

Digital radio performance

World DAB Automotive

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Why reception is important

- 2020 date for DAB receivers in Italy
- Real life experiences
- Planning issues and limitations to coverage
- How to improve

DAB Italia s.c.p.a.

- First national DAB operator
 - GEDI - Espresso Repubblica Group
 - Il Sole 24 Ore
 - Radio Mediaset-Mondadori
 - RDS/ RadioMaria/ Radio Radicale
- Broadcasting national commercial radio stations
- 80% mobile coverage planned for 2018
- Continuously extending network
- More info and coverage on www.dab.it



2020 date for DAB receivers in Italy

- Law prescribes that from Jan 1 st 2020 all radio receivers sold in Italy shall be able to receive DAB+, from 1 st June 2019 distributors will be allowed to buy only DAB+ compatible products.
- Currently 3.3 mio DAB+ receivers sold, 31% of new cars are sold with a DAB+ receiver (according to GFK Italy CAPI research)
- Awareness of DAB is growing rapidly (currently 19%), also thanks to an important marketing campaign
- 3 national operators, local operators – all with both simulcast and new services
- National operators have to use SFN networks in order to be spectrum efficient
- Over 64% of radio listening in Italy happens in cars!

**THIS MAKES PERFORMANCE OF DAB
RECEIVERS IN CARS MORE IMPORTANT
THAN EVER!**

Real life experiences

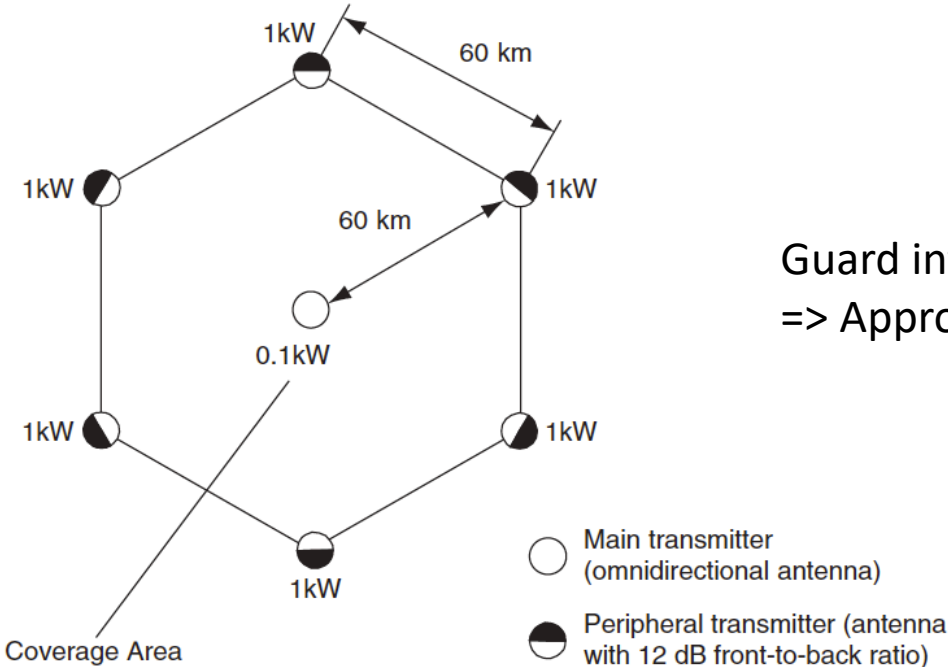
- When we talk about performance in this context we mean of course DAB+ reception sensitivity
- We have found that OEM DAB+ car radios can work....
 - Very well
 - Decently
 - Really bad
- The problem is that there are a lot of car radios out there not working well

Real life experiences

- Customers complain for bad reception with both operators and manufacturers
- The simplest apparent solution is of course just increasing the field strength
- There are different options to do this
 - Add transmitters to the networks...
 - Increase Tx power...
- This means for network operators in both cases higher costs!
- But things are more complex than this!

