Test Report issued under the responsibility of:

TEST REPORT
IEC 60 950-22

Information technology equipment
Safety – Part 22: Equipment to be installed outdoors

Report Reference No.....:	RSE-100-21-100199-2-A
Date of issue.....:	19/04/2021
Total number of pages.....	39
CB Testing Laboratory.....:	**EMITECH Montigny le Bretonneux**
Address.....:	30-32 Avenue des 3 peuples 78180 MONTIGNY-LE-BRETONNEUX - FRANCE
Applicant's name.....:	Rapid Space
Address.....:	17 Rue Pache 75011 Paris - FRANCE
Test specification:	
Standard .....:	IEC 60 950-22 : 2005 (1st Edition)
Test procedure.....:	/
Non-standard test method……..:	N/A
Test Report Form No.....:	IEC60950_22A
Test Report Form(s) Originator .....:	The Standards Institution of Israel Ltd.
Master TRF.....:	Dated 2007-03

If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

Test item description..... :	Open Radio Station eNode B
Trade Mark .....:	Rapid Space
Manufacturer.....:	Rapid Space
Model/Type reference.....:	CASE-BJT1
Ratings.....:	50W by PoE, 24-50V

Testing procedure and testing location:		
☒	**Testing Laboratory**:	
Testing location/ address .....:	**EMITECH Montigny le Bretonneux** 30-32 Avenue des 3 Peuples FR – 78180 MONTIGNY LE BRETONNEUX	
Tested by (name + signature) ..... :	**BOUGRAINVILLE L.** **Safety technician**	
Approved by (name + signature)... :	**LOPES E.** **Safety manager**	

List of Attachments (including a total number of pages in each attachment):

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
4 – Conditions for outdoor equipment 5 – Marking and instructions 6 - Protection from electrical shock in an outdoor location 7 - Wiring terminals for connection of external conductors 8 - Construction requirements for outdoor enclosures 9 - Protection of equipment within an outdoor enclosure	**EMITECH MONTIGNY LE BRETONNEUX** 30-32 Avenue des 3 Peuples 78180 MONTIGNY LE BRETONNEUX - France

Summary of compliance with National Differences:

List of countries addressed:

The group differences applicable for CENELEC member countries and affiliate member countries have also been checked: EN60950-22 :2006/Cor :2008

- Country members of CENELEC:

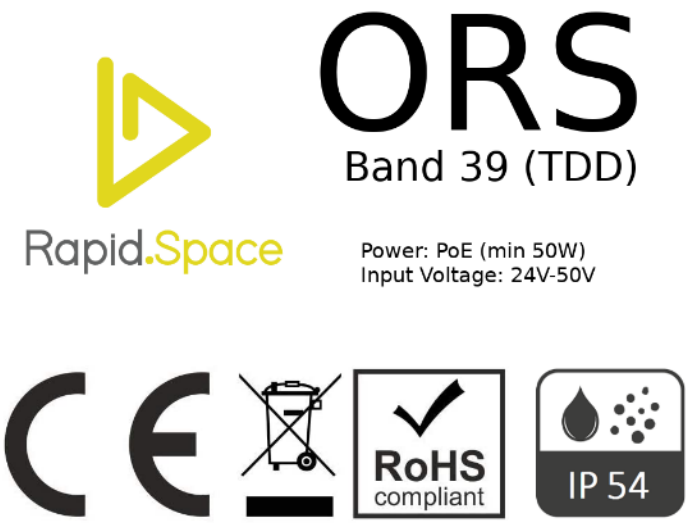
Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

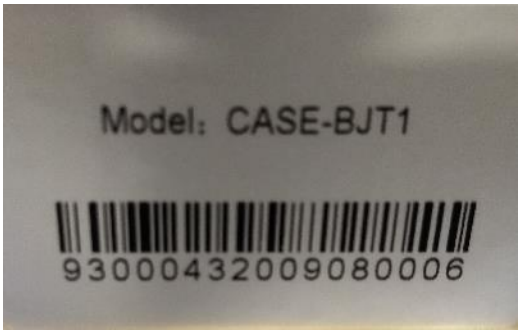
- Country affiliates members of CENELEC:

Albania, Belarus, Bosnia and Herzegovina, Georgia, Israel, Jordan, Libya, Montenegro, Serbia, Morocco, Tunisia, and Ukraine.

The product fulfils the requirements of EN 60950-22 : 2006, subject to the validity of document provided.

Copy of marking plate





Test item particulars.....:	
Temperature range .....:	-25 to 55 °C
Overvoltage category.....:	☐ OVC I ☐ OVC II ☐ OVC III ☐ OVC IV ☒ other: Power supply ethernet cable
IP protection class .....:	IP54
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement .....:	P (Pass)
- test object does not meet the requirement .....:	F (Fail)
Testing.....:	
Date of receipt of test item.....:	19/04/2021
Dates of performance of tests .....:	19/04/2021 to 21/04/2021 and 05/08/2021 for document analysis

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Throughout this report a comma (point) is used as the decimal separator.

This Test Report Form is intended for the investigation of safety of equipment to be installed outdoors in accordance with IEC 60950-22. It can only be used together with the IEC 60950-1 requirements.

General product information:

Product Description –

The equipment under test is: an Open Radio Station is a 4G/5G LTE (Long Term Evolution) base station.

The ORS come in a white metallic case (see picture) which includes an embedded computer and a PCB radio. This equipment is class III and use Power over Ethernet (PoE) to be powered on and antennas to emit/receive the RF signal.

This equipment is class III and is powered by an Ethernet cable (PoE)

Characteristics:

It weighs 2kg and measures 170x105x250mm

Test conditions:

Tested on table and connected to a switch to supply power to the equipment and carry out data exchanges with smartphone in 4G network

Conditions of acceptability:

Maximum ambient temperature: 55°C

Instructions and equipment marking related to safety must be applied in the language that is acceptable in the country in which the equipment is to be sold.

