

# Regional Initiative for Europe EUR1- Spectrum management and transition to digital broadcasting

Manuel da Costa Cabral

# TABLE OF CONTENTS

1. Transition to digital broadcasting and the switch-off
2. DVB-T in Portugal
3. Framework for the probing network
4. Objectives and Needs
5. Evolution
6. DVB-T Probes Network
7. Lessons learned





## 1. Transition to digital broadcasting and the switch-off

- ✓ Public Tender (2008)
  - ✓ Only one interested (PT Comunicações – historic operators)
  - ✓ Simulcast (3 years)
- ✓ Network roll-out initiated in Dec. 2008
- ✓ Service launched, with a coverage of 40% of the population in Apr. 2009
- ✓ Network roll-out concluded at the of **end 2010**, according to the license, with 153 transmitters

- ✓ Sudden Migration
  - ✓ Total number of receivers sold
    - ✓ Nov 2011 - around 170 000
    - ✓ Dec 2011 – around 260 000
    - ✓ Aug 2012 – around 1 550 000
- ✓ 500 000 households with TDT.
- ✓ Around 10 000 complaints – 2%
- ✓ Total number of households in Portugal 5 900 000

# Switch-off – Detailed plan

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## 1<sup>st</sup> phase – 12 of January 2012

Transmitters that cover approximately the coastal area of the mainland territory (**green area**)

## 2<sup>nd</sup> phase – 22 of March 2012

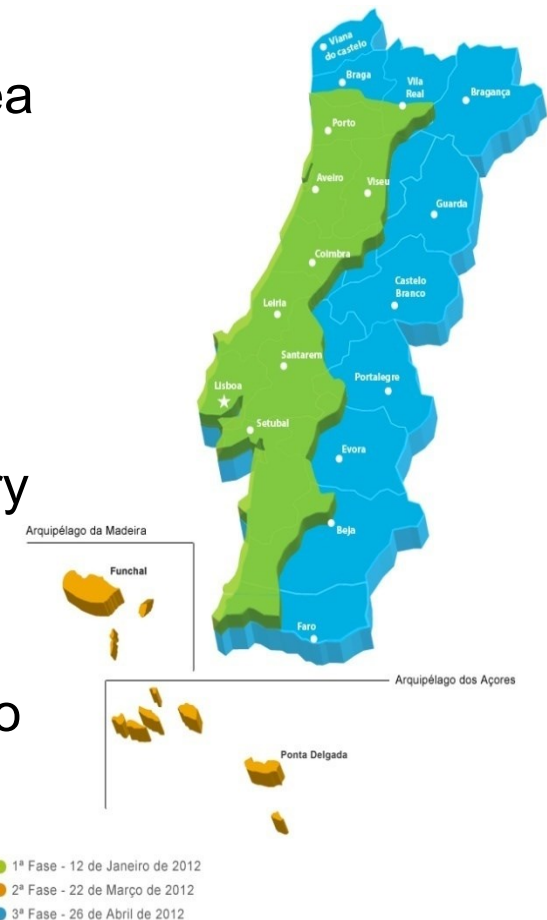
Transmitters of Azores and Madeira (**yellow area**)

## 3<sup>rd</sup> phase – 26 of April 2012

Remaining transmitters covering the mainland territory (**blue area**)

The plan also established the switch-off in certain retransmitters in pilot zones, before this 3 phases, to be further determined

*ANACOM's decision of 24 June 2010*





## 1. DVB-T in Portugal

## Spectrum refarming (EU)

- **October 2009** – European Commission (EC) non-binding Recommendation on the digital dividend asking Member States to:
  - Complete analogue switch-off by 1 January 2012
  - Opening the 800 MHz band under harmonised conditions for electronic communication services other than, and in addition to, broadcasting services
- **May 2010** – EC decision on technical harmonisation of the 800 MHz band
- **September 2010** – EC proposal for a decision on RSPP, including opening the 800 MHz band for wireless broadband
- **December 2010** – RSPP decision approved => opening the 800 MHz band (which includes the channel used for DTT in Mainland Portugal)

