Exhibit 8 Manual - Confidential

Radio Description

Radio 2217, Radio 2218 and Radio 0208

DESCRIPTION

PRELIMINARY

Contents

1 Introduction

This document describes Radio 2217, Radio 2218 and Radio 0208.

1.1 Warranty Seal

The unit is equipped with a warranty seal sticker.

Note: Seals that have been implemented by Ericsson shall not be broken or removed, as it otherwise voids warranty.

PRELIMINARY

2 Product Overview

The radio remotely extends the reach of the Radio System, and is designed to be located near the antenna. The radio is part of a modular radio building concept that enables a variety of installation alternatives that are also easy to expand. Flexible mounting solutions are provided using rails, pole clamps, and brackets. The small size of the radio together with the flexible mounting solutions reduces the site volume. The lower weight also improves the handling of the radio.

An optic cable connects the radio to the Radio System main unit or an expanded macro Radio System. The radios can be connected in a star configuration or in a cascade configuration with optical cable links. An overview of different radio installations is shown in Figure 1.
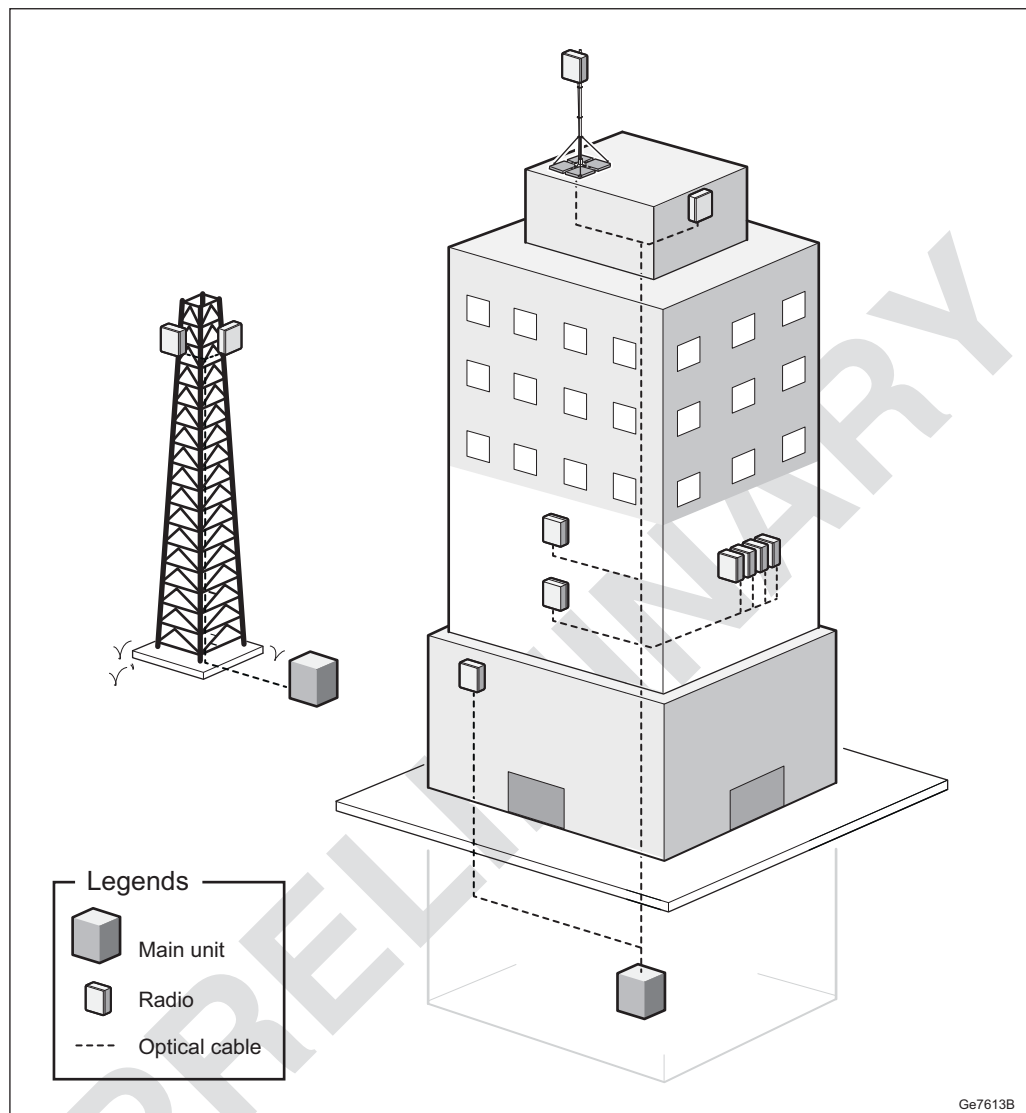
Figure 1   Radio Installations

2.1   Main Features

The following are the main features of the radio:

- Supports 2- and 3-wire power connections. For 2-wire power solutions, a DC adapter is used.

- Supports:

    – Radio 2217 and Radio 0208: Wideband Code Division Multiple Access (WCDMA) and Long Term Evolution (LTE).

    – Radio 2218: LTE.

- Supports:

    - Radio 2217 and Radio 0208: Frequency Division Duplex (FDD).

    - Radio 2218: Time Division Duplex (TDD).

- Supports：

    - Radio 2217 and Radio 2218: Duplex transmitter/receiver (2TX/2RX) branches.

    - Radio 0208 has two uplink RX branches but no downlink TX branch. It can be used as a two RX unit to add support for four way RX diversity when used in combination with the following RRUs:

        - RRUW 01/02

        - RRUS 01

        - RRUS 11

        - RRUS 12

        - RRUS 13

        - Radio 2217

- Supports up to 9.8 Gbit/s CPRI (optical).

- Complies with 3GPP base station classes Medium Range (MR) and Wide Area (WA); relevant standards are listed in Section 6.1.4 on page 39 (Radio 2217), Section 7.1.4 on page 42 (Radio 2218) and Section 8.1.4 on page 46 (Radio 0208).

2.2 Optional Equipment

Optional equipment for Radio 2217 is the following:

- Fan unit.

PRELIMINARY

3 Technical Data

This section contains the radio physical characteristics, environmental data, and the power information of the Radio System.

3.1 Technical Data Summary

This section contains a technical data summary for Radio 2217, Radio 2218 and Radio 0208.

3.1.1 Radio 2217

The technical data for Radio 2217 is listed in Table 1.

Table 1   Radio 2217 Technical Data

Description	Value
Maximum nominal output power[1][2]	2 x 10 W, 2 x 20 W, 2 x 30 W, and 2 x 40 W (License key is required for total output power over 20 W.)
Number of carriers	WCDMA: One to eight carriers (B1); one to seven carriers (B8); one to five carriers (B5) LTE: One to three carriers Mixed mode: Two to six carriers (B1); two to seven carriers (B8); two to seven carriers (B5) (HWAC required)

Description	Value
Frequency[3]	1920–1980 MHz uplink
	2110–2170 MHz downlink
	B1 for WCDMA and LTE
	1710–1785 MHz uplink
	1805–1880 MHz downlink
	B3 for LTE
	880–915 MHz uplink
	925–960 MHz downlink
	B8 for WCDMA and LTE
	832–862 MHz uplink
	791–821 MHz downlink
	B20 for LTE
	718–748 MHz uplink
	773–803 MHz downlink
	B28A for LTE
	824–849 MHz uplink
	869–894 MHz downlink
	B5 for WCDMA and LTE
Dimensions without Fan Unit	
Height	351 mm
Width	298 mm
Depth	127 mm
Dimensions with Fan Unit	
Height	351 mm
Width	298 mm
Depth	138 mm
Weight without Fan	
Radio 2217 B1, B3, B8, B20, B28A	12.3 kg
Radio 2217 B5	13.3 kg
Weight with Fan	

Description	Value
Radio 2217 B1, B3, B8, B20, B28A	12.8 kg
Radio 2217 B5	13.8 kg
Color	
Body	NCS S 1002-B
Front	NCS S 6502-B

(1) Detailed information about LTE licences can be found in *License Management* or *Manage Licenses*.

(2) Detailed information about output power can be found in applicable Output Power User Guide.

(3) Information about Instantaneous Bandwidth (IBW) can be found in *RBS Configurations*.

Radio 2217 height, width, and depth without fan unit, are shown in Figure 2.

Figure 2   Radio 2217 Height, Width, and Depth without Fan Unit

Radio 2217 height, width, and depth with fan unit, are shown in Figure 3.

