

EXHIBIT 3

Section 2.1033 (c)(3) INSTALLATION AND OPERATING INSTRUCTIONS

A copy of the installation and operating instructions to be furnished to the user. A draft copy of the instructions may be submitted if the actual document is not available. The actual document shall be furnished to the FCC when it becomes available.

Response

A copy of Alcatel-Lucent 9768 Metro Radio Outdoor B4 User Manual is attached to this exhibit.



Alcatel-Lucent 9768

Metro Radio Outdoor B4

User Manual

3MN-MRO-AWS-IMOP

Issue 1 | February 2014

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About this document

Purpose

The purpose of this document is to provide hardware installation instructions for Alcatel-Lucent 9768 Metro Radio Outdoor (9768 MRO) B4.

Reason for reissue

The reissue reasons are:

Issue number	Issue Date	Reason for reissue
1	February 2014	Standard

Intended audience

The audience for this document is Installation personnel.

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 9768 MRO and what is required to connect it to the network, meet its power needs, and ensure that it can be placed into reliable service.

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.

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.

Conventions used

Vocabulary conventions

The following vocabulary conventions are also used when referring to Alcatel-Lucent products:

Table 1 Terminology

Term	Description/Meaning
9768 MRO B4	Refers to Alcatel-Lucent 9768 Metro Radio Outdoor B4 or Alcatel-Lucent 9768 MRO B4.
Alcatel-Lucent 9768 Metro Radio Outdoor	Refers to 9768 MRO B4.
9768 MRO	Refers to Alcatel-Lucent 9768 Metro Radio Outdoor or Alcatel-Lucent 9768 MRO.

Related information

Not Applicable.

How to order

Not Applicable.

How to comment

To comment on this document, go to the [Online Comment Form \(http://infodoc.alcatel-lucent.com/comments/\)](http://infodoc.alcatel-lucent.com/comments/) or e-mail your comments to the [Comments Hotline \(comments@alcatel-lucent.com\)](mailto:comments@alcatel-lucent.com).

1 Safety

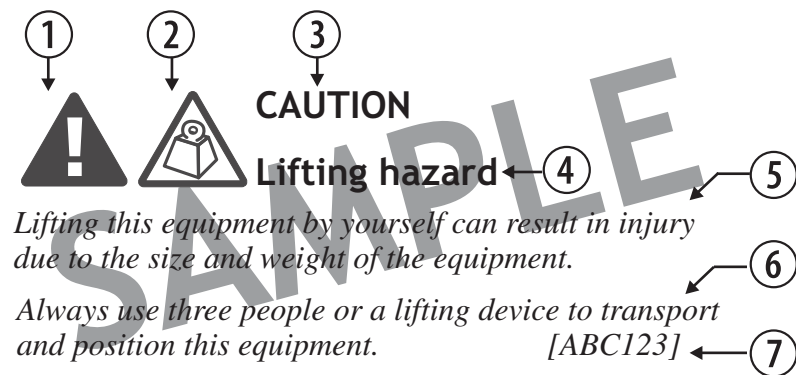
Structure of safety statements

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

Item	Structure element	Purpose
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.

General safety considerations

Shock hazards



Some parts of all electrical installations are energized. Failure to follow safe work practices 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 or EN 60215 + A1 or in the National Electrical Code or in ANSI/NFPA No. 10) may install or service the installation.



There is a danger of electric shock if the grounding system is inadequate.

You must comply with the grounding requirements for the grounding system.

Specific safety hazards

Human irradiation by RF transmissions

The Federal Communications Commission (FCC) establishes and from time to time revises guidelines for human exposure to RF electromagnetic fields in the USA. Its Office of Engineering and Technology then publishes these guidelines in bulletins to allow companies, such as Alcatel-Lucent, who develop products that transmit non-ionizing RF waves to calculate safe human exposure distances, based on a corresponding amount of time spent within those distances.

Safe separation distance

The product with antennas equipped shall comply with RF exposure limits of *FCC Part 1.1310 Table 1 (B) Limits for General Population/Uncontrolled Exposure*.

The equipment must be installed and operated with a minimum separation distance, determined by RF field evaluation, between the radiating antennas and nearby persons. Any changes to the antenna or other equipment in the transmit path may require re-evaluation of the exposures to electromagnetic fields.

2 Metro Radio Outdoor features

Functional features

Air interface and carrier band

The 9768 MRO B4 is a dual transmit/dual receive path radio supporting frequency division duplex (FDD) LTE air interface. The 9768 MRO B4 is ideally suited to support dense metro hot spots, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

Note: 9768 MRO B4 also supports a single Tx antenna (SIMO).

Power

AC power system

The 9768 MRO B4 requires a single phase, three-wire power source to provide nominal 120 -V AC, 208 -V AC, or 220 -V AC (measured at the input), line to neutral.

The following table summarizes the AC power system wiring color codes:

Table 2-1 AC power system wiring color codes

Color	Connector pin assignment	Function
Brown	Pin 1	Line
Blue	Pin 2	Neutral
Green/Yellow	Pin 3	Ground/protective earth (PE)
N/C	Pin 4	N/C

Power factor

The minimum power factor (ratio of working power to apparent power) is 0.92. Although this value is above the typical power factor penalty threshold, it is unlikely to have a true impact on rates for power consumption.

