

DAB+ in Norway

The Switch is completed

Petter Hox, NRK

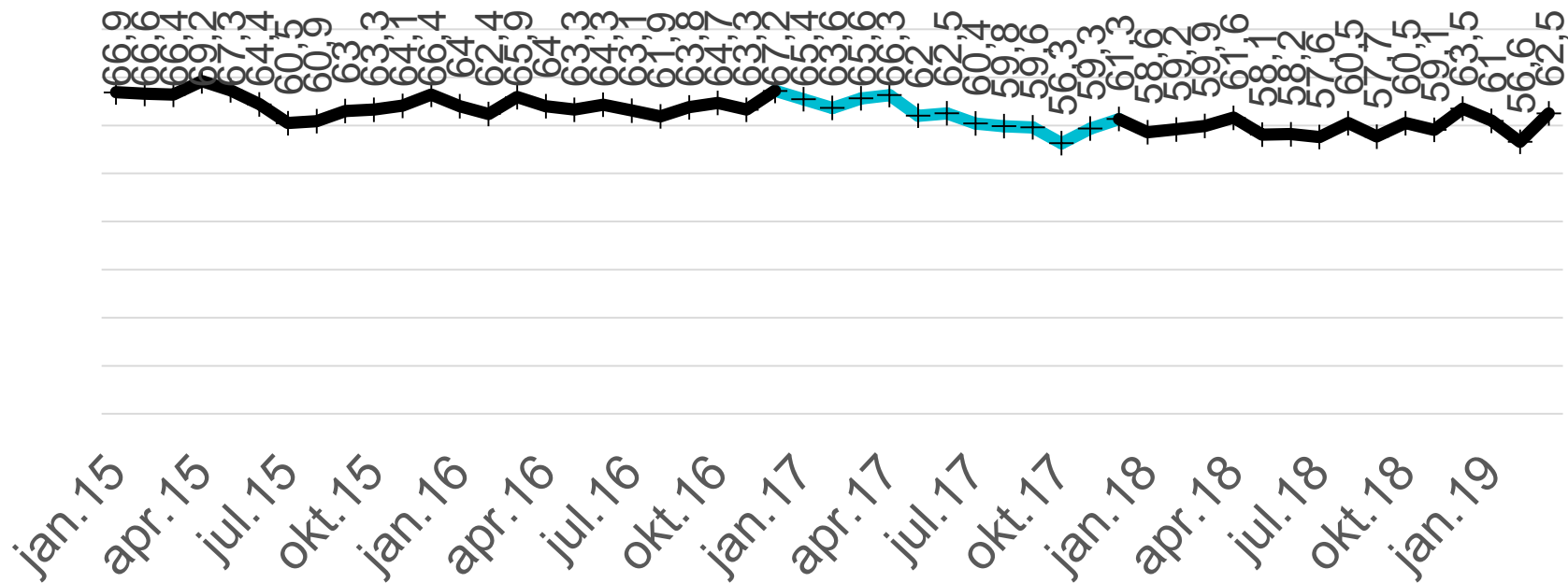


Hot news from Norway January 11, 2017

The Switch is completed

- Throughout 2017, 5 nationwide FM networks were switched off
- The public broadcaster NRK closed 3 FM networks
- The commercial broadcasters closed 2 FM networks
- Local radio stations have still permission to transmit on FM until 2022
- But more and more local radio stations are in the process of establishing themselves on DAB
- Listening figures dropped about 10% when we switched off FM
- But now, we can see signs of a positive development
- But, it takes time

Total Radio, population 12y+ Daily reach % from January 2015 – March 2019.



Radio broadcasting - from one to all

- Within a specific geographical area, a DAB frequency block carries **10 -15 radio channels**
- The number of channels depends on the quality (**capacity**) the broadcaster chooses to give to each channel
- Typical bit rate (NRK): **80 kbs (DAB+)**
- DAB broadcast uses a small number of frequencies (and frequencies are a **limited natural resource**)
- NRK's DAB network uses a total of **5 frequency blocks**
- DAB networks are **SFN** networks (single frequency networks)

174 – 240MHz

(band III + **ch.13**)

(FM 88 -108MHz)

2 nationwide networks

1) **“RIKSBLOKKEN”** (The commercial radio channels)