Unit of measurement: mm

Ge7606C
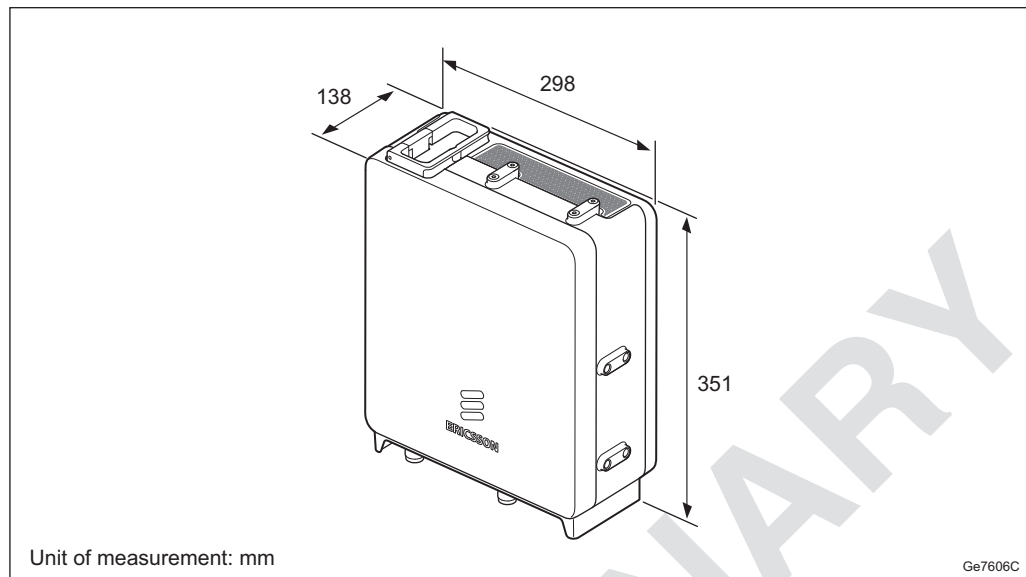
Figure 3   Radio 2217 Height, Width, and Depth with Fan Unit

The technical data for the fan unit is listed in Table 2.

Table 2   Fan Unit Technical Data

Description	Value
Dimensions	
Height	351 mm
Width	298 mm
Depth	15 mm
Total depth	63 mm
Weight	
Fan unit	0.5 kg
Color	
Back cover	NCS S 1002-B
Fan box	NCS S 6502-B

The fan unit height, width, and depth, are shown in Figure 4.
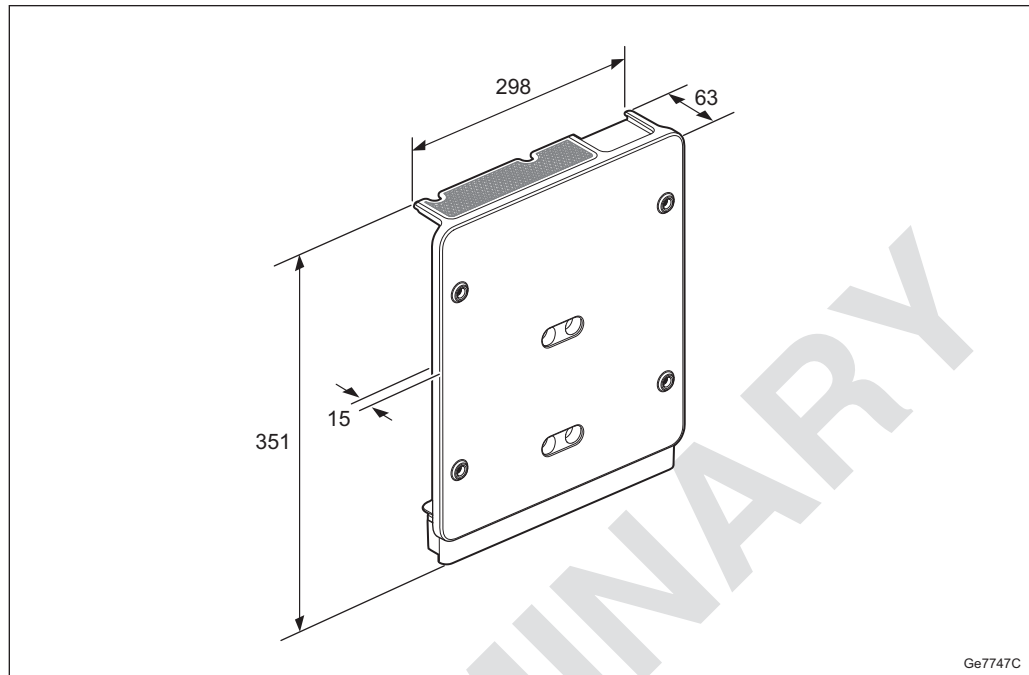
Figure 4   Fan Unit Height, Width, and Depth

3.1.2   Radio 2218

The technical data for the radio is listed in Table 3.

Table 3   Radio 2218 Technical Data

Description	Value
Maximum nominal output power[1][2]	2×10 W, 2×20 W, 2×30 W, and 2×40 W (License key is required for total output power over 20 W.)
Number of carriers	LTE: One to three carriers (HWAC required)
Frequency[3]	1885–1915 MHz B39A for LTE
Dimensions	
Height	381mm
Width	291 mm
Depth	115 mm
Weight	
Radio 2218	13.5 kg

Description	Value
Color	
Body	NCS S 1002-B
Front	NCS S 6502-B

(1) Detailed information about LTE licences can be found in License Management or Manage Licenses.
(2) Detailed information about output power can be found in applicable Output Power User Guide.
(3) Information about Instantaneous Bandwidth (IBW) can be found in RBS Configurations.
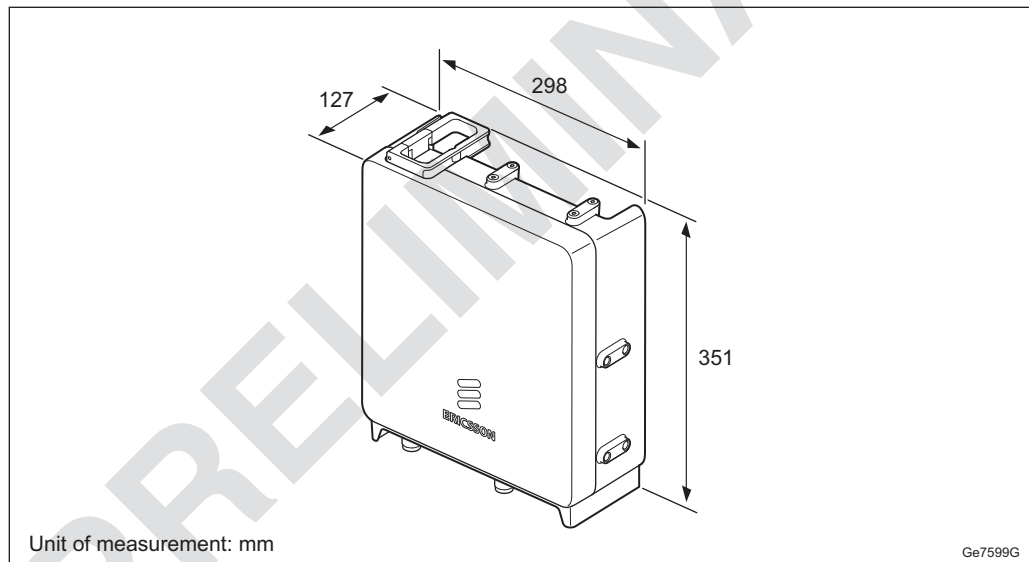
The radio height, width, and depth, are shown in Figure 5.
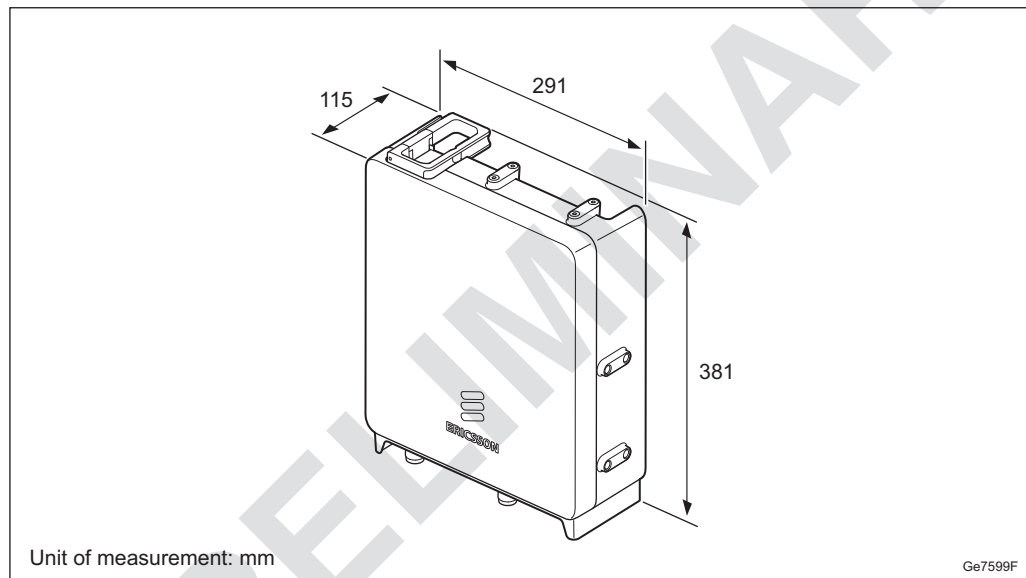
Figure 5   Radio 2218 Height, Width, and Depth

3.1.3   Radio 0208

The technical data for Radio 0208 is listed in Table 4.

