remove the four screws holding the backhaul module onto the back of the 9764 CMCO and turn the module through 180° to access the SFP ports.

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3   Remove the SFP transceiver module from its protective packaging. Check the label on the SFP transceiver module body to verify that you have the correct type and model for your network.

> **Important!** Do not remove the SFP transceiver module dust plugs until directed to do so later in the procedure.

4   Insert SFP transceiver modules into SFP ports.

If…	Then…	View
You are connecting a single cable from the backhaul system.	Align the backhaul optical SFP transceiver module with the SFP port labelled "BH 1" and insert the module into the socket until you feel the connector latch into place.	
You are connecting a daisy chain cable in addition to the cable from the backhaul system.	Align the daisy chain optical SFP transceiver module with the SFP port labelled "BH 2" and insert the module into the socket until you feel the connector latch into place.	

> **Attention:** If the SFP module resists as you insert it, do not force it. Remove the module, turn it over, and try reinserting.

5   Push up and latch the SFP module locking bar into position to secure the SFP transceiver module(s) into the port.

6   To check that each SFP transceiver module is seated and latched properly, grasp the SFP module and try to remove it without releasing the latch.

If the SFP module cannot be removed, it is installed and seated properly. If the SFP module can be removed, reinsert it until the module is latched securely into the socket.

E ND OF STEPS

Connect the Ethernet cable

To connect the Ethernet cable(s) to the 9764 CMCO, perform the following steps:

1 Ensure that the Ethernet cable coming from the backhaul system to the 9764 CMCO is correctly routed. If daisy chaining to a second 9764 CMCO, ensure that the daisy chain Ethernet cable is correctly routed to this 9764 CMCO.

2 Unscrew and remove the rounded compression nut from the cable gland located on the bottom of the bottom of the backhaul module.
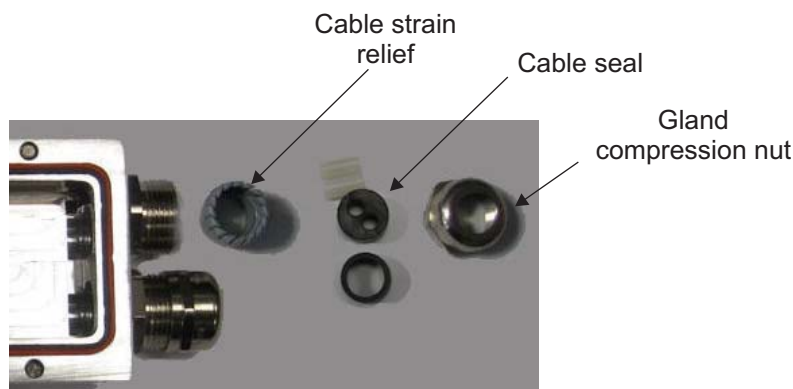
In the following order place the rounded compression nut, the cable seal and the strain relief onto the Ethernet cable, as shown:

3 Feed the Ethernet cable through the backhaul module gland opening and replace the cable clamp onto the optical cable.

Remove dust plugs from the optical cable connectors and the SFP transceiver module and immediately insert the cable connectors into the SFP transceiver in the port labelled "BH 1".

BH2 port ——————————————— BH1 port
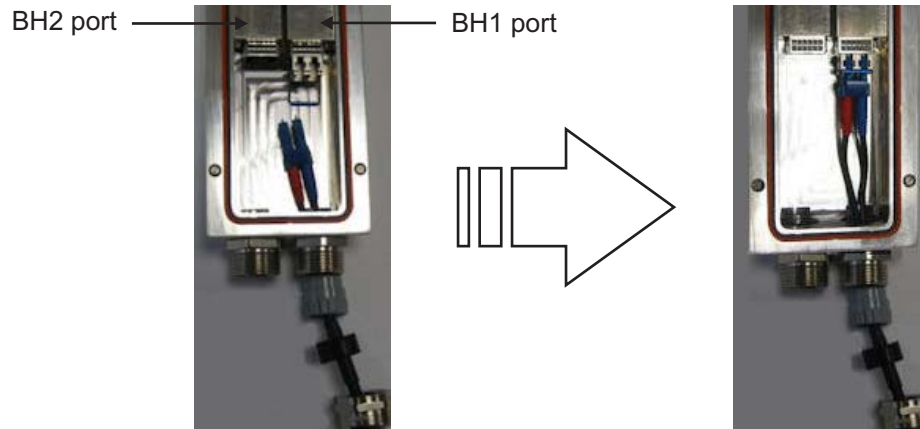
4   Loosely insert the gland assembly into the gland housing.

   Note: The gland assembly with cable may need to be turned slightly in order to fully
   slide into the gland housing before the compression nut can be screwed on.

5   Screw the rounded compression nut back onto the main body of the gland. Use an
   adjustable or open-end wrench to tighten the compression nut.

   Important! Alcatel-Lucent recommends that the compression nut is torqued to 2.5 N
   m (1.8 lb.ft) in order to create a watertight seal and avoid a potential loose connection.

6   If you are daisy chaining two 9764 CMCOs feed optical Ethernet cable through the
   second bachkaul module cable gland and insert the daisy chain Ethernet cable connector
   into the SFP transceiver in the port labelled "BH 2".

BH2 port ——————————————— BH1 port
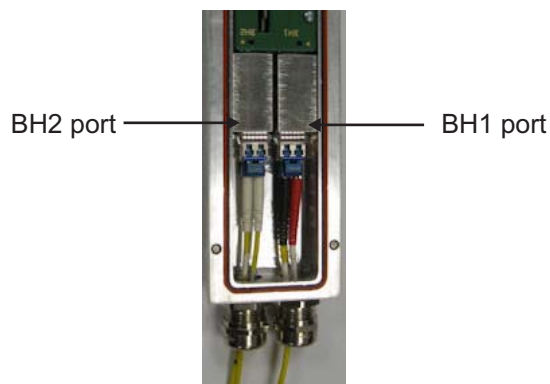
7 Reattach the backhaul module to the 9764 CMCO using the four retention screws.

Important! Ensure the backhaul module gasket is seated correctly in the groove on the underside of the backhaul module. Tighten the four retention screws in the sequence shown. Recommended torque, 2.0 N.m (17.7 lb.in).
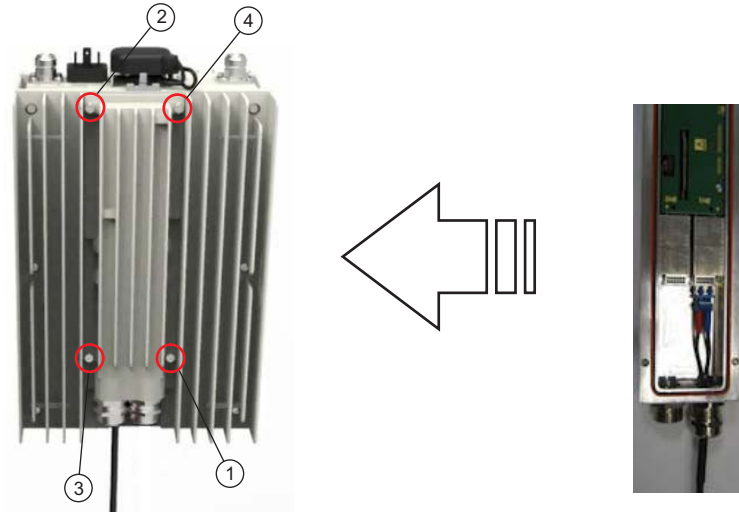
8 Finally, secure the Ethernet cable(s) to the wall or pole.

Important! When securing cables ensure the following to avoid cable damage:

- Secure cables with cable clips. Use additional clips wherever necessary for neatness.
- All cables should be run parallel with no twisting or tangled cables.
- Avoid excessive tension on the cables.

E ND OF STEPS

Ethernet cabling - electrical

Purpose

This topic describes the procedures to be followed when connecting an electrical Ethernet cable to the 9764 CMCO. The 9764 CMCO may either be in a single configuration, or daisy chained to a second 9764 CMCO.

Cabling ancillary items

The following backhaul cabling related ancillary items can be ordered from Alcatel-Lucent:

- 10/100/1000Base-T electrical transceiver. See "SFP modules" (p. 2-16).
- Electrical Ethernet cable with RJ45 connector to electrical SFP module. See "Ethernet cable - Electrical" (p. 2-17).

Before you begin

Before you begin the following should be noted:

- Equipment cabling should only be carried out by suitably trained or qualified personnel and must comply with local and national electrical codes.
- As a prerequisite, backhaul cable has been routed from the backhaul system to the 9764 CMCO.
- One SFP port may be cabled for backhaul to the network while the other SFP port may be cabled for daisy chaining to another 9764 CMCO.
- If the backhaul module is to be cabled **after** the 9764 CMCO is mounted onto a surface then, in order to gain access to the backhaul module, the 9764 CMCO must firstly be placed in the "service position". Once the cabling is complete the 9764 CMCO should then be moved back to it's " normal position" . See, Appendix A, "9764 CMCO service position"

Install SFP transceiver module

Before the Ethernet cable can be connected to the 9764 CMCO, the SFP port(s) must be equipped with the appropriate SFP transceiver (either 1000Base-X GigE optical transceiver or 10/100/1000Base-T electrical transceiver), according to the network specifications.

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PRELIMINARY

To install an SFP transceiver module into the 9764 CMCO SFP port:

1   Firstly, carry out the following to attach the ESD wrist strap:

  • Attach the ESD strap over your wrist so that is in contact with your bare skin.

  • Momentarily touch the ESD clip onto a bare (unpainted) metal spot so that any built up static charge is dissipated.

  • Attach the ESD clip to the MCO ground lug screw (the ground lug screw can be unscrewed slightly for easier ESD clip attachment).

2   Remove the four screws holding the backhaul module onto the back of the 9764 CMCO and turn the module through 180° to access the SFP ports.

3   Remove the SFP transceiver module from its protective packaging. Check the label on the SFP transceiver module body to verify that you have the correct type and model for your network.

  Important! Do not remove the SFP transceiver module dust plugs until directed to do so later in the procedure.

4   Insert SFP transceiver modules into SFP ports.

If…	Then…	View
You are connecting a single cable from the backhaul system.	Align the backhaul electrical SFP transceiver module with the SFP port labelled "BH 1" and insert the module into the socket until you feel the connector latch into place.	
You are connecting a daisy chain cable in addition to the cable from the backhaul system.	Align the daisy chain optical SFP transceiver module with the SFP port labelled "BH 2" and insert the module into the socket until you feel the connector latch into place.	

> **Attention:** If the SFP module resists as you insert it, do not force it. Remove the module, turn it over, and try reinserting.

5   Push up and latch the SFP module locking bar into position to secure the SFP transceiver module(s) into the port.

6   To check that each SFP transceiver module is seated and latched properly, grasp the SFP module and try to remove it without releasing the latch.

If the SFP module cannot be removed, it is installed and seated properly. If the SFP module can be removed, reinsert it until the module is latched securely into the socket.

E ND OF STEPS

Connect the Ethernet cable

Follow these step to connect the electrical Ethernet backhaul cable to the SFP module in the 9764 CMCO or the optional internal surge arrestor module (if installed).

1   Obtain, from the packaging, the Alcatel-Lucent electrical Ethernet cable. The RJ45 connector without connector cover should be used at the 9764 CMCO side.

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Note: If an external surge arrestor is installed then use a short cable from the surge arrestor to the 9764 CMCO.

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2   For increased cable connection within the cable gland, expose a section of screen braid (approximately 10 mm) by cutting through the cable jacket. The exposed section should measured from the leading edge of the RJ45 connector to the center of the exposed area.
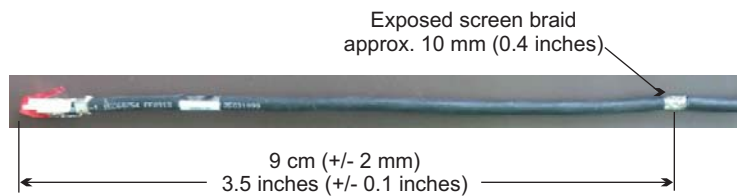
Exposed screen braid approx. 10 mm (0.4 inches)

9 cm (+/- 2 mm)
3.5 inches (+/- 0.1 inches)

---

3   Unscrew and remove the rounded compression nut from the cable gland located on the bottom of the bottom of the backhaul module.

Cable strain relief

Cable seal

Gland compression nut

In the following order place the rounded compression nut, the cable seal and the strain relief onto the Ethernet cable, as shown:

PRELIMINARY

PRELIMINARY
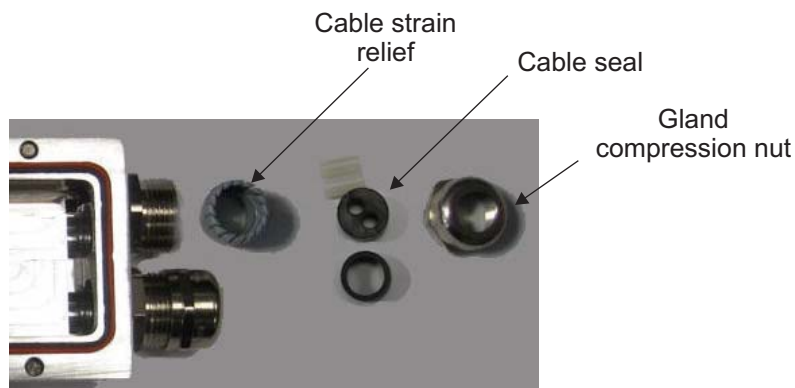
4   Pull the cable through the gland assembly parts until a connection is made between the exposed cable screen braid and the gland contact springs.
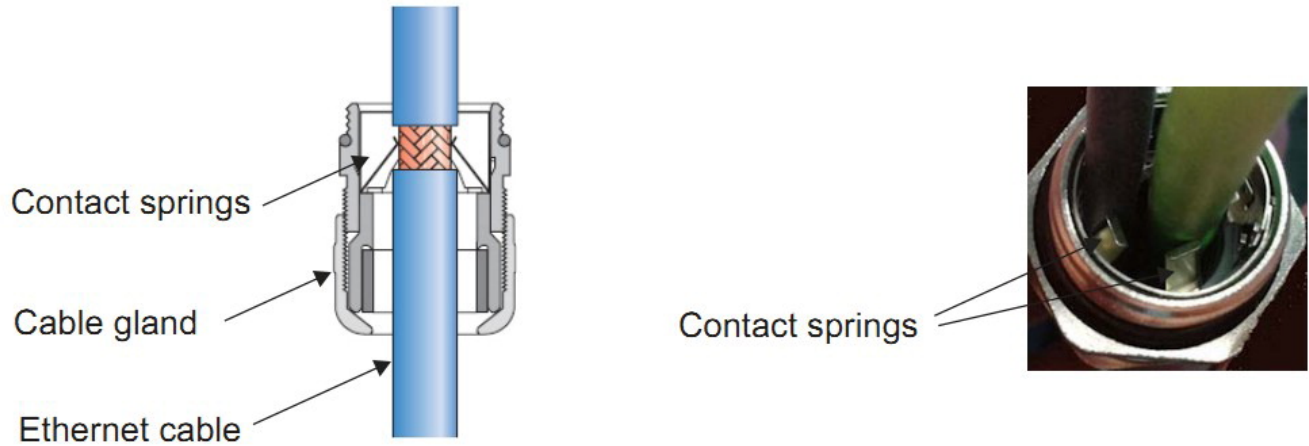
5   Feed the Ethernet cable through the gland opening on the backhaul module and insert the Ethernet cable connector into the SFP transceiver in the port labelled "BH 1".
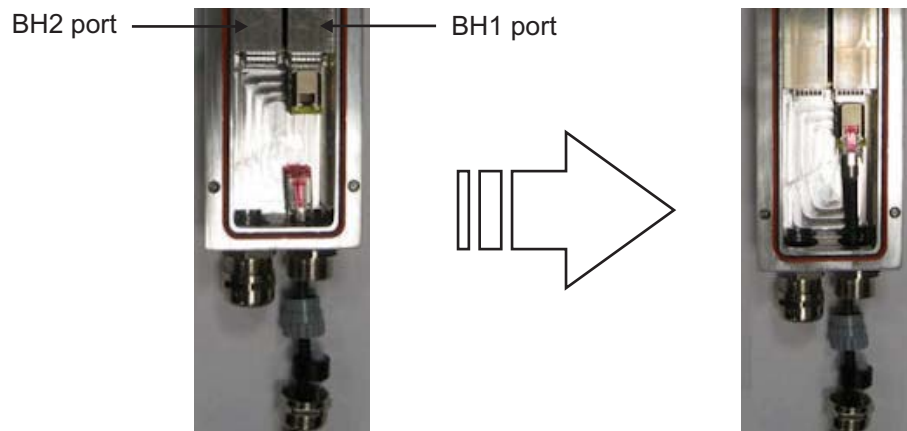
6   Loosely insert the gland assembly into the gland housing.

   Note: The gland assembly with cable may need to be turned slightly in order to fully slide into the gland housing before the compression nut can be screwed on.

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7 Screw the rounded compression nut back onto the main body of the gland. Use an adjustable or open-end wrench to tighten the compression nut.

> **Important!** It is recommended that the compression nut is torqued to 2.5 N.m (22.1 lb.in) in order to create a watertight seal and avoid a potential loose connection.

8 If you are daisy chaining two 9764 CMCO, feed optical Ethernet cable through the second backhaul module cable gland and insert the daisy chain Ethernet cable connector into the SFP transceiver in the port labelled "BH 2".

BH2 port ———— ———— BH1 port

9 Reattach the backhaul module to the 9764 CMCO using the four retention screws.

> **Important!** Ensure the backhaul module gasket is seated correctly in the groove on the underside of the backhaul module. Tighten the four retention screws in the sequence shown. Recommended torque, 2.0 N.m (17.7 lb.in).