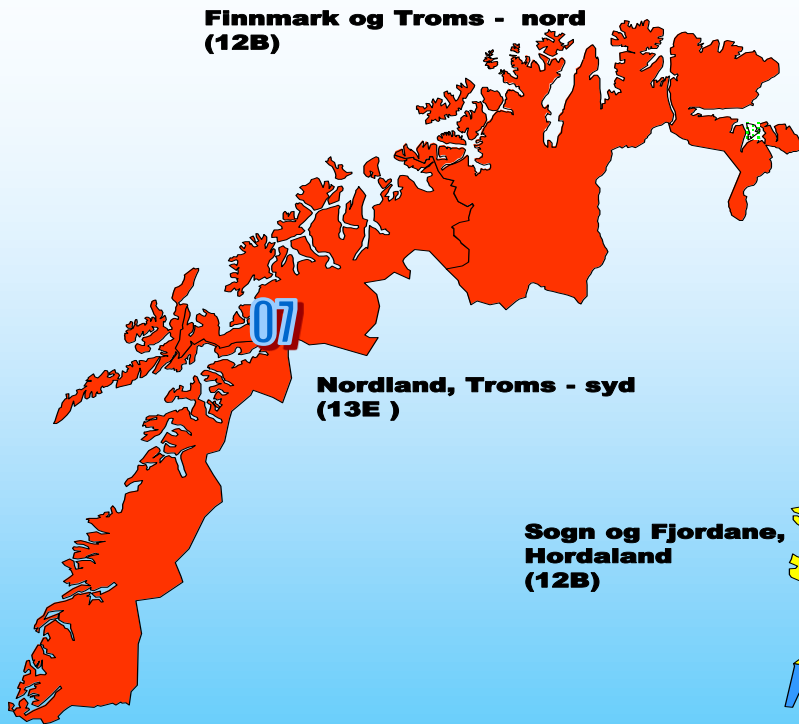
Coverage requirement : 90% (92,8%) (population coverage)

2) **“REGIONBLOKKA”** (NRK's own regionalized network)

Coverage requirement : 99,5% (99,7%) (population coverage)

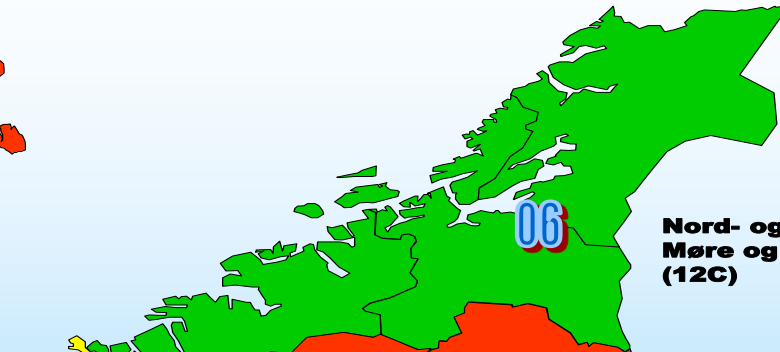
DAB frequency blocks in Norway

**Finnmark og Troms - nord
(12B)**

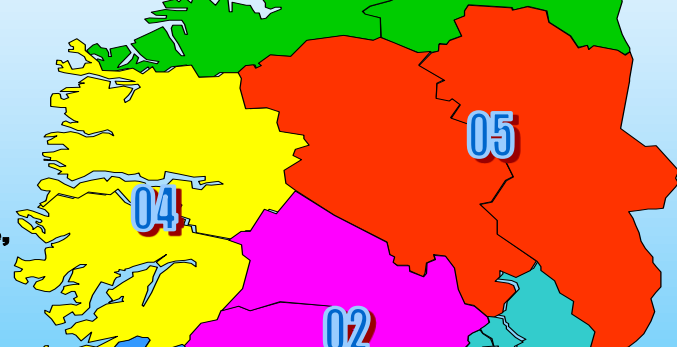


**Nordland, Troms - syd
(13E)**

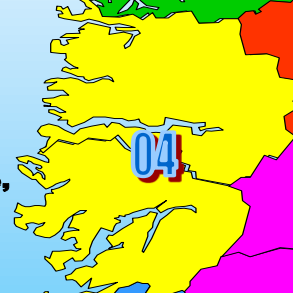
**Nord- og Sør-Trøndelag,
Møre og Romsdal
(12C)**