Means of fixing on the post not been provided (installation is made by qualified personnel)

(this report must be used with Report N° RSE-100-21-100199-1-A)

Model Differences

No other models

Additional application considerations – (Considerations used to test a component or sub-assembly)

No additional application consideration

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

4	**CONDITIONS FOR OUTDOOR EQUIPMENT**		**P**
4.1	Ambient air temperature		P
	Suitability for use at any temperature in the range specified by the manufacturer. If not specified by the manufacturer, the range is taken as -33°C to +40°C	Test report provided "Open Radio Station – temperature and water tightness tests" See annex	P
4.2	AC mains supply		N/A
	Suitability for the highest Overvoltage Category expected in the installation location	No main supply	N/A
	Components used to reduce the Overvoltage Category comply with IEC 61643-series		N/A
	Reference to installation instructions .....:	-	N/A
4.3	Rise of earth potential		N/A
	Special earthing conditions		N/A
	Reference to installation instructions .....:	-	N/A

5	**MARKING AND INSTRUCTIONS**		**P**
	Special installation features for protection from conditions in the OUTDOOR LOCATION (see 1.7.2 of IEC 60950-1)	Documentation provided outdoor location See page 5 §2.3	P
	OUTDOOR ENCLOSURE classification according to IEC 60529 (IP Code)	IP code on nameplate AND notice provided	P

6	**PROTECTION FROM ELECTRICAL SHOCK IN AN OUTDOOR LOCATION**		
6.1	Voltage limits of user-accessible parts in OUTDOOR LOCATIONS (2.2.2 and 2.2.3 of IEC 60950-1 with voltage limits of IEC60950-22)		P
	Voltages under normal conditions (V) .....:	RSE-100-21-100199-1-A test report EMITECH	P
	Voltages under fault conditions (V).....:	RSE-100-21-100199-1-A test report EMITECH	P
6.2	Limited current circuits in outdoor locations		N/A
	The requirements of 2.4 of IEC60950-1 apply without change		N/A

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

7	**WIRING TERMINALS FOR CONNECTION OF EXTERNAL CONDUCTORS**		
	The mains supply terminations powered via the normal building installation wiring are as specified in 3.3 of IEC 60950-1	No main supply	N/A
	The mains supply terminations powered directly from the mains distribution system are as specified in IEC 60364	See above	N/A

8	**CONSTRUCTION REQUIREMENTS FOR OURDOOR ENCLOSURES**		
8.1	General		N/A
	Protection against corrosion by use of suitable materials or by application of a protective coating		N/A
	Parts serving as a functional part of an OUTDOOR ENCLOSURE (e.g., dials, connectors, etc.) comply with the same environmental protection requirements as for the OUTDOOR ENCLOSURE		N/A
	Use of OUTDOOR ENCLOSURE to carry current during normal operation		N/A
	Connection of a conductive part of an OUTDOOR ENCLOSURE to protective earth for carrying fault currents (see 2.6 of IEC 60950-1 and 8.3 of this standard)		N/A
8.2	Resistance to ultra-violet radiation		N/A
	Resistance of non-metallic parts of an OUTDOOR ENCLOSURE to degradation by ultra-violet (UV) radiation		N/A
	Parts providing mechanical support:		N/A
	Tensile strength test (ISO 527)		N/A
	Flexural strength test (ISO 178)		N/A
	Parts providing impact resistance:		N/A
	Charpy impact test (ISO 179)		N/A
	Izod impact test (ISO 180)		N/A
	Tensile impact test (ISO 8256)		N/A
	All parts:		N/A
	Flammability classification (1.2.12 and annex A of IEC 60950-1)		N/A
8.3	Resistance to corrosion		P
8.3.1	General	Refer to annex	P

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict
	Resistance of metallic parts of an OUTDOOR ENCLOSURE to the effects of water-borne contaminants		P
	Alternate method for 8.3.2-8.3.4 (IEC 61587-1)		N/A
8.3.2	Test apparatus		N/A
	Salt-spray test (IEC 60068-2-11)		N/A
	Test in a water-saturated sulphur dioxide atmosphere (water-saturated sulphur dioxide atmosphere as described in Annex A; chamber as described in ISO 3231)		N/A
8.3.3	Test procedure		N/A
8.3.4	Compliance criteria		N/A
8.4	Bottoms of FIRE ENCLOSURES		N/A
	Comply with 4.6.2 of IEC 60950-1		N/A
	Bottom of FIRE ENCLOSURE of OUTDOOR EQUIPMENT mounted directly and permanently on a non-combustible surface (e.g., concrete or metal)		N/A
8.5	Gaskets		N/A
	If gaskets are used as the method for protection against the ingress of potential contaminants, requirements of 8.5.1 through 8.5.3 apply		N/A
8.5.1	General		N/A
8.5.2	Oil resistance		N/A
8.5.3	Securing means		N/A

9	**PROTECTION OF EQUIPMENT WITHIN AN OUTDOOR ENCLOSURE**		
9.1	Protection from moisture (see Table 2)	See documentation page 5 §2.3 of ORS – User Manual of equipment (see annex)	P
9.2	Protection from plants and vermin	No opening	N/A
9.3	Protection from excessive dust		N/A

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

10	**MECHANICAL STRENGTH OF ENCLOSURES**		
10.1	General		P
10.2	Impact test (4.2.5 of IEC 60950-1)		N/A
	Compliance criteria:		N/A
	- after test the level of protection remains in accordance with 9.1of this standard		N/A
	- after test the requirements of 4.2.1 of IEC 60950-1 are met		N/A

11	**OUTDOOR EQUIPMENT CONTAINING VENTED BATTERIES**		
	Adequate ventilation in the compartment housing a vented battery, where gassing is possible during normal usage or over-charging	No such battery	N/A
	Protection against the risk of ignition of local concentrations of hydrogen and oxygen in a compartment containing both a battery and electrical components		N/A
	Hydrogen gas concentration measurement test		N/A
	Measured hydrogen gas concentration (% by volume) ..... :	-	—
	Max. allowed gas concentration for the mixture location in proximity to an ignition source (% by volume) ..... :	-	—
	Max. allowed gas concentration for the mixture location not in proximity to an ignition source (% by volume) ..... :	-	—
	Overcharging of rechargeable battery (see 4.3.8 of IEC 60950-1)		N/A

