

Nkom Report on 700 MHz project in Norway

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- If 700 MHz band is going to be released for mobile services and no changes is done on the DTT platform, **no** MUX (and TV services) will longer have national coverage
- By switching around frequencies between different MUX, it will be possible to achieve 2 MUX with national coverage
- To obtain higher capacity, it must be performed a much more comprehensive work
 - The project has looked at the consequences of 4 scenarios based on the assumption that DTT has to move out from the 700 MHz band and 1 scenario based on the assumption that DTT continues to use the 700 MHz band after 2021

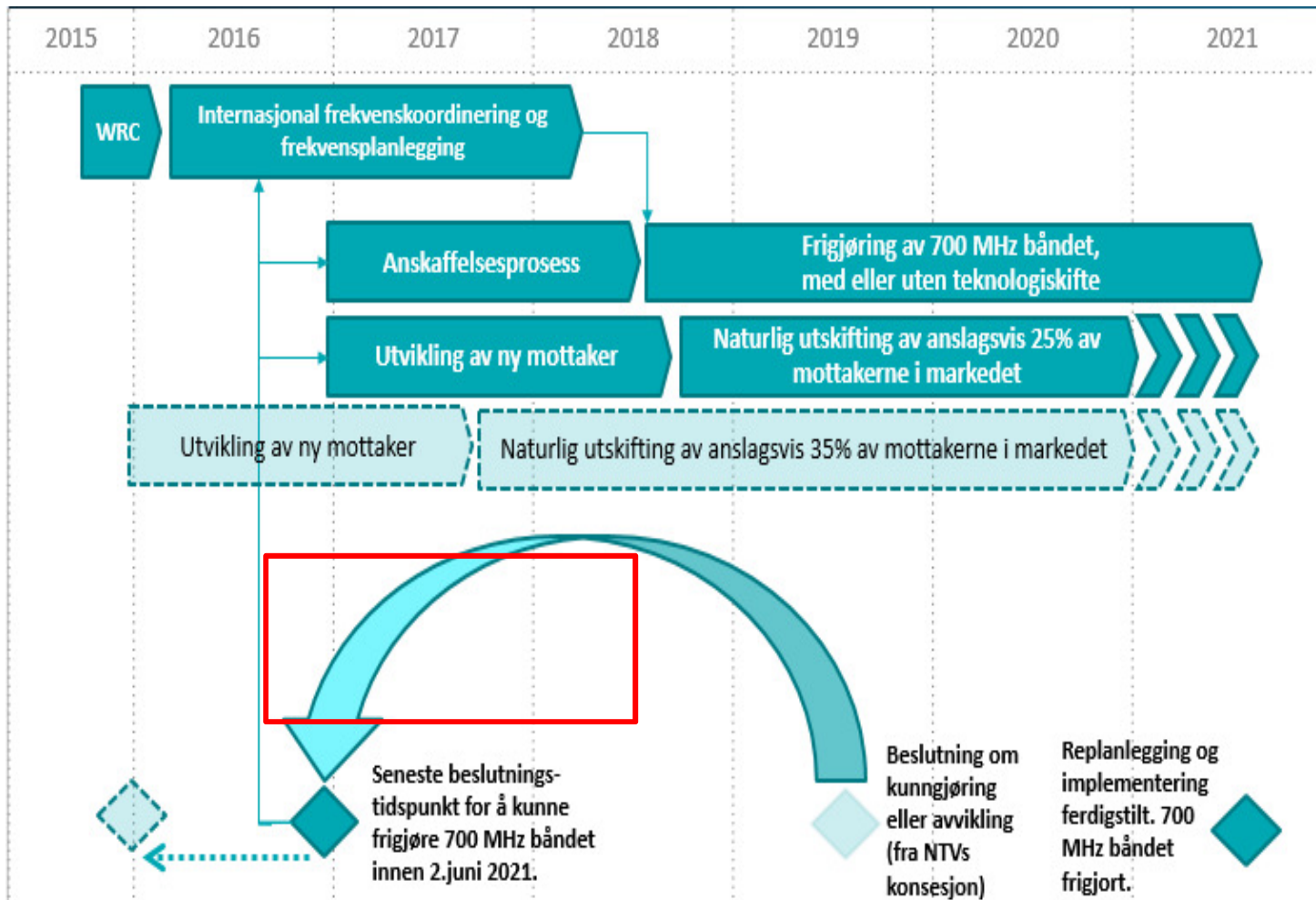
Scenario and Technology	Total capacity	Consequences
<p>Scenario 1: DVB-T og MPEG-4</p> <p>Same technology as today, 700 MHz band still in use (not released).</p>	<p>110 Mbit/s As today</p>	<p>None</p>
<p>Scenario 2: DVB-T and MPEG-4</p> <p>Same technology as today, but release of 700 MHz band.</p> <p>Requires international frequency coordination, re-planning of frequency use and a comprehensive implementation project.</p>	<p>82 Mbit/s. Reduction of 25 % compared with today's DTT platform.</p>	<ul style="list-style-type: none"> - Reduction of existing coverage. In these areas, some end-users may re-establish coverage by changing direction on the antenna. Alternatively, it can be established 10-15 % extra transmitters in order to maintain today's coverage percentage - Coverage may move to other areas - The satellite shadow network increases. Some households can risk to lose 4 MUX and only have 1 MUX left - Reduction of capacity result in reduction in the service provision