AC frequency from source

The power supply of the 9768 MRO B4 accepts frequencies ranging from 47 Hz to 63 Hz from the voltage source, at any allowable level of voltage.

DC power system

The 9768 MRO B4 requires a -48 V DC input.

The following table summarizes the DC power system wiring color codes:

Table 2-2 DC power system wiring color codes

Color	Connector pin assignment	Function
N/C	Pin 1	N/C
White	Pin 2	Return
N/C	Pin 3	N/C
Black	Pin 4	-48 V DC

Physical properties

Form factor

The form factor of the 9768 MRO B4 is as shown below.

Figure 2-1 Form factor



Dimensions

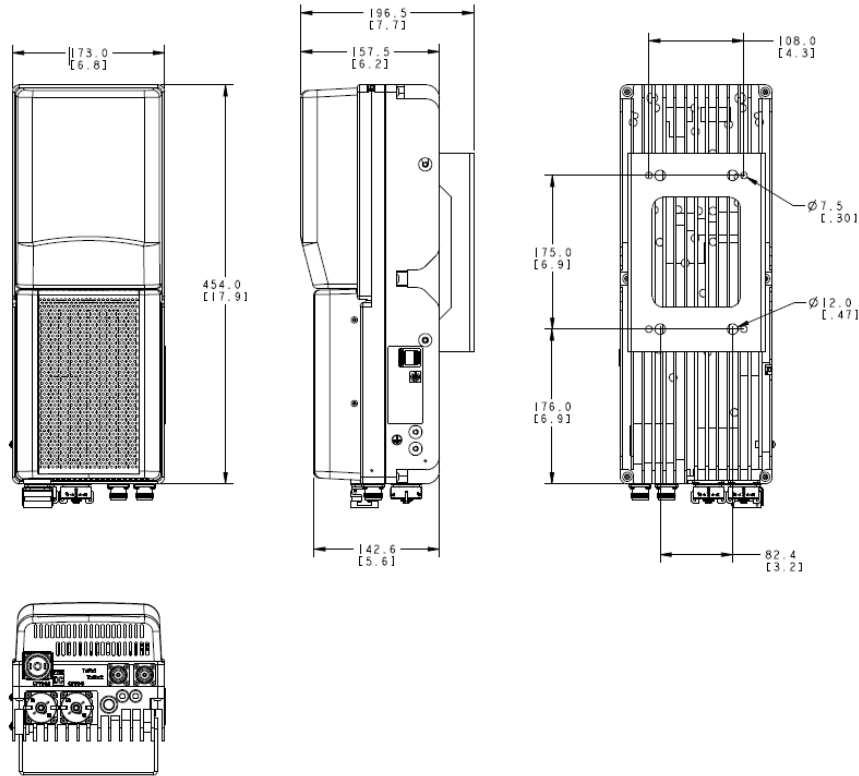
The approximate dimensions of the 9768 MRO B4 without its mounting hardware is as follows:

- 17.9 inches (454 mm) high
- 6.8 inches (173 mm) wide
- 6.2 inches (158 mm) deep
- 7.8 inches (198 mm) deep with its wall-mount bracket

Drill hole pattern

The following image provides different views of the drill hole pattern for mounting the 9768 MRO B4 in a right-side up position:

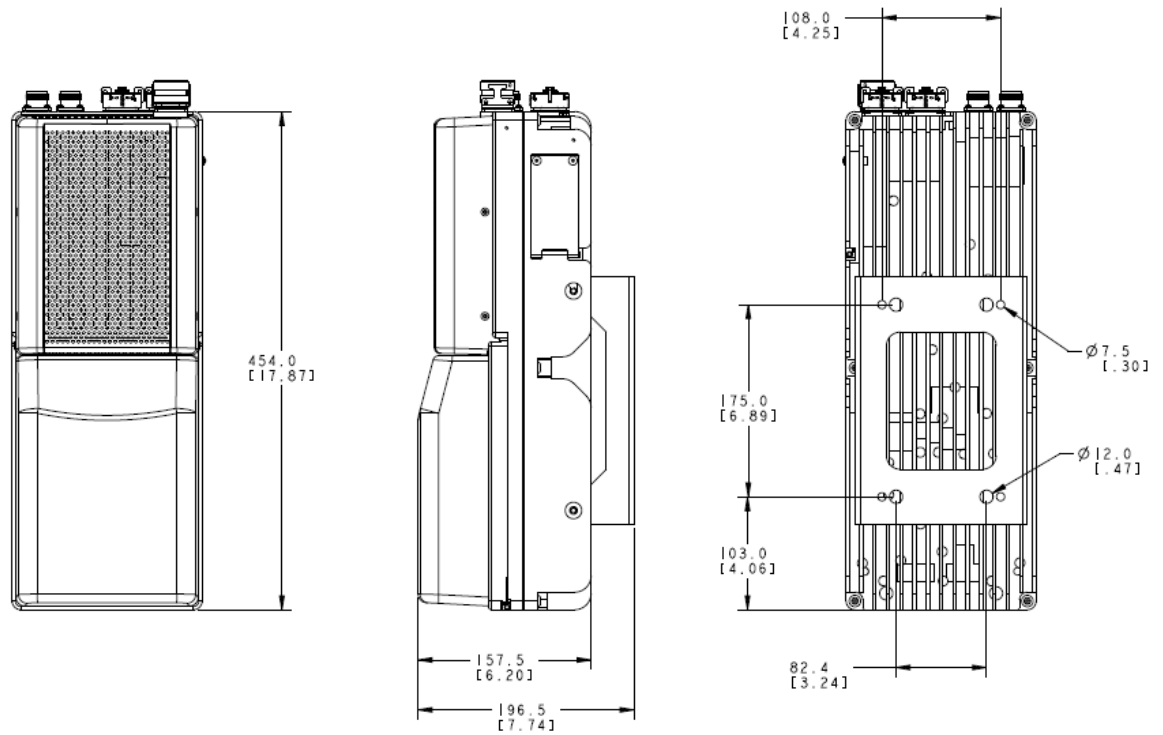
Figure 2-2 Drill hole pattern for right side up orientation