**Hedmark, Oppland
(13E)**



**Sogn og Fjordane,
Hordaland
(12B)**



**Akershus, Oslo,
Østfold
(12C)**



**Buskerud, Telemark
og Vestfold
(13A)**

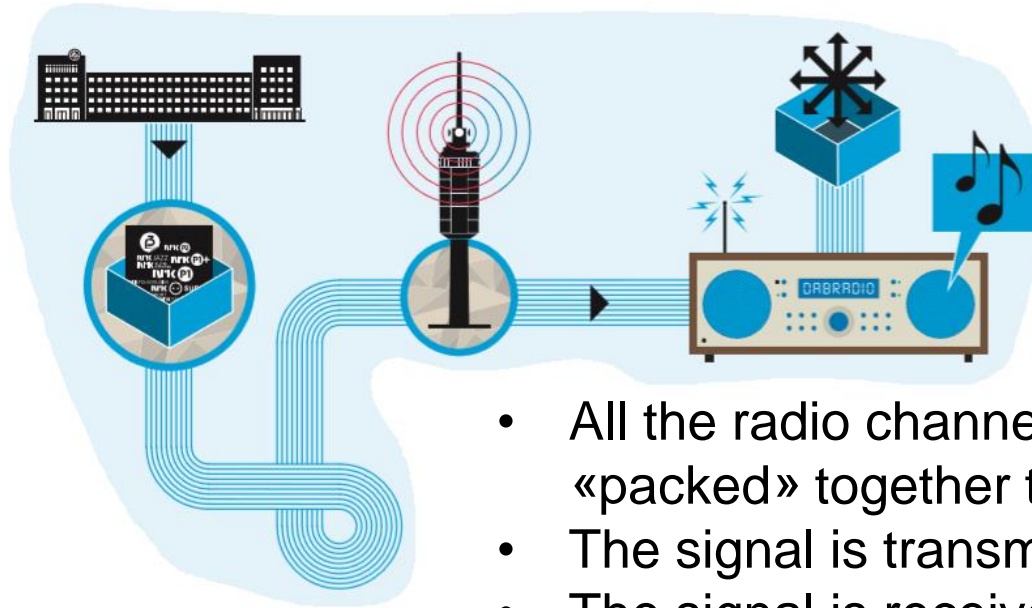


**Rogaland, Aust- og
Vest Agder
(13F)**



Riksblokken (12D)

DAB multiplexing



- All the radio channels are coded and «packed» together to one signal
- The signal is transmitted
- The signal is received and the receiver decode and pack it up
- You can listen to all the radio channels

“REGIONBLOKKA” – NRKs own network

- It contains 7 multiplexes (7 regions)
- Each multiplex contains 15 radio channels
- The multiplexes are channel-like with the exception of the channel NRK P1
- Every day between 06.00 – 09.00 and 14.00 – 17.00 NRK P1 goes local
- At that time there will be 2 or 3 local variants of P1 in every multiplex
- All the channels, except P1, have the same SiD in the respective multiplex
- With the same SiD, but different frequency block, the service following function works

How is the DAB networks set up?

- Main transmitters do the basic coverage
- More than 50 main transmitters in Norway with very high power
- Refills of low power transmitters
- “Regionblokka” has a total of approximately **1050 transmitters**
- “Riksblokken” has approximately **250 transmitters**
- Sea coverage about 50 km out of shore to cover the coastal fishing fleet
- DAB+ is also established at Svalbard close to the North Pole

DAB - coverage in practice

Level 0	<42 dB μ V/m	No <u>coverage</u>
Level 1	42 – 48 dB μ V/m	<u>Car reception/good portable receivers outdoors</u>
Level 2	48 – 54 dB μ V/m	<u>Reception within wooden houses in areas with scattered buildings</u>
Level 3 Level 4	>54 dB μ V/m >60 dB μ V/m	<u>City reception, wooden houses</u> ← RPC5 <u>City reception, brick buildings («concrete coverage»)</u>

DAB coverage by various field strength levels

- Planning value of networks is 54dBuV/m - 1,5m (RPC5)
- Following recommendation from Geneva in 2006 (RPC5 and RPC4)
- High field strength requires less of the receiving equipment
- Low field strength requires more of the receiving equipment
- We have chosen to dosage the field strength in a “practical way”

Velg hvilken dekning du vil se:

DAB-NETT

- NRK
- RIKS
- LOKAL

REGION

- Troms & Finmark
- Nordland
- Trøndelag, Møre & Romsdal
- Sogn & Fjordane, Hordaland
- Hedmark & Oppland
- Akerhus & Oslo, Østfold
- Telemark, Vestfold, Buskerud
- Sørlandet, Rogaland

TUNNELLER

- Tunneler som har/får DAB dekning

SIGNALSTYRKE

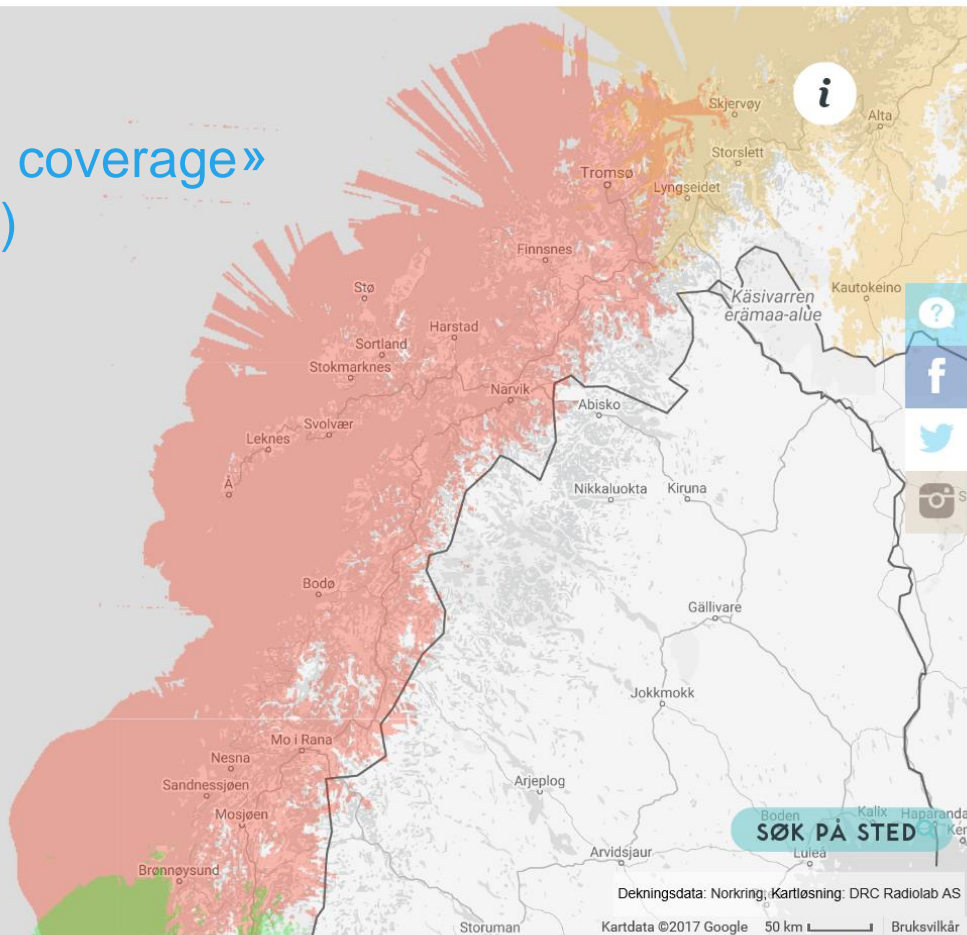
- Meget god **dekning**
Stor sannsynlighet for mottak innen- og utendørs også i bymessige strøk.
- God dekning
- Basisdekning
Mottak kan påvirkes av materialer i bygg eller forstyrres av gjenstander i bilen. Les mer [her](#)



«Very good coverage»
(54dBuV/m)

Norwegian Sea

Google



SØK PÅ STED

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- Sørlandet, Rogaland

TUNNELLER

- Tunneler som har/får DAB dekning

SIGNALSTYRKE

- Meget god dekning
- God dekning

Generelt godt mottak, blant annet i trehusbebyggelse.