A	**ANNEX A, WATER-SATURATED SULPHUR DIOXIDE ATMOSPHERE (see 8.3.2 and 8.3.3)**	**N/A**

B	**ANNEX B, WATER SPRAY TEST (see 9.1)**	**N/A**

C	**ANNEX C, ULTRAVIOLET LIGHT CONDITIONING TEST (see 8.2)**		
C.1	Test apparatus .....:	-	N/A
C.2	Mounting of test samples .....:	-	N/A
C.3	Carbon-arc light-exposure apparatus.....:	-	N/A
C.4	Xenon-arc light-exposure apparatus .....:	-	N/A

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict
D	**ANNEX D, GASKET TESTS (see 8.5)**		
D.1	Gasket tests	Test report IP code - §3.Water tightness tests page 8 in documentation ORS Temperature and water tightness tests	P
D.2	Tensile strength and elongation tests (for gaskets that can stretch)		N/A
	Tensile strength (%) .....:	-	N/A
	Elongation (%) .....:	-	N/A
	Visible deterioration, deformation, melting, cracking or hardening of the material.....:		N/A
D.3	Compression test (for gaskets with closed cell construction)		N/A
	Initial thickness of the specimen (mm) .....:		N/A
	Thickness of the specimen after test a) (mm), compression set after test a) (%).....:		N/A
	Thickness of the specimen after test b) (mm), compression set after test b) (%).....:		N/A
	Thickness of the specimen after test c) (mm), compression set after test c) (%).....:		N/A
	Visible cracks or deterioration .....:		N/A
D.4	Oil immersion test		N/A
	Swelling (%).....:		N/A
	Shrinking (%).....:		N/A
E	**ANNEX E, RATIONALE**		—
E.1	General		—
E.2	Electric shock		—
E.3	Energy related hazards		—
E.4	Fire		—
E.5	Mechanical hazards		—
E.6	Heat related hazards		—
E.7	Radiation		—
E.8	Chemical hazards		—
E.9	Biological hazards		—
E.10	Explosion hazards		—

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

IEC 60950-22:2005 – COMMON MODIFICATIONS		
Contents	Add the following annexes: Annex ZA (normative) Normative references to international publications with their corresponding European publications Annex ZB (normative) Special national conditions	N/A
General	Delete all the “country” notes in the reference document according to the following list: 4.1 Note 3 4.3 Note 8.5 Note 10.2 Note D.3 Note D.4 Note	N/A

ZA	**NORMATIVE REFERENCES TO INTERNATIONAL PUBLICATIONS WITH THEIR CORRESPONDING EUROPEAN PUBLICATIONS**	—

ZB	**SPECIAL NATIONAL CONDITIONS**		
4.1	In **Finland**, **Norway** and **Sweden**, the temperature in winter may be extremely low. For OUTDOOR EQUIPMENT this will demand special design so that the equipment can withstand transport, erection and operation/service at temperatures down to -50°C	Not considered	N/A
10.2	In **Finland**, **Norway** and **Sweden** there are additional requirements for the minimum ambient temperature. See 4.1 of this annex.		N/A
D.3	In **Finland**, **Norway** and **Sweden** there are additional requirements for the minimum ambient temperature. See 4.1 of this annex.		N/A

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

8.2	**TABLE: Resistance to ultra-violet radiation**	
8.2a)	Tensile strength test (ISO 527)	**N/A**
Material identification (manufacturer, type designation) .....:		—
Shape and dimensions of test samples.....:		—
Conditioning for Set 1 of samples.....:		—
Conditioning for Set 2 of samples (including Annex C) .....:		—
Test conditions (T °C, RH %) .....:		—

Set 1 (without Annex C conditioning)		Set 2 (after Annex C conditioning)	
Test sample #	Tensile strength (MPa)	Test sample #	Tensile strength (MPa)

Arithmetic mean for Set 1 (MPa) .....:	
Arithmetic mean for Set 2 (MPa) .....:	
Retention (%).....:	

Supplementary information:

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

8.2	**TABLE: Resistance to ultra-violet radiation**	
8.2b)	Flexural strength test (ISO 178)	**N/A**
Material identification (manufacturer, type designation) .....:		—
Shape and dimensions of test samples.....:		—
Conditioning for Set 1 of samples.....:		—
Conditioning for Set 2 of samples (including Annex C) .....:		—
Test conditions (T °C, RH %) .....:		—

Set 1 (without Annex C conditioning)		Set 2 (after Annex C conditioning)	
Test sample #	Flexural strength (MPa)	Test sample #	Flexural strength (MPa)

Arithmetic mean for Set 1 (MPa) .....:	
Arithmetic mean for Set 2 (MPa) .....:	
Retention (%).....:	

Supplementary information:

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

8.2	**TABLE: Resistance to ultra-violet radiation**	
8.2c)	Charpy impact test (ISO 179) - unnotched	**N/A**
Material identification (manufacturer, type designation) .....:		—
Shape and dimensions of test samples.....:		—
Conditioning for Set 1 of samples.....:		—
Conditioning for Set 2 of samples (including Annex C) .....:		—
Test method (according to Tables 2 and 3 of ISO 179) .....:		—
Test conditions (T °C, RH %) .....:		—

Set 1 (without Annex C conditioning)		Set 2 (after Annex C conditioning)	
Test sample #	Charpy impact strength (kJ/m^2)	Test sample #	Charpy impact strength (kJ/m^2)

Arithmetic mean for Set 1 (kJ/m^2).....:	
Arithmetic mean for Set 2 (kJ/m^2).....:	
Retention (%).....:	

Supplementary information:

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

8.2	**TABLE: Resistance to ultra-violet radiation**	
8.2d)	Charpy impact test (ISO 179) - notched	**N/A**
Material identification (manufacturer, type designation) .....:		—
Shape and dimensions of test samples.....:		—
Conditioning for Set 1 of samples.....:		—
Conditioning for Set 2 of samples (including Annex C) .....:		—
Test method (according to Tables 2 and 3 of ISO 179) .....:		—
Test conditions (T °C, RH %) .....:		—

Set 1 (without Annex C conditioning)		Set 2 (after Annex C conditioning)	
Test sample #	Charpy impact strength (kJ/m^2)	Test sample #	Charpy impact strength (kJ/m^2)

Arithmetic mean for Set 1 (kJ/m^2).....:	
Arithmetic mean for Set 2 (kJ/m^2).....:	
Retention (%).....:	

Supplementary information:

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

8.2	**TABLE: Resistance to ultra-violet radiation**	
8.2e)	Izod impact test (ISO 180) - unnotched	**N/A**
Material identification (manufacturer, type designation) ..... :		—
Shape and dimensions of test samples..... :		—
Conditioning for Set 1 of samples..... :		—
Conditioning for Set 2 of samples (including Annex C) ..... :		—
Test method (according to Table 1 of ISO 180) ..... :		—
Test conditions (T °C, RH %) ..... :		—

Set 1 (without Annex C conditioning)		Set 2 (after Annex C conditioning)	
Test sample #	Izod impact strength (kJ/m^2)	Test sample #	Izod impact strength (kJ/m^2)

Arithmetic mean for Set 1 (kJ/m^2)..... :	
Arithmetic mean for Set 2 (kJ/m^2)..... :	
Retention (%)..... :	

Supplementary information:

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

8.2	**TABLE: Resistance to ultra-violet radiation**	
8.2f)	Izod impact test (ISO 180) - notched	**N/A**
Material identification (manufacturer, type designation) .....:		—
Shape and dimensions of test samples.....:		—
Conditioning for Set 1 of samples.....:		—
Conditioning for Set 2 of samples (including Annex C) .....:		—
Test method (according to Table 1 of ISO 180) .....:		—
Test conditions (T °C, RH %) .....:		—

Set 1 (without Annex C conditioning)		Set 2 (after Annex C conditioning)	
Test sample #	Izod impact strength (kJ/m^2)	Test sample #	Izod impact strength (kJ/m^2)

Arithmetic mean for Set 1 (kJ/m^2).....:	
Arithmetic mean for Set 2 (kJ/m^2).....:	
Retention (%).....:	

Supplementary information:

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

8.2	**TABLE: Resistance to ultra-violet radiation**	
8.2g)	Tensile impact test (ISO 8256) - unnotched	**N/A**
Material identification (manufacturer, type designation) ..... :		—
Shape and dimensions of test samples..... :		—
Conditioning for Set 1 of samples..... :		—
Conditioning for Set 2 of samples (including Annex C) ..... :		—
Test method (A or B) ..... :		—
Test conditions (T °C, RH %) ..... :		—

Set 1 (without Annex C conditioning)		Set 2 (after Annex C conditioning)	
Test sample #	Tensile impact strength (kJ/m^2)	Test sample #	Tensile impact strength (kJ/m^2)

Arithmetic mean for Set 1 (kJ/m^2)..... :	
Arithmetic mean for Set 2 (kJ/m^2)..... :	
Retention (%)..... :	

Supplementary information:

IEC 60950-22			
Clause	Requirement + Test	Result - Remark	Verdict

8.2	**TABLE: Resistance to ultra-violet radiation**	
8.2h)	Tensile impact test (ISO 8256) - notched	**N/A**
Material identification (manufacturer, type designation) ..... :		—
Shape and dimensions of test samples..... :		—
Conditioning for Set 1 of samples..... :		—
Conditioning for Set 2 of samples (including Annex C) ..... :		—
Test method (A or B) ..... :		—
Test conditions (T °C, RH %) ..... :		—

Set 1 (without Annex C conditioning)		Set 2 (after Annex C conditioning)	
Test sample #	Tensile impact strength (kJ/m^2)	Test sample #	Tensile impact strength (kJ/m^2)

Arithmetic mean for Set 1 (kJ/m^2)..... :	
Arithmetic mean for Set 2 (kJ/m^2)..... :	
Retention (%)..... :	

Supplementary information:

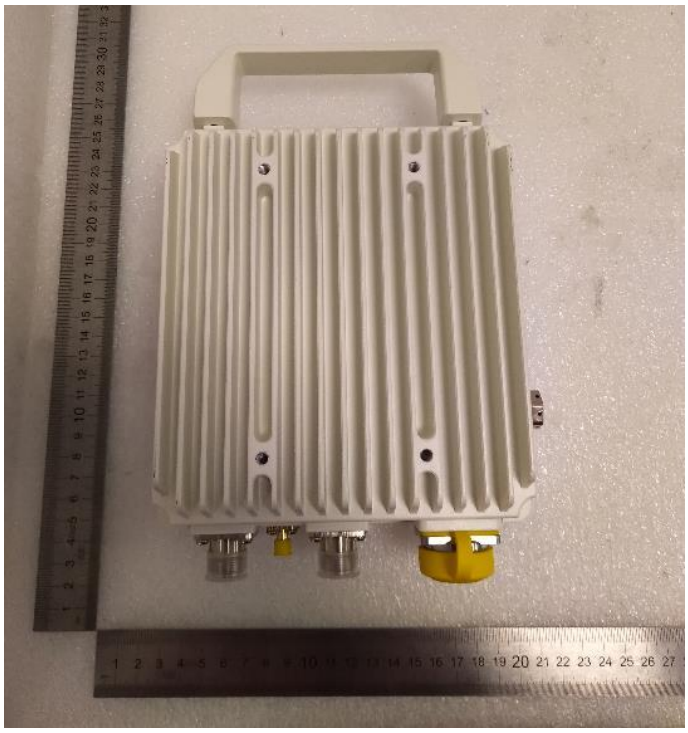
« □□□ End of report, 2 annexes to be forwarded □□□ »