Measurements are in mm [inches]

The following image provides different views of the drill hole pattern for mounting the 9768 MRO B4 in an upside down position:

Figure 2-3 Drill hole pattern for upside down orientation



Measurements are in mm [inches]

Note: Mounting the 9768 MRO B4 upside down is recommended only for installations where the 9768 MRO B4 will not be exposed to the weather elements.

3 Installing an 9768 MRO B4

Components and subassemblies

List of major components and subassemblies

CC	Description
109803106	9768 MRO B4 DC
109809806	9768 MRO B4 AC
849178934	Filter, KS24799 L5
201386596	Amplifier, BNJ893, CDY-B4
201386620	Radio, BNJ895, NG3e-B4
270056567	Power Supply Unit, DC
1AF24959AAAA	Power Supply Unit, AC

Procedure 3-1: Installing the 9768 MRO B4 onto a wall or pole

Overview

This procedure includes guidelines for fastening the bracket, making the data connection and making the power connection. It does not extend to bringing the 9768 MRO B4 into operation, reading the status of the connected 9768 MRO, and optimizing its RF communications.

The Alcatel-Lucent 9768 MRO is designed to be primarily installed in the right-side up orientation, but it can also be installed in an upside down position, as shown in the following image:

Figure 3-1 Example of 9768 MRO B4 orientations



Installing the 9768 MRO B4

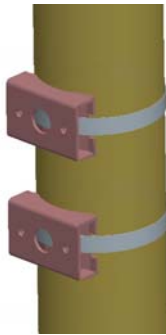
Note: Save all the protective caps and connector covers in case the unit needs to be returned later.

Perform the following steps:

-
- 1 If this is a pole-mount installation, attach the standard RRH pole-mount hardware to the pole.

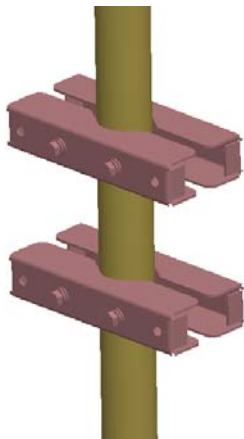
The following image shows a large pole kit (152 mm - 380 mm).

Figure 3-2 Pole-mount bracket attachment to a large pole



The following image shows a small pole kit (50 mm - 152 mm).

Figure 3-3 Pole-mount bracket attachment to a small pole



2 Attach the wall-mount bracket

- to the pole-mount bracket, if this is a pole-mount installation, using M10 hardware provided with the pole mount kit.
- to the venue wall or façade, if this is a wall-mount installation, using 3/8 inch (M10) or 1/4 inch (M6) hardware.