- Basisdekning

Mottak kan påvirkes av materialer i bygg eller forstyrres av gjenstander i bilen. Les mer [her](#)

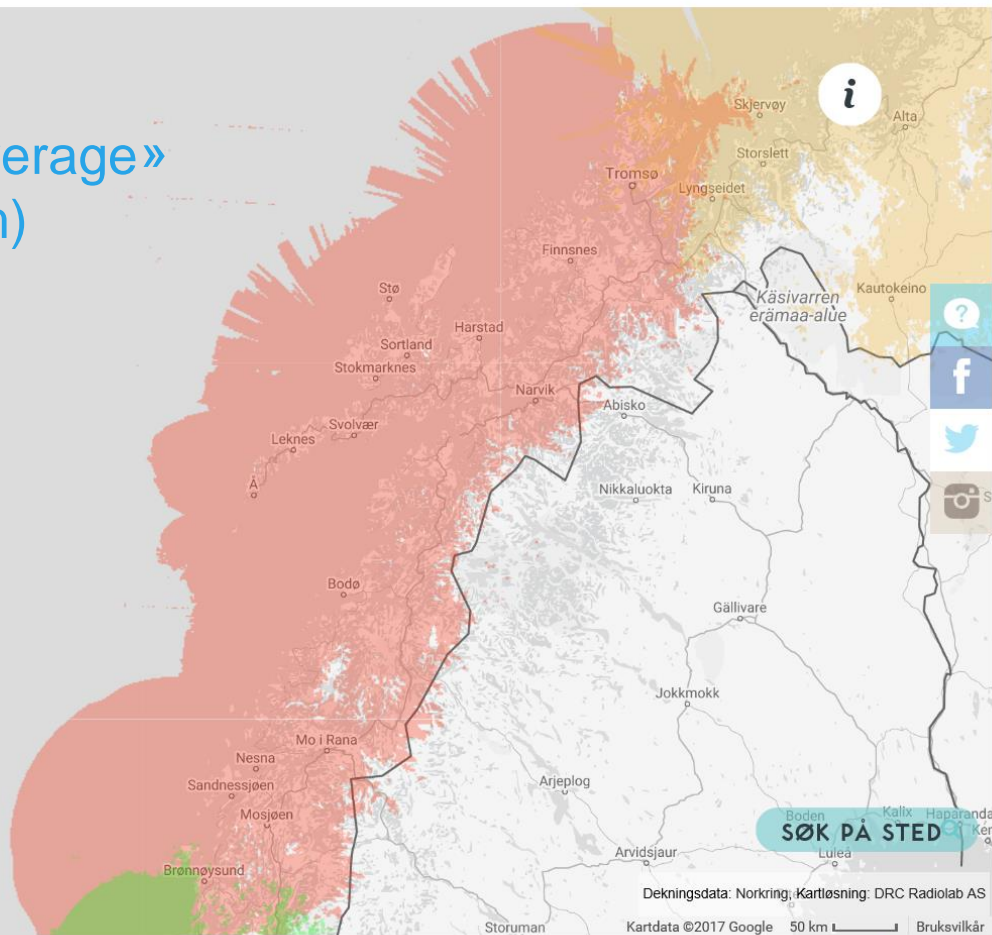
22.05.2019



«Good coverage»
(48dBuV/m)