Scenario and Technology	Total capacity	Consequences
<p>Scenario 3: DVB-T2 and HEVC</p> <p>New technology and compression standard. Release of 700MHz frequency band.</p>	<p>150 Mbit/s.</p> <p>Increase of 36 % compared with today's DTT platform.</p> <p>The new compression standard HEVC will enable additional improvement in capacity.</p>	<ul style="list-style-type: none"> - The IRDs must be replaced - Reduction/change in today's coverage. In these areas, some end-users may re-establish coverage by change direction on the antenna
<p>Scenario 4: DVB-T2 and HEVC</p> <p>As scenario 3. But in this scenario DTT is assigned with frequencies from the DVB-T frequency block in the VHF band.</p>	<p>175 Mbit/s.</p> <p>Increase of 59 % compared with today's DTT platform.</p> <p>The new compression standard HEVC will enable additional improvement in capacity.</p>	<p>In addition to the consequences described in scenario 3:</p> <ul style="list-style-type: none"> - Expected significant down-time due to additional work with changing the existing antennas on all transmitters - The end-users have to buy a new additional VHF antenna or replace the existing UHF antenna with a combo (VHF and UHF) antenna

Scenario and Technology	Total capacity	Consequences
<p>Scenario 5: LTE Broadcast and HEVC</p> <p>The 700 MHz band is released.</p>	<p>Uncertain.</p> <p>Capacity is dependent the technological properties to a new future technology that is not yet standardised.</p> <p>Scenario is dependent of building a mobile network that offers LTE Broadcast.</p>	<ul style="list-style-type: none"> - IRDs and antennas must be replaced - Reduction/change in today's coverage - Uncertainty in how many base stations that is needed to maintain the same coverage as todays DTT network - May result in fewer information channels in case of emergency situations etc. if DTT shall be dependent of the existing mobile networks (reduced preparedness) compared with today's situation

- It is several limitations with the LTE technology that need to be solved before it can be used for broadcast of TV signals to big TV screens and with national coverage