Table 4   Radio 0208 Technical Data

Description	Value
Maximum nominal output power [1][2]	N/A [3]
Number of carriers	WCDMA: One to eight carriers LTE: One to three carriers Mixed mode: One to eight carriers (HWAC required)

Description	Value
Frequency[4]	1920–1980 MHz uplink
	B1 for WCDMA and LTE
Dimensions	
Height	310 mm
Width	291 mm
Depth	63.4 mm
Weight	
Radio 0208	8.4 kg
Color	
Body	NCS S 1002-B
Front	NCS S 6502-B

(1) Detailed information about LTE licences can be found in License Management *or* Manage Licenses.
(2) Detailed information about output power can be found in applicable Output Power User Guide.
(3) The Radio 0208 is not TX-capable. When used in an RBB together with a TX-capable remote radio, the output power of the RBB is that of the TX-capable remote radio.
(4) Information about Instantaneous Bandwidth (IBW) can be found in RBS Configurations.
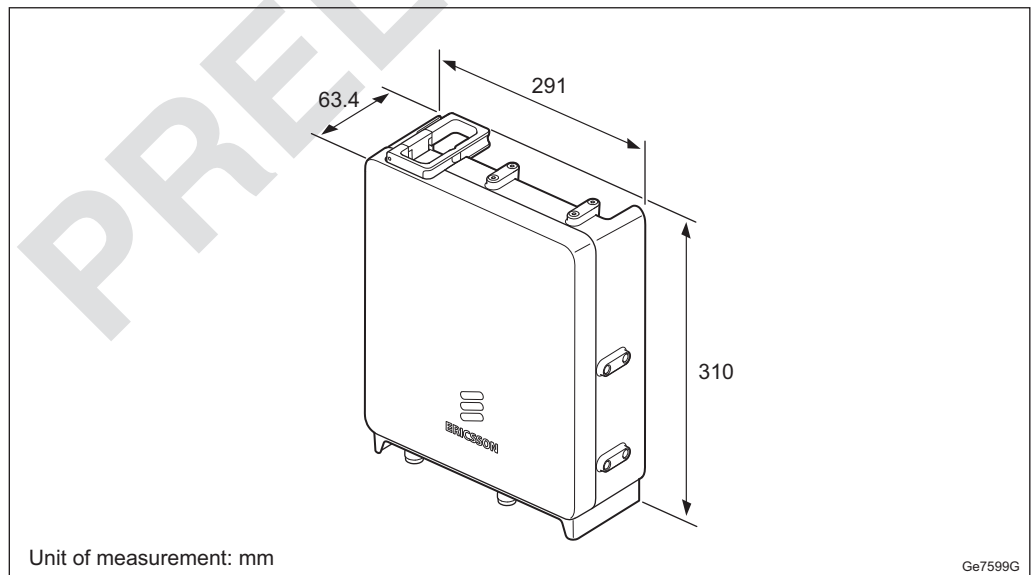
The radio height, width, and depth, are shown in Figure 6.

Unit of measurement: mm

Ge7599G

Figure 6   Radio 0208 Height, Width, and Depth

3.2 Installation Recommendations

To achieve reliable operation, and maximum performance, an appropriate installation location must be chosen.

3.2.1 Indoor Locations to Avoid

Although the unit is designed for outdoor use, it can also operate in an indoor environment according to ETSI EN 300 019-1-3 class 3.1, 3.2, 3.3, and 3.6. This does not cover installation with heat traps or installation in lofts, where air ventilation does not exist. To ensure smooth performance of the product, it is recommended to ensure that the planned installation site for the unit is not a potential microclimate location. This typically occurs in places such as unventilated lofts, sites with heat traps, or sites where the product is exposed to direct sunlight through windows. Ensure proper ventilation and avoid installing the equipment under glass covers or skylight windows.

3.2.2 Outdoor Locations to Avoid

Although Ericsson declares this product suitable for most outdoor environments, this does not cover installations where the planned installation site for the unit is a potential microclimate location. Typical examples for these microclimate locations are sites where the products are not only exposed to the actual temperature, but also additional temperature as heat coming from dark-colored planes, for example, reflections from the floor or walls. The additional temperature can generate heat traps with temperatures up to $10°$ C higher than expected.

Avoid installing equipment in the following locations:

- Near the exhaust of building ventilation system.

- Near the exhaust of the chimney.

- Opposite large surfaces made of glass or new concrete.

3.2.3 Installations that Require Fan Unit

The Radio 2217 fan unit must be used in all installation scenarios where the cables from the radio are not pointing directly downwards. The fan unit must also be used in extreme conditions, such as installations with poor ventilation or installations with heat traps.

3.2.4 Painting Limitations

Ericsson does not recommend painting the radio as it may affect radio performance of the unit.

Ericsson will apply limitations to the warranty and service contract if the radio is painted.

3.2.4.1 Technical Limitations

If the radio is painted, be aware of the technical limitations below:

- Sunlight on dark paint may increase the temperature of the radio causing it to shut down.

- The plastic surfaces and the plastic covers are suited for painting with normal commercially available one or two component paints.

- Never use metallic paint or paint containing metallic particles.

- Ensure that ventilation and drainage holes are free from paint.

- Ensure proper adhesion of the paint.

3.2.4.2 Commercial Limitations

If the radio is painted, the commercial limitations below apply:

- Failure modes directly related to overheating due to painting are not valid for repair within the scope of the warranty or standard service contract.

- Product failures related to paint contamination of components of the unit are not valid for repair within the scope of warranty or standard service contract.

- When a painted unit is repaired, it will be restored to the standard color before being returned to the market. It is not possible to guarantee the same unit being sent back to the same place. This is also valid for units repaired under a service contract.

- For repairs within the warranty period or a standard service contract, the customer will be charged the additional costs for replacing all painted parts of the unit or the complete unit.

3.3 Space Requirements

The installation alternatives for the radio are shown in Figure 7 and listed in Table 5.
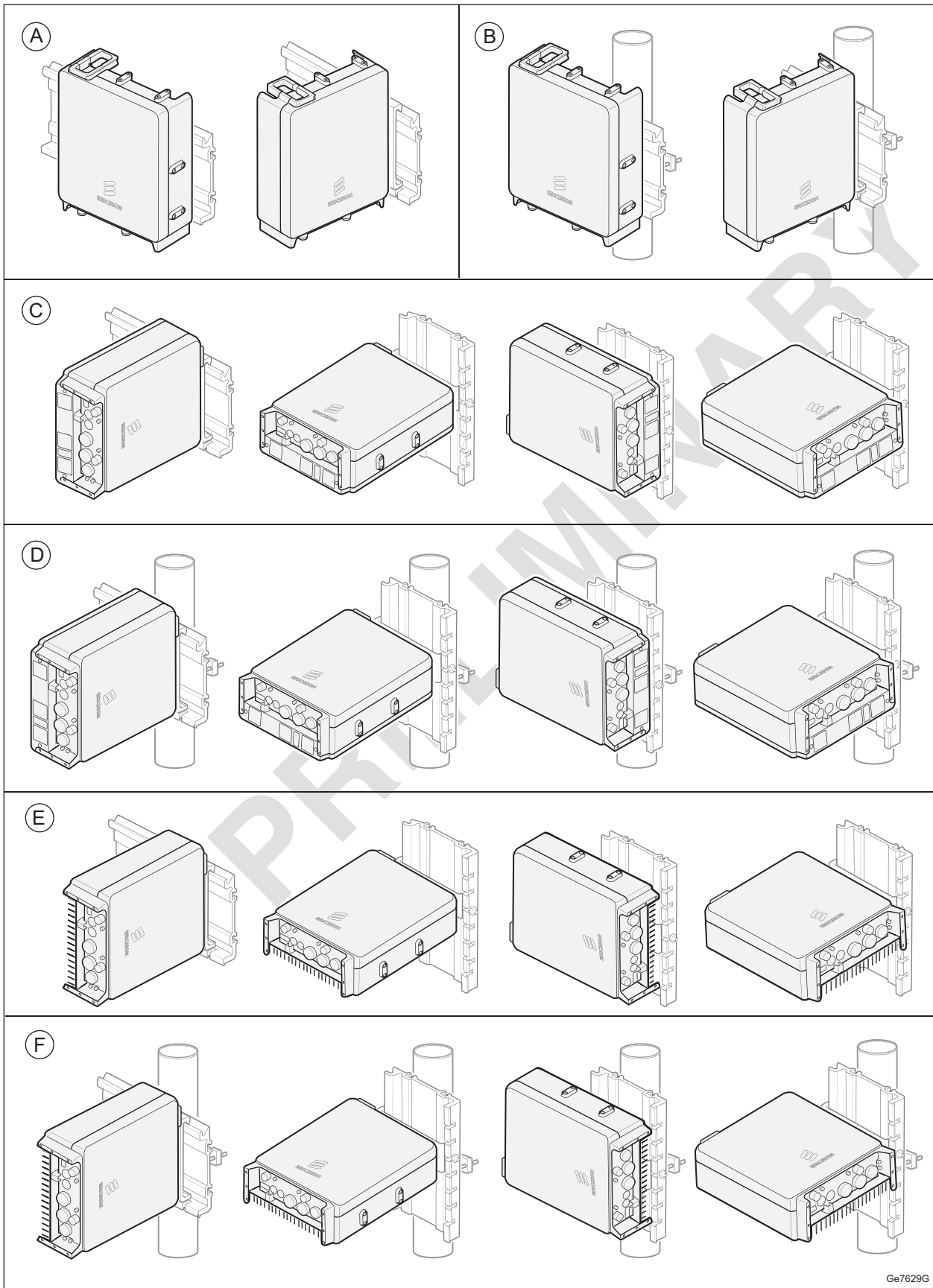
Figure 7   Installation Alternatives

Table 5   Key to Installation Alternatives

Installation Method	Description
A	Wall installation
B	Pole installation[1]
C	Wall installation with fan unit, only Radio 2217
D	Pole installation with fan unit, only Radio 2217[1]
E	Wall installation without fan unit, only Radio 0208
F	Pole installation without fan unit, only Radio 0208[1]

(1) Maximum rail 450 mm

3.3.1   Generic Requirements

Parts of the radio can attain high temperatures during normal operation. Therefore the radio must be installed in a classified service access area. Exception applies when the radio is installed at a height that is not reachable from ground level.