Figure 3-4 Wall-mount bracket



Wall-mount bracket

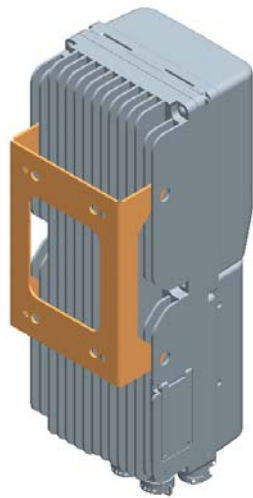


Wall-mount bracket on a large pole



Wall-mount bracket on a small pole

Figure 3-5 Fixed wall-mount bracket



Rear view

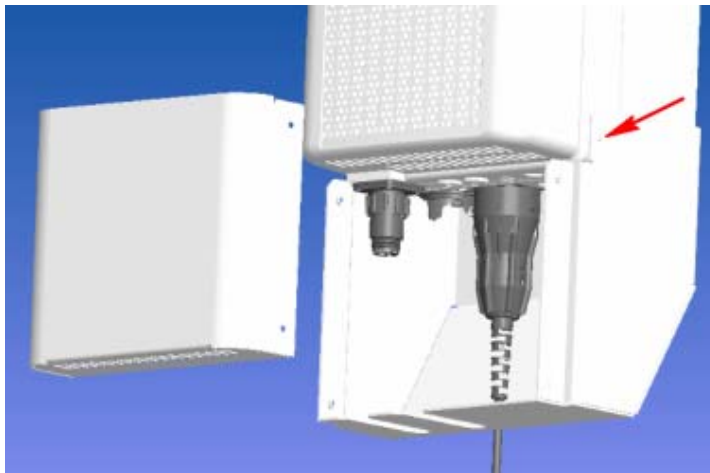


Front view

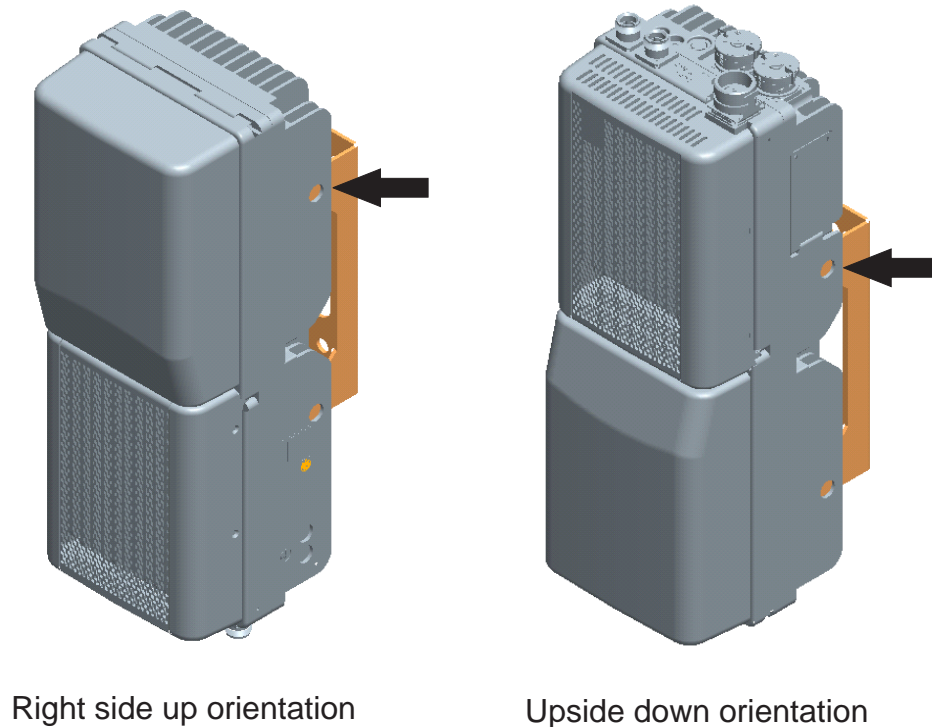
- 3 If this 9768 MRO B4 includes the optional interface security cover, attach the rear half of the cover to the 9768 MRO B4 enclosure using two-M3x8 TR10 screws.

The following image is a preliminary view of the security cover:

Figure 3-6 Security cover rear attachment



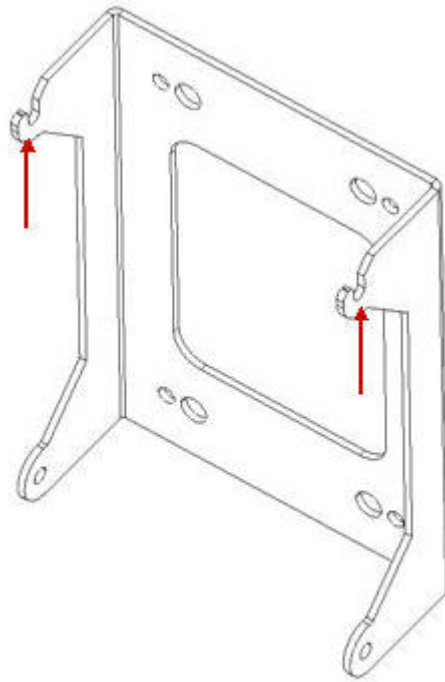
-
- 4 Thread two M6x20 TR30 screws into the upper holes on the left and right side of the 9768 MRO, irrespective of the 9768 MRO B4 orientation (right side up or upside down), as show in the following image:

Figure 3-7 Upper screws for attachment to wall-mount bracket

-
- 5 Place the 9768 MRO B4 onto the wall-mount bracket so that the top ears of the bracket slide into the slots that run along the sides of the back of the 9768 MRO B4.

 - 6 Slide the 9768 MRO B4 downward until the tops of the slots in the mounting bracket ears meet the screws that you threaded into the side flanges of the 9768 MRO B4.