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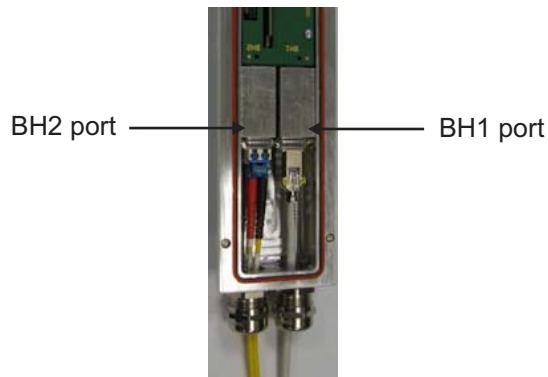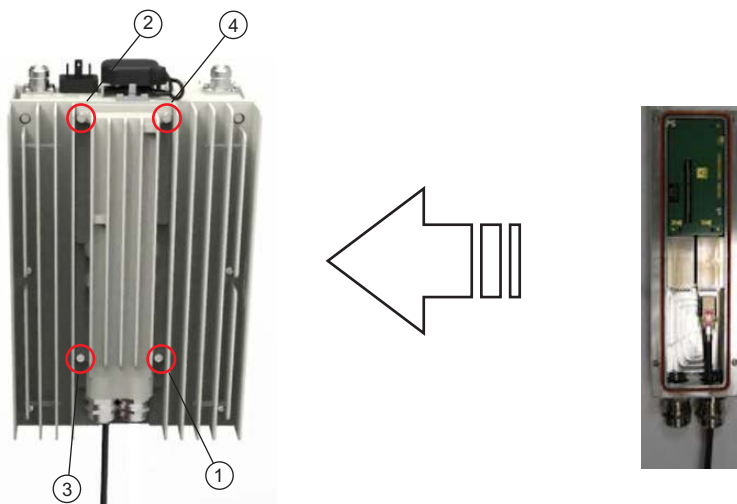
10   Finally, secure the Ethernet cable to the wall or pole.

Important! When securing cables ensure the following to avoid cable damage:

- Secure cables with tie wraps. Use additional tie wraps wherever necessary for neatness
- All cables should be run parallel with no twisting or tangled cables
- Avoid excessive tension on the cable.

E ND OF STEPS

Cable the optional external surge arrestor

Follow these steps to connect the Ethernet cables to the external surge arrestor.

1   On the surge arrestor, unscrew the lower weatherized strain relief connector and locking nut from the surge arrestor.

2   Carefully feed the end of Ethernet cable coming from the Customer Network Interface Device through the unscrewed lower strain relief connector.

3   Plug the Ethernet cable RJ45 connector into the lower connector on the arrestor. Screw the weatherized strain relief connector back onto the arrestor and tighten.

4   At the top of the arrestor, unscrew the upper weatherized strain relief connector from the surge arrestor.

5   Carefully feed the end of Ethernet cable coming from the 9764 CMCO through the upper strain relief connector.

6   Plug the Ethernet cable RJ45 connector into the upper connector on the arrestor. Screw the weatherized strain relief connector back onto the arrestor and tighten.

7   Finally, secure the Ethernet cable to the wall/pole.

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PRELIMINARY

PRELIMINARY

Important! When securing cables ensure the following to avoid cable damage:

- Secure cables with tie wraps. Use additional tie wraps wherever necessary for neatness.

- All cables should be run parallel with no twisting or tangled cables.

- Avoid excessive tension on the cable.

E ND OF STEPS

Installation

Overview

Purpose

This section provides the installation instructions for mounting the 9764 CMCO onto either a pole or wall with or without the optional tilt mechanism.

Contents

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Pole mount the 9764 CMCO

Purpose

This topic describes the procedures to be followed when installing the 9764 CMCO onto a pole using pole bands.

Prerequisites

A site survey has been conducted and a location for the device has been selected that is both central to the public space and elevated in order to maximize coverage. Before installation begins you should ensure the following are in place:

- Ensure adequate clearance is provided for service access.
- Ground cable has been routed and the site grounding system is in place.
- Backhaul cable has been routed and is in place.
- Any site specific fixing materials are available (for example, bolts, washers and wall plug materials).

  Attention: The 9764 CMCO must be mounted with the appropriate mounting hardware suitable for the various supporting structures, building materials and construction methods. Following a site survey, it is the responsibility of the customer to ensure that:

  - The installation support structure is adequate and compliant with ICC IBC (2012): International Building Code, and all other national and local codes.
  - The appropriate mounting hardware and any necessary recommended supporting anchor fixings are used.

Mounting requirements and materials

The 9764 CMCO can be easily mounted onto a wooden or metal pole. Refer to the following for the installation kits, anchor materials and tools for the installation type:

- For pole mount refer to, "Pole mount installation requirements" (p. 3-5).
- For a list of standard tools that may be required to support the installation, see "Tools required for installation" (p. 3-3).

Before you begin

Record the 9764 CMCO 18 digit serial number before mounting onto a pole.

Pole mount the 9764 CMCO

⚠️ 🚶 **WARNING**

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Perform the following procedure to pole mount the 9764 CMCO using standard pole bands.

1   Refer to the equipment orientation plan and, at the selected installation point on the pole, mark the upper and lower position of the pole bands. Using digital compass determine the planned left/right orientation of the 9764 CMCO mounting bracket around the pole and mark the center line of the left/right orientation on the pole.

2   Using the supplied stainless steel pole bands insert and thread the open band ends into the upper and lower slots on the reverse side of the mounting bracket.

Upper banding slots

Lower banding slots
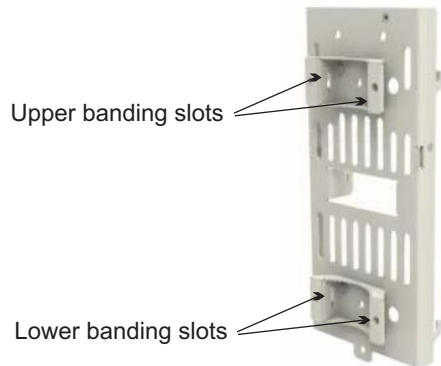
3   At the marked installation point on the pole place the bands around the pole at the determined height. Carry out any required adjustment of the mounting bracket around the pole so that it is pointing in the desired direction.

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4

If…	Then…
A surge arrestor[1] is to be mounted on the pole	Obtain the surge arrestor bracket from the surge arrestor kit and position the bracket lug behind either the upper or lower pole band. Once the surge arrestor bracket is in the desired position, proceed with the next step.
A surge arrestor is not used	Proceed with the next step.

Notes:

1. Although optional, Alcatel-Lucent strongly recommends for outdoor deployments, that when the backhaul connection is configured for electrical Ethernet (GBE 10/100/1000BaseT) a surge arrestor is installed, as the electrical SFP does not provide surge protection.

5 Once the mounting bracket is in the correct position and orientation tighten and secure the bands around the pole. Check the banding is secure, there is no movement of the bracket around the pole and that the banding stubs (cut ends) are flattened down with a hammer.

Note: Refer to *BAND-IT® C00169 Hand Tool Operation Instructions,* PO5886.

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....

6 To attach the 9764 CMCO to the mounting bracket open the mounting frame lever by pulling the lever outwards.

....
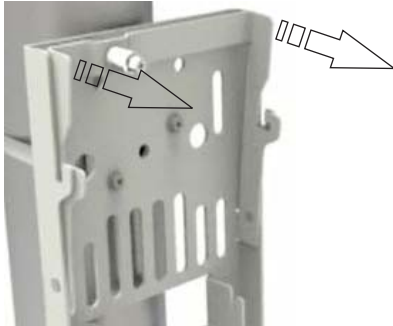
7 Align the mounting points on the reverse side of the 9764 CMCO with the mounting lugs on the bracket. Attach the 9764 CMCO to the bracket by sliding the 9764 CMCO forwards and downwards onto the bracket mounting lugs.

....

8 Secure the 9764 CMCO onto the mounting frame by tightening the lever retaining screw.

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9   Finally, check the 9764 CMCO is correctly locked into position and there is no movement of the module on the mounting frame.

E ND   O F   S T E P S

Mount surge arrestor (optional)


WARNING

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Although optional, Alcatel-Lucent strongly recommends for outdoor deployments, that when the backhaul connection is configured for electrical Ethernet (GBE 10/100/1000BaseT) a surge arrestor is installed, as the electrical SFP does not provide surge protection.

Follow these steps to mount the optional external surge arrestor onto the surge arrestor bracket where the surge arrestor bracket has already been banded to a pole.

1   On the surge arrestor, unscrew the lower weatherized strain relief connector and locking nut from the surge arrestor.

2   Site the surge arrestor onto the bracket so that the lower threaded Ethernet connection point is positioned through the arrestor mounting hole.

PRELIMINARY

3   Screw the arrestor locking nut back onto the arrestor and tighten so that the arrestor is securely attached to the bracket.

External
surge arrestor

E ND OF STEPS

Standard pole mount example

The following figure depicts a 9764 CMCO standard pole mount using pole bands.
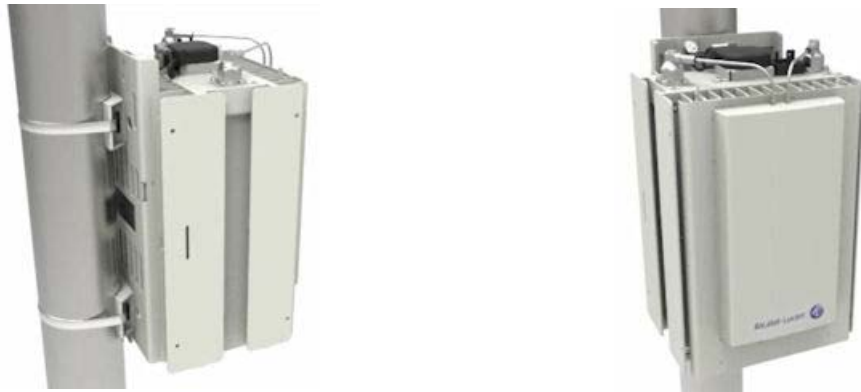
How to continue

After mounting the 9764 CMCO onto a pole the cables need to be connected. Continue with the Chapter 5, "Cabling" chapter.

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PRELIMINARY

PRELIMINARY

Pole mount the 9764 CMCO using optional tilt brackets

Purpose

This topic describes the procedures to be followed when installing the 9764 CMCO onto a pole using optional tilt brackets.

Prerequisites

A site survey has been conducted and a location for the device has been selected that is both central to the public space and elevated in order to maximize coverage. Before installation begins you should ensure the following are in place:

- Ensure adequate clearance is provided for service access.
- Ground cable has been routed and the site grounding system is in place.
- Backhaul cable has been routed and is in place.
- Any site specific fixing materials are available (for example, bolts, washers and wall plug materials).

  Attention: The 9764 CMCO must be mounted with the appropriate mounting hardware suitable for the various supporting structures, building materials and construction methods. Following a site survey, it is the responsibility of the customer to ensure that:

  - The installation support structure is adequate and compliant with ICC IBC (2012): International Building Code, and all other national and local codes.
  - The appropriate mounting hardware and any necessary recommended supporting anchor fixings are used.

Mounting requirements and materials

The 9764 CMCO can be easily mounted onto a wooden or metal pole. Refer to the following for the installation kits, anchor materials and tools for the installation type:

- For pole mount, refer to "Pole mount installation requirements" (p. 3-5).
- For a list of standard tools that may be required to support the installation, see "Tools required for installation" (p. 3-3).

Before you begin

Record the 9764 CMCO 18 digit serial number before mounting onto a pole.

Attach pole brackets onto a pole

⚠️ 🚶 **WARNING**

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.
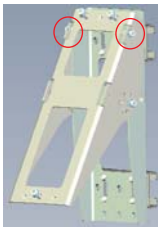
Perform the following procedure attach the tilt bracket onto a pole.

1   Refer to the equipment orientation plan and, at the selected installation point on the pole, mark the upper and lower position of the pole bands. Using digital compass determine the planned horizontal (left/right) orientation of the 9764 CMCO around the pole and mark the center line of the left/right orientation on the pole.

2   Using the supplied stainless steel pole bands insert and thread the open end of one band into the upper two slots on the tilt bracket.

Taking the other steel band insert and thread the open end into the lower two slots on the tilt bracket.

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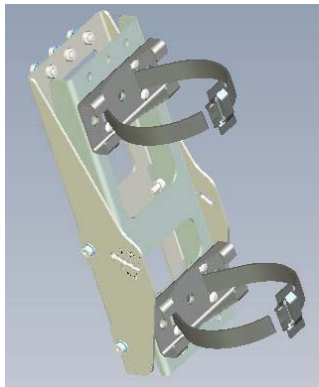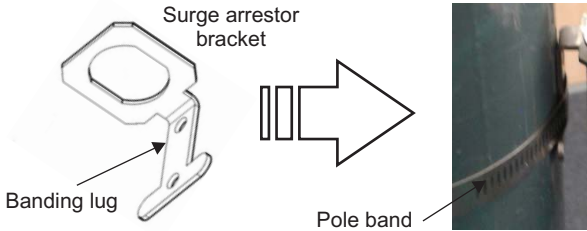
3   Depending on the required vertical tilt orientation ensure the bracket is positioned the correct way up before placing on the pole:

If...	Then...	View...
upward vertical tilt is required	the tilt bracket must be positioned with the pivot point at the top	
downward vertical tilt is required	the tilt bracket must be positioned with the pivot point at the bottom	

4   At the marked installation point on the pole wrap the upper and lower pole bands around the pole at the determined height. Carry out any required adjustment of the tilt bracket around the pole so that it is pointing in the desired direction.

5

If...	Then...
A surge arrestor[1] is to be mounted on the pole	Obtain the surge arrestor bracket from the surge arrestor kit and position the bracket lug behind either the upper or lower pole band. Once the surge arrestor bracket is in the desired position, proceed with the next step.

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If...	Then...
A surge arrestor is not used	Proceed with the next step.

Notes:

1. Although optional, Alcatel-Lucent strongly recommends for outdoor deployments, that when the backhaul connection is configured for electrical Ethernet (GBE 10/100/1000BaseT) a surge arrestor is installed, as the electrical SFP does not provide surge protection.

6   Once the tilt bracket is in the correct position and orientation tighten and secure the bands around the pole. Check the banding is secure, there is no movement of the bracket around the pole and that the banding stubs (cut ends) are flattened down with a hammer.

   Note: Refer to *BAND-IT® C00169 Hand Tool Operation Instructions,* PO5886.

7   On the reverse side of the 9764 CMCO mounting bracket unscrew the M4 pole grips bolts and remove the upper and lower pole grips from the bracket.

8   Unscrew and remove the two upper M6 bolts and the one lower M6 bolt from the tilt bracket.

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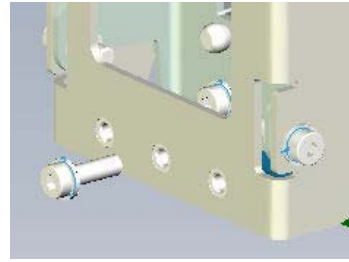
Upper M6 bolts (x2)

Lower M6 bolt (x1)

9 Position the 9764 CMCO mounting bracket against the front of the tilt bracket so that the two upper bolt holes and the single lower bolt hole on the 9764 CMCO mounting bracket are aligned with the bolts holes on the tilt bracket. From the 9764 CMCO mounting bracket side, screw in the two upper M6 bolts and lower M6 bolt to attach the brackets.
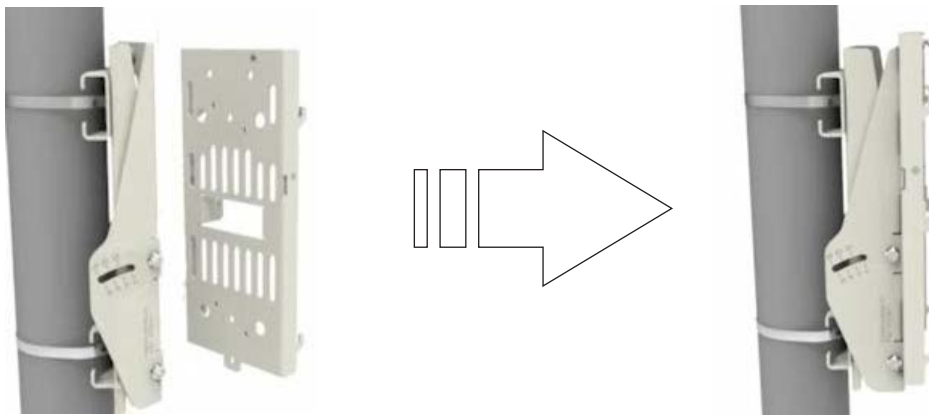
10 To attach the 9764 CMCO to the mounting bracket open the mounting frame lever by pulling the lever outwards.

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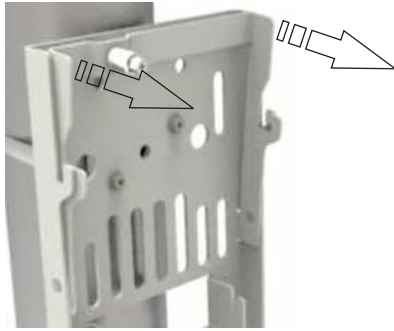
11 Align the mounting points on the reverse side of the 9764 CMCO with the mounting lugs on the bracket. Attach the 9764 CMCO to the bracket by sliding the 9764 CMCO forwards and downwards onto the bracket mounting lugs.