Allow a sufficient working space in front of the radio.

It is recommended that the radio is installed below, or behind the antenna. Do not install the radio closer than 25 m from the main lobe of it its own antenna, or antennas belonging to other services or operators using the same site.

3.3.2   Pole or Mast Installation

The installation requirements when installing the radio on a pole or a mast are shown in Figure 8 .
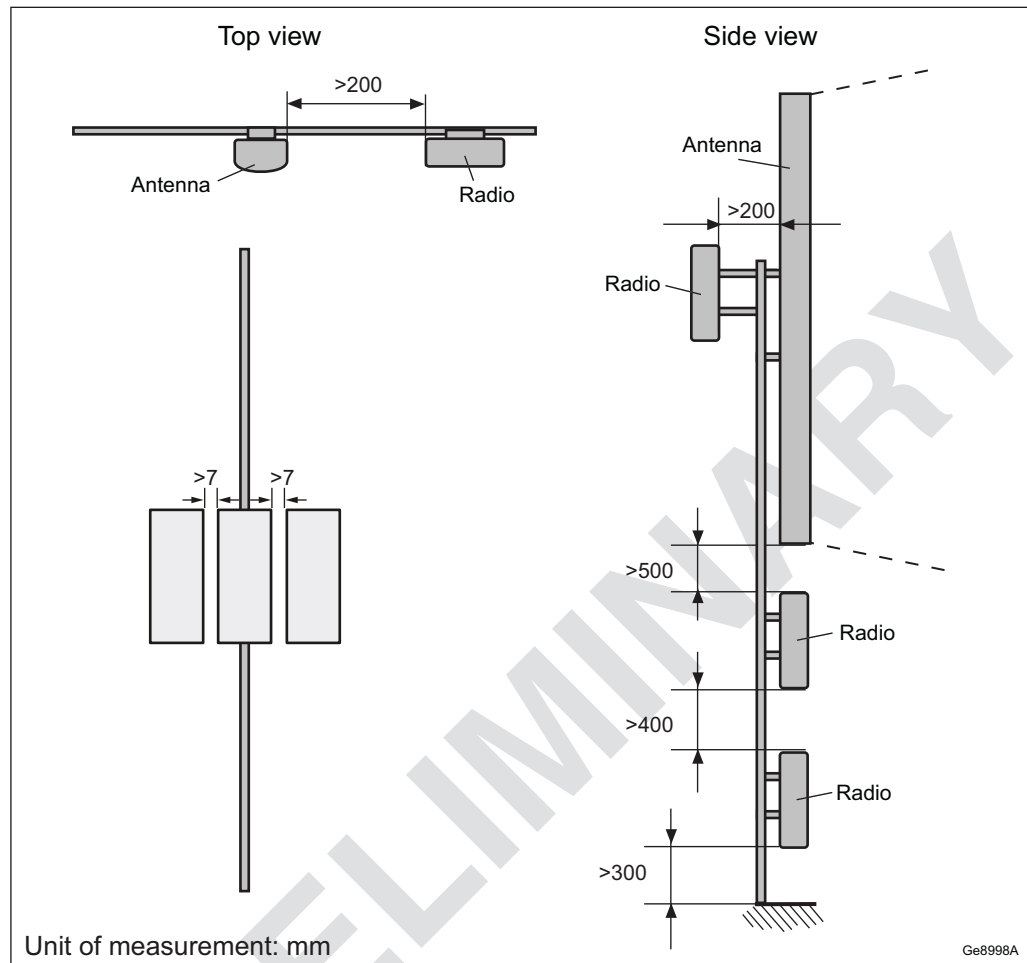
Figure 8   Radio Pole Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a single pole, or a dual pole installation. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 7 mm free space (created by the distance blocks) between radios installed side by side on the rail.

For Radio 2217 and Radio 2218 allow for a minimum of 40 mm free space between radios installed side by side on the rail when ambient temperature is expected to be above +45°C.

Note: A radio cannot be installed in the uppermost position of a pole or mast.

3.3.3   Rail Installation on Wall

This section describes the installation requirements when installing the radio on a wall.

3.3.3.1 Radio Installation on Outdoor Wall

The installation requirements if installing the radio outdoor on a wall are shown in Figure 9.

Figure 9   Radio Outdoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. Allow a minimum vertical distance of 500 mm between radio and antenna, if installed above or below an antenna. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 7 mm free space (created by the distance blocks) between radios installed side by side on the rail.

For Radio 2217 and Radio 2218 allow for a minimum of 40 mm free space between radios installed side by side on the rail when ambient temperature is expected to be above +45°C.

3.3.3.2 Radio Installation on Indoor Wall

The installation requirements if installing the radio on an indoor wall are shown in Figure 10.
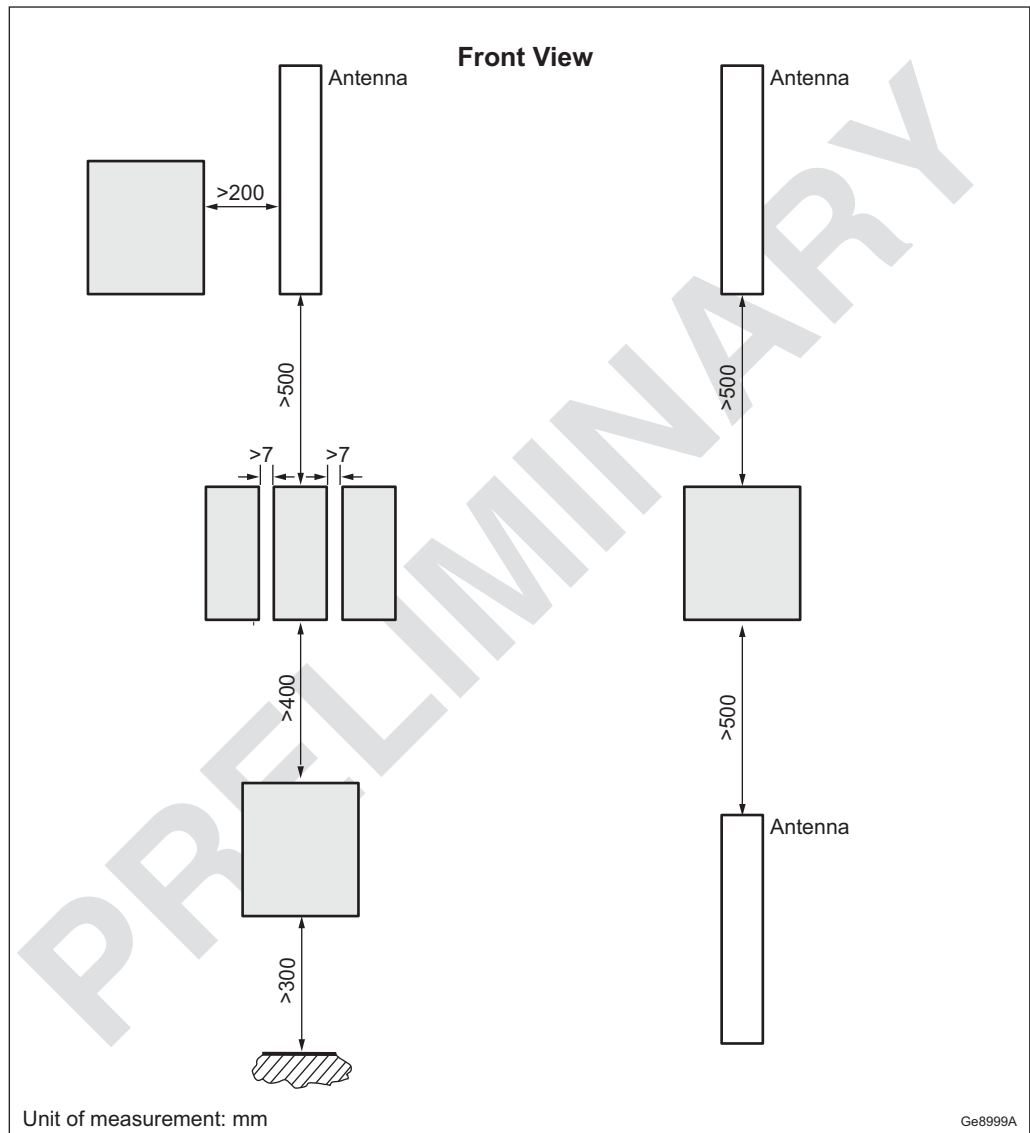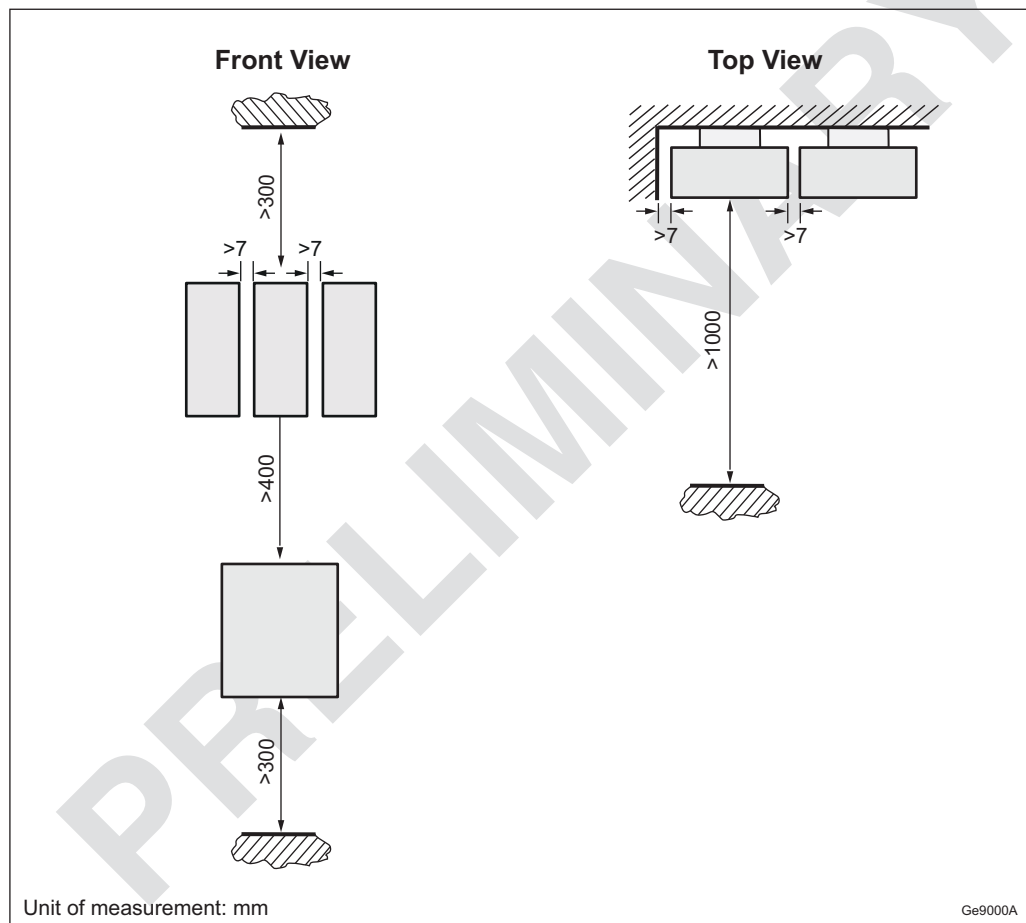