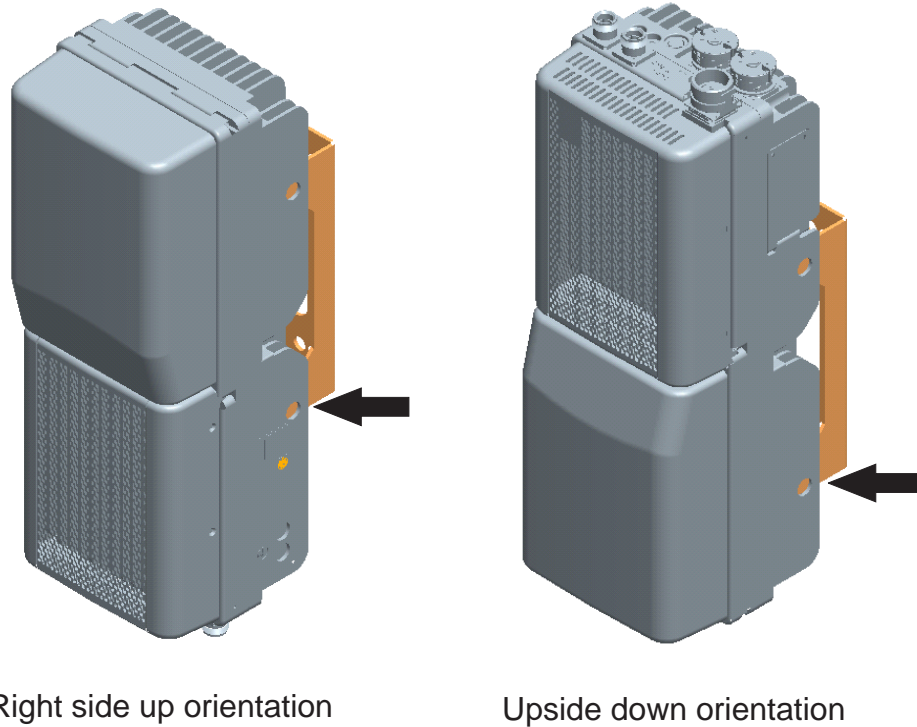
Figure 3-8 Bracket ears of the wall-mount bracket



Fixed bracket

-
- 7 Thread an M6x20 TR30 screw through each of the lower side flange holes
-
- 8 Tighten all four mounting screws, torque to 4.5 Nm (3.3 lb ft).

Figure 3-9 Lower screws for attachment to wall-mount bracket



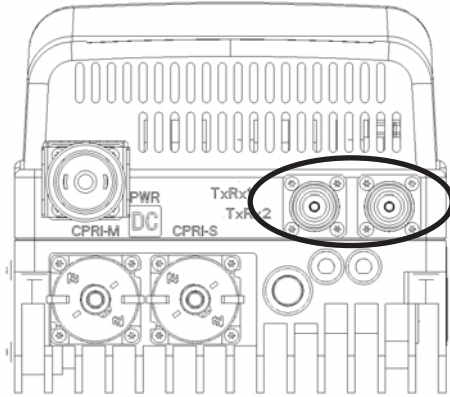
END OF STEPS

Installing RF antenna cables for 9768 MRO B4

Perform the following steps:

- 1 Connect TxRx1 and TxRx2 antenna cables to the 9768 MRO B4. The 9768 MRO B4 uses a 4.1/9.5 miniDIN RF connectors.

Figure 3-10 RF connectors



- 2 Torque the miniDIN connectors to 10 Nm (7.5 ft lb).
- 3 Locate the surge protector within reach of the RF jumper cable from 9768 MRO B4.
Note: See instructions that comes with the surge protection kit for more information.
- 4 Mount the surge protector to a wall or panel using the bulkhead nut provided with the protector.
- 5 Attach the 6 AWG ground cable (wire provided with the surge protector kit) to the protector body using the M8 hardware.
- 6 Attach the other end of the ground wire to the site grounding system.

Appropriate hardware may need to be provided by the customer to attach the ground wire to the site grounding system.

- 7 Attach the DIN 7/16 connector of the RF jumper cable from the 9768 MRO B4 to one side of the surge protector. Torque the DIN 7/16 connection to 30 Nm (22 lb ft).
 - 8 Attach the customer provided antenna cable to the DIN 7/16 -F side of surge protector. Torque the DIN 7/16 connection to 30 Nm (22 lb ft).
-

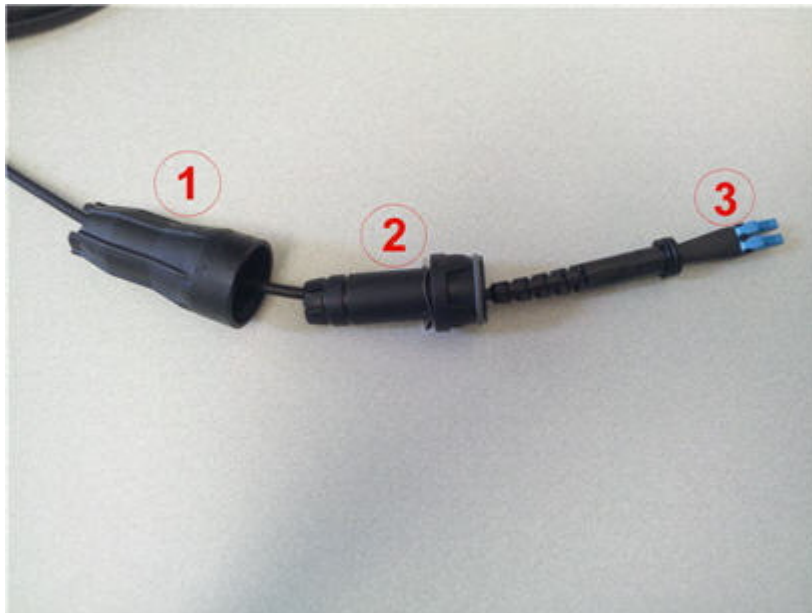
END OF STEPS

Installing fiber cables

Perform the following steps:

- 1 Route the fiber cable between the Alcatel-Lucent 9768 Metro Radio Outdoor (9768 MRO) and the Alcatel-Lucent 9926 Base Band Unit.(9926 BBU). The FullAXS cable components are described in [Figure 3-11, “FullAXS cable, connector components separated”](#) (p. 3-11).

