



ORS / OPEN RADIO STATION

Temperature and water tightness tests

05/05/2021

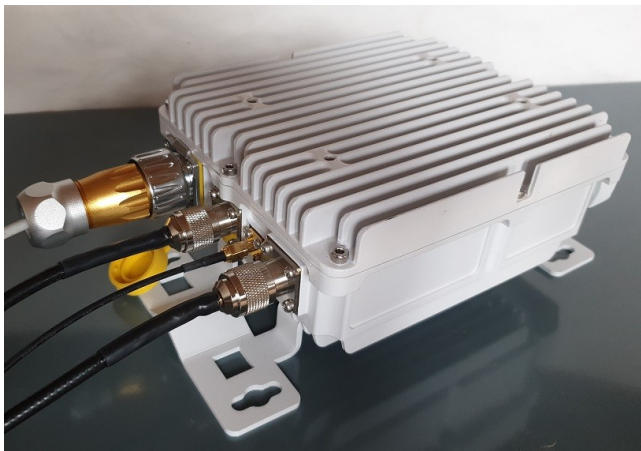


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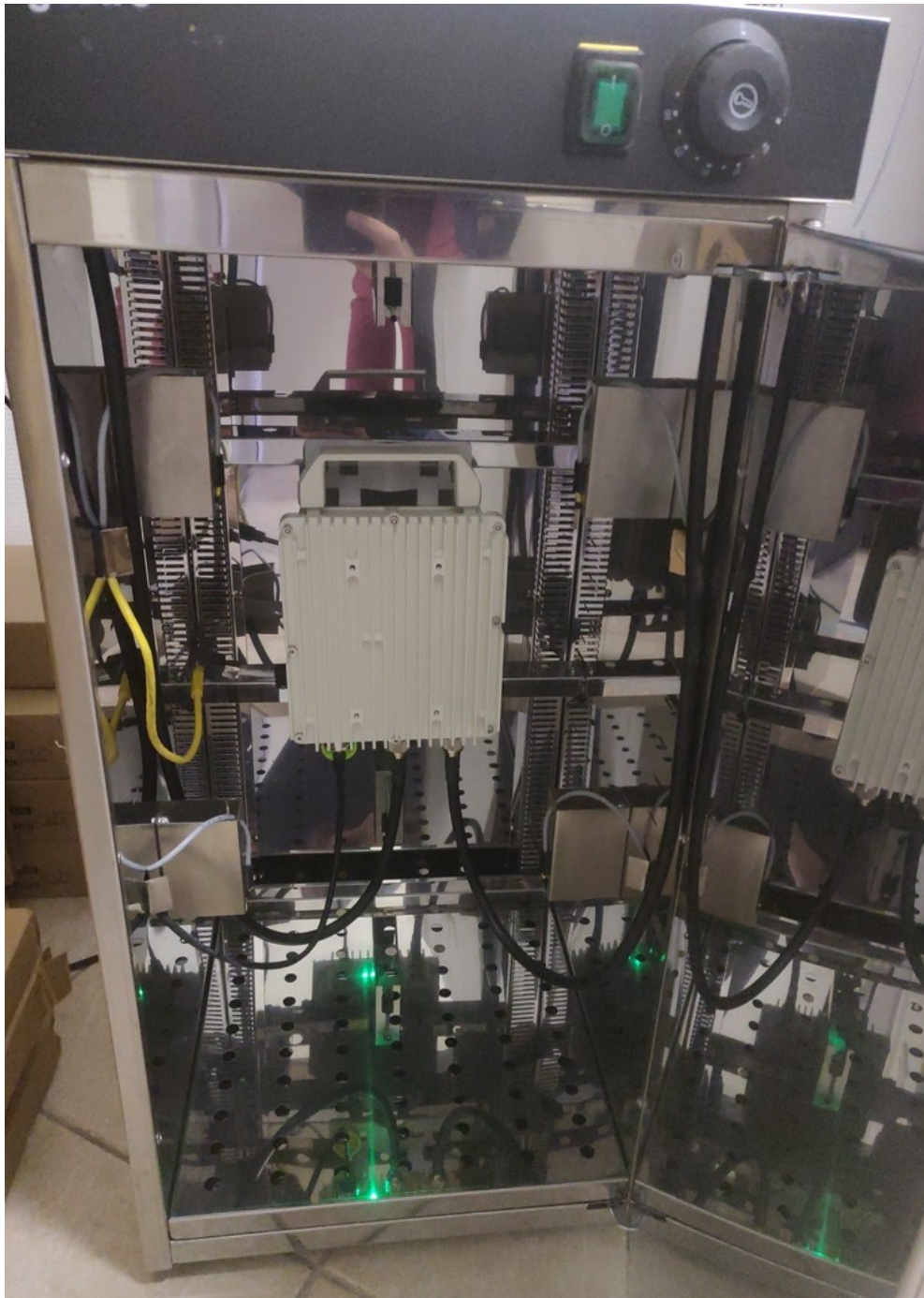
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1. High temperature tests

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.

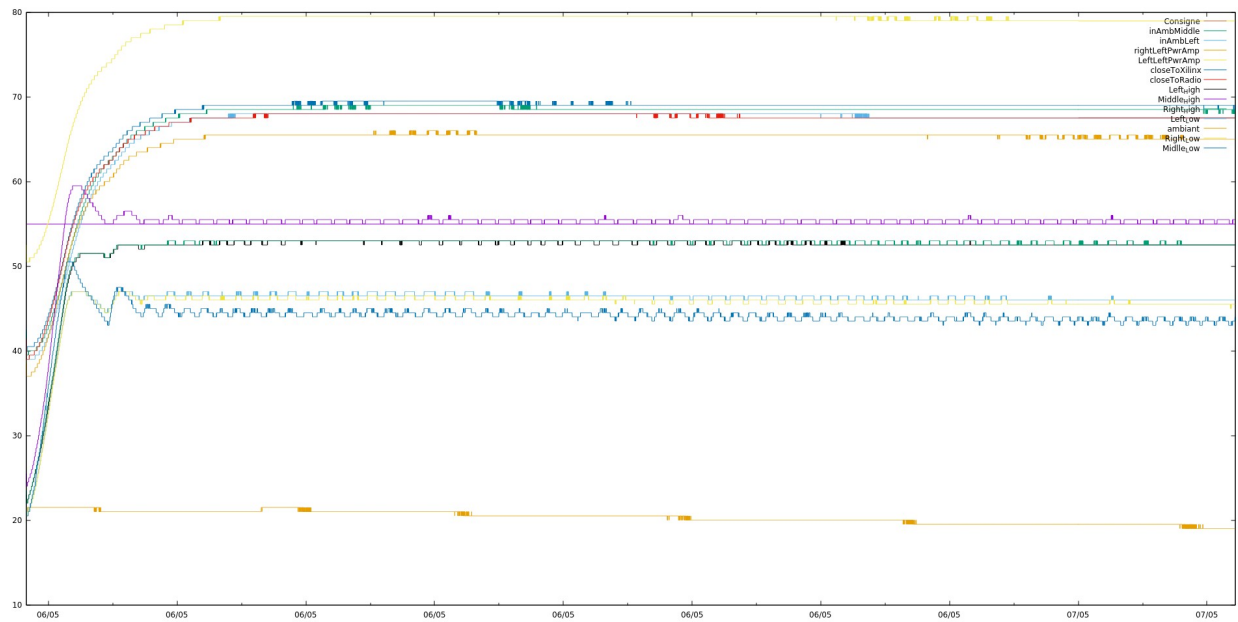
Here are the location of the thermal sensors:

- 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.