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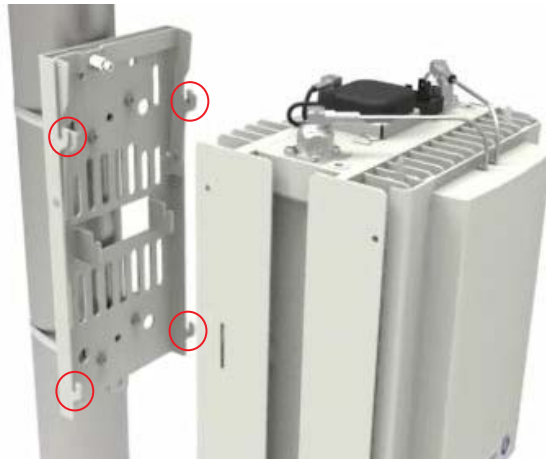
12 Secure the 9764 9764 CMCO onto the mounting frame by tightening the lever retaining screw.

13 Finally, check the 9764 CMCO is correctly locked into position and there is no movement of the module on the mounting frame.

E N D   O F   S T E P S

Mount surge arrestor (optional)

⚠️ ⚠️ **WARNING**
Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Although optional, Alcatel-Lucent strongly recommends for outdoor deployments, that when the backhaul connection is configured for electrical Ethernet (GBE 10/100/1000BaseT) a surge arrestor is installed, as the electrical SFP does not provide surge protection.
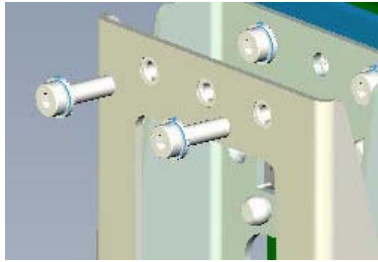
Follow these steps to mount the optional external surge arrestor onto the surge arrestor bracket where the surge arrestor bracket has already been banded to a pole.

1 On the surge arrestor, unscrew the lower weatherized strain relief connector and locking nut from the surge arrestor.

2 Site the surge arrestor onto the bracket so that the lower threaded Ethernet connection point is positioned through the arrestor mounting hole.

3   Screw the arrestor locking nut back onto the arrestor and tighten so that the arrestor is securely attached to the bracket.

External
surge arrestor

E ND OF STEPS

Pole mount with tilt example

The following figure depicts a pole mounted 9764 CMCO with tilt installation using pole bands.

How to continue

After mounting the 9764 CMCO onto a pole the cables need to be connected. Continue with the Chapter 5, "Cabling" chapter.

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Wall mount the 9764 CMCO

Purpose

This topic describes the procedures to be followed when installing the 9764 CMCO onto a wall or solid flat surface

Prerequisites

A site survey has been conducted and a location for the device has been selected that is both central to the public space and elevated in order to maximize coverage. Before installation begins you should ensure the following are in place:

- Ensure adequate clearance is provided for service access.
- Ground cable has been routed and the site grounding system is in place.
- Backhaul cable has been routed and is in place.
- Any site specific fixing materials are available (for example, bolts, washers and wall plug materials).

    Attention: The 9764 CMCO must be mounted with the appropriate mounting hardware suitable for the various supporting structures, building materials and construction methods. Following a site survey, it is the responsibility of the customer to ensure that:

    - The installation support structure is adequate and compliant with ICC IBC (2012): International Building Code, and all other national and local codes.
    - The appropriate mounting hardware and any necessary recommended supporting anchor fixings are used.

Mounting requirements and materials

The 9764 CMCO can be easily mounted onto solid concrete or wooden flat surface. Refer to the following for the installation kits, anchor materials and tools for the installation type:

- For wall mount, refer to "Wall mount installation requirements" (p. 3-7).
- For a list of standard tools that may be required to support the installation, see "Tools required for installation" (p. 3-3).

Before you begin

Record the 9764 CMCO 18 digit serial number before mounting onto a wall or flat surface.

Attach the mounting bracket

⚠ ⚠ **WARNING**

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Perform the following procedure to attach the 9764 CMCO mounting bracket directly onto a wall or flat surface.

....

1 At the selected installation location, mark the points on the wall for the mounting bracket anchor holes. See drill hole pattern below to use as a guide:
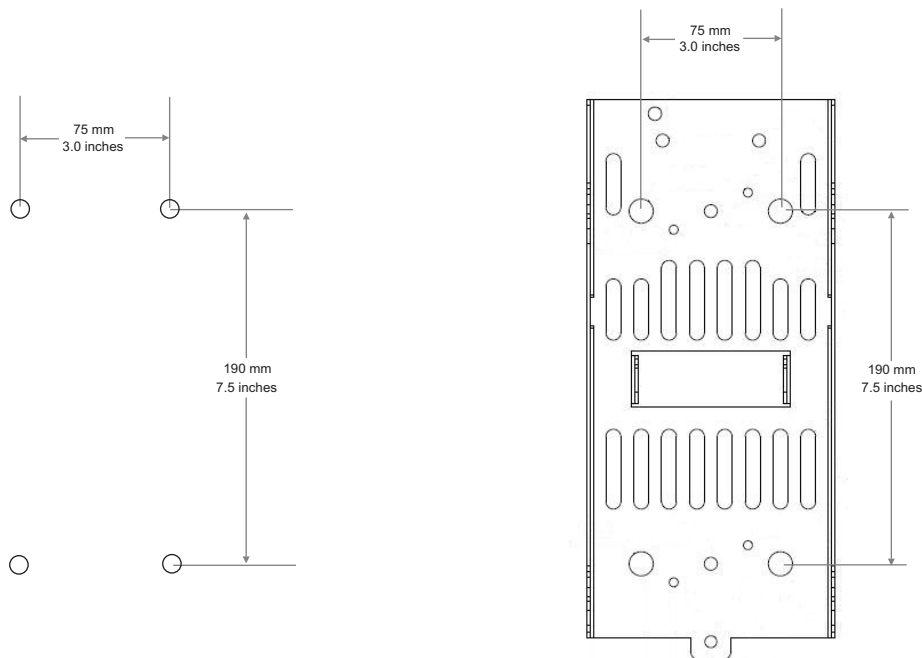
Tip: The 9764 CMCO mounting bracket can also be used as a template to mark the points on the wall for the fixing holes.

....

2 Check the horizontal marked position of the holes with a spirit level.

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3   Drill two upper holes and two lower holes at the marked points to the appropriate depth. Insert screw anchor plugs into the drilled holes and, using a hammer, tap home until the plugs are flush with the wall.

4   Align the mounting bracket bolt holes with the drilled wall anchor holes. Screw in the upper and lower bolts into the wall fixings to the appropriate depth so that the mounting bracket is securely attached to the wall.
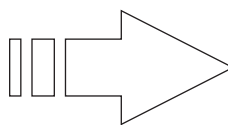
5   To attach the 9764 CMCO to the mounting bracket open the mounting frame lever by pulling the lever outwards.
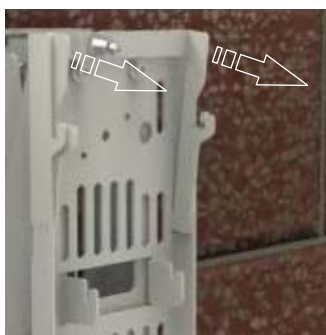
6   Align the mounting points on the reverse side of the 9764 CMCO with the mounting lugs on the bracket. Attach the 9764 CMCO to the bracket by sliding the 9764 CMCO forwards and downwards onto the bracket mounting lugs.

PRELIMINARY
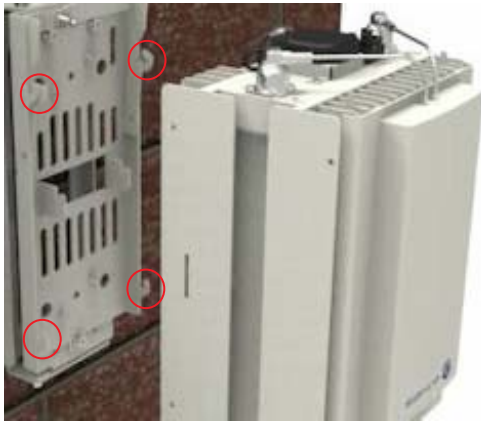
7   Secure the 9764 9764 CMCO onto the mounting frame by tightening the lever retaining screw.

8   Finally, check the 9764 CMCO is correctly locked into position and there is no movement of the module on the mounting frame.

E N D   O F   S T E P S

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PRELIMINARY

PRELIMINARY

Mount surge arrestor (optional)

⚠️ ⚠️ **WARNING**

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Although optional, Alcatel-Lucent strongly recommends for outdoor deployments, that when the backhaul connection is configured for electrical Ethernet (GBE 10/100/1000BaseT) a surge arrestor is installed, as the electrical SFP does not provide surge protection.

Follow these steps to attached the surge arrestor bracket to a wall and mount the optional external surge arrestor onto the surge arrestor bracket.

1   At the selected mounting location for the surge arrestor, mark the points on the wall for the mounting bracket anchor holes. See drill hole pattern below to use as a guide:


30 mm
(1.2 inches)

Tip: The surge arrestor mounting bracket can be used as a template to mark the points on the wall for the fixing holes.

2   Drill the upper hole and lower hole at the marked points to the appropriate depth. Insert screw anchor plugs into the drilled holes and, using a hammer, tap home until the plugs are flush with the wall.

3   Align the surge arrestor mounting bracket bolt holes with the drilled wall anchor holes. Screw the upper and lower bolts into the wall fixings to the appropriate depth so that the mounting bracket is securely attached to the wall.

4   On the surge arrestor, unscrew the lower weatherized strain relief connector and locking nut from the surge arrestor.

5   Site the surge arrestor onto the bracket so that the lower threaded Ethernet connection point is positioned through the arrestor mounting hole.

6   Screw the arrestor locking nut back onto the arrestor and tighten so that the arrestor is securely attached to the bracket.

E ND OF STEPS

Standard wall mount example

The following figure depicts a standard 9764 CMCO wall mount installation.

How to continue

After mounting the 9764 CMCO onto a wall or flat surface the cables need to be connected. Continue with the Chapter 5, "Cabling" chapter.

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Wall mount the 9764 CMCO using optional tilt brackets

Purpose

This topic describes the procedures to be followed when the 9764 CMCO is required to be mounted onto a wall or solid flat surface using tilt brackets (vertical, horizontal or combined horizontal/vertical).

Prerequisites

A site survey has been conducted and a location for the device has been selected that is both central to the public space and elevated in order to maximize coverage. Before installation begins you should ensure the following are in place:

- Ensure adequate clearance is provided for service access.
- Ground cable has been routed and the site grounding system is in place.
- Backhaul cable has been routed and is in place.
- Any site specific fixing materials are available (for example, bolts, washers and wall plug materials).

   Attention: The 9764 CMCO must be mounted with the appropriate mounting hardware suitable for the various supporting structures, building materials and construction methods. Following a site survey, it is the responsibility of the customer to ensure that:

   - The installation support structure is adequate and compliant with ICC IBC (2012): International Building Code, and all other national and local codes.
   - The appropriate mounting hardware and any necessary supporting anchor fixings are used.

Mounting requirements and materials

The 9764 CMCO can be easily mounted onto solid concrete or wooden flat surface. Refer to the following for the installation kits, anchor materials and tools for the installation type:

- For wall mount, refer to "Wall mount installation requirements" (p. 3-7).
- For a list of standard tools that may be required to support the installation, see "Tools required for installation" (p. 3-3).

Before you begin

Record the 9764 CMCO 18 digit serial number before mounting onto a wall.

Tilt configurations

Carry out one of the following procedures depending on the required tilt installation configuration:

If..	Then..
Mounting for vertical tilt only	Carry out the procedure, "Mount the vertical tilt and 9764 CMCO brackets" (p. 4-39)
Mounting for horizontal tilt only	Carry out the procedure, "Mount combined horizontal/vertical tilt and 9764 CMCO brackets" (p. 4-47)
Mounting for combined horizontal and vertical tilt	Carry out the procedure, "Mount combined horizontal/vertical tilt and 9764 CMCO brackets" (p. 4-47)

Mount the vertical tilt and 9764 CMCO brackets

WARNING

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Perform the following procedure to mount a vertical tilt bracket onto a flat surface or wall and then attach the 9764 CMCO bracket.

1   At the selected installation location, mark the points on the wall for the tilt bracket anchor holes. See drill hole pattern below to use as a guide:

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52 mm
2.0 inches

52 mm
2.0 inches

270 mm
10.6 inches

270 mm
10.6 inches

Note: If the vertical tilt bracket is available it can be placed against the wall and be used as a template to mark the points on the wall for the bracket anchor holes.

Check the horizontal marked position of the holes with a level.

2 Drill two upper holes and two lower holes at the marked points to the appropriate depth. Insert screw anchor plugs into the drilled holes and, using a hammer, tap home until the plugs are flush with the wall.

3 Remove the two tilt angle positioning gauge bolts on either side of the vertical tilt bracket and allow the front part of the bracket to pivot away allowing easier access to the bracket anchor holes.

Bracket anchor holes

Tilt angle positioning gauge bolt

Tilt angle positioning gauge bolt

Bracket anchor holes

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4   Depending on the required vertical tilt orientation ensure the bracket is positioned the correct way up before placing on the wall:

If...	Then...	View...
upward vertical tilt is required	the tilt bracket must be positioned with the pivot point at the top	
downward vertical tilt is required	the tilt bracket must be positioned with the pivot point at the bottom	

5   Align the vertical tilt bracket bolt holes with the drilled wall anchor holes. Screw in the upper and lower bolts into the wall fixings to the appropriate depth so that the tilt bracket is securely attached to the wall.

Recommended screw torque; 7.0 N.m (62.0 lb.in).

6   Unscrew and remove the two upper and one lower M6 bolts from the vertical tilt bracket in readiness for attaching the 9764 CMCO bracket.

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7 Next, on the reverse side of the 9764 CMCO mounting bracket unscrew the M4 pole grips bolts and remove the upper and lower pole grips from the bracket.

8 Position the 9764 CMCO mounting bracket against the front of the tilt bracket so that the two upper bolt holes and the single lower bolt hole on the 9764 CMCO mounting bracket are aligned with the bolts holes on the tilt bracket.

From the 9764 CMCO mounting bracket side, screw in the two upper M6 bolts and lower M6 bolt to attach the 9764 CMCO mounting bracket to the vertical tilt bracket.

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9   Once the brackets are mounted the 9764 CMCO can be attached. Continue with "Attach 9764 CMCO to the mounting bracket" (p. 4-53).

E ND OF STEPS

Mount the horizontal tilt and 9764 CMCO brackets

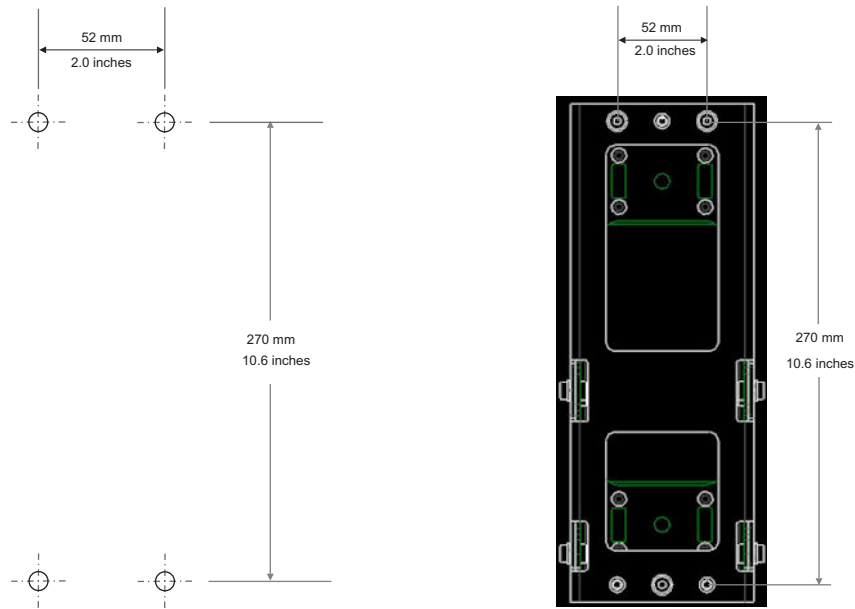## WARNING
Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Perform the following procedure to mount a horizontal tilt bracket onto a flat surface or wall and then attach the 9764 CMCO bracket.
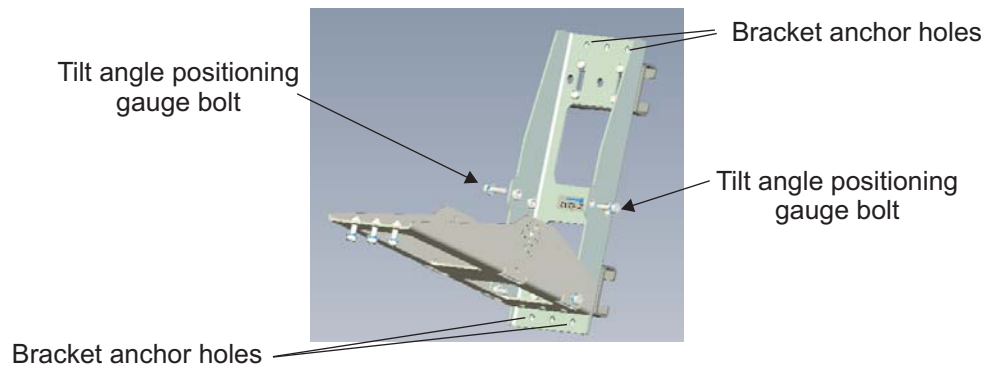
1   At the selected installation location, mark the points on the wall for the bracket anchor holes. See drill hole pattern below to use as a guide:

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Note: If the horizontal tilt bracket is available it can be placed against the wall and be used as a template to mark the points on the wall for the bracket anchor holes.

Check the horizontal marked position of the holes with a level.

....