Figure 10   Radio Indoor Wall Installation Requirements

To ensure adequate airflow between the units, allow a minimum of 400 mm free space between radios vertically installed on a horizontal rail on a wall. The minimum distance from the bottom of the radio to the floor is 300 mm.

Allow a minimum of 7 mm free space (created by the distance blocks) between radios installed side by side on the rail.

For Radio 2217 and Radio 2218 allow for a minimum of 40 mm free space between radios installed side by side on the rail when ambient temperature is expected to be above +45°C.

3.4 Acoustic Noise

The radio may emit low levels of acoustic noise when operating on low capacity in LTE.

With the Radio 2217 fan unit, the acoustic noise is ambient temperature dependent.

The sound pressure level for Radio 2217 without fan and when operating on low capacity in LTE can be 30 dBA.

The sound pressure levels for Radio 2217 with fan are shown in Table 6.

Table 6   Sound Power Level

Temperature (°C)	Sound Power Level (dBA)
> +25	44
+30	45
+40	49
+45	51
+55	55

The sound pressure level for Radio 2218 without fan and when operating on low capacity in LTE can be 28 dBA.

3.5 Environmental Characteristics

This section contains operating environment data for the radio.

3.5.1 Operating Environment

The following are the values for the normal operating environment of the radio:

Temperature[1]	−40 to +55 °C
Solar radiation	≤ 1,120 W/m²
Relative humidity	5–100%
Absolute humidity	0.26–40 g/m³
Maximum temperature change	1.0°C/min
Maximum wind load at 50 m/s (pole installed single case)	260 N (front)

(1) Depending on installation scenario, traffic load, and configuration, the product might in the highest 10 °C temperature range, temporary reduce the output power. This depends on the durations of the high ambient temperature.

3.5.2 Heat Dissipation

The radio is convection cooled and designed for outdoor installation. Table 7 shows the radio output power and maximum heat dissipation. Indoor installation in a room without adequate ventilation and cooling must be avoided.

Table 7 Radio Heat Dissipation

Unit	Output Power (W)	Maximum Heat Dissipation (kW)
Radio 2217 B1	2 x 40	0.22
Radio 2217 B3	2 x 40	0.22
Radio 2217 B8	2 x 40	0.22
Radio 2217 B20	2 x 40	0.25
Radio 2217 B28A	2 x 40	0.25
Radio 2217 B5	2 x 40	0.32
Radio 2218 B39A	2 x 40	0.27
Radio 0208 B1	N/A	0.036

3.5.3 Vibration

This section describes the radio tolerance to vibrations. The radio operates reliably during seismic activity as specified by test method IEC 60068-2-57 Ff.

Maximum level of Required Response Spectrum (RRS)	50 m/s^2 within 2–5 Hz for DR=2%
Frequency range	1–35 Hz
Time history signal	Verteq II

The radio operates reliably during random vibration as specified by test method IEC 60068-2-64 Fh

Random vibration, normal operation	0.3 m^2/s^3

3.5.4 Materials

This section contains information about materials.

All Ericsson products fulfill the legal and market requirements regarding the following:

• Material declaration

- Materials' fire resistance, components, wires, and cables

- Recycling

- Restricted and banned material use

3.6 Power Characteristics

This section describes the power supply requirements, power consumption, and fuse and circuit breaker recommendations for the radio.

Different power systems can supply power for multiple radios, if necessary.

3.6.1 DC Power Characteristics

The power supply voltage for the radio is -48 V DC. The power supply requirements are shown in Table 8.

Table 8 Radio DC Power Supply Requirements

Conditions	Values and Ranges
Nominal voltage	-48 V DC
Operating voltage range	Radio 2217 and Radio 0208: -36.0 to -58.5 V DC
	Radio 2218: -38.0 to -58.5 V DC
Non-destructive range	0 to -60 V DC

The radio is designed for 3-wire power connections. For 2-wire power solutions, a DC adapter is used.

Fuse and Circuit Breaker Recommendations

The external fuse and circuit breaker recommendation for the radio are shown in Table 9.

The recommendations given in this section are based on peak power consumption and give no information on power consumption during normal operation.

The recommended melting fuse type is gG-gL-gD in accordance with IEC 60269-1. Circuit breakers must comply with at least Curve 3 tripping characteristics, in accordance with IEC 60934.

The radio has a built-in Class 1 (Type 1) Surge Protection Device (SPD) to protect the equipment in case of lightning and network transients. The recommended fuse or circuit breaker rating is therefore dimensioned not to trip the fuse or circuit breaker in case of most SPD operation. The minimum fuse

rating could be taken into account only if it is accepted that fuses or circuit breakers trip in such situations.

Table 9   External Radio Fuse and Circuit Breaker Recommendations

Unit (DC Powered)	Output Power (W)	Minimum Fuse Rating [1] (A)	Fuse Rating Recommended for Reliable Operation [2] (A)	Maximum Allowed Fuse Rating [3] (A)
Radio 2217 B1, B3, B8, B20, B28A and B5	2 x 40 W	16 A	25 A	32 A
Radio 2218 B39A	2 x 40 W	16 A	25 A	32 A
Radio 0208 B1	N/A	2 A	2 A	3 A
Radio 2217 B1 + Radio 0208 B1	2 x 40 W	16 A	25 A	32 A

(1) These fuse ratings can only be used if it is acceptable that fuses trip because of lightning or network transients.

(2) The recommended fuse rating takes into account that external fuses are not to trip because of lightning or network transients.

(3) The absolute maximum fuse class in accordance with radio design restrictions.

Note: If a fuse or circuit breaker rating above minimum fuse rating is selected, cable dimensioning rules in Section 5.5 on page 34 are to be reconsidered to make sure that the fuse or circuit breaker tripping criteria are met.

3.6.2   AC Power Characteristics

The radio installation accepts 100–250 V AC when used together with an optional PSU. For more information about the PSU, refer to *PSU Description*.

3.6.3   Power Consumption

For information about power consumption, refer to *Power Consumption Guideline for RBS 6000*.

3.7   System Characteristics

This section describes the system characteristics of the Radio System.

3.7.1   RF Electromagnetic Exposure

General information on RF Electromagnetic Fields (EMF) for radios connected to a Radio System from the 6000 family can be found in *Radio Frequency Electromagnetic Fields*.

Information about radio access specific compliance boundaries for electromagnetic exposure can be found in *Radio Frequency Electromagnetic Exposure*.

3.7.2 Software

Information on software dependencies can be found in *Compatibilities for Hardware and Software*.

3.7.3 Radio Configurations

For information about available radio configurations, refer to *RBS Configurations*.

PRELIMINARY

4 Hardware Architecture

This section describes the radio hardware structure regardless of configuration or frequency. The DC adapter, radio components and Y-power cable are shown in Figure 11 and listed in Table 10.