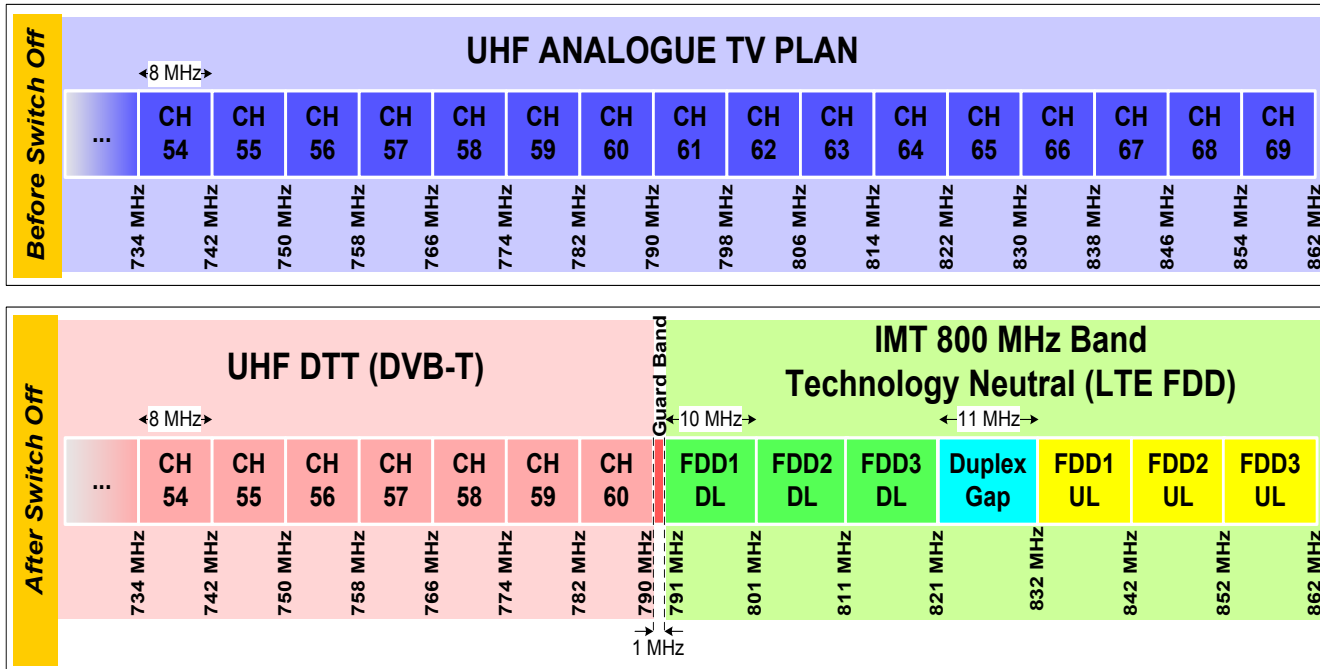


## Spectrum refarming (Portugal)

ANACOM had to coordinate with neighbours and identify alternative channels for DTT => **ch. 60 (782-790 MHz) in Mainland Portugal** / others in Madeira and Azores

- **December 2010** – Public consultation on the refarming, including the replacement of channel 67 by channel 60 for DTT in Mainland Portugal
- **March 2011** – Final decision on the replacement of channels in Madeira and Azores / Further public consultation on the replacement of channel 67 by channel 56, for DTT in Mainland Portugal
- **April 2011** – Final decision to replace channel 67 by 56
  - DTT operator had 16 weeks to conclude the transition, starting with the relays of the 3 pilot areas
- Reduced impact on users due to the yet small DTT take-up by July 2011