ANNEX 1:

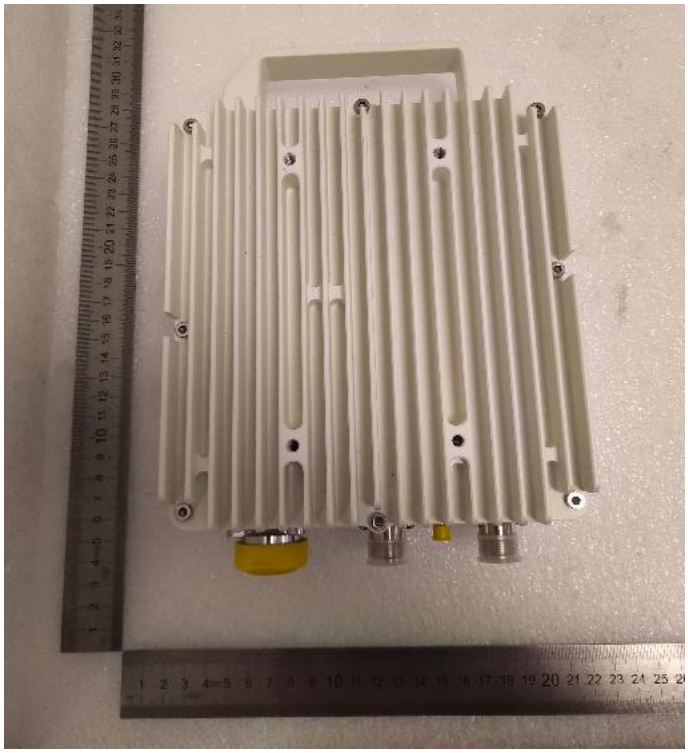
Photos of equipment

External views

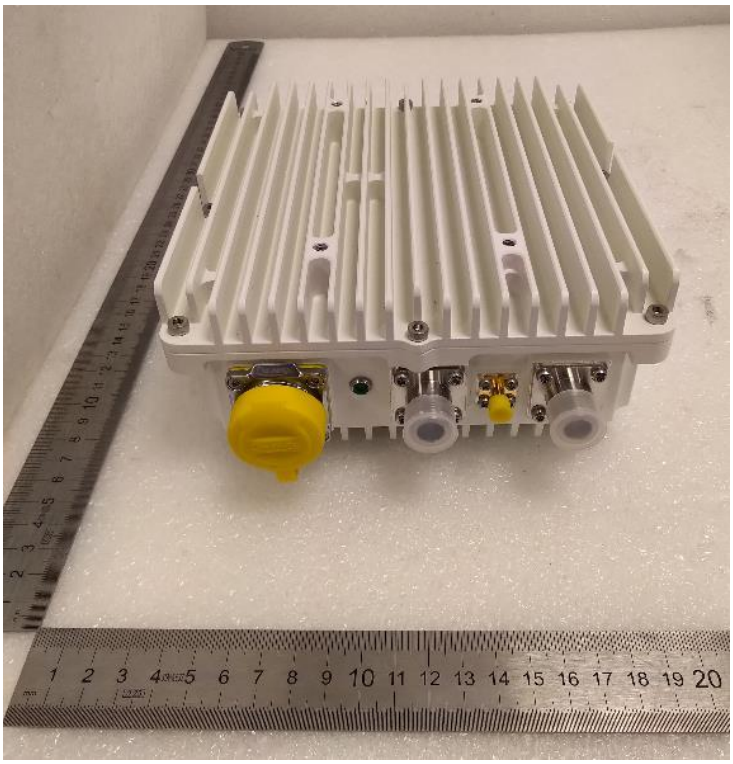
Top view



Bottom view



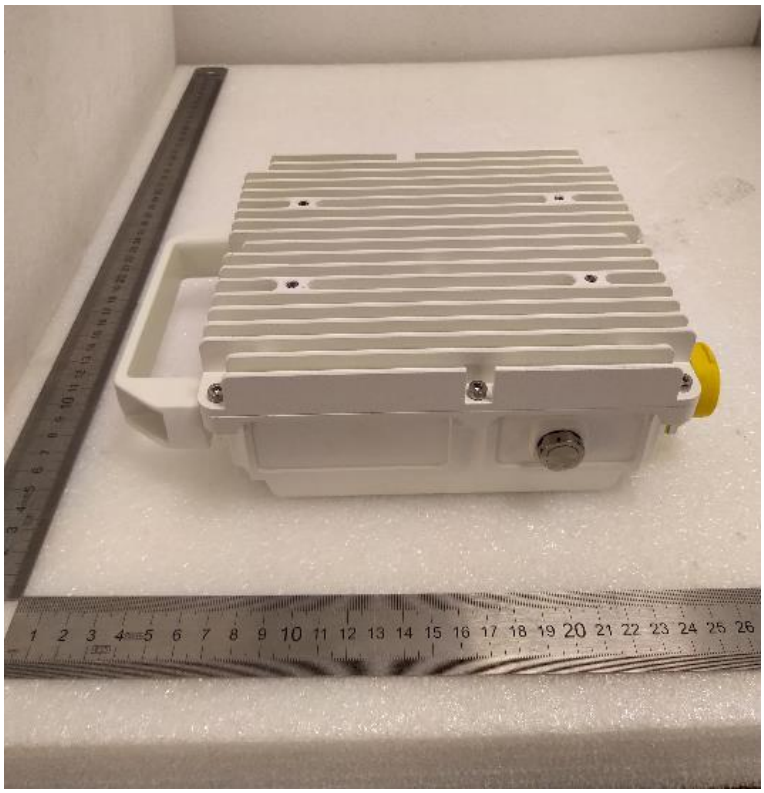
Front view



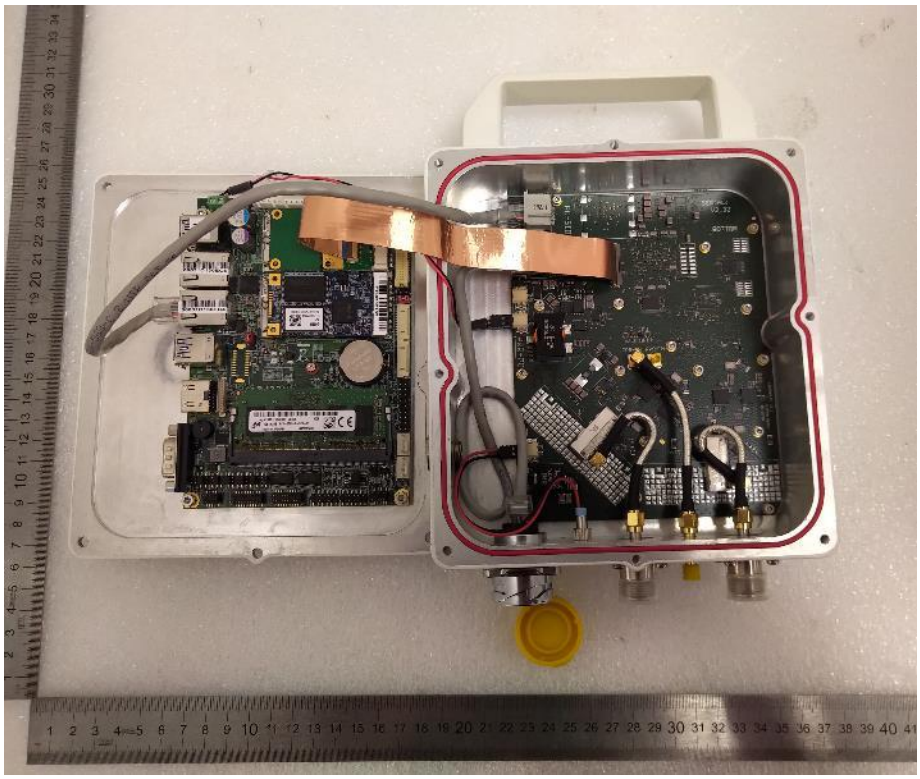
Rear view

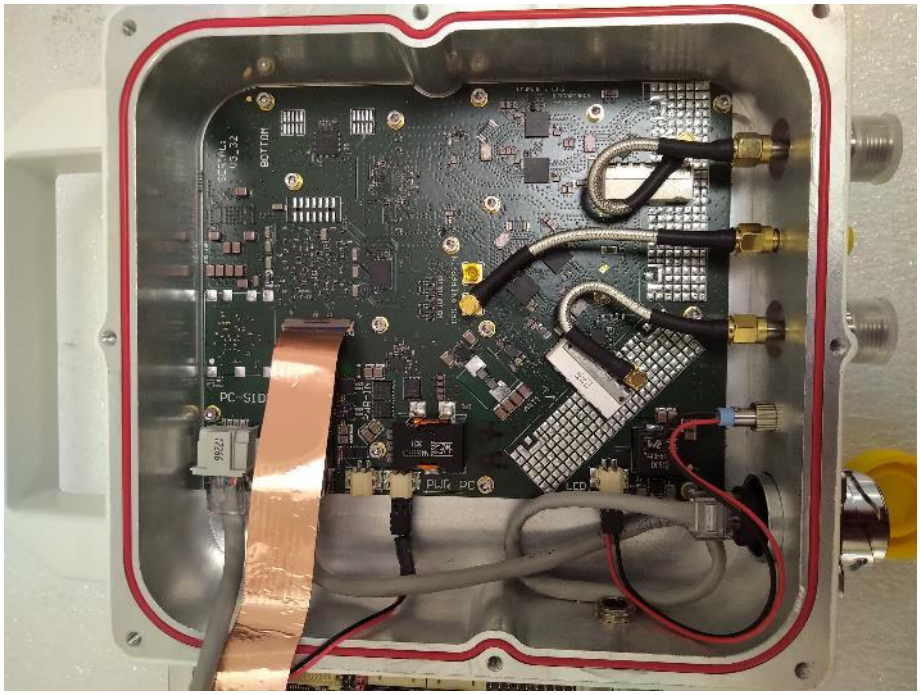
Right view

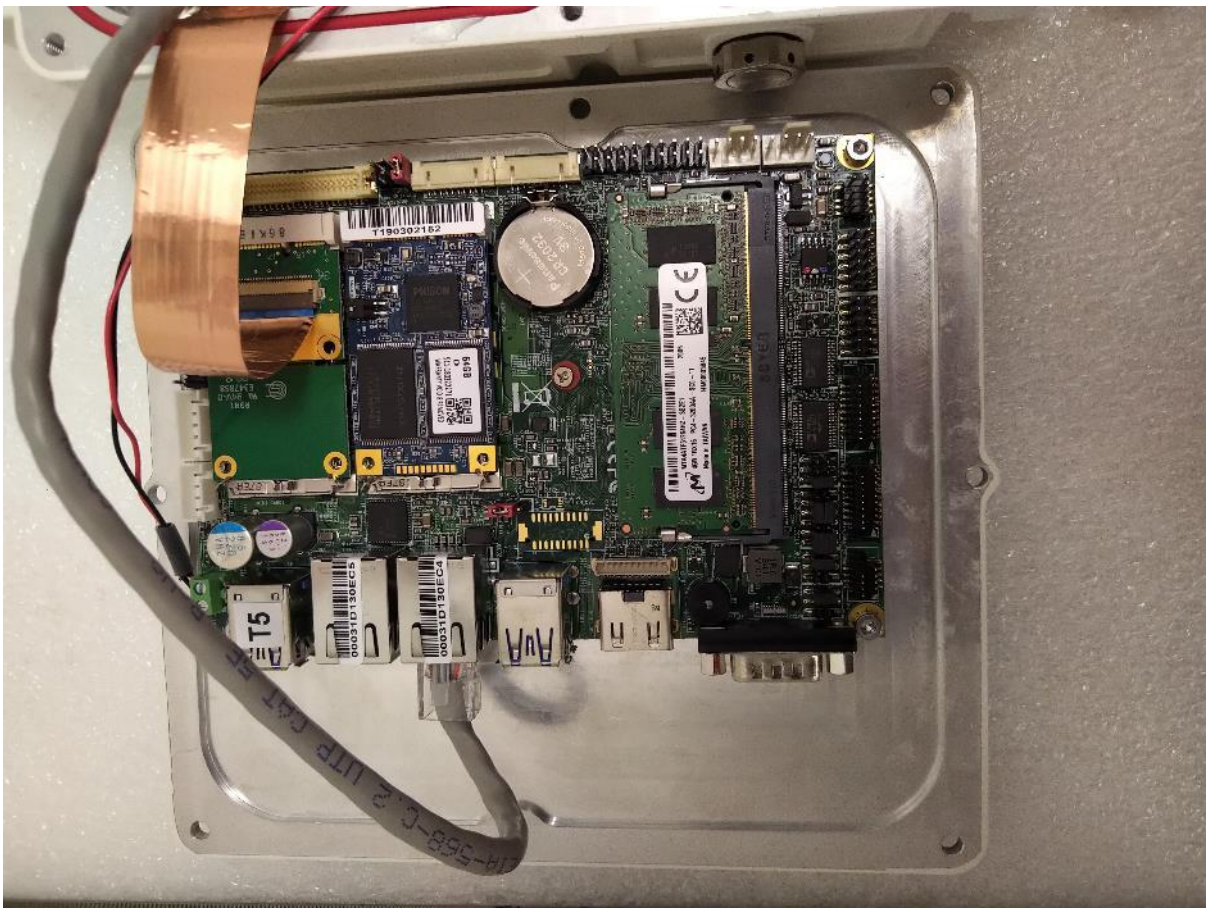
Left view



Internal views







ANNEX 2:

Extract of user guide

Table of Content

List of Tables

1. Introduction

This User Manual (UM) provides the information necessary for Telecom operators to effectively use the Open Radio Station (ORS).

The ORS is a 4G/5G LTE (Long Term Evolution) base station.

The ORS come in a white metallic case (see picture) which includes an embedded computer and a PCB radio. The ORS use Power over Ethernet (PoE) to be powered on and antennas to emit/receive the RF signal. Note that this User Manual only applies to the ORS itself, not to the power system (Power injector, cable) nor the antennas.

Each ORS is designed to work on a given LTE band (the band can be TDD or FDD): the radio PCB is mounted with filters specific to the desired band.

The band is specified on the sticker on the ORS side.

This User Manual applies to all ORS no matter the band.