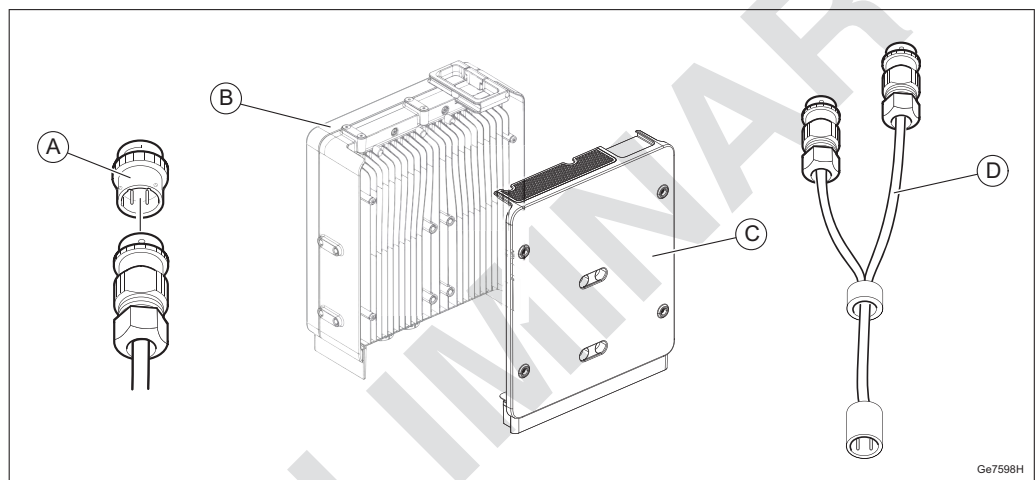For a description of the supported radio configurations, refer to *RBS Configurations*.

Figure 11   DC Adapter, Radio Components and Y-Power Cable

Table 10   Key to DC Adapter and Radio Components

Position	Component
A	DC adapter for 2-wire connector
B	Radio
C	Radio 2217 Fan unit
D	Radio 0208 Y-power cable

4.1 Radio Overview

The radio contains most of the radio processing hardware. The following sections describe the components inside the radio.

4.1.1 TRX

The Transmitter and Receiver (TRX) provides the following:

• Analog/Digital (A/D), Digital/Analog (D/A) conversion

- Channel filtering

- Delay and gain adjustment

- Digital predistortion

- RF modulation and demodulation

- Optical cable interface termination

- Two receivers for RX diversity

- RET modem (the antenna system communication link)

4.1.2 PA

The Multi Carrier Power Amplifier (MCPA) is the linear power amplifier for the RF carriers. The radio has two MCPAs, one for each branch.

4.1.3 FU

The Filter Unit (FU) consists of low-noise amplifiers (only Radio 2217) and band-pass filters.

In the radio, the FU also provides the following:

- Power and supervision for the TMA, or the RIU

- Voltage Standing Wave Ratio (VSWR) supervision

4.1.4 DC SPD

The DC SPD board protects the DC power input from lightning currents.

4.1.5 ALD (RET) SPD

An SPD provides overvoltage or overcurrent protection for the ALD (RET) port.

4.1.6 External Alarm SPD

An SPD provides overvoltage or overcurrent protection for the external alarm ports.

4.2 Fan Unit (Optional)

The Radio 2217 fan is DC-powered (24 V DC) and controlled via the radio external alarm port.

4.3   Optical Indicators and Buttons

The radio is equipped with optical indicators that show system status. The radio optical indicators are located under the maintenance cover. The radio optical indicators are shown in Figure 12 and Figure 13 for Radio 0208, and explained in Table 11. The Radio 2217 fan unit optical indicators are located under a cover and are shown in Figure 14, and explained in Table 12.
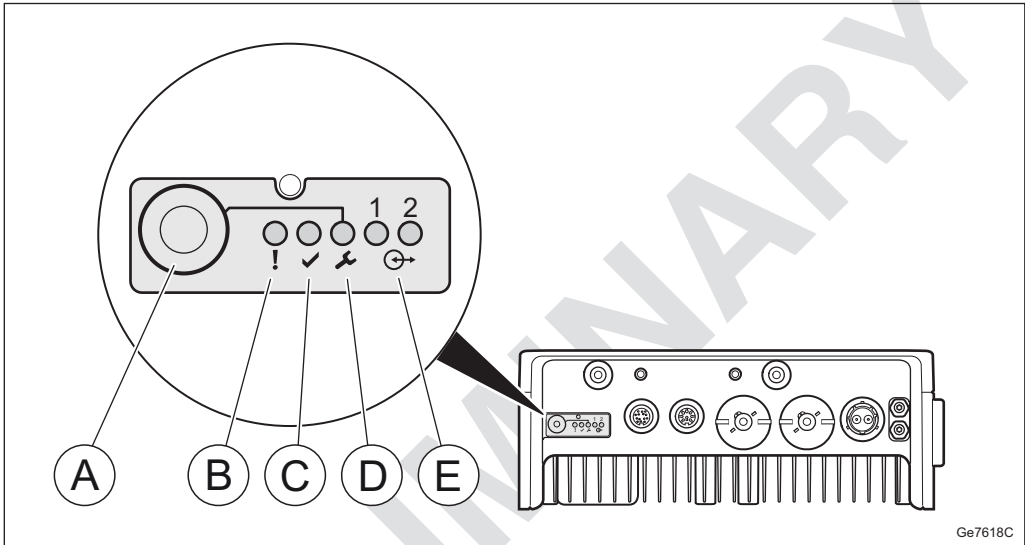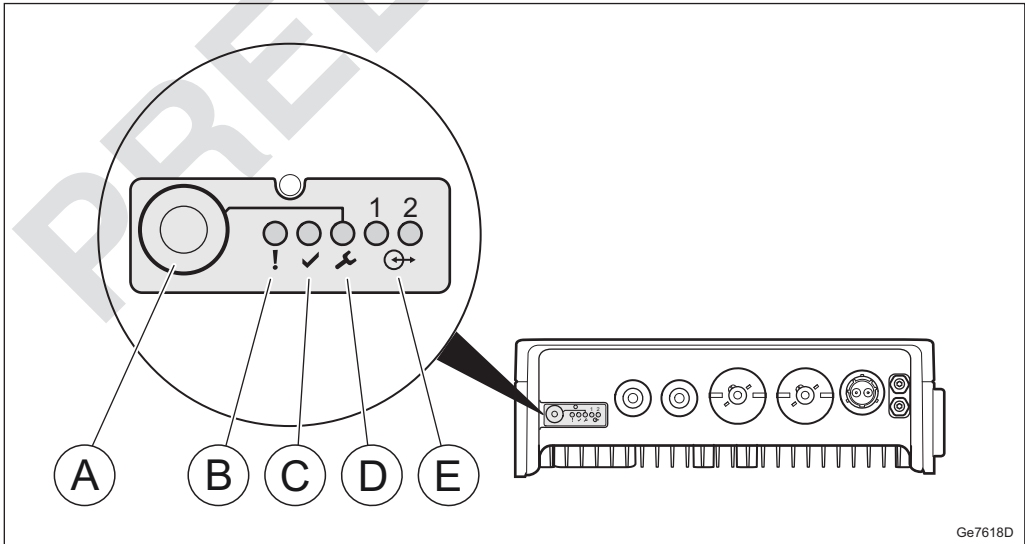

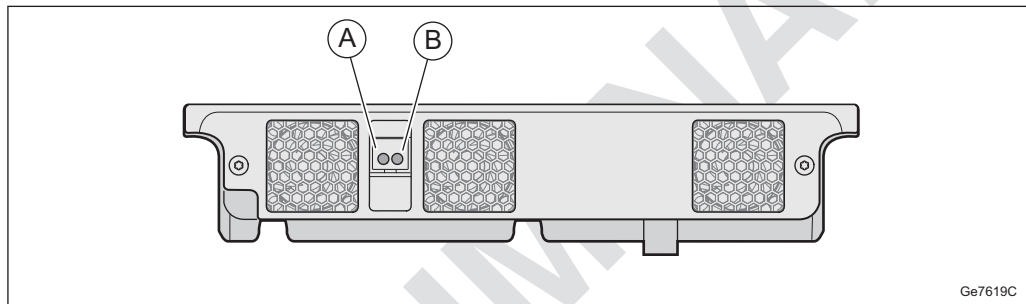*Figure 12   Radio Optical Indicators and Buttons*

Figure 13   Radio Optical Indicators and Buttons for Radio 0208

Table 11   Description of Radio Optical Indicators and Buttons

Position	Name	Marking
A	Maintenance button	–

Position	Name	Marking
B	Fault	**!**
C	Operational	✔
D	Maintenance	🔧
E	Interface 1 Interface 2	⊕→

Figure 14   Radio 2217 Fan Unit Optical Indicators

Table 12   Description of Fan Unit Optical Indicators

Position	Name	Marking
A	Fault	**!**
B	Operational	✔

For more information about the behavior of the optical indicators and the maintenance button, refer to *Indicators, Buttons, and Switches*.