# Portuguese DVB-T Network



- **SFN network**

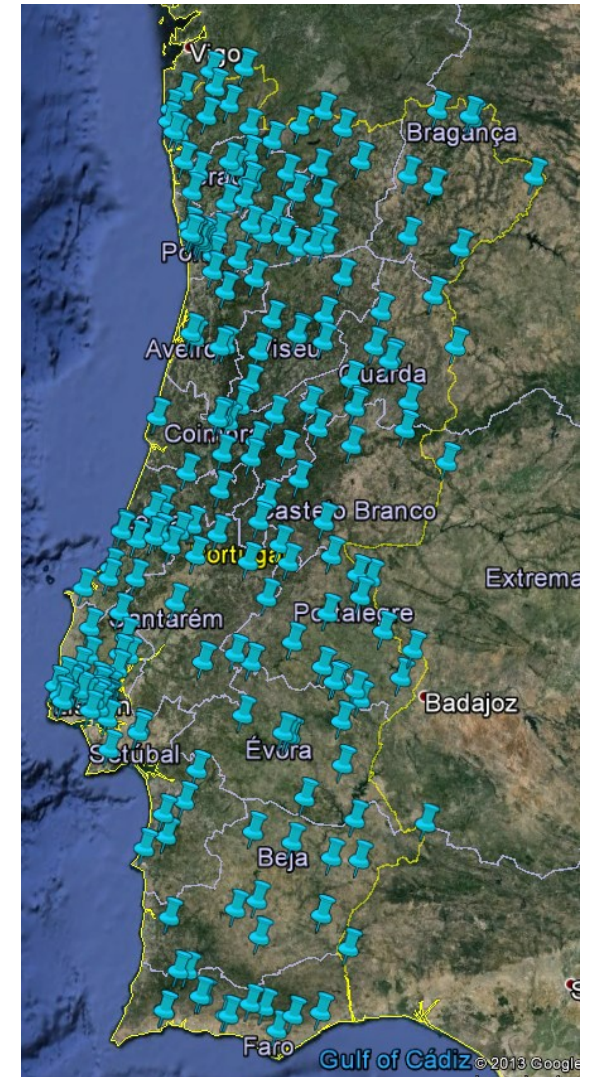
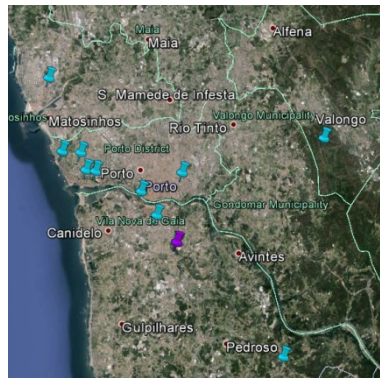
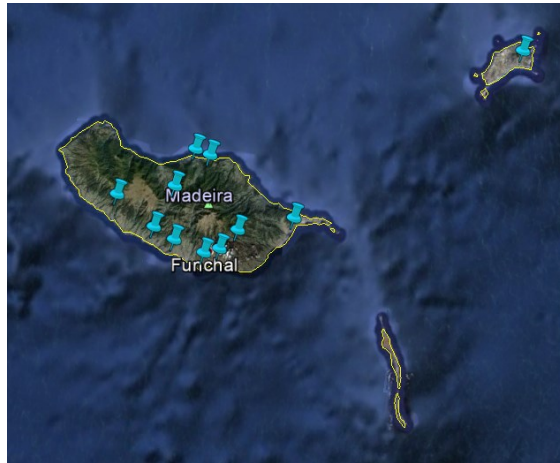
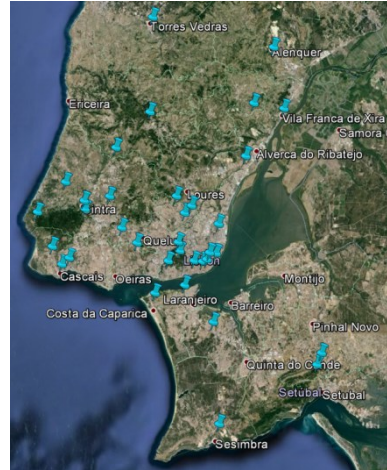
- Portugal's Mainland – Channel 56 (750-758 MHz)
- Madeira Island - Channel 54 (734-742 MHz)
- Azores Archipelago - Channel 47 (678-686 MHz), 48 (686-694 MHz), 49 (694-702 MHz), 55 (742-750 MHz) and 56 (750-758 MHz)

- **MFN Network (Overlay)**

- Portugal's Mainland. Seven emitters - Channel 40, 42, 45, 46, 48 and 49
- Currently, there are 242 (SFN) + 7 (MFN) transmitters

