



Joint ITU/EBU Workshop on
«Interference to DAB reception»
Thursday, 18 October 2018

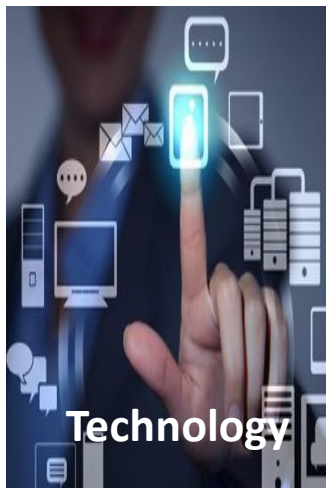


Norwegian Communications Authority

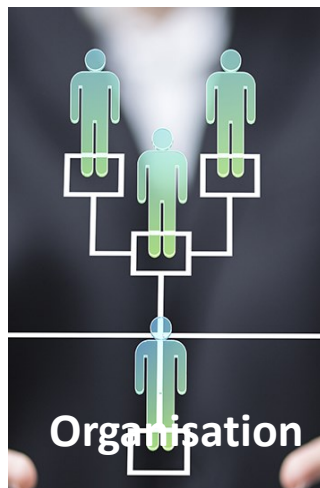
Director General Elisabeth Aarsæther



Security



Technology



Organisation



Spectrum



Market

19th May 2011 the Norwegian parliament decided that:

- Digital radio is the future in Norway
- FM services will be switched off
 - Target year: 2017
 - Exception for smaller local radios

Norwegian ministry of culture - Digital radio in Norway.

The following three conditions are absolute and must be fulfilled regardless of when switch-off takes place:

- 1: Digital coverage for the NRK's radio services correspond to that of NRK P1 on FM. (Simulated to be 99,5 per cent of population).**
- 2: The multiplex that carries commercial national services (Riksblokka) must cover at least 90 per cent of the population.**
- 3: The digital radio offer must represent added value to the listeners.**

The above three conditions, as well as the two following conditions, must be fulfilled by 1 January 2015 for the switch-off to take place in January 2017:

- 4: Affordable and technically satisfactory solutions for in-car radio reception must be available.**
- 5: At least 50 per cent of daily radio-listeners employ digital platforms, exclusively or in combination with FM-radio.**

DAB-coverage measurements/ simulation tools

Measurement:

- Calibrated monitoring vehicle (substitution method)
- Spectrum analyser, Rohde-Schwarz ETL
Reference receiver, Ruark audio R1



Simulation:

- Radio propagation model described by ITU-R P.1546-5
- Simulation tool “ICS “from ATDI

The role of Nkom

Frequency strategy - Geneva 2006 / Constanta 2007 (GE06/Co07)

- Same planning criteria's and parameters used for both Ch. 5-12 (174-230 MHz) and ch.13 (230-240 MHz).

Planning criteria's	RPC 4	RPC 5
Location probability	99 %	95 %
Reference, C/N (dB)	15	15
Minimum fieldstrength ($E_{med/ref}$) (dB(μ V/m)) at 10 m	60	66
Minimum fieldstrength ($E_{med/ref}$) (dB(μ V/m)) at 1,5 m	48	54

($E_{med/ref}$): Reference value for minimum median field strength

RPC 4: RPC for mobile reception

RPC 5: RPC for portable indoor reception

- Ch. 13 also for military use in some neighboring countries.

Verification of coverage requirements and switch-off criteria's.

- Field-strengths according to international standards, not according to the quality of receivers and antennas.
- DAB+ compared with FM stereo-coverage.
- Population- and road-coverage, not area-coverage.
- Switch-off criteria 1: The National Broadcaster's (NRK) DAB+ program 1 need to have the same coverage as FM/ P1 of today.

Result: FM-98.6%/ DAB-99.5%

- Switch-off criteria 2: The Commercials blocks, including the community radio block, need to have at least 90% coverage

Result: 93%

“Interference to DAB reception”

Poor indoor coverage:

Most issues solved over phone.

- Move the receiver to another location,
- rescan
- use of external antenna.

Poor mobile coverage:

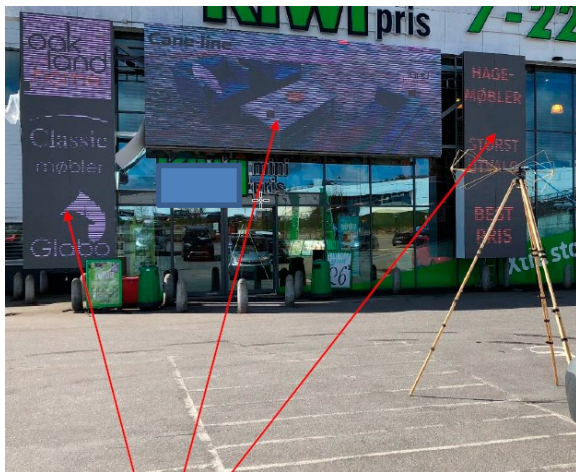
In case several complaints

- Information (antenna solutions)
- Simulation
- Measurement

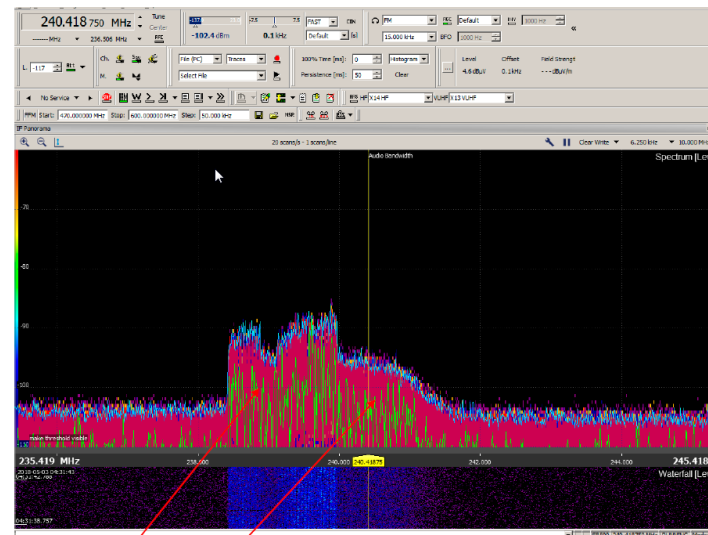


“Interference to DAB reception” – LED displays

Complaint on no NRK (13F-239 MHz) coverage at the parking space in front of LED displays



3 panels of LED displays
 10m distance: 39 dBuV/m at 239 MHz (13F NRK)
 EN 55032 – 37 dBuV/m over 230 MHz



DAB-signal 13F NRK
 239 MHz
 Noise signal center
 frequency 240,4 MHz

DAB Local/ community Radio

- Trial period Jan.1.2013 until Dec.31.2016
 - Auction March 2016, 35 of 37 areas granted, valid to 31.12.2031
 - 120 transmitters reported to Nkom, 67 put into service
 - No requirements concerning coverage
 - Digital broadcast technology and service neutral, DAB+
 - Mux operator, responsible to give access to content providers
 - All new stations should be approved by Nkom.
 - Yearly fee between 2000,- and 5000,- EUR
 - Should allow secondary use, based on cognitive techniques
 - In areas with possibilities of adjacent channel interference, critical mask filter is required (GE06/ RRC-06, p 3.6.1/ figure 3-2).
 - Possible to apply to put transmitters outside the given area
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- Adjacent Channel interference challenge
 - High Power in cities jamming other listeners
 - Need close cooperation with national operators to avoid interference