2   Drill two upper holes and two lower holes at the marked points to the appropriate depth. Insert screw anchor plugs into the drilled holes and, using a hammer, tap home until the plugs are flush with the wall.

....

3   Remove the two tilt angle positioning gauge bolts from the top and bottom of the horizontal tilt bracket and swing the horizontal tilt bracket arms outwards allowing easier access to the bracket anchor holes.

4   Depending on the required horizontal tilt orientation ensure the bracket is the correct way up before securing the bracket onto the wall:

If…	Then…	View…
left horizontal tilt is required	the tilt bracket must be positioned with the pivot point on the left	
right horizontal tilt is required	the tilt bracket must be positioned with the pivot point on the right	

5   Align the horizontal tilt bracket bolt holes with the drilled wall anchor holes and screw in the upper and lower bolts into the wall fixings to the appropriate depth so that the tilt bracket is securely attached to the wall.

Swing the horizontal tilt bracket arms inwards and replace the two tilt angle positioning gauge bolts into the top and bottom of the horizontal tilt bracket.

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6   Unscrew and remove the two upper M6 bolts and the one lower M6 bolt from the horizontal tilt bracket in readiness for attaching the 9764 CMCO bracket.
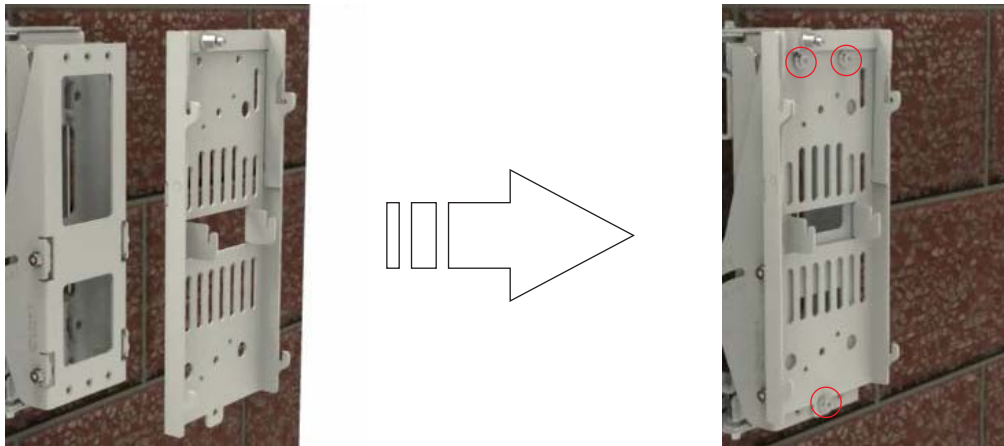

7   Position the 9764 CMCO mounting bracket against the front of the horizontal tilt bracket so that the two upper bolt holes and the single lower bolt hole on the 9764 CMCO mounting bracket are aligned with the bolts holes on the horizontal tilt bracket.

From the 9764 CMCO mounting bracket side, screw in the two upper M6 bolts and lower M6 bolt to attach the 9764 CMCO mounting bracket to the horizontal tilt bracket.

PRELIMINARY

PRELIMINARY
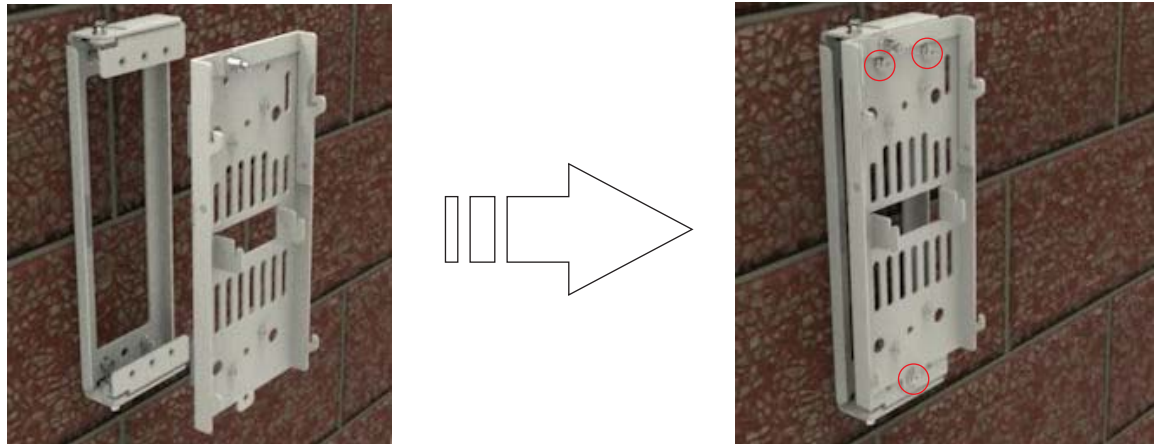
8   Once the brackets are mounted the 9764 CMCO can be attached. Continue with "Attach 9764 CMCO to the mounting bracket" (p. 4-53).

E ND OF STEPS

Mount combined horizontal/vertical tilt and 9764 CMCO brackets
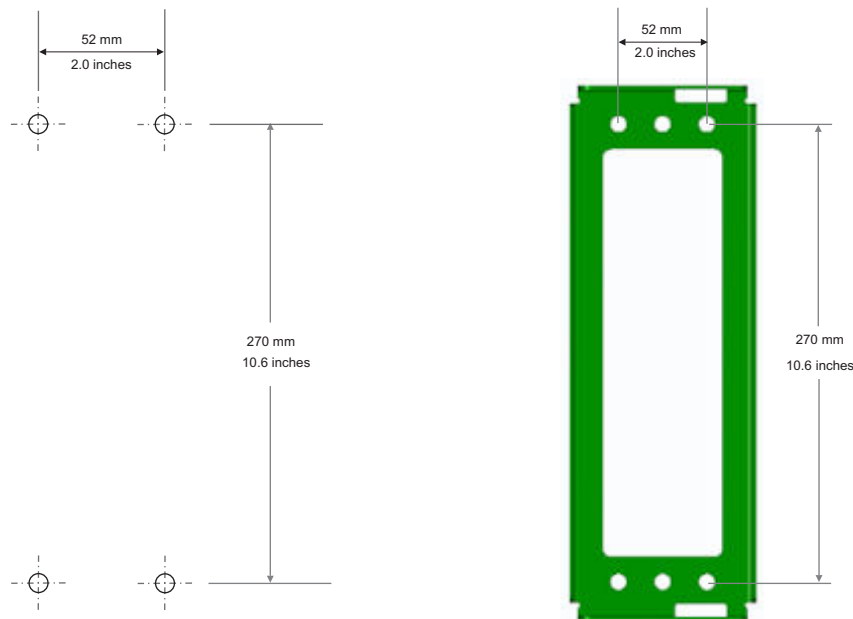
WARNING

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Perform the following procedure to mount combined horizontal/vertical tilt brackets onto a flat surface or wall and then attach the 9764 CMCO bracket.
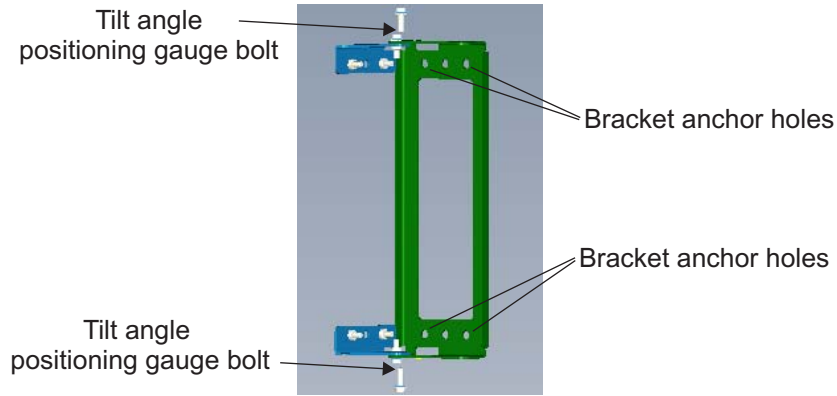
1   At the selected installation location, mark the points on the wall for the bracket anchor holes. See drill hole pattern below to use as a guide:
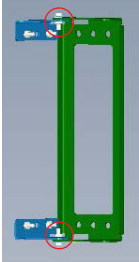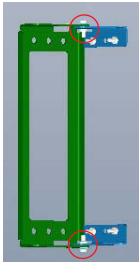
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52 mm
2.0 inches

52 mm
2.0 inches

270 mm
10.6 inches

270 mm
10.6 inches

Note: If the horizontal tilt bracket is available it can be placed against the wall and be used as a template to mark the points on the wall for the bracket anchor holes.

Check the horizontal marked position of the holes with a level.

2   Drill two upper holes and two lower holes at the marked points to the appropriate depth. Insert screw anchor plugs into the drilled holes and, using a hammer, tap home until the plugs are flush with the wall.

3   Remove the two tilt angle positioning gauge bolts from the top and bottom of the horizontal tilt bracket and swing the horizontal tilt bracket arms outwards allowing easier access to the bracket anchor holes.
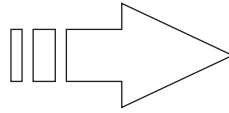
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4   Depending on the required horizontal tilt orientation ensure the bracket is the correct way up before securing the bracket onto the wall:

If…	Then…	View…
left horizontal tilt is required	the tilt bracket must be positioned with the pivot point on the left	
right horizontal tilt is required	the tilt bracket must be positioned with the pivot point on the right	

5   Align the horizontal tilt bracket bolt holes with the drilled wall anchor holes and crew in the upper and lower bolts into the wall fixings to the appropriate depth so that the bracket is securely attached to the wall.

Swing the horizontal tilt bracket arms inwards and replace the two tilt angle positioning gauge bolts into the top and bottom of the horizontal tilt bracket.

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PRELIMINARY

PRELIMINARY
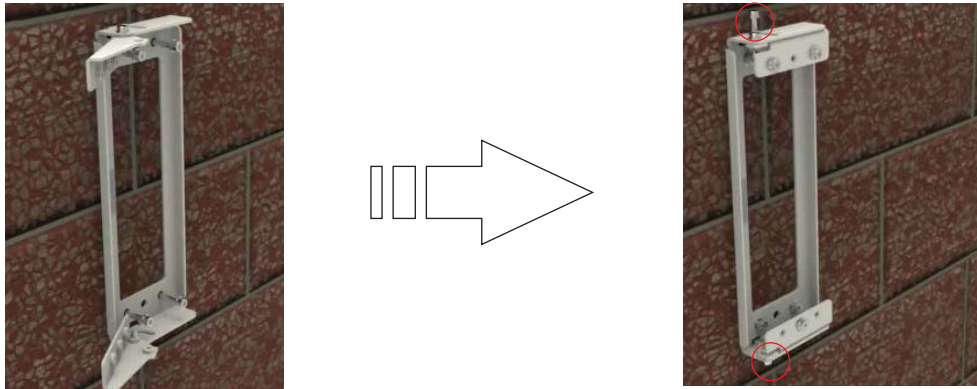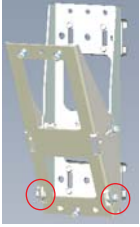
6 Remove the two tilt angle positioning gauge bolts on either side of the vertical tilt bracket and allow the front part of the bracket to pivot away allowing easier access to the bracket anchor holes.
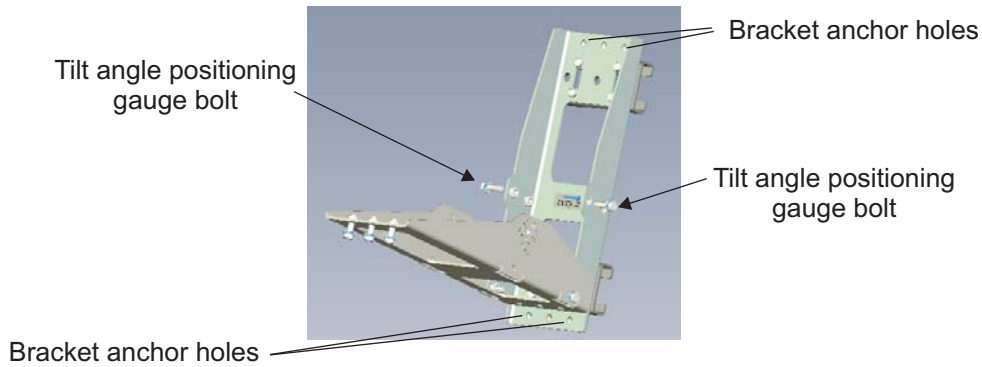
7 Align the attachment holes on the vertical tilt bracket with the attachments holes on the horizontal tilt bracket. Depending on the required vertical tilt orientation ensure the bracket is positioned the correct way up before attaching to the horizontal tilt bracket.

If…	Then…	View…
upward vertical tilt is required	the tilt bracket must be positioned with the pivot point at the top	

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If...	Then...	View...
downward vertical tilt is required	the tilt bracket must be positioned with the pivot point at the bottom	

8 Insert the two upper and two lower bolts through the attachment holes on the vertical tilt bracket and through the attachment holes on the horizontal tilt bracket.

For each bolt, screw on the retaining nut. Using a 10 mm ratchet wrench, tighten the two upper and two lower M6 retaining bolts so that the brackets are securely attached.

Recommended screw torque; 7.0 N.m (62.0 lb.in).
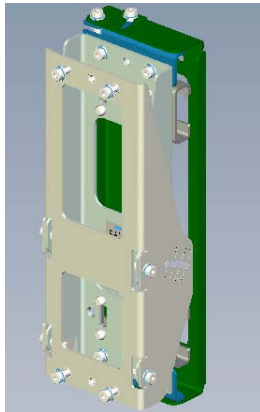
9 Unscrew and remove the two upper and one lower M6 bolts from the vertical tilt bracket in readiness for attaching the 9764 CMCO bracket.

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10 Next, on the reverse side of the 9764 CMCO mounting bracket unscrew the M4 pole grips bolts and remove the upper and lower pole grips from the bracket.

11 Position the 9764 CMCO mounting bracket against the front of the tilt bracket so that the two upper bolt holes and the single lower bolt hole on the 9764 CMCO mounting bracket are aligned with the bolts holes on the tilt bracket.

From the 9764 CMCO mounting bracket side, screw in the two upper and one lower M6 bolts to attach the 9764 CMCO mounting bracket to the vertical tilt bracket.

PRELIMINARY
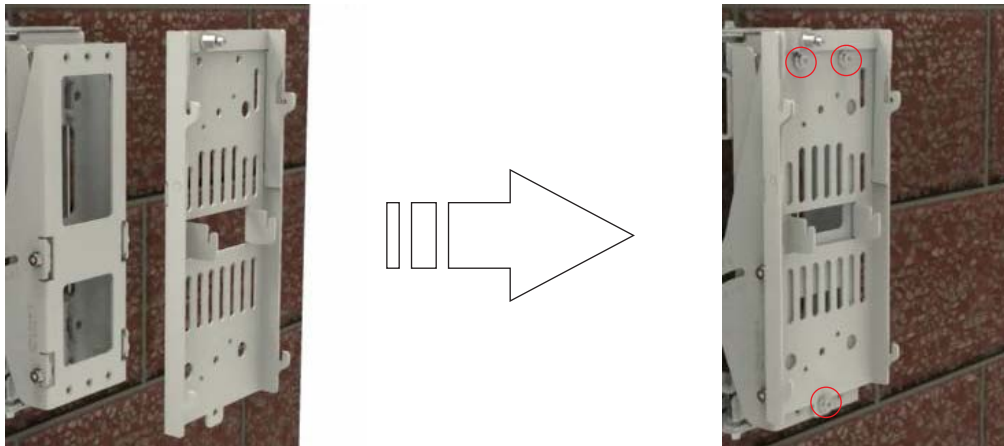
12 Once the brackets are mounted the 9764 CMCO can be attached. Continue with "Attach 9764 CMCO to the mounting bracket" (p. 4-53).

E ND OF STEPS

Attach 9764 CMCO to the mounting bracket

⚠ ⚠ **WARNING**
Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Perform the following procedure to attach the 9764 CMCO to the mounting bracket.

1 Open the mounting frame lever by pulling the lever outwards.

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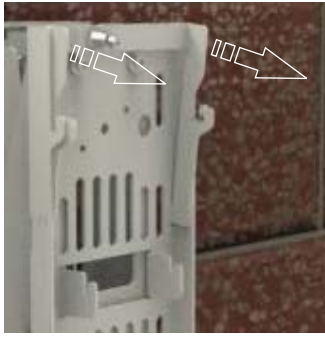
2 Align the mounting points on the reverse side of the MCO Compact with the mounting lugs on the bracket. Attach the MCO Compact to the bracket by sliding the MCO Compact forwards and downwards onto the bracket mounting lugs.

3 Secure the MCO Compact onto the mounting frame by tightening the lever retaining screw.

PRELIMINARY

PRELIMINARY

4 Finally, check the 9764 CMCO is correctly locked into position and there is no movement of the module on the mounting frame.

E ND OF STEPS

Mount surge arrestor (optional)

⚠️ **WARNING**
Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

Although optional, Alcatel-Lucent strongly recommends for outdoor deployments, that when the backhaul connection is configured for electrical Ethernet (GBE 10/100/1000BaseT) a surge arrestor is installed, as the electrical SFP does not provide surge protection.

Follow these steps to attached the surge arrestor bracket to a wall and mount the optional external surge arrestor onto the surge arrestor bracket.

1 At the selected mounting location for the surge arrestor, mark the points on the wall for the mounting bracket anchor holes. See drill hole pattern below to use as a guide:

30 mm
(1.2 inches)

Tip: The surge arrestor mounting bracket can be used as a template to mark the points on the wall for the fixing holes.