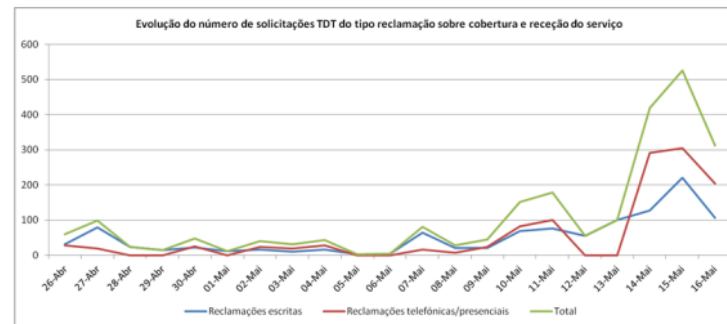
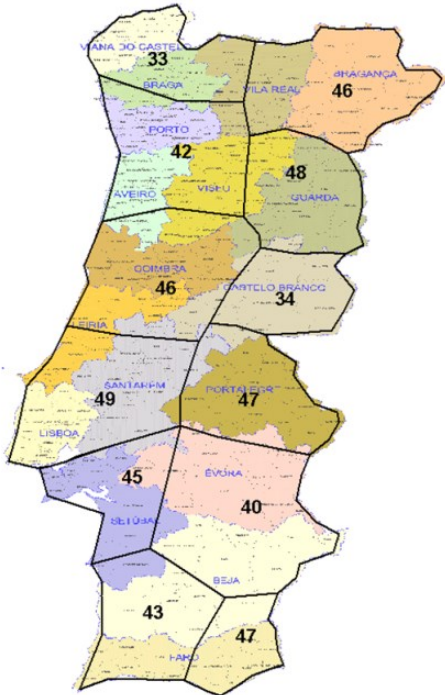
# Portuguese DVB-T Network - SFN

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- Due to the high number of interference complains in May 2012 and in order to solve rapidly the problems, the DTT operator, with the accordance of the ICP-ANACOM, installed three emitters in a MFN.
- The network is evolving to a MFN.





## 2. Framework for the Probing network

## Portuguese DVB-T Probing Network

*To assess in real time the integrity of the DVB-T signal globally delivered across the country by the operator*



- ✓ **386 probes**
- ✓ **Permanent monitoring** 24 by 24 hours, 7 days/week, 365 days/year, in **386 different places**
- ✓ Developed by 2 Portuguese companies (UBIWHERE & WAVECOM) with the scientific supervision of the University of Oporto (INESC-TEC/FEUP)

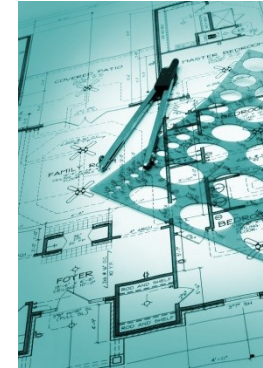


## 3. Objectives and Needs



## What did we need?

- **A technological solution capable of fulfill the following challenges:**
  - ✓ Permanent monitoring in a representative set of locations of the population distribution
  - ✓ Low cost
  - ✓ Flexible (automatic) e autonomous (communications)
- **Manufacturers**
  - ✓ No adequate solutions
  - ✓ High costs



## Option:

- ✓ Design a probe from scratch
- ✓ 100% Portuguese technology
- ✓ Very significant cost reduction