ORS is IP54 (https://en.wikipedia.org/wiki/IP_Code) under normal condition of usage (warning: see 2.2 Cautions & Warnings).

2. Overview

The ORS is intended to provide 4G/5G network in specific location. The client must install the ORS at his own convenience where it best suits its need. The client needs to check that he has the right to operate a LTE network at this location and the right to operate with LTE band used by the ORS. (warning: see 2.2 Cautions & Warnings).

2.1 Conventions

Many information are available online (notably in https://handbook.rapid.space). In this case, the link is an hyperlinkin blue.

2.2 Cautions & Warnings

LTE bands

The usage of LTE frequency bands is strictly regulated in many countries. The user needs to make sure he complies with all existing rules in the country where the ORS is run.

Water

The ORS is waterproof ONLY IF all the fllowing cables have been properly mounted:

- 1 ethernet cable at least cat 6
- 2 antenna cables
- 1 GPS antenna cable

Regarding the ethernet cable, it must be mounted using the special connector sent with the box. RapidSpace declines all responsibility in the event of damage resulting of water if the connector was not properly mounted.

2.3 Condition of usage

Altitude :
No special altitude condition

Operating temperatures:
The ORS could be use up to 55 ° Celsius in a very ventilated place in the shade as in the sun

The ORS cannot be started at external temperatures less than 0 ° Celsius however once started the outside temperature can drop down to -25 ° Celsius

Water :

The ORS is IP54 and can be mounted outdoor. Please make sure to read 2.2 Cautions & Warnings.

Sun :

The ORS can resist the sun. Please make sure to use ethernet cable resistant to UV.

3. Getting Started

3.1 Material needed to use the ORS

Here is the list what you need to use the ORS :

- Poe Injector 50/60W max 50V
- Category 6 ethernet cable or higher
- two antennas with short and efficient cables
- any UE or modem compatible with the ORS' band

3.2 LTE band licence considerations

Warning: you need to be make sure you have the right to use the ORS band in the location you start it (see Cautions & Warnings).

3.3 Power on the ORS

See https://handbook.rapid.space/user/rapidspace-How.To.Power.On.Your.ORS.

3.4 Do a first test

See https://handbook.rapid.space/user/rapidspace-How.To.Test.Your.ORS.

3.5 Poweroff the ORS

In order to poweroff the ORS, you can simply unplug the power cable from the ORS.