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2   Drill the upper hole and lower hole at the marked points to the appropriate depth. Insert screw anchor plugs into the drilled holes and, using a hammer, tap home until the plugs are flush with the wall.

3   Align the surge arrestor mounting bracket bolt holes with the drilled wall anchor holes. Screw the upper and lower bolts into the wall fixings to the appropriate depth so that the mounting bracket is securely attached to the wall.
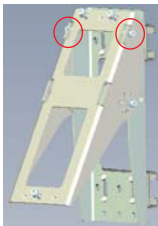
4   On the surge arrestor, unscrew the lower weatherized strain relief connector and locking nut from the surge arrestor.

5   Site the surge arrestor onto the bracket so that the lower threaded Ethernet connection point is positioned through the arrestor mounting hole.

6   Screw the arrestor locking nut back onto the arrestor and tighten so that the arrestor is securely attached to the bracket.

E ND OF STEPS

Wall mount with horizontal/vertical tilt example

The following figure depicts a 9764 CMCO wall mount installation with horizontal/vertical tilt.

Wall mount horizontal tilt only

Wall mount horizontal and vertical tilt

How to continue

After mounting the 9764 CMCO onto a wall the cables need to be connected. Continue with the Chapter 5, "Cabling" chapter.

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5 Cabling

Overview

Purpose

This chapter provides instructions for routing and connecting the following cables to the 9764 CMCO:

- Ground cable
- External RF antenna cable
- External GPS antenna cable
- Power cable

Contents

Connect ground cable

Purpose

Follow this procedure to connect the ground cable to the 9764 CMCO.

Before you begin

Ensure the following:

- All site preparation activities for cabling have been completed.
- All installation procedures for the 9764 CMCO have been completed.

Steps

Note: The 9764 CMCO must be grounded with a 16 mm^2 ground cable (Type NYY-1x16 mm^2 or similar) to a grounding system.

The grounding cable is not included in the delivery and must be locally supplied.

To attach the ground cable perform the following steps:

....

1   Route the ground cable from the ground system to the 9764 CMCO.

....

2   At the 9764 CMCO, cut the cable to a proper length, strip the cable end and crimp a 2-hole ground lug, with holes suitable for M6 screws, on the end of the cable.

Clean the contact surface area and use antioxidant to avoid oxidation.

....

3   Connect the ground lug to the grounding point on the 9764 CMCO using the supplied M6 screws, lock washers, and flat washers. Use antioxidant at the grounding pads.

Figure 5-1   Position of grounding point

Double lug
ground point
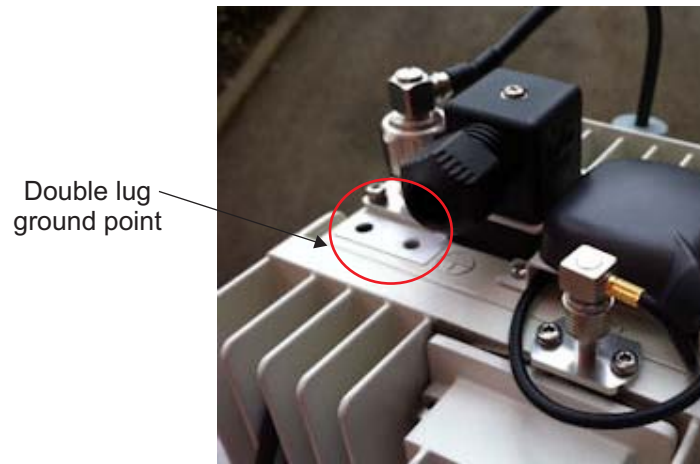
4   Finally, secure the grounding cable to the wall or pole.

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PRELIMINARY

PRELIMINARY

Connect RF antennas

Purpose

Two RF antenna connectors are located externally on the top of the 9764 CMCO, giving the service provider the option of either connecting an attached RF antenna or connecting to two externally cabled RF antennas.

Use this procedure to connect RF antenna cables to the 9764 CMCO.

> **Note:** Alcatel-Lucent supplies the attached RF antenna attached to a solar shield. Alcatel-Lucent does not supply external RF antennas for the 9764 CMCO.

Before you begin

Ensure that the following tools are available:

- Adjustable (crescent) wrenches
- Torque ratchet (socket wrench)
- Items such as crimping tools that are appropriate for attaching a new cable connector to the RF antenna cable
- Protective eye wear

Safety statements

⚠️ ⚠️ **WARNING**
Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

These admonishments apply throughout this procedure. Refer to the Safety statements chapter for general safety information.

Connect attached RF antennas

Use this procedure to attach and connect the attached RF antenna.

....

1   If a solar shield (without an RF antenna attached) is already attached to the 9764 CMCO, then remove the solar shield from the 9764 CMCO by pressing the two levers (1 in the figure below) and sliding the solar shield (2 in the figure) upwards. No tools are required to do this.

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2   Attach the solar shield (to which the RF antenna is fixed) to the 9764 CMCO by placing it on the front of the 9764 CMCO and sliding it downwards until a click is heard.

3   Locate the N-type RF antenna connectors on the top of the 9764 CMCO.

RF antenna connector (N-type)

RF antenna connector (N-type)

9764 Compact MCO (top view)

4   Connect each antenna cable by pushing the antenna cable connector onto the N-type connector on the top of 9764 CMCO and firmly tighten the connectors by hand.

RF antenna connector ———→   ←——— RF antenna connector
Lever ———→   ←——— Lever
Solar shield ———→
RF antenna ———————→

E ND OF STEPS

Connect external RF antennas

Use this procedure to connect external RF antennas.

1   Refer to the RF antenna mounting instructions included with the RF antenna kit for the steps to mount the antennas.

2   Locate the N-type RF antenna connectors on the top of the 9764 CMCO.

RF antenna
connector
(N-type)

RF antenna
connector
(N-type)

9764 Compact MCO (top view)

3   Connect each RF adapter cable by pushing the adapter cable connector onto the 9764 CMCO N-type connector until it clicks into place.

E ND OF STEPS

PRELIMINARY

Connect GPS antenna

Purpose

Use this procedure to connect an external (remote) GPS antenna cable to the 9764 CMCO.

Integrated GPS antenna

The 9764 CMCO is supplied with an integrated GPS antenna attached to the top of the MCO, and connected to the QMA connector on the top of the MCO. The integrated GPS antenna is a part of the 9764 CMCO and must not be removed, even if you are intend to connect an external GPS antenna.

External GPS antenna

The following figure shows the external GPS antenna and its mounting kit:

Figure 5-2 External GPS antenna configuration
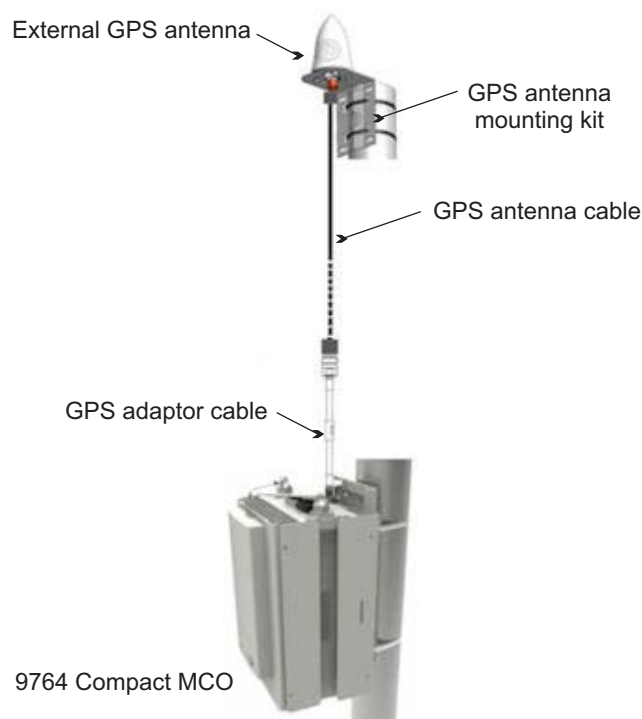
PRELIMINARY

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Before you begin

Ensure that the following tools are available:

- Adjustable (crescent) wrenches
- Torque ratchet (socket wrench)
- Items such as crimping tools that are appropriate for attaching a new cable connector to the GPS cable
- Protective eye wear

  Important! Do not mount the GPS antenna within 10 feet (3 m) of any transmit antenna.

Safety statements

⚠️ ⚠️ **WARNING**
Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

These admonishments apply throughout this procedure. Refer to the Safety statements chapter for general safety information.

Connect external GPS antenna

....

1 Refer to the GPS antenna mounting instructions included with the GPS antenna kit for the steps to mount the antenna.

....

2 Locate the GPS antenna connector on the top of the 9764 CMCO.

Figure 5-3 External GPS antenna connector

GPS antenna connector (QMA)

Integrated GPS antenna (attached)

PRELIMINARY   PRELIMINARY

PRELIMINARY
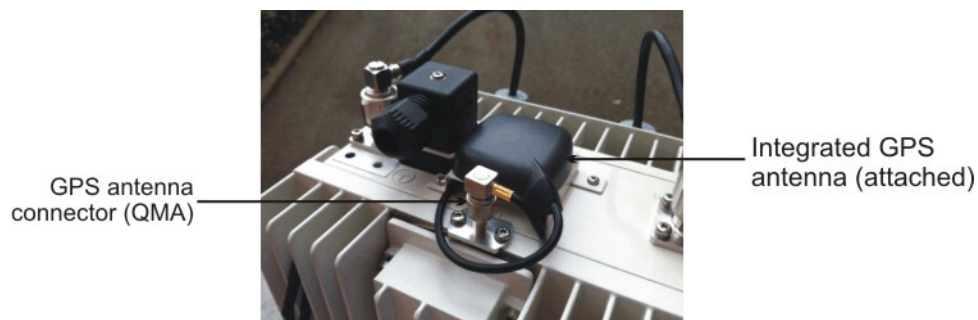
3   Disconnect the integrated GPS antenna cable from the GPS antenna connector on the top of the MCO.

4   Connect the GPS adapter cable by pushing the adapter cable connector onto the 9764 CMCO QMA-type GPS antenna connector until it clicks into place.

Cable connector

MCO QMA connector
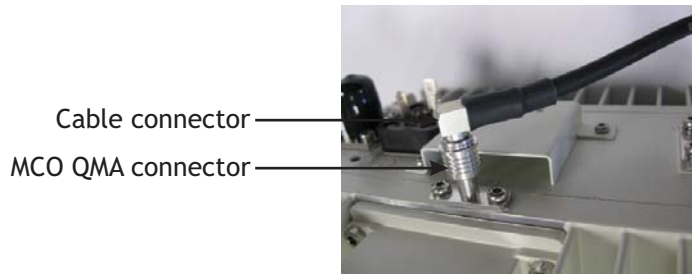
5   Apply weatherizing tape at the point indicated by the red arrows shown in the following figure:

PRELIMINARY
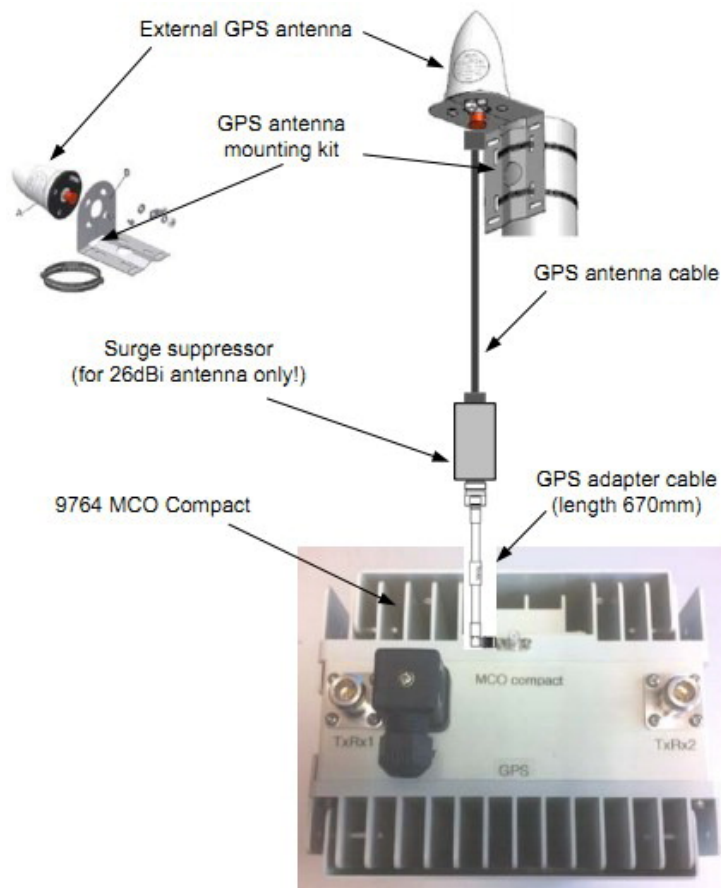
First, apply Linerless rubber splicing tape, then apply vinyl electrical tape over the Linerless rubber splicing tape.

E ND OF STEPS

Connect power cable

Purpose

This topic describes the procedures to be followed when connecting the power cable to the 9764 CMCO.

Connections

The following figure shows the power connection interface of the 9764 CMCO:

Figure 5-4 Power connection interface

Power connector
(connector attached)
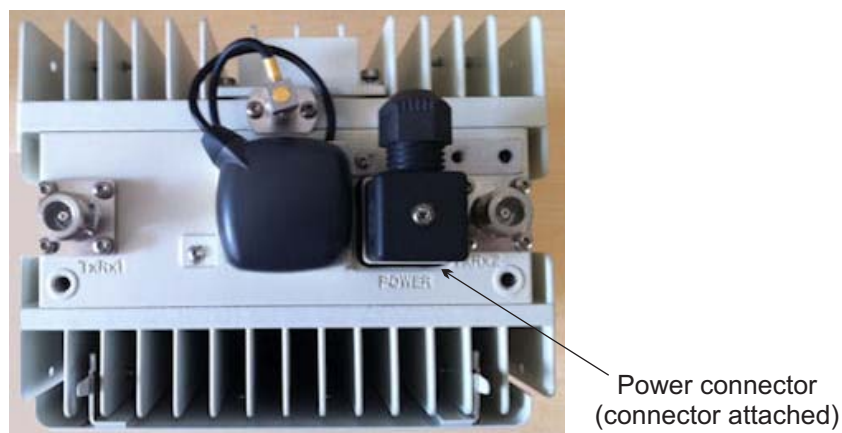
9764 Compact MCO (top view)

Power cable

The 9764 CMCO is equipped with a Standard IEC60320 C16 power socket. The Alcatel-Lucent supplied power cable and connector should be used with this equipment.

Before you begin

Depending on whether your 9764 CMCO requires AC or DC power, select the appropriate procedure from the following table:

If...	Then follow this procedure
your MCO requires AC power	"Connect AC power cord" (p. 5-13)
your MCO requires DC power	"Connect DC power cord" (p. 5-14)

In the United States and Canada, outdoor cords, whether installed as cord pendants or with mating plug/receptacles, shall comply with NEC Article 400 or Canadian Electrical Code, Part I Rule 4-012.

Connect AC power cord

⚠️⚡ DANGER
Electric-shock hazard

Since the 9764 CMCO operates on 120-220 V AC, the risk of serious injury or death from electrocution exists throughout this procedure.

Follow the first step of this procedure carefully and completely.

⚠️🚶 WARNING
Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

1   Ensure that the power that feeds the AC power cable to the 9764 CMCO is OFF, and block access so that no one can restore power to that cable during this procedure.

2   Plug the AC power connector on the power cord into the power connector on the top of the 9764 CMCO module.

3   Fix the AC power connector in position by tightening the screw on the AC power connector. Using a screwdriver with a Phillips head, torque to 0.4 Nm (0.295 lb ft).

Power connection point on 9764 CMCO

4   Lower the power connector cover over the power connector, align the captive TORX M3x5 attachment screw on the power connector cover with the screw hole in the 9764 CMCO, and fix the power connector cover in position by inserting the screw into the screw hole and tightening.

Power connector
cover

Captive TORX
M3x5 screw

E ND OF STEPS

Connect DC power cord

DANGER

Electric-shock hazard

Since the 9764 CMCO operates on DC power, the risk of serious injury or death from electrocution exists throughout this procedure.

Follow the first step of this procedure carefully and completely.

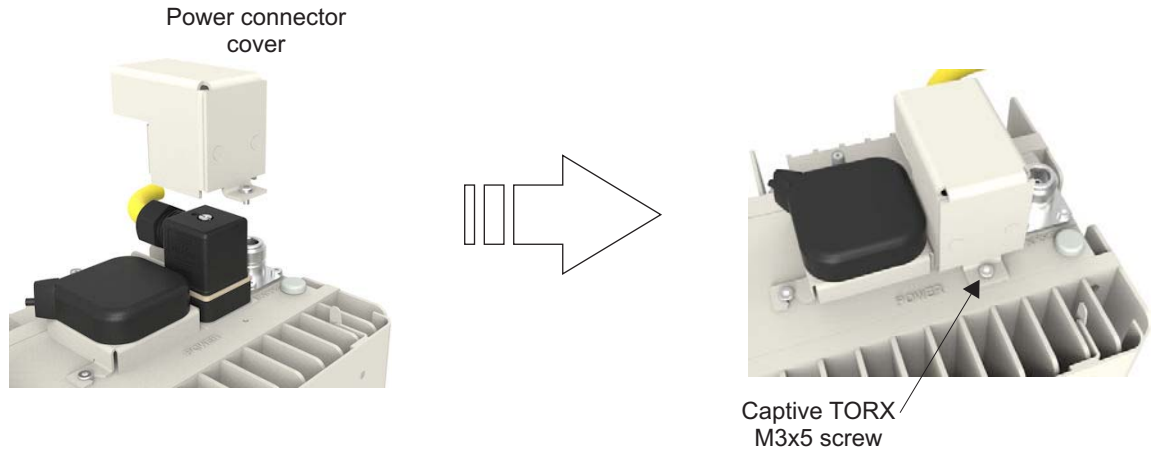**WARNING**

Fall hazard

Falls can occur when working at heights resulting in serious personal injury or death.