Norwegian Sea

Google



SØK PÅ STED

Dekningsdata: Norrking; Kartløsning: DRC Radiolab AS

Storuman Kartdata ©2017 Google 50 km Bruksvilkår

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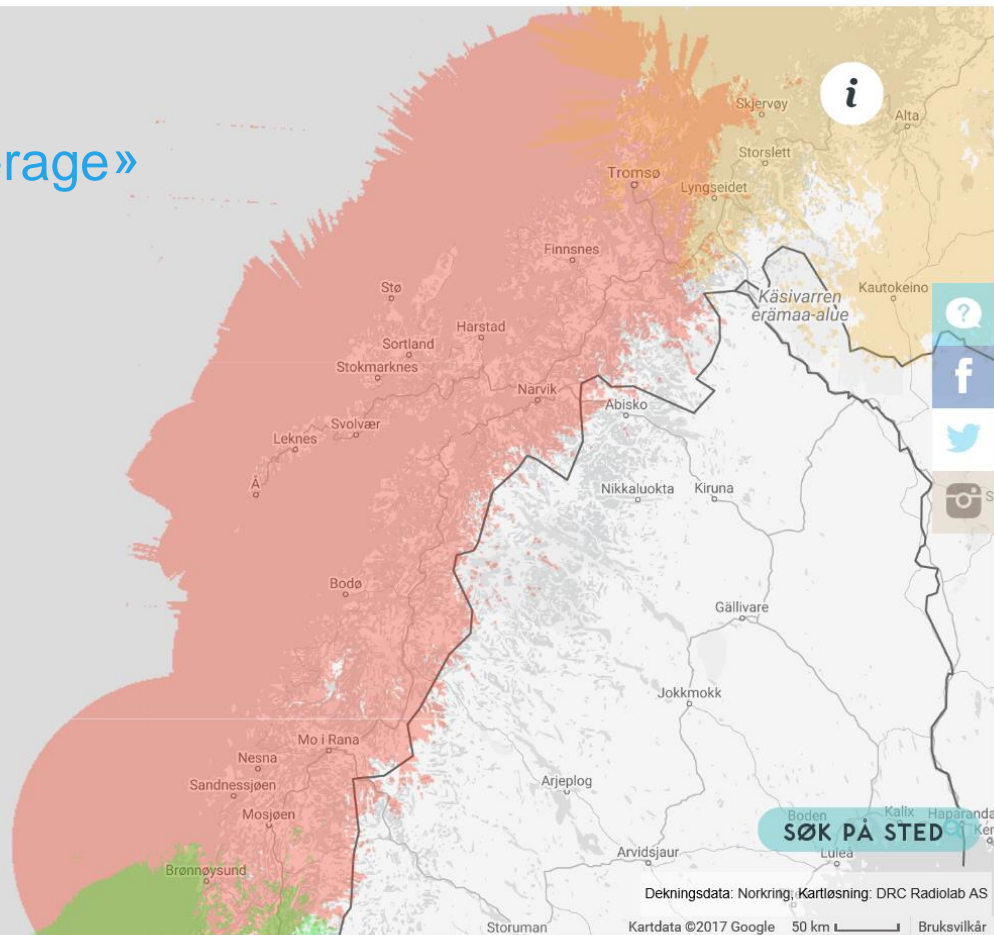
- Meget god dekning
- God dekning
- Basisdekning

*Mottak med god, utvendig antenne og god glassklebe- eller originalmontert antenne i bil.
Mottak kan påvirkes av materialer i bygg eller forstyrres av gjenstander i bilen. Les mer [her](#)*



«Basic coverage» 42dBuV/m

Norwegian Sea

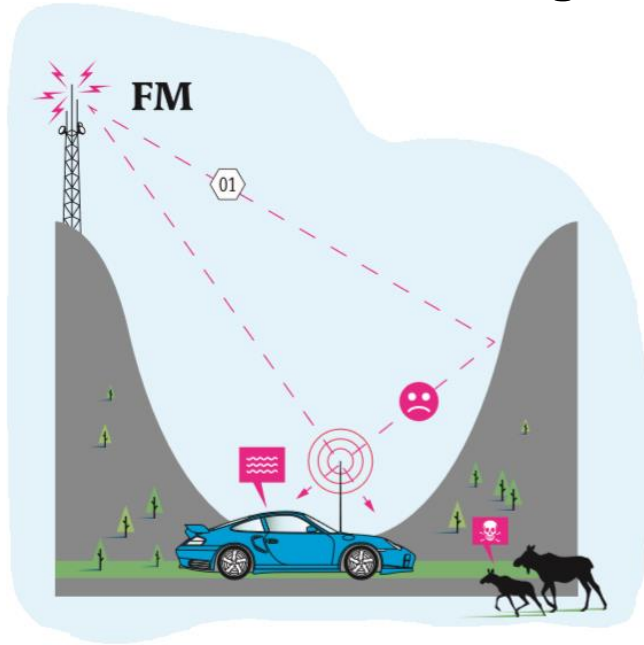


DRN / NRK has systematically measured and controlled the networks throughout the construction period from 2012 until today. The coverage follows the norm set out in Geneva 2006