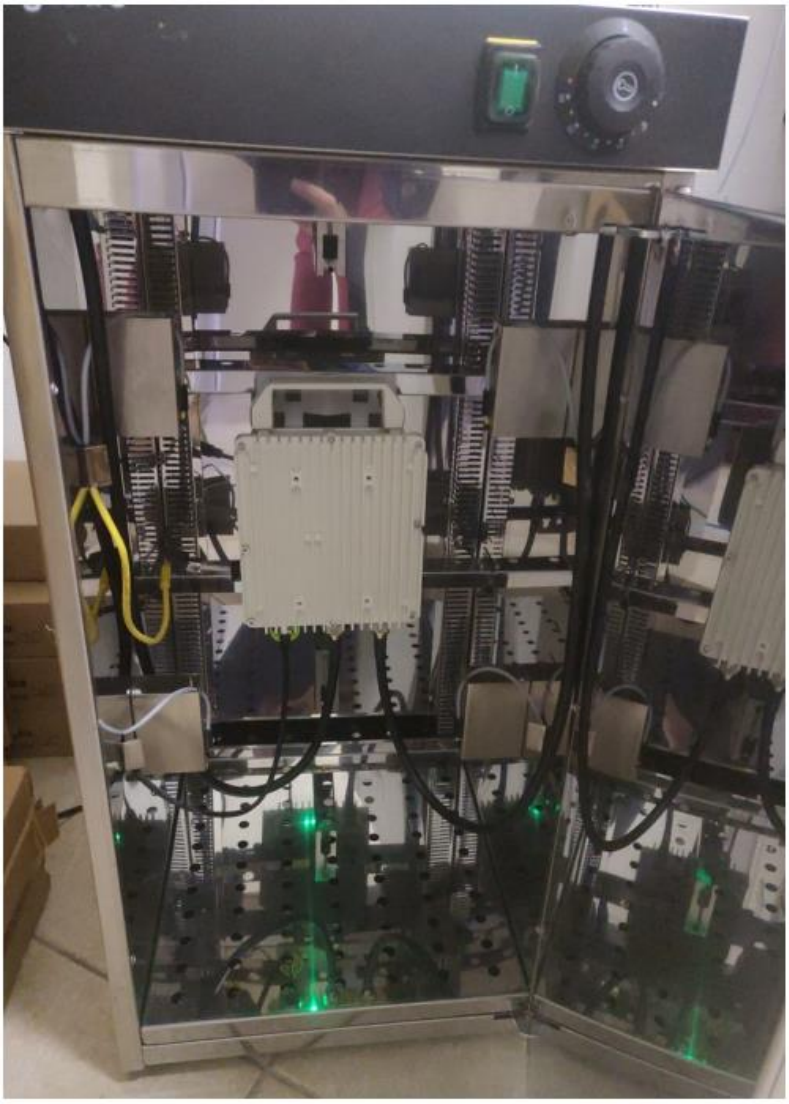
Table of Contents

1. High temperature tests

The ORS is specified to be used in temperature up to 55°C.

1.1 Condition of test

The ORS has been mounted inside a heated cabinet:



The cabinet was setup to be at 55°C during 10 hours. The ORS inside is powered on with maximum power consumption and we measure the temperature inside the ORS at different location through thermal sensors.

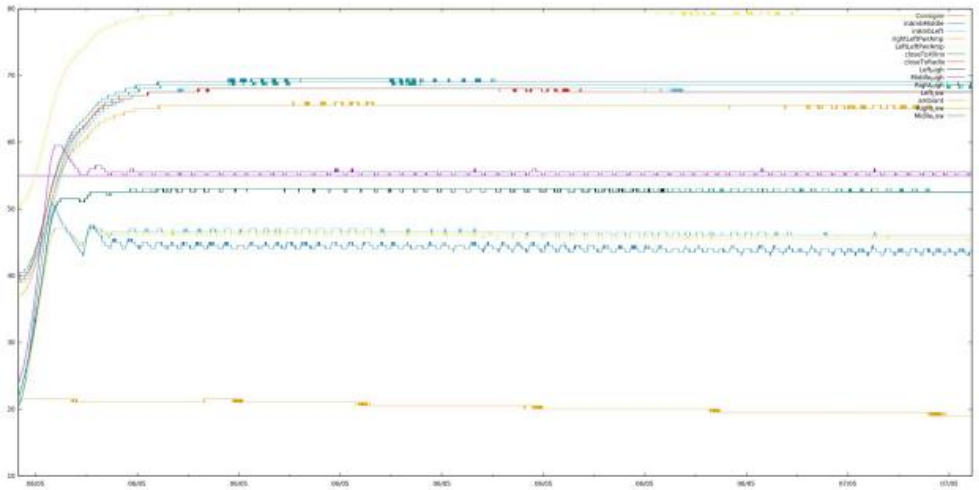
Here are the location of the thermal sensors:

- on radio amplifiers
- on the FPGA
- in the air in the middle of the ORS

1.2 Test results

After 10 hours in such condition, we can find the ORS is still working fine. The radio communication never stopped and the bandwidth never changed.

Here are the graphics showing the evolution of temperature in the location of the ORS.



As you can see in the graphic above, all temperatures are stabilized really quickly and doesn't move after a short period of time.

The highest temperatures are measured closed to the radio amplifier which is totally expected.

2. Low temperature tests

The ORS can start only at positive temperatures. Once started though, the ORS can supports temperatures down to -25°C.

2.1 Condition of test

The ORS is started at ambient temperature (20°C) then, it is placed inside a freezer running at -25°C during 2 days.

2.2 Test results

The ORS never stopped and the phones could always connect to the ORS through 4g network.

The internal temperature of the CPU was never measured below 0°C.

3. Water tightness tests

The ORS is IP54.

Here is the meaning of IP54: (from https://en.wikipedia.org/wiki/IP_Code)

First digit :

Ingress of dust is not entirely prevented, but it must not enter in sufficient quantity to interfere with the satisfactory operation of the equipment

Second digit

Splashing of water : Water splashing against the enclosure from any direction shall have no harmful effect, utilizing either: a) an oscillating fixture, or b) A spray nozzle with no shield. Test a) is conducted for 10 minutes. b) is conducted (without shield) for 5 minutes minimum.

3.1 Condition of test

To be completely sure to respect the IP54 protection index Rapid Space has carried out the following experience :

The protective vent has been removed to be replaced by a plug. This plug is connected to a flexible plastic pipe of 5mm diameter with length of 1.5 meter. A compressor injects air at a pressure of 0.1 bar into the pipe.
The ORS is powered up with PoE cable through the waterproof Ethernet socket.
Antenna cables and GPS cable are plugged too (as shown in the cover picture).

The ORS is then submerged under 20 cm under water during 15mn.

3.2 Test result

At this stage we didn't see any air bubbles coming out of the ORS case.

We can affirm that in these conditions the ORS respects at least the protection index IP54.