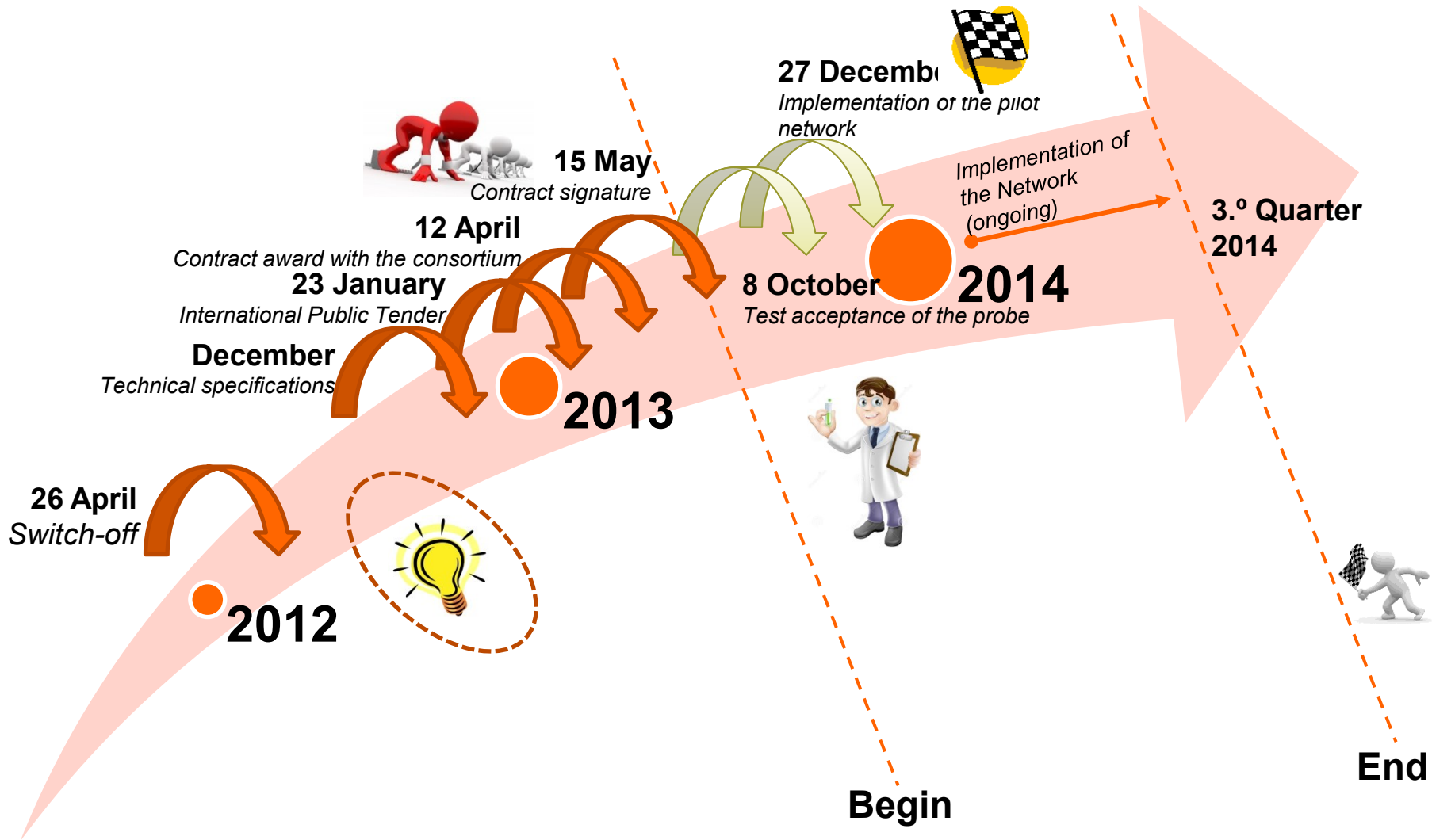


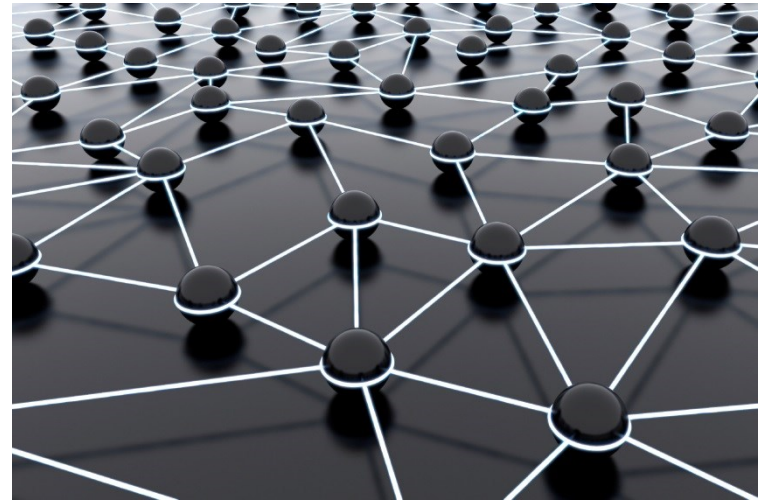


## 4. Evolutionary Perspective of the Project

# Evolutionary Perspective

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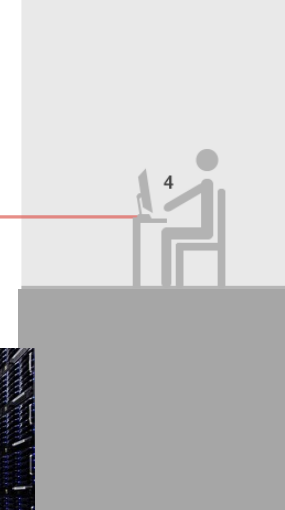