High level time schedule

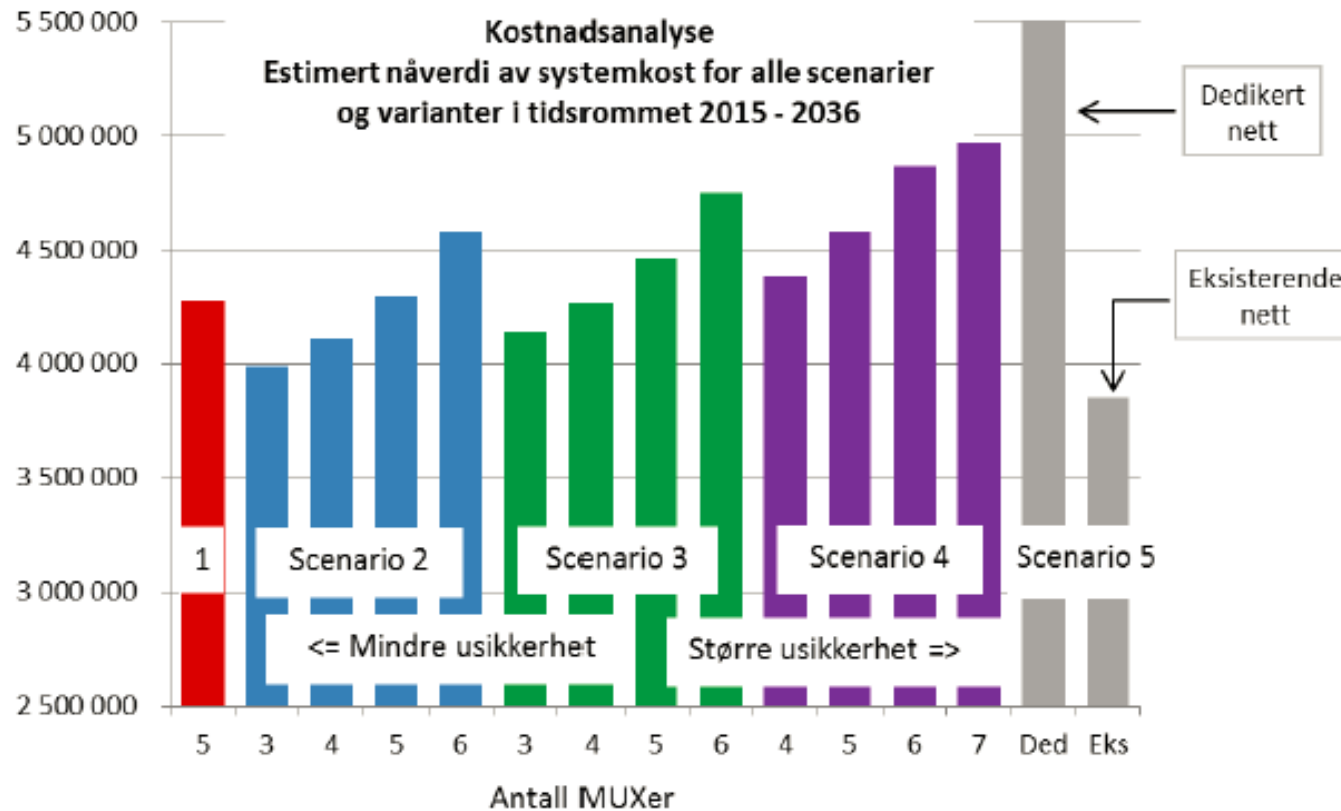


Co-existence between DTT and mobile services in the 700 MHz band

- Risk of interference on the TV signal
- Can be much more extensive than we have experienced so far with the 800 MHz band
 - Difference: The mobile terminals use the lowest frequencies in the 700 MHz band

- Nexia has, on behalf of Nkom, performed a cost analysis of the 5 scenarios
- ...but based on different assumptions and risk, as i. a.
 - Scenario 2 does not include cost for 10 - 15% more DTT transmitters (condensation of the DTT network due to more interference)
 - For scenario 5 it is very uncertain how many LTE basestations that is needed to achieve the same coverage as the DTT network
- it is different assumptions and risk for the 5 scenarios – very unclear described in the report

From Nexia report – cost estimate for the 5 scenarios



Figur 1. Nåverdi estimert systemkost - alle varianter. NOK 000. Vi understreker at de ulike scenariene har ulik kapasitet, dekning og risikoprofil.

- The figure (previous slide) can be interpreted that there is no additional cost to release the 700 MHz band
 - the figures are accumulated cost for the period 2015-2031. Since all figures are very high, it is very difficult to notice differences even though it can be many million NOK difference between the scenarios
- Nexia has i. a. not considered:
 - Profitability of the scenarios
 - If the scenarios is technical and commercial feasible