History break

Theory



Guard interval of 246 μ S
=> Approx 73 KMs



Input RF: 227360
 Ensemble 5009 * DAB Italia *
 GPS Status

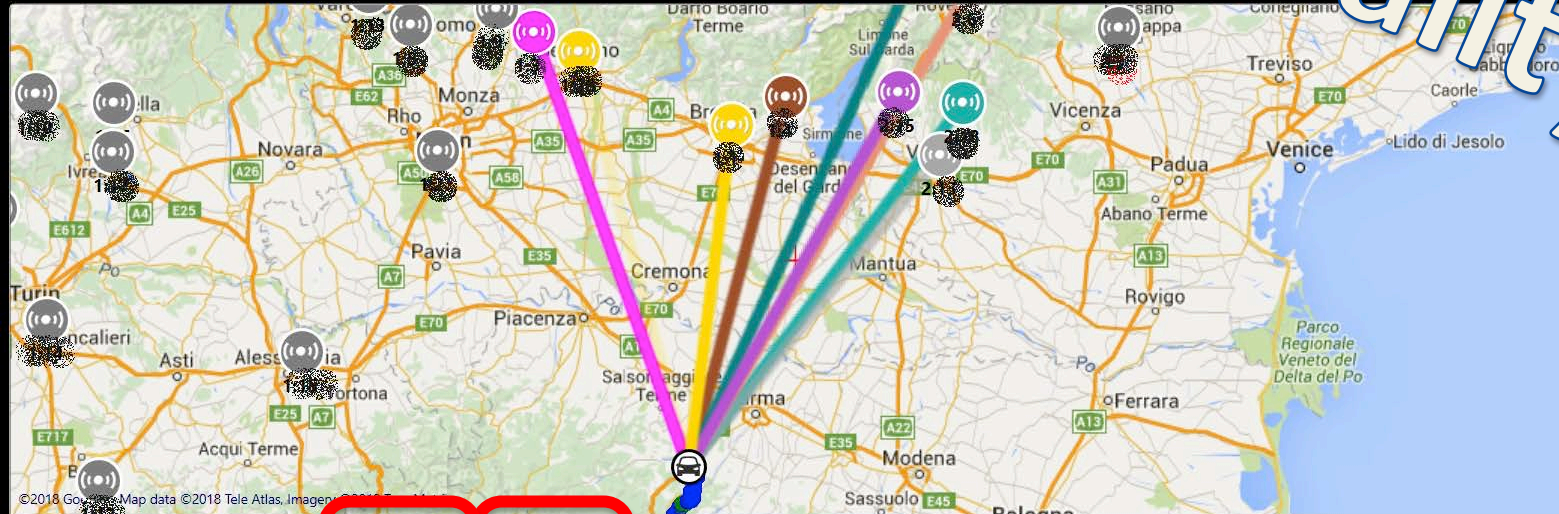
Field Strength 68,71 dBuV/m
 BER 2,40E-003

Playout
 Analysed

Volume



Logging



Reality!!!!

Auto centre map

Coordinates
 Latitude 44,894
 Longitude 11,874
 Satellites 11
 Status LOCKED
 Time 30/04/2018 13:02:02

Mouse Position
 Latitude 44,8091
 Longitude 7,8992

Selected Transmitter Details

Name
 ID
 Latitude
 Longitude
 Comments

Map Options



Cache



TII Database



Strength and Quality Settings

TII	Name	Delay	Distance	Delay	Offset Delay	Notes
	Selva Piana	-66,17 μ s	110,06 km			
	Vedetta	-65,70 μ s	99,11 km			
	Velo Veronese	87,67 μ s	131,18 km			
	Valcava	-63,54 μ s	132,39 km			
	Spiazz di Montebello	-11,56 μ s	123,50 km			
	Torricelle	2,54 μ s	115,25 km			
	Finonchio	24,20 μ s	159,73 km			
	Paganella	94,96 μ s	180,52 km			