Figure 3-11 FullAXS cable, connector components separated



Legend:

- | | |
|---|----------------------|
| 1 | Outer connector body |
| 2 | Inner connector body |
| 3 | LC connector |
-

- 2 Twist and remove the cap from the *CPRI-S* SFP cage in the bottom of the 9768 MRO B4.

Figure 3-12 Bottom of the 9768 MRO



Figure 3-13 CPRI-S SFP cage, uncovered



-
- 3 Install the SFP module into the 9768 MRO B4.
-
- 4 On the fiber cable assembly, slide the outer connector body and inner connector body away from the LC connector.

Figure 3-14 FullAXS cable, connector components separated



-
- 5 Connect the LC connector on the cable to the SFP module in the 9768 MRO B4.

Figure 3-15 CPRI-S SFP port, exposed



Figure 3-16 CPRI-S SFP port, LC connected



-
- 6 Slide the inner connector body over the LC connector until it engages the bulkhead half of the FullAXS connector on the 9768 MRO B4.

Figure 3-17 FullAXS cable, inner connector body in place



-
- 7 Slide the outer connector body upward to the bulkhead and twist it clockwise, to lock in place and provide a watertight seal.

Figure 3-18 FullAXS cable, connected, and watertight



-
- 8 Gently apply twisting pressure to ensure that the cover for the unused (*CPRI-M*) cage in the bulkhead is still snug in place.

END OF STEPS

Connecting the ground cable

Perform the following steps to connect the ground cable to the 9768 MRO B4:

- 1 The following figures show the ground connection 9768 MRO B4 points:

Figure 3-19 9768 MRO B4 ground connection points



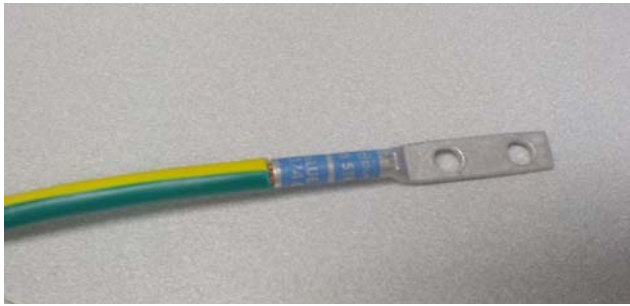
9768 MRO B4

Note: For AC powered 9768 MRO B4s, the primary ground is through the AC power line. The external chassis ground is used only if the site requires a dedicated chassis ground.

- 2 Crimp the double hole lug on to the ground cable.

The following image shows a long barrel double hole crimp lug:

Figure 3-20 Double hole lug



Long barrel double hole crimp lug
(1/4" hole, 3/4" spacing)

-
- 3** Attach the ground cable to the 9768 MRO B4 chassis using the M6 hardware provided in the ground kit (M6x16 screw, lock washer, plain washer).

Clean the contact surface area and use an antioxidant to avoid oxidation. Torque the M6 fasteners to 4.5 Nm (3.3 lb ft).

-
- 4** Route and attach the ground wire to the site ground system. An extra double hole crimp lug, included in the ground kit, may be used if appropriate or the customer can provide the necessary components to attach the ground wire to the site ground.

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

END OF STEPS

Connecting the power connector



There is a danger of electric shock when the power cord is energized.

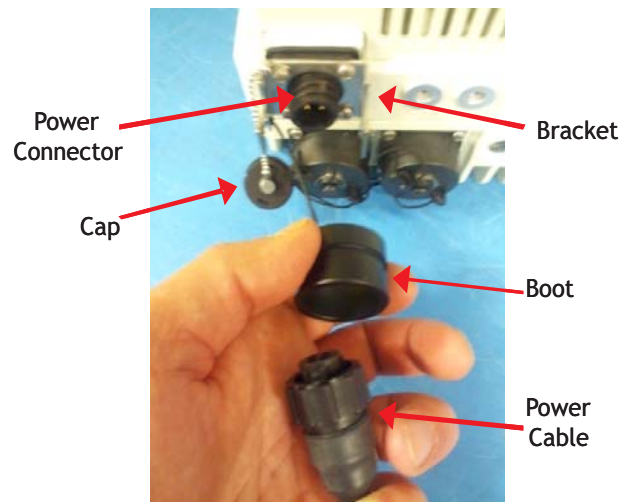
The connection/disconnection of the power cord to the 9768 MRO must be done only with the power cord de-energized. De-energize the far end of the power cord from the power source prior to disconnection at the 9768 MRO end.

The power connector is equipped with a twist-off weather protection cap. The connector also has a connector boot and bracket that must be installed over the power cord. The boot and bracket prevent accidental disconnection of the power from the 9768 MRO while the power cord is powered. Before connecting, ensure safe and appropriate disconnection of power from the 9768 MRO.

Perform the following steps to connect the power connector to the 9768 MRO B4.

- 1 Remove the connector cap by twisting counterclockwise.