5 Connection Interfaces

This section contains information about the radio and fan unit connection interfaces. The radio connection interfaces are shown in Figure 15 and Figure 16 for Radio 0208, and listed in Table 13, and the Radio 2217 fan unit connection interface is shown in Figure 17 and listed in Table 14.
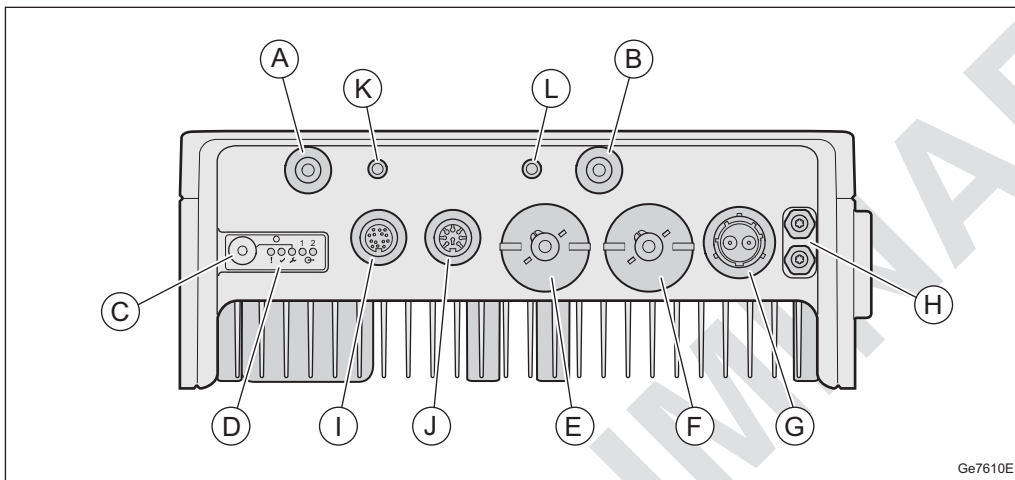

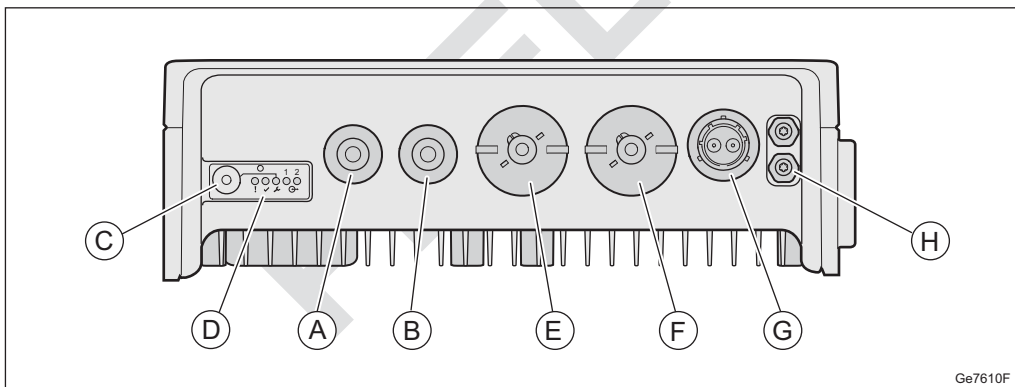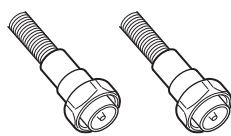*Figure 15   Radio Connection Interfaces*
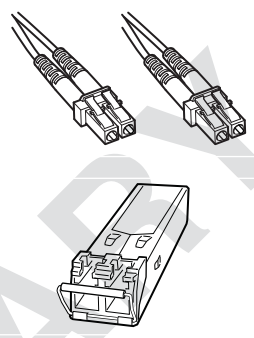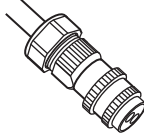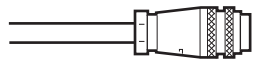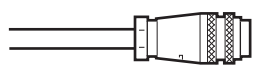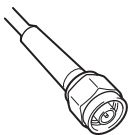
Figure 16   Radio 0208 Connection Interfaces

Table 13   Radio Connection Interfaces

Position	Description	Marking	Connector Types	Cable Types
A	Antenna A	A⚡⇄	4.3-10 connector	
B	Antenna B	B⚡⇄		
C	Maintenance button	–	–	–

Position	Description	Marking	Connector Types	Cable Types
D	Optical indicators	! , ✓ , 🔧 ⊕→1, ⊕→2	–	–
E	Optical cable 1	⊕→1	LC (On SFP)	
F	Optical cable 2	⊕→2		
G	−48 V DC power supply	POWER	Screw terminal connector	
H	Grounding	⏚	2 x M6 bolt	
I	External alarm and fan unit power supply and control	✺ 🔔	Mini-DIN connector, 14 pin	
J	ALD (used for a RET unit for example)	ALD	Mini-DIN connector, 8 pin	
K[1]	TX monitor A	A🩺	SMA connector	
L[1]	TX monitor B	B🩺		

(1) Radio 2217: Optional for Radio 2217 B1, B3, B8, B20, B28A and B5. Radio 2218: The TX monitor interface is not hardware ready, function is not applicable.
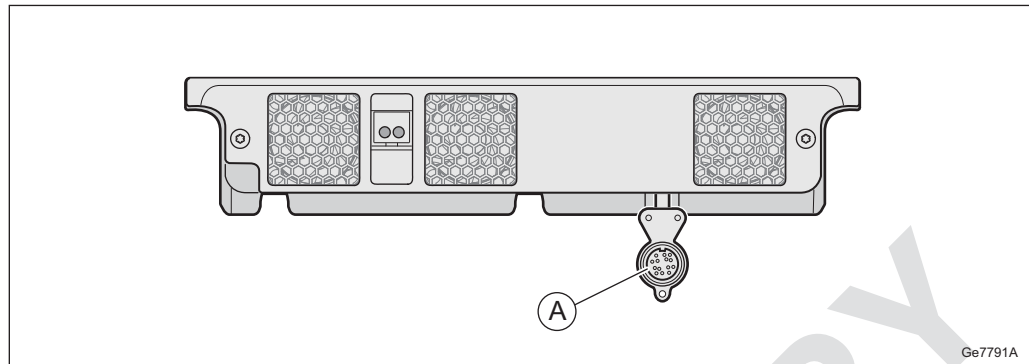
Figure 17   Radio 2217 Fan Unit Connection Interface

Table 14   Description of Radio 2217 Fan Unit Connection Interface

Position	Description	Marking
A	External alarm	🔔

5.1   Position A and B, Antenna Interface

The antenna interfaces provide connections for the radio to antennas. RF cables connect the radio to the antenna.

The antenna connection interface characteristics of these cables are described in Table 15.

Table 15   Radio Antenna Connection Interface Characteristics

Connector Type	RF Cable Type	Cable Connector Type
4.3-10, insert-receiver type	50 Ω coaxial	4.3-10 type

Table 16 shows how to connect the antenna cables.

Table 16   Radio Antenna Cable Connectors

Radio Connectors	Antenna Connectors
A ⛢⇄ (Antenna A)	TX/RX[1]
B ⛢⇄ (Antenna B)	TX/RX[1]

(1) Radio 0208 only has RX branches.

5.2   Position C, Maintenance Button

The maintenance button is at the left of the **!** symbol.

More information about the maintenance button can be found in *Indicators, Buttons, and Switches*.

5.3 Position D, Optical Indicators

Optical indicators show the system status. More information about the optical indicators can be found in *Indicators, Buttons, and Switches*.

5.4 Position E and F, Interface for Optical Cable to Main Unit

The ⊙→ 1 and ⊙→ 2 interfaces provide connections to optical cables for traffic and timing signals between the radio and the main unit. A Small Form-factor Pluggable (SFP)+ is used to connect the optical cable to the radio.

Note: The radio uses SFP+ modules for optical transmission and optical radio interfaces on Data 1 (optical cable 1 in) and Data 2 (optical cable 2 out).

Only use SFP+ modules approved and supplied by Ericsson. These modules fulfill the following:

• Compliance with Class 1 laser product safety requirements defined in standard IEC 60825-1.

• Certification according to general safety requirements defined in standard IEC 60950-1.

• Functional and performance verified to comply with Radio System specifications.

Recommended SFP+ modules are obtained from the product packages for the Radio System and the Main Remote Installation products. For more information about SFP modules, refer to *Spare Parts Catalog* and *Main-Remote Installation Products Overview* for more information.

5.5 Position G, −48 V DC Power Supply Interface

The −48 V DC power connection is made through a connector. The connector accepts cables with various cross-sectional areas depending on the cable length and the radio consumption. The values can be found in Figure 18, and are calculated using the following formulas:

```
R=2×(0.02/D)
```

R- cable resistance

D- cable area (mm^2)

```
L=4V/(R×i)
```

L- the maximum permitted distribution length

R- calculated cable resistance

i- current which Radio 2217 uses at 36V or Radio 2218 uses at 38V
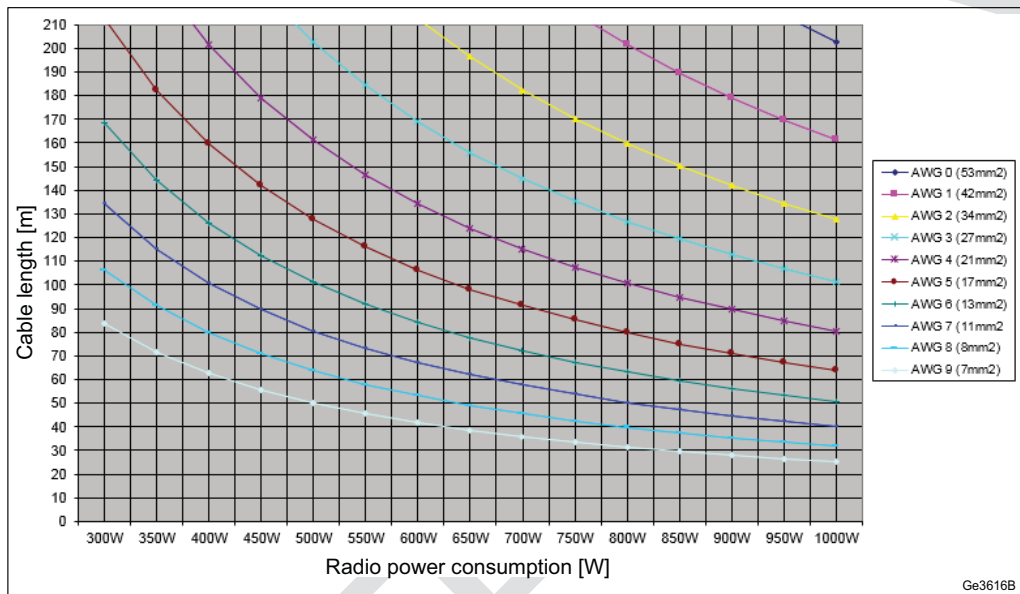
Figure 18   Maximum Cable Lengths versus Radio Power Consumption (4V@36V/38V)

The power cable conductor has a wire for the 0 V conductor and a wire for the −48 V conductor. The wire color code for both is market dependent.