To prevent a fall when working at heights (ladder, scaffold, manlift, roof etc.) follow safe work practices and wear appropriate fall protection equipment.

1   Ensure that the power that feeds the DC power cable to the 9764 CMCO is OFF, and block access so that no one can restore power to that cable during this procedure.

2   Plug the DC power connector on the power cord into the power connector on the top of the 9764 CMCO module.

3   Fix the DC power connector in position by tightening the screw on the DC power connector. Using a screwdriver with a Phillips head, torque to 0.4 Nm (0.295 lb ft).

Power connection point on 9764 CMCO

4   Lower the power connector cover over the power connector, align the captive TORX M3x5 attachment screw on the power connector cover with the screw hole in the 9764 CMCO, and fix the power connector cover in position by inserting the screw into the screw hole and tightening.

Power connector cover

Captive TORX M3x5 screw

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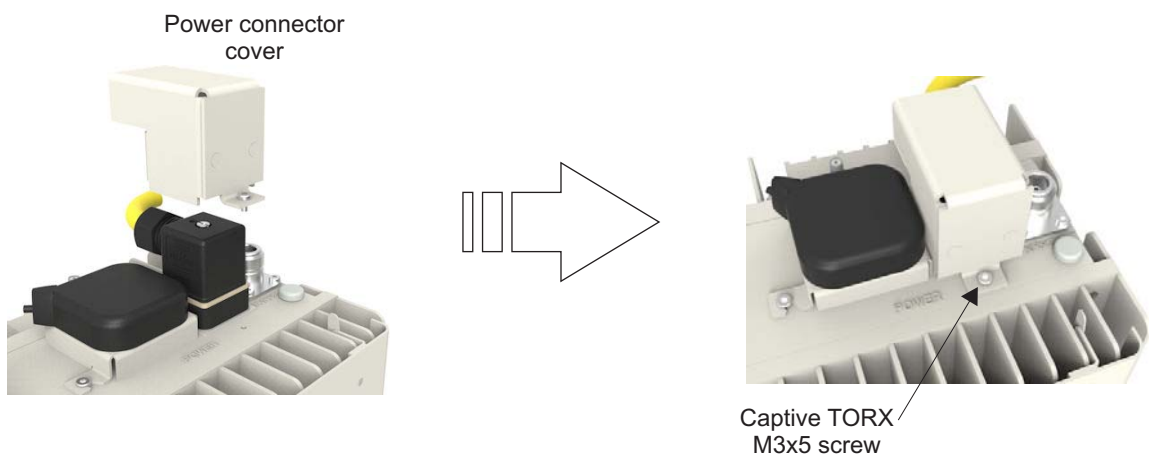
6 Post-installation

Overview

Purpose

This chapter provides post-installation information and activities that should be carried out after the Alcatel-Lucent 9764 Compact Metro Cell Outdoor has been installed.

Contents

Final installation activities and checks

Overview

This topic describes the final Alcatel-Lucent 9764 Compact Metro Cell Outdoor installation activities and checks to be carried out.

Final installation checks

Before leaving the installation site, check the following:

1   Check the overall installation. Verify that mounted equipment is secure and that no unintentional mechanical alteration has occurred to either the equipment itself or the installation infrastructure.

2   Ensure all the exterior connections are secure.

3   Ensure all cables are secured along their routes.

4   Finally, inspect the site for loose tools, materials, and parts. Remove all such loose tools, materials, and parts.

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Appendix A: 9764 CMCO service position

Overview

Purpose

This appendix provides instructions on how to place the 9764 CMCO into the service position, allowing access to the backhaul module.

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9764 CMCO service position

When to use

Use the following procedures to place the 9764 CMCO in and out of the service position.

Placing the 9764 CMCO into the service position

Carry out the following to place the 9764 CMCO into the service position:

....

1   Unscrew the mounting lever retaining screw.

Lever retaining screw

....

2   Lift the 9764 CMCO and remove it from the bracket.

....

3   Turn the 9764 CMCO through 90° and align the mounting points on the side of the 9764 CMCO with the mounting lugs on the bracket.

....

4   Attach the 9764 CMCO to the bracket by sliding the 9764 CMCO forwards and downwards onto the bracket mounting lugs.
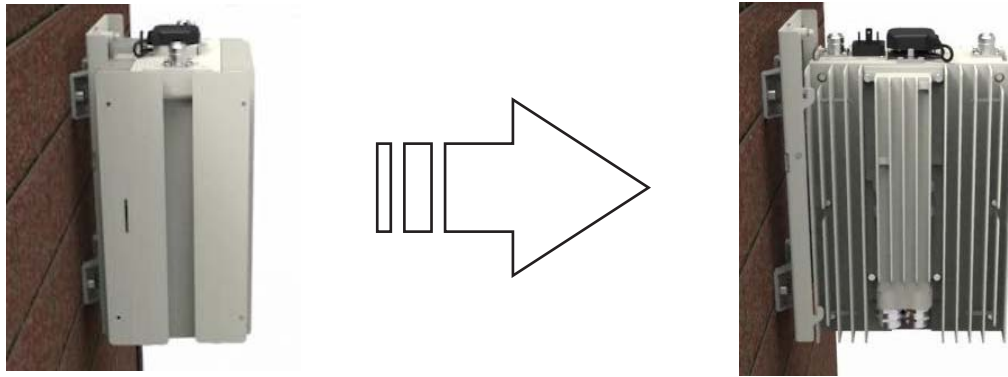
5   Secure the 9764 CMCO onto the mounting frame by tightening the lever retaining screw.

E ND OF STEPS

Placing the 9764 CMCO into the normal position

Carry out the following to place the 9764 CMCO into the normal position:

1   Unscrew the mounting lever retaining screw.

Lever retaining screw

2   Lift the 9764 CMCO and remove it from the bracket.

3   Turn the 9764 CMCO through 90° and align the mounting points on the back of the 9764 CMCO with the mounting lugs on the bracket.

4   Attach the 9764 CMCO to the bracket by sliding the 9764 CMCO forwards and downwards onto the bracket mounting lugs.

5   Secure the 9764 CMCO onto the mounting frame by tightening the lever retaining screw.

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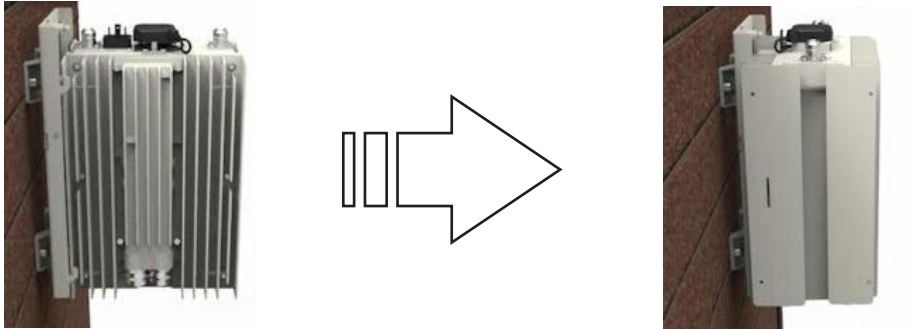
Appendix B: LED State Description

Overview

Purpose

This chapter describes the LED status and descriptions for 9764 CMCO.

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....

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LED status for 9764 CMCO

Location of LED

The following figure shows the location of the LED on the back of the 9764 CMCO:

Hardware LED interpretation table

The following table describes the possible states for the single bi-color LED:

Table B-1   LED statuses

State	Description	LED
Power off	Power off	OFF
Initial state	Power on or Restart	ON (Red)
Software downloading during system initialization	Software downloading	Blinking (Green)
Failure	9764 CMCO LTE start-up or operational failure	ON (Red)
9764 CMCO LTE becomes operational	9764 CMCO LTE becoming operational	ON (Green)
9764 CMCO LTE is operational	9764 CMCO LTE has been in stable operation for 15 minutes	OFF

Appendix C: Installation of the 9764 MCO Wi-Fi AP

Overview

Purpose

This appendix provides instructions for attaching the 9764 MCO Wi-Fi AP to the 9764 MCO.

The 9764 MCO Wi-Fi AP is optional. If you do not have a 9764 MCO, then do not perform the procedures in this appendix.

9764 MCO Wi-Fi AP V1.0 does not support B41 Compact Metro Cells.

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Physical description - external 9764 MCO Wi-Fi AP module

Product overview

The 9764 MCO Wi-Fi AP is housed in a weatherized enclosure containing the following active components:

- Integrated antennas supporting 2x2 MIMO.

This figure reflects the location of the 9764 MCO Wi-Fi AP when attached to the technology-specific module (9764 MCO WCDMA module or 9764 MCO LTE module) of the Alcatel-Lucent 9764 Metro Cell Outdoor, or to the Alcatel-Lucent 9764 Compact Metro Cell Outdoor.

Figure C-1　9764 MCO Wi-Fi AP attached to 9764 MCO hardware variants

These 9764 MCO hardware variants are designed to be deployed close to the users, usually on light poles or on walls of buildings.

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This figure reflects the available 9764 MCO Wi-Fi AP models (9764 Metro Cell Outdoor Wi-Fi AP V1.0 HG [high gain] and 9764 Metro Cell Outdoor Wi-Fi AP V1.0 MG [medium gain]).

Figure C-2   9764 MCO Wi-Fi AP - closed housing

This figure reflects the major components of both the High-gain and Medium-gain models of the 9764 MCO Wi-Fi AP.

Figure C-3   9764 MCO Wi-Fi AP - cutaway view
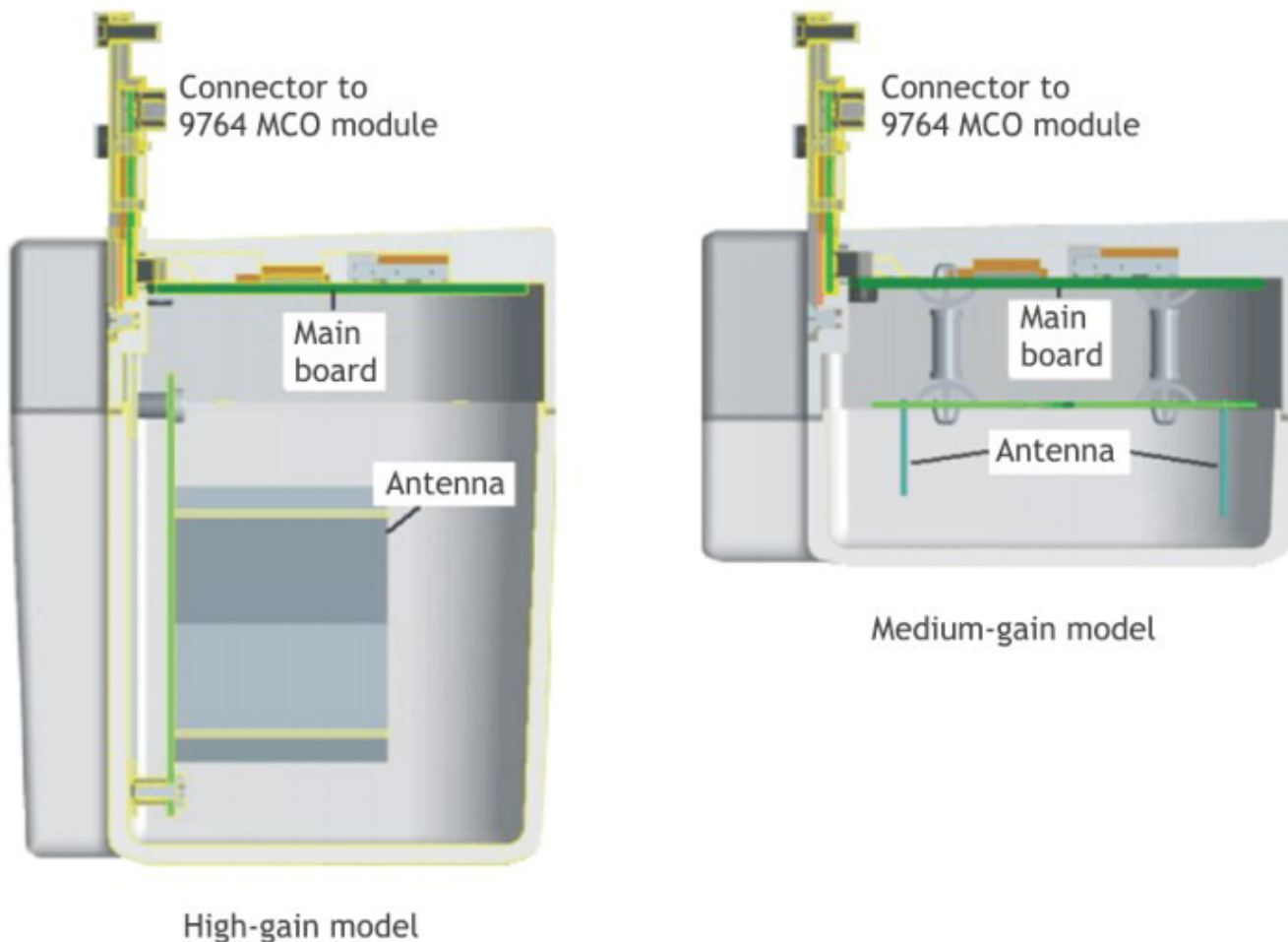
The physical dimensions of the 9764 MCO Wi-Fi AP module are:

Table C-1   9764 MCO Wi-Fi AP physical characteristics

Physical property	9764 MCO Wi-Fi AP V1.0 MG model	9764 MCO Wi-Fi AP V1.0 HG model
Dimension (Height x Width x Depth)	5cm x 13cm x 7cm	9cm x 13cm x 7cm
Volume	0.5 liters	0.8 liters
Weight	0.35 kg	0.4 kg

Product base items and configurations

The 9764 MCO Wi-Fi AP module is a single, field-replaceable, unit that may be mounted to many Alcatel-Lucent 9764 Metro Cell Outdoor variants.

Available models include:

- 9764 Metro Cell Outdoor Wi-Fi AP V1.0 HG (contains High-gain integrated antennas)
- 9764 Metro Cell Outdoor Wi-Fi AP V1.0 MG (contains Medium-gain integrated antennas)

The unit is shipped with three M3 10mm Torx screws used to secure the 9764 MCO Wi-Fi AP module to the 9764 MCO module.

Connection interfaces

The 9764 MCO Wi-Fi AP module has a single interface connector that plugs into the back bottom of the technology-specific module (9764 MCO WCDMA module or 9764 MCO LTE module) of the Alcatel-Lucent 9764 Metro Cell Outdoor or the Alcatel-Lucent 9764 Compact Metro Cell Outdoor, carrying both power and all communication between the two components.

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This figure reflects the connection point on the back bottom of the supported 9764 MCO hardware variants.

Figure C-4   9764 MCO Wi-Fi AP connection point on 9764 MCO
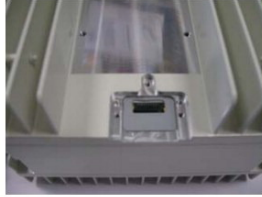
Wi-fi AP on 9764 MCO   Wi-fi AP on 9764 Compact MCO

This figure provides a cutaway side view of the 9764 MCO Wi-Fi AP module when connected to a 9764 MCO hardware variant.

Figure C-5   9764 MCO Wi-Fi AP connected to 9764 MCO (cutaway side view)

Antennas

The 9764 MCO Wi-Fi AP supports two integrated antennas optimized for 2x2 MIMO with up to two spatial streams.

Two hardware models are available:

- 9764 MCO Wi-Fi AP V1.0 MG with Medium-gain integrated antennas.
- 9764 MCO Wi-Fi AP V1.0 HG with High-gain integrated antennas.

Co-location and interference

For Metro Cells with a fixed integrated antenna and an attached Wi-Fi AP module, antenna interference is mitigated due to antenna isolation achieved by the hardware design.

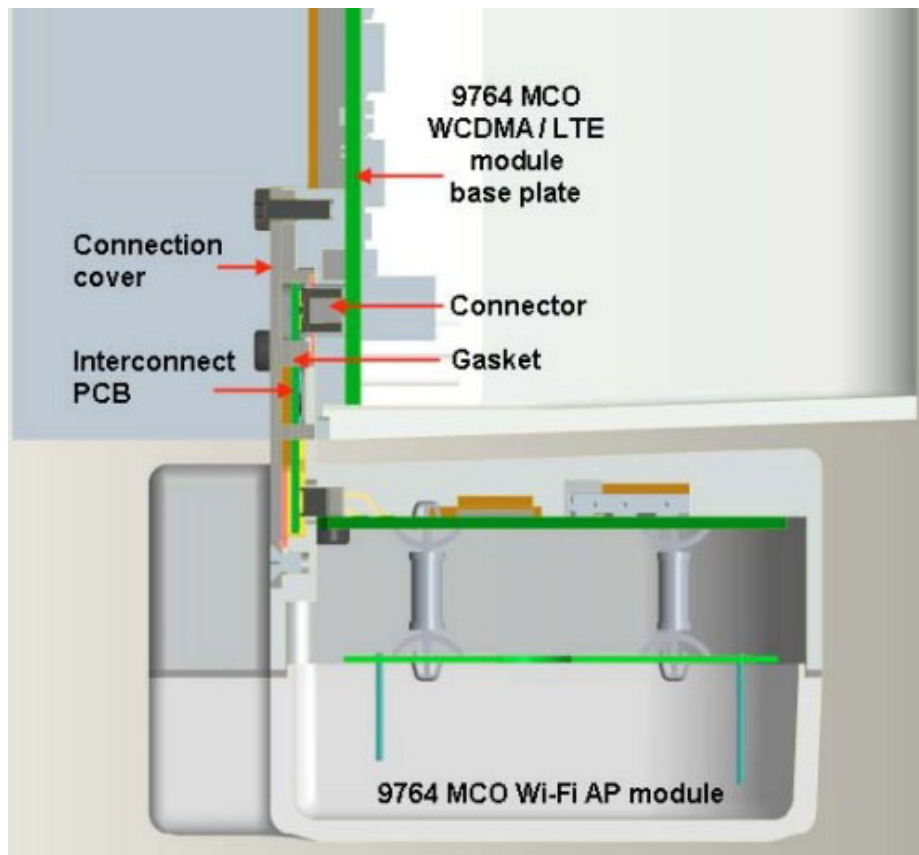For 9764 Compact Metro Cells using *external* LTE antennas and an attached Wi-Fi AP module, antenna interference is mitigated when antenna isolation between the Wi-Fi AP and the LTE antennas is at least -42 dB.