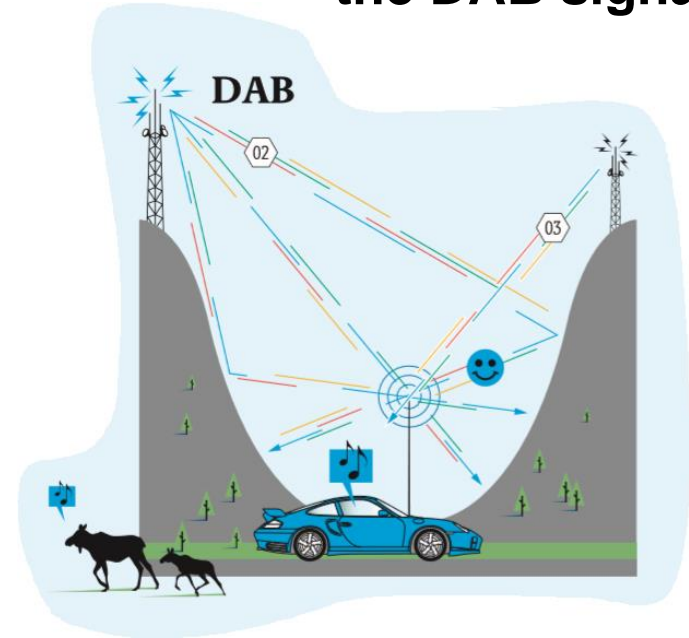
At least 50,000 km are covered with measurements and radio listening