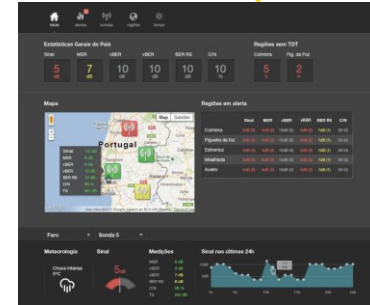
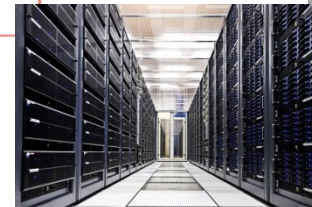
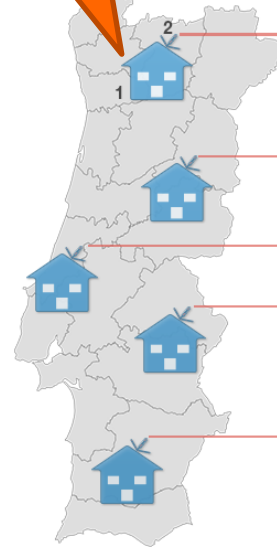
## 5. DVB-T Probing Network

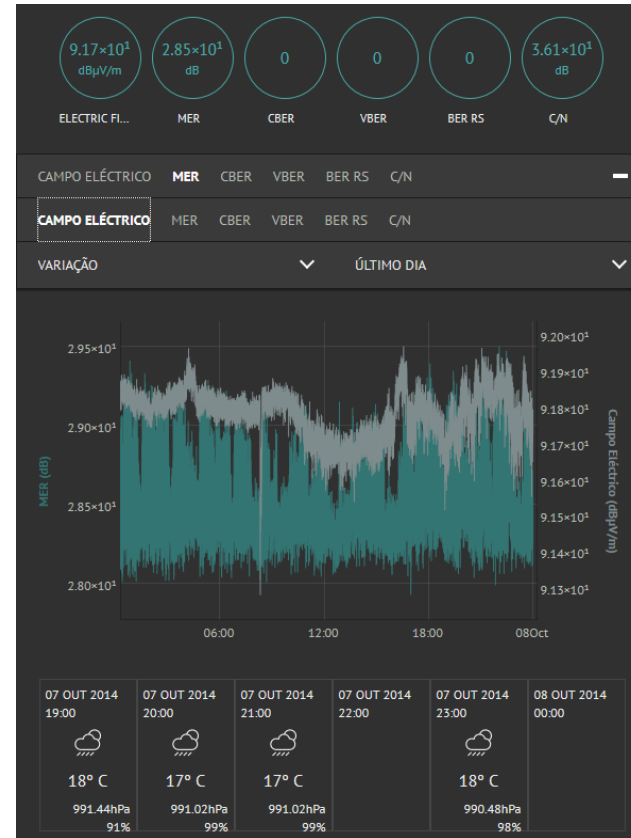
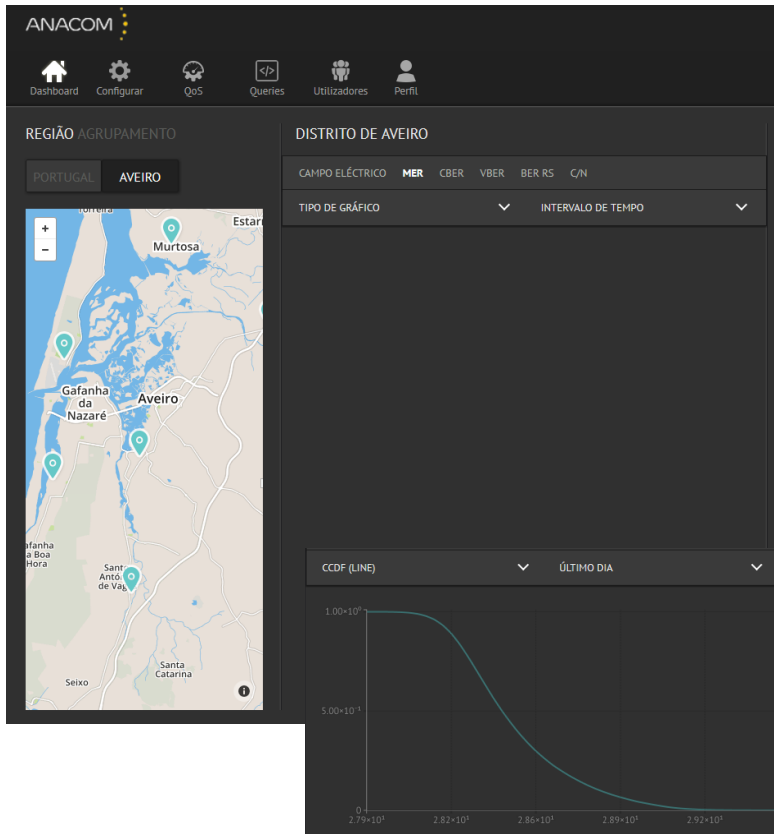
## Full automatic operation