Status indicators

There is an external single bi-color LED (red/green) on the upper side of the 9764 MCO Wi-Fi AP housing (pointing up towards the 9764 MCO LTE/WCDMA module radome).

Although external, this LED is not easily visible and is not used for post-installation troubleshooting. During initial cell power-up, however, the installation technician may observe the LED changes as the unit goes through its booting sequences. Once the cell is in normal operation for 30 minutes, the LED will turn off automatically.

Refer to "LED state description - external Wi-Fi AP module" (p. C-13) for details.

The 9764 MCO Wi-Fi AP is monitored/managed remotely at the Alcatel-Lucent 9772 Wi-Fi Service Controller.

Product labeling

To the top of the 9764 MCO Wi-Fi AP will be affixed three labels:

1. A product label reflecting:
    - Vendor name/Icon
    - Customer ID
    - Model name
    - Part number
    - Lock / Unlock mode icon

        Note: The "Unlock" icon applies only to units designated as R&D lab mode.
    - Serial number
    - MAC address

- CLEI code (U.S. only)
- Data matrix barcode (2D MicroPDF Symbol) for Part number, Serial number, MAC address, and CLEI code (CLEI code is for U.S. only)

2. A regulatory label reflecting:

- Vendor name/Icon
- Product name
- Regulatory rules
- Power input
- Enclosure rating
- Applicable regulatory and environmental certification logos (for example, CE and WEEE recycling logos)
- Manufacturer name

3. (NAR only) An FCC label reflecting:

- Vendor name/Icon
- FCC ID

9764 MCO Wi-Fi AP pre-installation information

Product delivery contents

The following items are supplied with the 9764 MCO Wi-Fi AP:

- The 9764 MCO Wi-Fi AP module
- Three M3 10mm Torx screws (to secure the 9764 MCO Wi-Fi AP module to the 9764 MCO module).

Variable parts and ancillary items

In addition to the standard delivered parts, the following variable and ancillary items are available:

- There are no ancillary parts for the 9764 MCO Wi-Fi AP.

Installation tools required

The following tools may be used during installation:

- Snips
- Screwdrivers (power and/or manual):
  - Phillips (flat blade)
  - Torx (T10)

Attach 9764 MCO Wi-Fi AP module to 9764 CMCO

Purpose

This topic describes the procedures to attach the 9764 MCO Wi-Fi AP module to the Alcatel-Lucent 9764 Compact Metro Cell Outdoor.

Prerequisites

Before installation begins, ensure the following:

- T10 Torx screwdriver (power and/or manual) is available.

- Internet service is available.

Attach 9764 MCO Wi-Fi AP module to 9764 CMCO

Perform the following steps to attach the 9764 MCO Wi-Fi AP module to 9764 CMCO:

....

1   Remove the 9764 MCO Wi-Fi AP module from its packaging.

....

2   Using a T10 Torx screwdriver, remove the cover over the Wi-Fi AP connector on the lower back of the 9764 CMCO by unscrewing the three screws.

> **Important!** Ensure that the appropriate gasket surrounding the connector is in place on the 9764 CMCO.

> **Note:** Retain the cover and the three (3) cover screws. Should the need arise to remove but not replace the 9764 MCO Wi-Fi AP module in the future, the dummy cover and its screws must be reattached to the 9764 CMCO.

....

3   Push the 9764 MCO Wi-Fi AP module onto the Wi-Fi AP connector.

....

4   Using a T10 Torx screwdriver and the three M3 10mm Torx screws shipped with the 9764 MCO Wi-Fi AP module, screw the attachment plate to the 9764 CMCO and to the back of the 9764 MCO Wi-Fi AP module, and tighten all screws.

Torque screws to 0.6 Nm (0.443 lb ft).

E ND OF STEPS
....

9764 MCO Wi-Fi AP integration overview

Integration refers to the entire process from hardware installation to "normal operation".

9764 MCO Wi-Fi AP integration proceeds as follows:

1. Hardware is installed.

   The 9764 MCO Wi-Fi AP module is physically installed on the 9764 CMCO , and the 9764 CMCO is installed and all cabling completed.

2. Power is applied to the 9764 CMCO (and by default, to the 9764 MCO Wi-Fi AP module).

3. The switch on the 9764 CMCO contains a default configuration that connects the 9764 MCO Wi-Fi AP port to the backhaul port (there are no 9764 MCO Wi-Fi AP OAM parameters to be configured prior to initial power-up).

   The switch will forward Wi-Fi packages as soon as the 9764 CMCO software has booted and as soon as the 9764 MCO Wi-Fi AP software is running.

4. A connection between 9764 MCO Wi-Fi AP and Alcatel-Lucent 9772 Wi-Fi Service Controller (9772 Wi-Fi SC) is automatically established.

5. The 9764 MCO Wi-Fi AP downloads the latest software version from the appropriate file server (if applicable).

6. The 9764 MCO Wi-Fi AP is provisioned and configured via the 9772 Wi-Fi SC.

   A 30-minute timer is started after the configuration is sent successfully from the 9772 Wi-Fi SC. During this 30 minutes, the LED on top of the 9764 MCO Wi-Fi AP module illuminates and is visible through the narrow gap between the bottom of the 9764 MCO and the top of the 9764 MCO Wi-Fi AP module.

   For information on the 9772 Wi-Fi SC, refer to the documents listed in the following table:

Refer to this document	At this location	For more information on
Alcatel-Lucent 9772 Wi-Fi Service Controller V1.0 L Hardware Installation, 3MN-01840-0001- RJZZA	(http://support.alcatel-lucent.com)	Instructions for installing the 9772 WiSC-L hardware and accessing its management interfaces.
Alcatel-Lucent 9764 and 9772 Metro Cell Outdoor Wi-Fi AP and Wi-Fi Service Controller, Release WA5.5, System Reference Guide, 3MN-01840-0002-RKZZA	(http://support.alcatel-lucent.com)	Instructions for accessing and using the web-based graphic user interface (GUI) to manage/administer the 9772 Wi-Fi Service Controller and 9764 MCO Wi-Fi Access Point

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Refer to this document	At this location	For more information on
Alcatel-Lucent 9764 and 9772, Metro Cell Outdoor Wi-Fi AP and Wi-Fi Service Controller, Release WA 5.5, CLI Reference Guide, 3MN-01840-0003-RKZZA	(http://support.alcatel-lucent.com)	Instructions for accessing and using command line interface (CLI) to manage/administer the 9772 Wi-Fi Service Controller and 9764 MCO Wi-Fi Access Point.

7. The field technician may choose to observe the LED colors and blinking patterns to ensure error-free boot-up and normal operation. Refer to "LED state description - external Wi-Fi AP module" (p. C-13) for details.

   - If normal operation is achieved, then the LED is automatically turned off when the 30-minute timer expires.

   - If there are problems, then the LED displays the applicable error color/pattern. Refer to "LED state description - external Wi-Fi AP module" (p. C-13) for details.

8. The field technician will make the first test call – provided all necessary core network elements (NEs) are configured properly (for example, WLAN GW, AAA, etc.).

LED state description - external Wi-Fi AP module

Overview

The externally-attached Wi-Fi AP module (supported on some Alcatel-Lucent 9764 Metro Cell products) has a single external bi-color LED (red/green) on the top of the module housing. Due to limited visibility requiring direct line-of-site between the Wi-Fi AP module housing and the host Small Cell housing, the LED is not intended for ongoing troubleshooting after the unit has been successfully deployed. However, the field technician installing/replacing the externally-attached Wi-Fi AP module may watch the LED during boot-up if desired.

The LED illuminates with different colors and blinking patterns during boot-up, then is automatically turned off after normal operation has been achieved and the 30-minute timer expires. If there are problems, then the LED displays the applicable error color/pattern.

LED statuses during boot-up

Tip: In the following table, note that "Slow blinking" refers to an LED blink cycle of 2500 ms on, 2500 ms off; "Fast blinking" refers to an LED blink cycle of 500 ms on, 500 ms off.

After the Wi-Fi AP hardware has been installed, upon power-up the LED reflects Wi-Fi AP statuses as follows:

Table C-2   Wi-Fi AP LED states during boot-up

Installation / commissioning step	Wi-Fi AP State	Red LED segment	Green LED segment	Combined LED behavior
1. Power-up with autotest	BOOTING	Solid On	Off	Solid On (appears red)
2. Wi-Fi AP tries to get adopted by the 9772 Wi-Fi Service Controller	ADOPTING	Solid On	Solid On	Solid On (appears orange)
3. (optional) 9772 Wi-Fi Service Controller pushes a software upgrade	UPGRADING	Off	Solid On	Solid On (appears green)
4. WLANs are mapped to radios, normal service	OPERATIONAL	Service on 5 GHz: Slow blinking	Service on 2.4 GHz: Slow blinking	With both radios operating: slow orange blinking

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Table C-2   Wi-Fi AP LED states during boot-up   (continued)

Installation / commissioning step	Wi-Fi AP State	Red LED segment	Green LED segment	Combined LED behavior
5. After 30 minutes in the same state (Note: the LED timeout default setting is 30 minutes, but is configurable by the Administrator to any value from 15 to 1440 minutes.)	HIDING	Off	Off	Off

LED functionality during OPERATIONAL states

The 2 9764 MCO Wi-Fi AP radios are mapped to a color segment of the LED:

- Radio 1 (2.4 GHz) maps to the GREEN segment.
- Radio 2 (5 GHz) maps to the RED segment.

There are 2 factors that affect the LED segment that is associated with each radio:

- If the radio is disabled (shutdown) or not by the administrator (this factor takes precedence).
- If a WLAN is mapped to the radio, making the radio usable.

If a radio has at least a WLAN mapped to it and it is enabled, then it is operational (meaning, it will beacon and provide client service).

Tip: In the following tables, note that "Slow blinking" refers to an LED blink cycle of 2500 ms on, 2500 ms off; "Fast blinking" refers to an LED blink cycle of 500 ms on, 500 ms off. An asterisk (*) means that the setting does not matter.

Table C-3   9764 MCO Wi-Fi AP LEDs based on Admin status and WLAN mapping

Radio's Admin status	Radio's WLAN mapping	LED segment
Disabled	*	Off
Enabled	no WLAN mapped	Fast blinking
Enabled	WLAN mapped	Slow blinking

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Table C-4   9764 MCO Wi-Fi AP LEDs during normal operation states

RADIO 1 / 2.4 GHz / GREEN LED Segment			RADIO 2 / 5 GHz / RED LED Segment			COMBINED LED Behavior
Admin status	WLAN mapping	Segment Behavior	Admin status	WLAN mapping	Segment Behavior	
Disabled	*	Off	Disabled	*	Off	Off
Enabled	no WLAN	Fast	Disabled	*	Off	Fast Green
	WLAN	Slow				Slow Green
Disabled	*	Off	Enabled	no WLAN	Fast	Fast Red
	*			WLAN	Slow	Slow Red
Enabled	no WLAN	Fast	Enabled	no WLAN	Fast	Fast Orange
	WLAN	Slow		WLAN	Slow	Slow Orange
	WLAN	Slow		no WLAN	Fast	Fast Red + Slow Green (results in a green/orange/red pattern)
	no WLAN	Fast		WLAN	Slow	Slow Red + Fast Green (results in a green/orange/red pattern)

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Appendix D: Product conformance statements

Overview

Purpose

This section presents the product conformance statements that apply to the Alcatel-Lucent Metro Cell Outdoor Access Point equipment when deployed in the United States.

The statements that are required are determined primarily by national or multi-national regulations. However, in some regions, contract terms determine which statements are required.

The presence of the statement indicates that the product does comply with that statement wherever it is required to do so.

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Federal Communications Commission

Federal Communications Commission

> **Important!** Changes or modifications not expressly approved by Alcatel-Lucent, Inc. could void the user's authority to operate the equipment.

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 undesired operation.

FCC Part 15 Class B

> **Note:** 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.

FCC Part 68

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA. At the upper-right-hand corner inside the cabinet assembly of this equipment is a label that contains, among other information, a product identifier in the format of AAAEQ##TXXXX. If requested, this number must be provided to the telephone company.

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The T1 network interface on this equipment is hardwired to a punchdown block, which meets the FCC specifications.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. However, if advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

FCC regulations prohibit the connection of customer-provided equipment to central office implemented systems. Connection to party lines is subject to tariffs; users should contact their state public utility commission, public service commission, or corporation commission for information.

If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

If trouble is experienced with this equipment repair or warranty information may be obtained by contacting:

Technical Support Services, within the United States: +1 630 224 4762, prompt 2

RF approval

This equipment complies with Part 2, Subpart J - Equipment Authorization Procedures, of the FCC Rules.

This device complies with Part 22 – Public Mobile Services, Subpart H – Cellular Radiotelephone Services.

This equipment complies with Part 24 - Personal Communications Services, Subpart E - Broadband PCS.

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Product safety conformance statements

Product safety conformance

The Alcatel-Lucent 9764 Compact Metro Cell Outdoor B41 2x6W is Safety Certified ITE by CSA International.

This Certification is marked on the equipment main nameplate label. Should the local Authority Having Jurisdiction (AHJ) require prior or additional verification of this Certification, a Product Certificate of Compliance can be obtained from the specific Certification Body by the Business/Product Unit Applicant for the product or by contacting:

Technical Support Services, within the United States: +1 630 224 4762, prompt 2

Any modifications to this equipment are not permitted without review and official written authorization from the specific Certification Body. Unauthorized changes may violate the Product Safety Certification. Modifications or changes authorized by official CN/CNN are assumed to have received prior approval from this Lab.

Indoor applications

This equipment is intended for installation in restricted access locations where access is controlled or where access can only be gained by service personnel with a key or tool. Access to this equipment is restricted to qualified service personnel only.

Antenna exposure statements

Antenna exposure

Antenna installations for this equipment shall be performed in accordance with all applicable manufacturer's recommendations, and national laws and regulations. To ensure correct antenna installation, the antenna installer shall perform all necessary calculations and/or field measurements to evaluate compliance with applicable national laws or regulations regarding exposure to electromagnetic fields. The supplier of radio equipment, the supplier of antenna equipment and the integrator and builder of the site must provide sufficient information so that the limits of the exclusion zones can be determined. Any changes to the antenna or other equipment in the transmit path may require re-evaluation of the exposures to electromagnetic fields.

Pursuant to 47 CFR Part 1, Subpart I, subject to the provisions of section 1.1307, all installations must be evaluated for requirements contained in Table 1, "Limits for maximum permissible exposure," in section 1.1310.

Guidelines for antenna placements

1. Antennas should be placed more than 20 cm (8 inches) away from possible human RF exposure.

2. When placing the antennas, please be aware of FCC 47 CFR 1.1307 - 1.1310 and FCC guidelines for public safety, for example, OET Bulletin No. 56, "Questions and Answers About the Biological Effects and Potential Hazards of Radio frequency Electromagnetic Fields" and OET Bulletin 65, "Evaluating Compliance With FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields"). FCC requirements mandate maximum power density at location of possible exposure to be below 0.5 mW/cm^2 (5 W/m^2) at 750 MHz and 1 mW/cm^2 (10 W/m^2) at AWS for general population/uncontrolled exposure and 2.5 mW/cm^2 (25 W/m^2) at 750 MHz and 5 mW/cm^2 (50 W/m^2) at AWS for occupational/controlled exposure. Exposure is averaged over a 30 minute time period for general population and over a 6 minute time period for occupational/controlled exposure.

   Example of a B13 MCO running at 5 W (7 dBW), connected via a 2 dB cable loss and a 3 dBi antenna:

   Power density at distance R from antenna is PwD = EIRP(dBW) - 10*log10(4pi*R^2)

   At 1 m away from the antenna, PwD(1m) = EIRP(7dBw - 2dB + 3dBi) - 11dB = -3dBw/m^2 (0.5W/m^2)

   At 1 ft away from the antenna, PwD(0.305m) = EIRP(8dBW)-0.82dB = 7.18dBW/m^2 (5.2W/m^2)

   Note: Losses of all components between the MCO port and antenna should be included in EIRP calculations. MCO power in indoor applications may have to be lowered based on antenna distance to human exposure and total EIRP.

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This example indicates that in this particular deployment configuration, US safety limits for general population are met at a distance slightly over 1 foot for B13 operation.

FDA/IEC optical transmitter product compliance statements

FDA/IEC optical transmitter product compliance

Alcatel-Lucent declares that this equipment complies with the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) regulations 21 CFR 1040.10 and 1040.11. It is a Class I/1 laser optical fiber communication systems "product" under the FDA.

This Product is designed to ensure that personnel operating the product are not endangered by laser radiation during normal operation and fault conditions. This product does not present a risk of eye injury because it is fully enclosed and does not contain embedded lasers greater than Class I/1 unless otherwise noted.