Figure 3-21 Power connector components



- 2 Slide the power connector through the connector boot.

Figure 3-22 Power connector in the connector boot



-
- 3 Twist on the power cord connector onto the 9768 MRO B4.
-
- 4 Slide the connector boot over the connector.

Figure 3-23 Connector boot over the connector



- 5 Secure the connector boot to the bracket using the cable tie provided with the power cable.

Figure 3-24 Power connector



END OF STEPS

Installing the AC power cable

There are two possible options while installing the AC power cable - using a connector or hardwire the power cord.

Perform the following steps if your using a connector:

-
- 1 To terminate the unterminated end of the AC power cable, ensure that the plug used is suitable to the environment of use. For example, in an uncontrolled outdoor environment, use a waterproof plug that supports the supply voltage (120-V AC, 208-V AC, or 240-V AC).

The cable may be cut down to length if the provided length of 14.7 ft (4.5 m) is more than required. The plug must be provided by the customer.

-
- 2 Do not connect the far end of the power cord to the AC receptacle outlet or any other power source until it is ready to turn on the 9768 MRO B4.

END OF STEPS

Hardwiring the power cord

Perform the following steps to hardwire the power cord:

-
- 1 The AC power cord is 14.7 ft (4.5 m) long. Locate the AC junction box within reach of the AC power cord.

Ensure suitable drip loops can be maintained at, both, the 9768 MRO B4 and the junction box.

-
- 2 Route the AC power from the source to the junction box per acceptable local codes.

-
- 3 Hardwire the power cord to the power source. If a local disconnect switch or circuit breaker is desired, install one in the junction box.

END OF STEPS

Installing the DC power cable

Perform the following steps to install the DC power cable:

- 1 The DC power cord is 14.7 ft (4.5 m) long. Locate the DC junction box within reach of the DC power cord. Ensure suitable drip loops can be maintained at, both, the 9768 MRO B4 and the junction box.
- 2 Route the DC power from the source to the junction box per acceptable local codes.
- 3 Hardwire the power cord to the power source. If a local disconnect switch or circuit breaker is desired, install one in the junction box.

END OF STEPS

Fixing the optional security cover

- 1 If this 9768 MRO B4 includes the optional interface security cover, attach the front half of the cover to the rear half using two-M3x8 TR10 screws.

The following image is a preliminary view of the security cover:

Figure 3-25 Security cover front attachment



END OF STEPS

Powering up the device

Perform the following steps:

- 1 Test the power at the power source.
- 2 If power to the receptacle outlet has been shut off, turn it on.

- 3   **CAUTION**
RF hazard

Near immediately after the model is powered, it can begin to transmit RF signals and thus becomes a potential hazard of human irradiation from that RF. Nonionizing radiation of this kind may damage human tissue or cause other health problems, even at doses far below those that produce perceptible heating.

For more information on the safe separation distance, see [“Safe separation distance” \(p. 1-4\)](#).

Plug the power cord into the power source.

- 4 Begin observing and noting the changes that occur in the LED indications of the 9768 MRO.

On the bottom of the Alcatel-Lucent 9768 MRO, a single visible LED provides local diagnostic indications. The LED indications have specific meanings, as defined in the following table:

Table 3-1 LED interpretations

If the LED is...	then the indication is that...
not lit at all	the 9768 MRO is not powered.
steady-lit green	the 9768 MRO is powered, its RF functions are enabled, and its links with the 9926 d2U Base Band Unit are active.
blinking green	the 9768 MRO is not transmitting.
steady-lit yellow	the slave link between this 9768 MRO and the next 9768 MRO in a daisy-chained configuration has a fault. Where a daisy chain is not implemented (as in the initial release of this product, which does not support daisy chaining), this LED condition will not be seen.
blinking yellow	a download of firmware is occurring.

Table 3-1 LED interpretations (continued)

If the LED is...	then the indication is that...
steady-lit red	either <ul style="list-style-type: none"> • the system is in its initial power-up state • a major non-recoverable hardware failure in the 9768 MRO is occurring, and it must be replaced.
blinking red	a recoverable error is occurring. For example, the temperature is out of range or an antenna fault exists.

- 5 When a steady-lit green indication has been achieved, inform the commissioning and integration team that the installation has been successfully completed.

END OF STEPS

Appendix A: Product conformance statements

Overview

Purpose

This section presents the product conformance statements that apply to the Alcatel-Lucent 9768 Metro Radio Outdoor access point equipment.

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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United States compliance

Introduction

Purpose

The statements that follow are the product conformance statements that apply to the Alcatel-Lucent 9768 Metro Radio Outdoor when deployed in the United States.

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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 47 CFR 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.

47 CFR 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 47 CFR 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.

RF approval

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

This equipment complies with Part 27 - MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES.

Product safety conformance statements

Product safety conformance

This equipment is Safety Certified for the United States of America by a Nationally Recognized Test Laboratory (NRTL) accredited by the US Department of Labor, Occupational Safety and Health Administration (OSHA), such as UL, CSA, or others. The product bears this certification mark of this certification laboratory on its 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 laboratory by the business/product unit Applicant for the product or by contacting Alcatel-Lucent Technical Support. See the Alcatel-Lucent Support web site (<http://www.alcatel-lucent.com/support/>) for contact information.