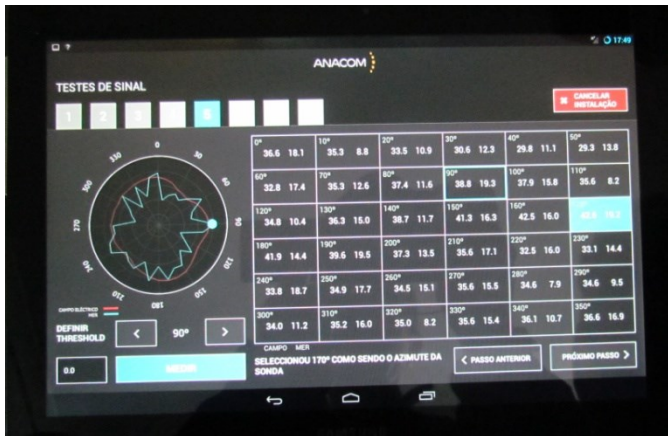
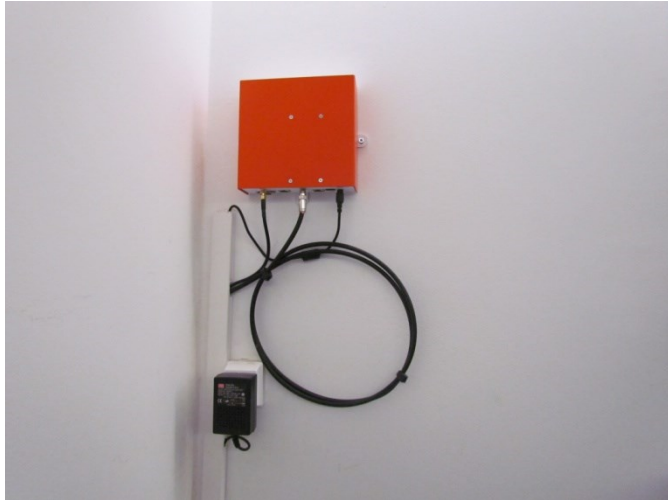
### Measurements (each second)

- Electrical Field
- MER
- cBER
- vBER
- BER Reed-Solomon
- C/N
- Recording of a sample of the transport stream in case of problems

- ✓ Installation in a Portuguese secondary local administrative unit equivalent to an administrative parish







## 400 Probes

386 for the network

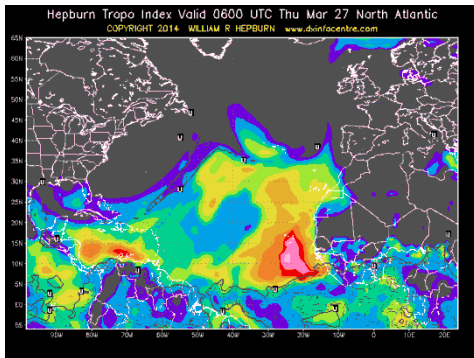
Remaining 14 Probes:

- Azores and Madeira
- Spare
- Alternative locations

- Automatic reports of a probe or a set of probes:
  - ✓ Number of event alarms by parameter
  - ✓ Downtime of the DTT signal
  - ✓ Statistical analysis, etc.
- National statistical analysis based on the data provided by the overall of the probes



- Georeferenced weather information
  - ✓ correlate the measurements with the weather conditions that were felt at the time and place where they were obtained







## 6. Lessons learned

## Lessons learned

- **Interference very difficult to manage on a SFN;**
- **Receiver equipment installation is crucial for a smooth transition;**
- **Difficult to monitor the quality of TDT network without appropriate tools;**
- **Do not underestimate public pressure.**

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