Laser warning

WARNING

Laser hazard

The light from laser and high-radiance LED's may cause eye damage if absorbed by the retina.

- *Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.*

- *Do not view directly into the laser beam with optical instruments such as a fiber microscope because viewing of laser emission in excess of Class 1 limits significantly increases the risk of eye damage.*

- *Never look into the end of an exposed fiber or an open connector as long as the optical source is switched on.*

- *Ensure that the optical source is switched off before disconnecting optical fiber connectors.*

Eco-environmental statements

Packaging collection and recovery requirements

Countries, states, localities, or other jurisdictions may require that systems be established for the return and/or collection of packaging waste from the consumer, or other end user, or from the waste stream. Additionally, reuse, recovery, and/or recycling targets for the return and/or collection of the packaging waste may be established.

For more information regarding collection and recovery of packaging and packaging waste within specific jurisdictions, contact the Alcatel-Lucent Environment, Health and Safety organization or Alcatel-Lucent Hazardous Waste Center technical support at (888) 539-2783.

For installations not performed by Alcatel-Lucent, please contact the Alcatel-Lucent Customer Support Center at:

Technical Support Services, within the United States: +1 630 224 4762, prompt 2

Material content compliance

The following notification applies to Alcatel-Lucent products distributed for sale, resale, or use.

This product, part, or both may include a lithium-manganese dioxide battery, which contains very small amounts of a perchlorate substance. Special handling may apply.

For California:

Perchlorate Material - special handling may apply.

See *http:\\www.dtsc.ca.gov/hazardouswaste/perchlorate/*.

Glossary

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Numerics

    3G

        Third Generation

    3GPP

        3rd Generation Partnership Project

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A   **A (Ampere)**

        Base SI unit of electrical current.

    A-GPS

        Assisted Global Positioning System

    AC (Alternating Current)

        Continuously variable current, rising to a maximum in one direction, falling to zero, then reversing direction and repeating the cycle in the other direction.

    AC convenience outlet

        Sites must be equipped with at least two duplex outlets for installation and maintenance procedures. The outlets are required to power test equipment and installation tools.

    ACF (AC Fail)

        The AC Fail (ACF) alarm indicates that AC input to one or more rectifiers in the power plant is absent or outside of the operating range of the equipment

    Ambient temperature

        The temperature of air or other media in a designated area, particularly the area

    ANR

        Automatic Neighbor Relation

    ANSI (American National Standards Institute)

        An organization chartered to accredit standards developed by a wide variety of industry groups, without influence from any one company or organization. Does not develop standards, but reviews and implements those developed by other organizations. ANSI is a member of the International Standards Organization (ISO).

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Antenna

An elevated device for radiating or receiving radio waves. It changes electrical currents into electromagnetic waves, and vice versa.

AP (Application Processor)

Network element located at the MSC which provides the radio control logic for managing calls. The AP is a general purpose computer that can host a number of RCS virtual machines.

AWG (American Wire Gauge)

American standard for classifying wire diameter.

B   ### Backup

Facility used to replace an element which has failed.

Base station

The equipment that provides the air interface that allows mobile terminals to communicate with the telecommunications network.

Bonding

Permanent connection of metallic parts to form an electrically conductive path that will assure electrical continuity and have the capability to safely conduct any current likely to be imposed.

Branch circuit

The circuit conductors between the final overcurrent device protecting the circuit and the outlet(s).

Breaker, circuit

A cut-out device which breaks a circuit when preset limits of current are exceeded.

Buried cable

A communication cable manufactured or produced for the purpose of burial in direct contact with the earth.

Buried ring ground

A buried, bare, tinned, solid copper cable encircling the site building and/or tower foundation.

Bus bar

One or more conductors that serves as a common connection for a group of related devices.

Busy hour

The uninterrupted period of 60 minutes for which the average intensity of traffic is at maximum.

C   ### Cable run

Referring to cable routing.

PRELIMINARY

Cable sweep

(See Sweep)

CDRH

Center for Devices and Radiological Health

CE

Conformité Européene

A CE Marking on a product is a manufacturer's declaration that the product complies with the essential requirements of the relevant European health, safety and environmental protection legislation.

Cell site

An installation located within a cell that houses the equipment needed to set up and complete calls on a cellular telephone.

CFR

Code of Federal Regulations

Circuit

1. The complete path between two terminals over which one-way or two-way communications may be provided. 2. An electronic path between two or more points, capable of providing a number of channels. 3. A number of conductors connected together for the purpose of carrying an electrical current. 4. An electronic closed-loop path among two or more points used for signal transfer. 5. A number of electrical components, such as resistors, inductances, capacitors, transistors, and power sources connected together in one or more closed loops.

CMAS

Commercial Mobile Alert System

CMS

Certificate Management System

Coaxial cable

A cable with one or more coaxial pairs under one outer sheath. The cable consists of a center conductor surrounded by an insulating material and a concentric outer conductor.

Configuration

An arrangement of functional units according to their nature, number, and chief characteristics.

Controlled environment

An indoor location in which temperature, humidity, and ventilation are maintained at specific levels.

CPRI

Common Public Radio Interface

CSA (Canadian Standards Association)

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An independent, non-government, not-for-profit association for the development, by consensus, of Canadian standards and product certifications.

CSC (Cell Site Configuration)

Sheets provided in this document for documenting cell site configuration, conditions, and other pertinent information for reference during product deployment, and future additions.

D   **d2U**

digital 2U-height box.

dBi (decibels (dB) relative to isotropic)

Decibels relative to an isotropic antenna gain at radio frequencies.

Antenna gain is usually defined as the ratio of the power produced by the antenna from a far-field source on the antenna's beam axis to the power produced by a hypothetical lossless isotropic antenna, which is equally sensitive to signals from all directions. Usually this ratio is expressed in decibels, and these units are referred to as "decibels-isotropic" (dBi).

DC (Direct Current)

Current flow in one direction.

DHCP

Dynamic Host Configuration Protocol

Diversity

A method of radio transmission and/or reception, which counteracts the effects of fading by combining several signals all bearing the same information.

DL

downlink

DNS

Domain Name System

DoS

denial of service

Down conductor

A vertical conductor of low impedance that connects the cell site grounding electrode system to the grounding electrode system.

Driven ground rod

A copper-clad steel or stainless steel rod, a minimum of 2.4 meters (8 feet) long and 5/8 inch in diameter.

DRX

discontinuous reception

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E   E1

A four-wire voice and data trunking facility that carries 30 duplex channels in 64-kbps time slices. E1 facilities are commonly used in countries outside of North America.

Earthquake zone

Seismic ratings ranging from zone 1 (relatively low central office operational shock and vibration levels) to the most severe zone 4 levels. Equipment must be able to withstand earthquake zone requirements under both operational and non-operational conditions.

ECID

enhanced cell ID

EIRP

effective isotropic radiated power

Electrolytic ground electrode (rods)

A low resistance grounding rod (pipe) using low resistivity materials.

EMS

Element Management System

ESD

Electrostatic Discharge

EU

European Union

Exothermic weld

A method of making electrical connections of copper to copper or copper to steel using high temperature fusion. The molten copper flows over conductors in a mold, melting and welding them together.

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F   FA (Fuse Alarm)

The fuse alarm (FA) indicates that the power system battery and load protection fuse opens.

Facility

Any element of physical telephone equipment needed to provide service, such as cables, switching systems, and microwave radio transmission systems.

FCC (Federal Communications Commission)

A group founded in 1934 to regulate all types of communications in the United States.

Float

To operate a power load on a main-driven rectifier in parallel with a low impedance storage battery, which is kept fully charged by the rectifier and is itself only called upon to provide power

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during temporary and short-duration peaks for which the rectifier output is insufficient.

FQDN

fully qualified domain name

Frequency

For a periodic wave, such as alternating current, the number of complete cycles per unit of time. The unit of frequency is cycles per second, or hertz.

FRU

field replaceable unit

Fuse

An overcurrent protective device that has as its critical component a metal wire or strip that will melt when heated by a prescribed (design) amperage, creating an open in the circuit of which it is a part, thereby protecting the circuit from an overcurrent condition.

G   **GA**

general availability

Gain

The ratio of output current, voltage, or power to input current, voltage, or power, respectively. Gain is usually expressed in dB. If the ratio is less than unity, the gain, expressed in dB, will be negative, in which case there is a loss between input and output.

Garmin 45XLS

A handheld GPS receiver that can be used to verify GPS reception at a cell site. It has a removable antenna and provides +5 VDC on the center pin of the RF connection to power external active antennas. If poor GPS reception is suspected, the Garmin 45XLS can be used to verify that the GPS antenna and cable system is working acceptably. It will also verify that the GPS antenna location is acceptable.

GE (Gig-E)

gigabit ethernet

GFCI (Ground Fault Circuit Interrupter)

A device intended for protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device of the supply circuit.

GPON

Gigabit Passive Optical Network

GPS (Global Positioning System)

A system of 24 satellites that provides, among other things, extremely accurate timing information to the cell sites.

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Ground

A conducting connection between equipment or an electrical circuit and earth, or conductive body that is used in place of earth.

Grounding conductor

A conductor used to connect equipment or a grounded electrical circuit to the grounding electrode system.

Grounding electrode system

The conductive objects that are intentionally bonded to furnish connection to earth (i.e., buried ring ground with ground rods, electrically continuous buried metallic water pipe, electrolytic ground electrode, etc.).

GUI

graphical user interface

Guy

Steel wire or rope used to hold a pole upright.

H   **Handoff**

A automatic transfer of a cellular telephone call from one cell to another, maintaining call quality as the mobile user moves through the coverage area.

Heat dissipation

The heat generated by cabinets during operation.

HPBW

half-power beamwidth

HTTP

Hypertext Transfer Protocol

HVAC (Heating, Ventilation, Air Conditioning)

Hz (hertz)

A unit of frequency of a periodic process equal to one cycle per second.

I   **IEEE**

Institute of Electrical and Electronics Engineers

Indoor site

Installation site in a controlled environment, allowing the use of indoor cabinets.

INTR (Intrusion Alarm)

The Intrusion (INTR) alarm indicates a door or access panel to the power system is open.

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IP

internet protocol

IPsec

internet protocol security

IRC

interference rejection combining

L **LED**

light emitting diode

Load

The power consumed by a device or circuit in performing its function.

Loss

The diminution, usually expressed in dB, of signal level in a communications medium. The power, usually expressed in watts, consumed by a circuit or component. The energy dissipated without accomplishing useful work or purpose.

LTE

Long Term Evolution

M **MAC (address)**

media access control address
A MAC address is a hardware identification number that uniquely identifies each device on a network.

MAC (protocol)

Medium Access Control Protocol
The media access control (MAC) data communication protocol is a sublayer of the data link layer. MAC protocol provides addressing and channel access control mechanisms that make it possible for several terminals or network nodes to communicate within a multiple access network that incorporates a shared medium, e.g. Ethernet.

MCI

Metro Cell Indoor

MFBI

multiple frequency band indicators

MGB (Main Ground Bus)

A copper bus bar used to provide the electrical interfaces for connection of the isolated ground plane to the integrated ground system.

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MHz (Megahertz)

Reference of radio frequency spectrum of one-million cycles.

MIMO

multiple input, multiple output

An antenna technology for wireless communications in which multiple antennas are used at both the source (transmitter) and the destination (receiver).

MOP (Method of Procedure)

Cell site walk-through where site preparation activities are verified prior to installing the 9412 eNodeB Compact equipment.

MSC (Mobile Switching Center)

In an automatic cellular mobile system, the interface between the radio system and the public switched telephone network. The MSC performs all signaling functions that are necessary to establish calls to and from mobile stations.

MSP

mobile service provider

mW

milliWatt

N   **NEC (National Electric Code)**

Standard that governs the use of electric wire, cable, and fixtures, and electrical and optical communication cable installed in buildings.

Network

A set of terminals, the communications link that joins them, and the protocols that allow them to function together and communicate with each other.

NFPA (National Fire Protection Association)

Standards and code writing organization made up of volunteer industrial and institutional subject-matter-expert committees.

NIU (Network Interface Unit)

A device that performs interface functions, such as code conversion, protocol conversion, and buffering, required for communications to and from a network. The device is used primarily within a local area network to allow a number of independent devices, with varying protocols, to communicate with each other. An NIU converts each device protocol into a common transmission protocol. The transmission protocol may be chosen to accommodate directly a number of the devices used within the network without the need for protocol conversion for those devices by the NIU.

Nominal

Specified value or intended value independent to any uncertainty in its realization. In a device that realizes a physical quantity, it is the value of such a quantity specified by the manufacturer.

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Non-Alcatel-Lucent power

3rd party power systems, or power systems other than Alcatel-Lucent.

O   **OA&M**

operations, administration, and maintenance

OLCS

Online Customer Support

OOT

out of time alignment

OSP

Outside Plant

OSS

Operation Support System

OTDOA

observed time difference of arrival

P   **Pair cable**

Cable made up of one or more separately insulated wire pairs, none of which is arranged with another quads.

PCI

physical cell ID

PDU

Power Distribution Unit

Phase

The number of separate voltage waves in commercial alternating current, designated as "single phase", "three phase", etc.

Pigtail

A short length of electrical conductor permanently affixed to a component, used to connect the component to another.

PMJ

Conditions that impacts service of the power system and/or requires immediate attention are classified as major alarms and designated as Power Major (PMJ) alarms.

PMN

Conditions requiring service, but having no immediate impact on the power system output are classified as minor alarms and designated as Power Minor (PMN) alarms.

PnP

plug and play

PVC (Polyvinyl Chloride)

A thermoplastic made of polymers, which is tough, nonflammable, and water resistant and is used as an insulation.

Q   QoE

Quality Of Experience

QoS

quality of service

R   RAN

Radio Access Network

Receive-only

Pertaining to a device or a mode of operation capable of receiving messages, but not transmitting messages.

RF (Radio Frequency)

Electromagnetic wave used for, among other things, cellular voice and data communications.

RMS (Root Mean Square)

Effective value of an alternative wave. For AC, this is numerically equal to DC value of the current with the same heating effect.

RoHS

Restriction of Hazardous Substances

Rx (RX)

Receive

S   Sector

The coverage area within the degree of directionality of the antennas.

SeGW

Security Gateway

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Service provider

Customer who purchases switching and Site equipment from system vendors, which, in turn, is provided to end-user subscribers through resellers and distribution channels.

SFP (Small Form-Factor Pluggable)

A compact, hot-pluggable transceiver that interfaces a network device motherboard to a fiber-optic or copper networking cable to support telecommunication and data communications.

Shield

A housing, screen, sheath, or cover that substantially reduces the coupling of electric, magnetic, or electromagnetic fields into or out of circuits or transmission lines.

Short-term

No more than 96 consecutive hours or 15 days per year.

Single-phase

A circuit in which there is only one sinusoidal voltage variation.

Site

An installation that houses the equipment needed to set up and complete calls on a cellular telephone.

Site preparation

To perform the requirements necessary at the site before installation can begin.

SON

Self-Organizing Network

Stranded

Wires twisted together to form a strong flexible cable.

Surge protector

Protective device used to limit surge voltages by discharging or bypassing any unwanted surge current that may enter a building or equipment.

Sweep

To vary the frequency of a signal over a whole band as a means of checking the response of equipment under test.

T   **T1**

A four-wire voice and data trunking facility that carries 24 duplex channels over 56-kbps time slots.

THHN (Thermoplastic high-heat resistant nylon-coated)

Three-phase

An alternating current supply with three sinusoidal voltages differing in phase by 120°.

THWN (Thermoplastic heat and water resistant nylon-coated)

TRDU (Transmit Receive Duplex Unit)

Twisted pair cable

Cable made up of one or more separately insulated twisted-wire pairs, none of which is arranged with another to form quads.

Tx (TX)

Transmit

TYP (Typical)

U   **UBC**

Uniform Building Code

UL

uplink

UL® (Underwriters Laboratories)

Laboratories that test and approve materials and equipment against predetermined performance standards.

UV (Ultraviolet)

The portion of the electromagnetic spectrum in which the longest wavelength is just below the visible spectrum, extending from approximately 4 nm to approximately 400 nm. Some authorities place the lower limit of uv at values between 1 and 40 nm, 1 nm being the upper wavelength limit of x-rays. The 400-nm limit is the lowest visible wavelength, i.e., the highest visible frequency, violet.

V   **V (Volt)**

The derived SI unit of electrical potential difference. It is the difference in potential between two points of a conducting wire carrying a constant current of 1 ampere when the power dissipated between these two points is equal to 1 watt.

Vac (Volts Alternating Current)

VDC (Volts Direct Current)

VoLTE

Voice over LTE

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VPN

Virtual Private Network

Vrms (Volts Root Mean Square)

VSWR (Voltage Standing Wave Ratio)

In a transmission line, the ratio of maximum to minimum voltage in a standing wave pattern. The VSWR is a measure of impedance mismatch between the transmission line and its load. The higher the VSWR, the greater the mismatch. The minimum VSWR, i.e., that which corresponds to a perfect impedance match, is unity.

W   **W (watts)**

The derived SI unit of power. It is equivalent to 1 joule per second, or 1 volt-ampere.

Walk-through

A critical examination of a design or product undertaken to ensure that it is of adequate quality.

Waveform

The characteristic shape of a periodic wave, determined by the frequencies present and their amplitudes and relative phases.

WCDMA

Wideband Code Division Multiple Access

WEEE

Waste Electrical and Electronic Equipment

WMM (9471 WMM)

The Alcatel-Lucent 9471 Wireless Mobility Manager (WMM) is the Serving GPRS Support Node and Mobility Management Entity (SGSN/MME) in the converged wireless packet core network. It performs mobility and session management signaling and packet data switching for GSM, WCDMA and LTE access networks.

WPS

Wireless Provisioning System

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