.....destroy
the FM signal



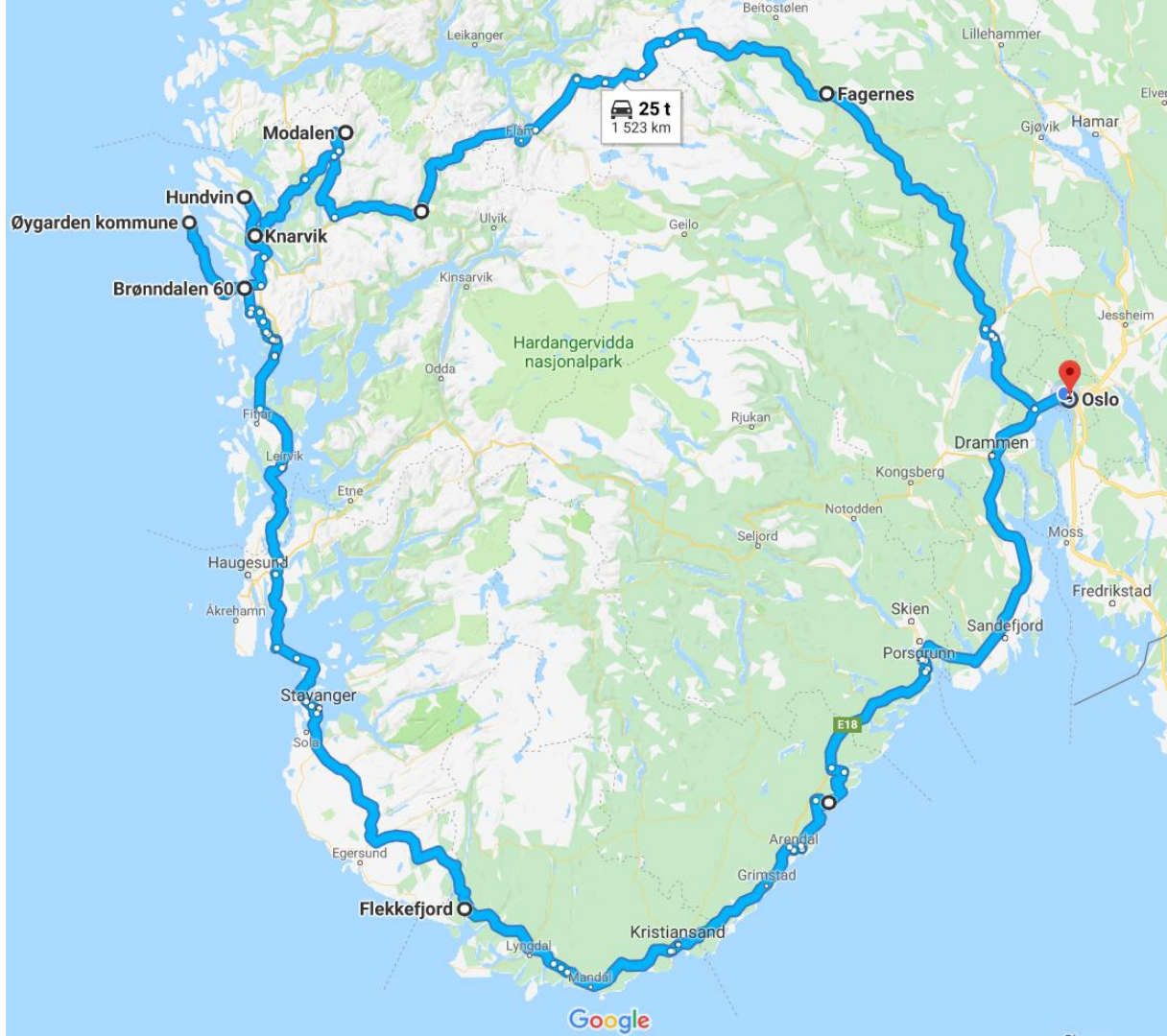
.....do not destroy
the DAB signal



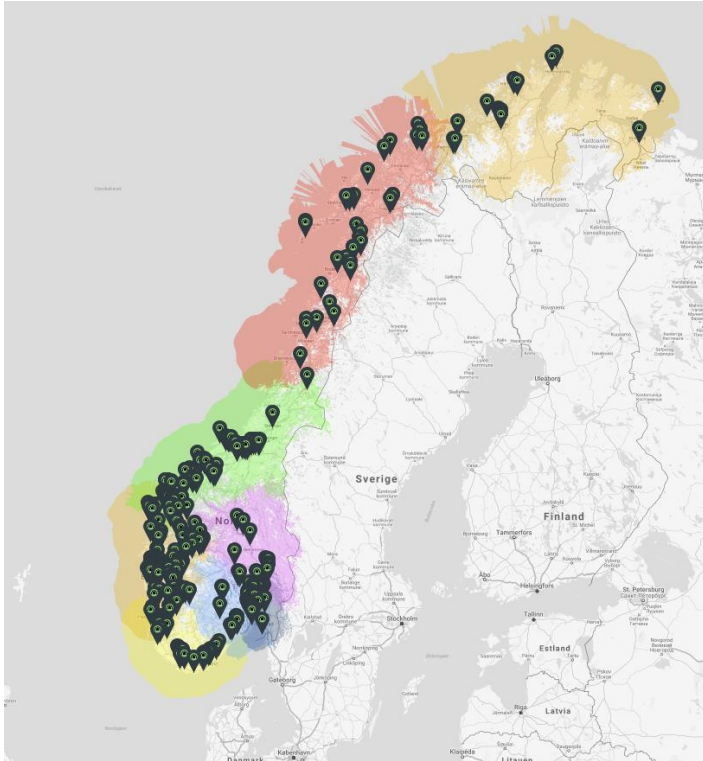
Observations made in February / March 2019

No drop outs was observed on this drive except a few road tunnels of old standard. The field strength was largely above 60 dB μ V/m all the way.

Car used: Volvo XC 60
2015 model



DAB in road tunnels



- DAB in 380 road tunnels at this moment
- Tunnels > 500m
- All new tunnels is equipped with DAB



- The road traffic control center can break into the radio transmission inside the tunnel and send messages to the motorists
- DAB in tunnels should help to make them safer

Why is this broadcast network so important ?

- **We can provide ALL our 15 program offerings to EVERYONE IN THE COUNTRY**
- DAB is especially designed for mobile reception
- DAB is well suited to alert the public in dangerous situations
- The DAB network is built with considerable back-up (redundancy)
- Non stop weather forecast for the coastal fishing fleet ("NRK Weather")
- The DAB network is fed individually (not in chains such as FM)

- Asymmetric networks are a challenge (different coverage)
- The public does not understand that there are differences in coverage for the two networks
- The public find it difficult to understand that the regions are transmitting on different frequencies
- In boundary areas between several DAB regions, you risk choosing the wrong frequency block
- Co-location of transmitters is an advantage in terms of adjacent channel challenges

A wide-angle photograph of a mountain valley. In the foreground, a calm lake reflects the surrounding landscape. The middle ground shows steep, rocky slopes with patches of snow and sparse green vegetation. In the background, a large, rounded mountain peak is partially covered in snow. The sky is bright and clear. Overlaid on the center of the image is the text "A good advice is now coming up:" in a large, bold, cyan font.

**A good advice is
now coming up:**



**Cooperate with
your
competitors!**



We compete with our radio programs – not the distribution techniques. And we have done that since 1995!

The result is 2 very good DAB networks.

Thank you!