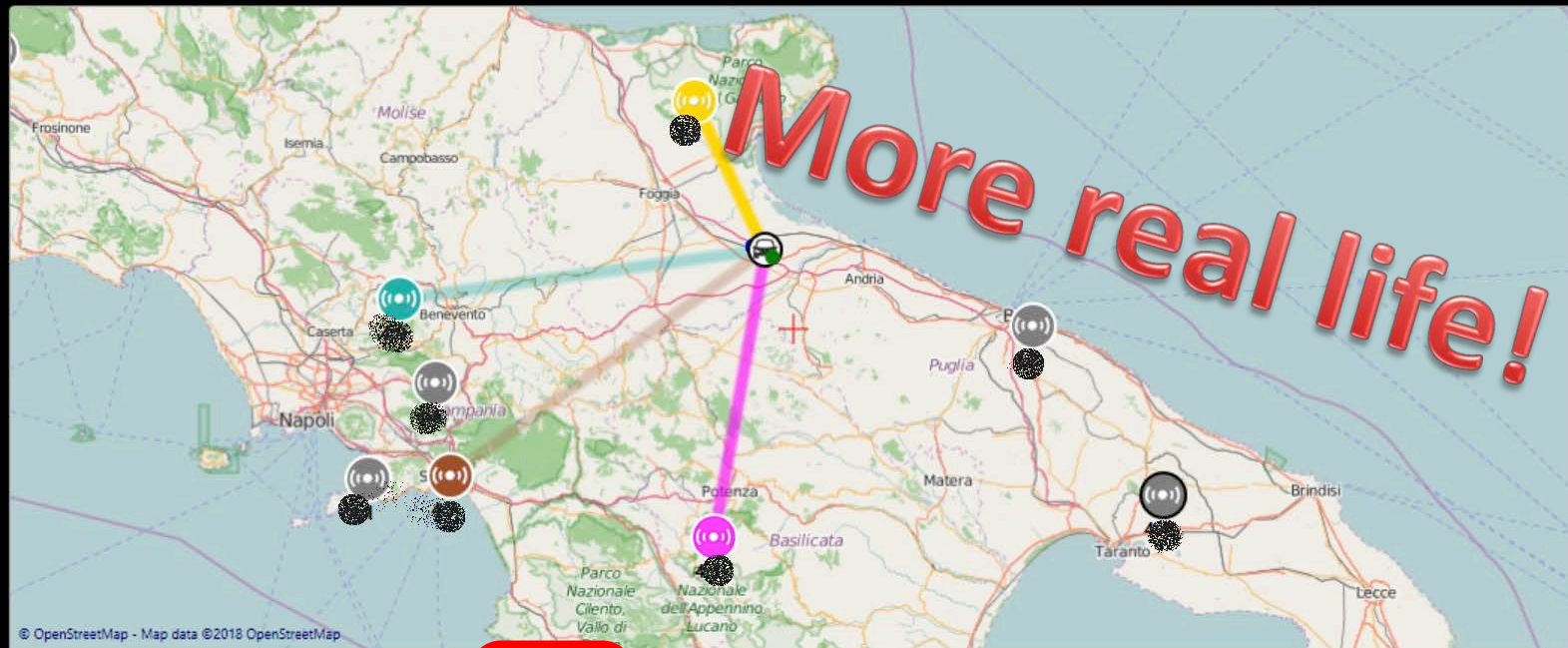


Input RF: 227360
Ensemble 5009 * DAB Italia *
GPS Status

Field Strength 51,71 dB μ V/m
BER 1,81E-003 Payout Kc3Test
Analysed

Volume

0,0 dB



Auto centre map

GPS Co-ordinates

Latitude 41,3029
Longitude 15,9337
Satellites 9
Status LOCKED
Time 08/05/2018 14:11:55
Mouse Position
Latitude 40,1495
Longitude 16,1444

Selected Transmitter Details

Name Trazzonara
ID 4:4
Latitude 40,6231
Longitude 17,3945
Comments 0,1

Map Options



Cache



TII Database



Strength and Quality Settings

TII	Name	Delay	Distance	Delay	Offset Delay	Notes
	Celano	0,68 μ s	50,17 km			7 m
	Pierfaone	112,19 μ s	90,10 km			7 m
	Camposauro	-48,47 μ s	112,77 km			7 m
	Colle Bellara	-102,24 μ s	119,01 km			7 m

Planning issues and limitations to coverage

- As shown above a reference network is hardly possible in a country with a morphology like Italy (Norway,...), both for cost reasons and for logistical reasons
- Propagation of DAB signals can be extreme and this means there must be power limitations in certain transmitter sites in order not to knock out the SFN
- Therefore there are areas where field strengths have to be limited or will be limited by practical reasons
- Car receivers need to be sensitive enough to be able to receive DAB+ services nevertheless

Planning issues and limitations to coverage

- In addition to the practical aspects for building networks with higher fieldstrengths another problem lays in the coordination aspects with neighbouring countries
- This can impose limitations to radiated power and therefore also to fieldstrengths inside the planned coverage area
- Planning a DAB network in complex territories will always mean also finding compromises between cost, coverage and compatibility and means that car receivers shall be able to receive services at least at 42 dBuV @ 1.5 meters

How to improve

- OEMs
 - Understand planning and coordination issues
 - Network deployment issues
 - Test performance on the field
- Network operators
 - Build good network
 - Minimize self interference in large SFNs
 - Support OEMs with test routes and information on planning parameters

How to improve

- Better antennas
- Vertical polarisation
- Diversity systems
- External antennas
- Limitation of EM noise inside the car

42

- ...the answer to the ultimate question of Life (DAB) , the Universe and Everything.

This Answer was first calculated by the supercomputer Deep Thought after seven and a half million years of thought. This shocking answer resulted in the construction of a even larger supercomputer, named Earth, which was tasked with determining what was the question in the first place.

Thank you for your attention!

Questions?

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