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.

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.

FDA/IEC optical transmitter product compliance statements

FDA/IEC optical transmitter product compliance

Alcatel-Lucent declares that Alcatel-Lucent 9764 Metro Cell Outdoor 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.

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.

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

A AHJ

The agency or authority having jurisdiction. Article 100 of the National Electrical Code (NEC) for the United States defines AHJ with greater specificity, stating that it *may be a federal, state, local government, or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department or health department, building official or electrical inspector, or others having statutory authority. In some circumstances, the property owner or his/her agent assumes the roles, and at government installations, the commanding officer or departmental official may be the AHJ.*

B BBU

Baseband unit, the digital signal processor that connects the MRO to the network and provides the timing and logic for periodic sync signals. In this context, the BBU is the master, and the MRO is the slave. Thus, the fiber optic cable from the BBU should be connected to the *slave* port of the MRO.

C CAN/CSA

Canadian Standards Association. See <http://www.csa.ca> (<http://www.csa.ca>).

CE Mark

The official logo that substantiates the manufacturer whose product bears it has complied with all EEC directives that apply. See also EEC directive.

CFR

Code of Federal Regulations. Among these regulations, Title 47, “Telecommunication,” conveys the rules of the FCC companies operating networks in the USA. See also FCC.

CPC

Circular Plastic Connector

CPRI

Common Public Radio Interface. Alcatel-Lucent was one of several major companies who participated in defining the specification for this interface between the radio (the MRO in this case) and the radio equipment controller (the BBU in this case). See also BBU.

D d2U

The BBU system supporting two controller and two modems. See also BBU.

E EEC directive

A law enacted by the European Union for enforcement by its Common Market. The terms of such a law have been used as a point of reference against which to compare the intentional RF emissions of the MRO.

EIRP

The equivalent isotropically radiated power. The density of the peak power of a radio in the direction of its greatest amount of gain. This is typically expressed in dBm, a measure relative to power out per mW.

ESD

Electrostatic discharge, a hazard that electronic equipment such as the MRO can suffer by way of exposure to static electricity or proximity to something that has no connection to ground.

F FCC

Federal Communications Commission. Its Wireless Communications Service (WCS) bureau regulates, among other services, commercial services in the upper 700-MHz frequency band in the USA.

FDD

Frequency-division duplexing, a radio indexing system whose transmit and receive signals are on differing carrier frequencies.

FRU

Field-replaceable unit, a designation connoting that the part can be removed in favor of a new one when diagnostic exercises seem to have isolated a fault to the part. The overall implication is that, if those exercises point to either no particular part, then the entire unit should be replaced. In the case of the MRO, the only FRUs are the SFP port modules (see also SFPs) and the whole MRO itself.

G GR

Generic requirements published by Telcordia Technologies. See also Core.

I IEC

International Electrotechnical Commission. The MRO complies with numerous standards that this independent body has propagated.

L LC

A small connector that terminates a fiber optic cable and snaps into its mate.

IR

A member of the Alcatel-Lucent lightRadio™ family of wireless products. The MRO belongs to this family.

LTE

3GPP Long Term Evolution wireless standard for high-speed data devices. Evolution implies that the air interface has evolved from GSM/UMTS standards to an OFDM-based air interface that realizes peak rates of 300 Mbps downlink and 75 Mbps uplink at less than 5 ms latency. See also 3GPP and OFDM.

O OFDM

Orthogonal frequency-division multiplexing, the multi-carrier modulation scheme that overcomes many commonly experienced wireless communications problems, such as multipath and signal attenuation.

P PDCP

Packet Data Convergence Protocol, which provides security to both the air interface and the fiber optic interface of the MRO by compressing and decompressing the IP headers, as specified in the UMTS protocol stack.

R Radiall

The proprietary name of an enterprise that produces components for device interconnections. These components include the R2CT weatherized connector kit by which the MRO installer retrofits the LC fiber optic connector on the backhaul cable to the SFP port module of the MRO. The proper name of this company is Radiall USA, Inc. See also SFP.

RoHS

The Restriction of Hazardous Substances Directive, a law enacted by the European Union for enforcement by its Common Market in order to restrict six particular materials in electrical and electronic products. These materials are the elements lead, mercury, and cambium, and three compounds. More broadly, the standard QC 080000 propagates RoHS specifications throughout the world and thus impacts the choice of regions, nations, and states and provinces selected to regulate the same substances. The MRO is fully compliant with the RoHS directive.

RRH

Remote RF head consisting of a radio, a receive filter, a transmit amplifier, and a CPRI link to a BBU. The MRO is an RRH. See also BBU and CPRI.

S SFP

A small form-factor pluggable module, which serves as the connector in the MRO for the fiber optic interface to the BBU. This module is an FRU. See also BBU and FRU.

SIMO

Single input, multiple output. Its transmitter function uses a one antenna, and its receiver function uses two. This scheme reduces the instance of multipath and fading, in particular. Antonyms are MISO (multiple input, single output) and MIMO (multiple input, multiple output).

V VSWR

Voltage standing wave ratio.

W W-CDMA

Wideband code division multiplex air interface, used by UMTS-FDD. See also FDD.

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