All cables must be shielded. The shielding must be properly connected both to the power connector and to the earthing interface in the power supply equipment, otherwise the radio overvoltage and lightning protection does not function properly.

5.6   Position H, Grounding Interface

The radio must be earthed to protect it from overvoltage and lightning strikes. The grounding interface on the radio accepts an M6 dual cable lug on a coated cable.

For more information about grounding principles, refer to *Grounding Guidelines for RBS Sites*.

5.7 Position I, Ext Alarm Interface

Two external alarms can be connected to the radio external alarm port.

5.8 Position J, ALD Ctrl Interface

The ALD control (ALD Ctrl) connects an ALD (RET) cable to the radio for antenna system communication.

5.9 Position K and L, TX Monitor Interface (Optional)

Note: This section only applies to Radio 2217.

The TX monitor interfaces provide the monitoring for the output power and are shown in Table 17.

Table 17   TX Monitor Cable Connectors

Radio Connectors	TX Monitor Connectors
TX Monitor A	SMA Connector
TX Monitor B	SMA Connector

5.10 Optional Equipment Interfaces

The equipment presented in this section is optional and can be ordered separately.

5.10.1 Fan Unit

The Radio 2217 fan unit consists of a replaceable fan tray with three fans.

6 Standards and Regulations, Radio 2217

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for Radio 2217.

Declaration of Conformity

"Hereby, Ericsson AB, declares that this RBS is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and 2011/65/EU."

6.1 Regulatory Approval

The Radio System complies with the following market requirements:

- European Community (EC) market requirements, R&TTE Directive 1999/5/EC

  CE0168① Alert Mark (Class 2 equipment). Restrictions to use the apparatus may apply in some countries or geographic areas. Individual license to use the specific radio equipment may be required.

  The apparatus may include radio Transceivers with support for frequency bands not allowed or not harmonized within the EC.

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU).

- Products containing radio Equipment outside North America and in countries not recognizing the CE-mark may be labeled according to national requirements or standards.

- Japanese market requirements

6.1.1 Environmental Standards Compliance

The Radio System complies with the following environmental standard:

Europe

- EN 50 581 (RoHS)

6.1.2 Safety Standards Compliance

In accordance with market requirements, the Radio System complies with the following product safety standards and directives:

International

- IEC 60215
- IEC 60950-1

Europe

- EN 50 385
- EN 60 215
- EN 60 950-1

6.1.2.1 Outdoor Specific Requirements

The Radio System complies with the following outdoor specific requirements:

International

- IEC 60529 (IP65)
- IEC 60950-22

Europe

- EN 60 529 (IP65)
- EN 60 950-22

6.1.3 EMC Standards Compliance

The Radio System complies with the following Electromagnetic Compatibility (EMC) standards:

International

- 3GPP TS25.113
- 3GPP TS36.113
- 3GPP TS37.113

Europe

- ETSI EN 301 489-1

- ETSI EN 301 489-23

- ETSI EN 301 489-50

6.1.4 Radio Standards Compliance

The Radio System complies with the following radio standards:

International

- 3GPP TS25.141

- 3GPP TS36.141

- 3GPP TS37.141

Europe

- ETSI EN 301 502

- ETSI EN 301 908-1

- ETSI EN 301 908-3

- ETSI EN 301 908-14

- ETSI EN 301 908-18

Japan

- TELEC-T112

- TELEC-T146

6.1.5 Marking

To show compliance with legal requirements, the product is marked with the following labels:

Europe

- CE mark

6.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory requirements.

6.2.1 Spare Parts

This radio complies with the Ericsson Serviceability and Spare Parts Strategy.

6.2.2 Surface Quality

The surface quality of the radio is in accordance with Ericsson standard class A3.

6.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.

7 Standards and Regulations, Radio 2218

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity.

Declaration of Conformity

"Hereby, Ericsson AB, declares that this RBS is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and 2011/65/EU."

7.1 Regulatory Approval

The Radio System complies with the following market requirements:

- European Community (EC) market requirements, R&TTE Directive 1999/5/EC

  CE 0168 ⊙ Alert Mark (Class 2 equipment). Restrictions to use the apparatus may apply in some countries or geographic areas. Individual license to use the specific radio equipment may be required.

  The apparatus may include radio Transceivers with support for frequency bands not allowed or not harmonized within the EC.

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU).

- Products containing radio Equipment outside North America and in countries not recognizing the CE-mark may be labeled according to national requirements or standards.

7.1.1 Environmental Standards Compliance

The Radio System complies with the following environmental standard:

Europe

- EN 50 581 (RoHS)

7.1.2 Safety Standards Compliance

In accordance with market requirements, the Radio System complies with the following product safety standards and directives:

International

- IEC 60215

- IEC 60950-1

Europe

- EN 50 385

- EN 60 215

- EN 60 950-1

7.1.2.1   Outdoor Specific Requirements

The Radio System complies with the following outdoor specific requirements:

International

- IEC 60529 (IP65)

- IEC 60950-22

Europe

- EN 60 529 (IP65)

- EN 60 950-22

7.1.3   EMC Standards Compliance

The Radio System complies with the following Electromagnetic Compatibility (EMC) standards:

International

- 3GPP TS36.113

- 3GPP TS37.113

Europe

- ETSI EN 301 489-1

- ETSI EN 301 489-23

- ETSI EN 301 489-50

7.1.4 Radio Standards Compliance

The Radio System complies with the following radio standards:

International

- 3GPP TS36.141
- 3GPP TS37.141

Europe

- ETSI EN 301 908-1
- ETSI EN 301 908-14
- ETSI EN 301 908-18

7.1.5 Marking

To show compliance with legal requirements, the product is marked with the following labels:

Europe

- CE mark

7.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory requirements.

7.2.1 Spare Parts

This radio complies with the Ericsson Serviceability and Spare Parts Strategy.

7.2.2 Surface Quality

The surface quality of the radio is in accordance with Ericsson standard class A3.

7.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.

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8 Standards and Regulations, Radio 0208

This section presents a brief overview of standards, regulatory product approval, and declaration of conformity for Radio 0208.

Declaration of Conformity

"Hereby, Ericsson AB, declares that this RBS is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC and 2011/65/EU."

8.1 Regulatory Approval

The Radio System complies with the following market requirements:

- European Community (EC) market requirements, R&TTE Directive 1999/5/EC

  CE 0168 ⓘ Alert Mark (Class 2 equipment). Restrictions to use the apparatus may apply in some countries or geographic areas. Individual license to use the specific radio equipment may be required.

  The apparatus may include radio Transceivers with support for frequency bands not allowed or not harmonized within the EC.

- Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2011/65/EU).

- Products containing radio Equipment outside North America and in countries not recognizing the CE-mark may be labeled according to national requirements or standards.

8.1.1 Environmental Standards Compliance

The Radio System complies with the following environmental standard:

Europe

- EN 50 581 (RoHS)

8.1.2 Safety Standards Compliance

In accordance with market requirements, the Radio System complies with the following product safety standards and directives:

International

- IEC 60950-1

Europe

- EN 50 385

- EN 60 950-1

8.1.2.1 Outdoor Specific Requirements

The Radio System complies with the following outdoor specific requirements:

International

- IEC 60529 (IP65)

- IEC 60950-22

Europe

- EN 60 529 (IP65)

- EN 60 950-22

8.1.3 EMC Standards Compliance

The Radio System complies with the following Electromagnetic Compatibility (EMC) standards:

International

- 3GPP TS25.113

- 3GPP TS36.113

- 3GPP TS37.113

Europe

- ETSI EN 301 489-1

- ETSI EN 301 489-23

- ETSI EN 301 489-50

8.1.4 Radio Standards Compliance

The Radio System complies with the following radio standards:

International

- 3GPP TS25.141

- 3GPP TS36.141

- 3GPP TS37.141

Europe

- ETSI EN 301 908-1

- ETSI EN 301 908-3

- ETSI EN 301 908-14

- ETSI EN 301 908-18

8.1.5 Marking

To show compliance with legal requirements, the product is marked with the following labels:

Europe

- CE mark

8.2 Other Standards and Regulations

The standards and regulations in this section are not regulatory approved.

8.2.1 Spare Parts

This radio complies with the Ericsson Serviceability and Spare Parts Strategy.

8.2.2 Surface Quality

The surface quality of the radio is in accordance with Ericsson standard class A3.

8.2.3 Vandal Resistance

Unauthorized access is not possible without damaging the unit.