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MENON ECONOMICS

Future use of the 700 MHz band

Economic analysis

Developed for the Norwegian Communications Authority

February 2017

Executive summary

Radio frequencies in the 700 MHz band are an attractive resource with high value to mobile network operators and society at large. The duplex frequency bands 703-733 MHz and 758-788 MHz are particularly valuable, since these will be supported in mobile broadband network equipment and user terminals in large parts of the world. The main topic of this report is how the duplex frequency bands should be allocated in a way that secures efficient use of the frequency resources and maximizes economic benefit to society. An important part of this discussion is how the special needs of the Public Protection and Disaster Relief (PPDR) sector can be catered for in different scenarios. Based on the analysis presented in this report, we recommend that all 2x30 MHz in the 700 MHz duplex bands are allocated to public mobile services. At the same time, we recommend that regulation is imposed to ensure that the needs of PPDR users can be met in public mobile networks.

The starting point of our analysis is three possible regulatory actions concerning the allocation of the 700 MHz duplex bands. These actions will shape the future of mobile communications in the PPDR sector as shown in Figure 1 below. We further describe four different outcomes regarding how the future mobile communications needs of PPDR users can be met. The four outcomes are compared in a cost-benefit analysis, taking both monetary and non-monetary factors into consideration. The monetary costs are calculated based on the different cost components involved in planning, building and running a solution in each outcome. The most important monetary benefits are auction fees and running frequency fees to the state.

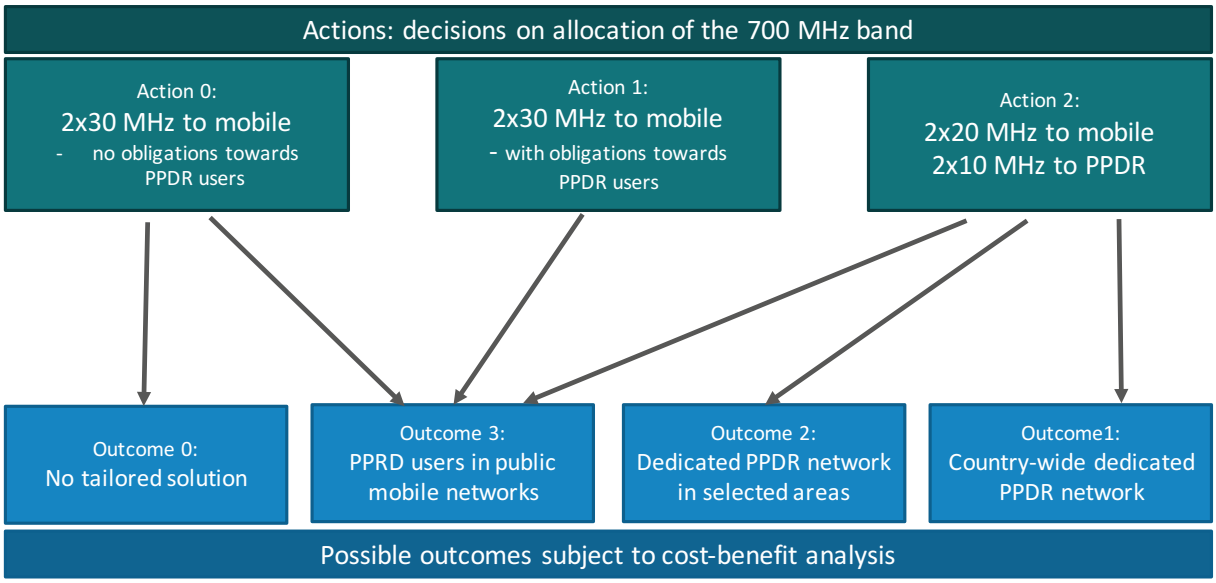

Figure 1. Relationship between actions and possible outcomes

There are large differences in monetary costs between the different outcomes, as shown in Figure 2 below. The figure shows total monetary cost (green bars) and benefits (red bars) over an analysis period of 35 years for each outcome. The net value is shown as cost minus benefit. A country-wide dedicated PPDR network has an estimated net cost of 27.7 billion NOK, while a dedicated network in only selected areas is estimated at 7.9 billion NOK. A solution based on public mobile networks has an estimated cost of 3.5 billion NOK. Outcome 0 (the reference case), without a tailored solution for PPDR users, has an estimated net benefit over the analysis period of 3.3 billion NOK.

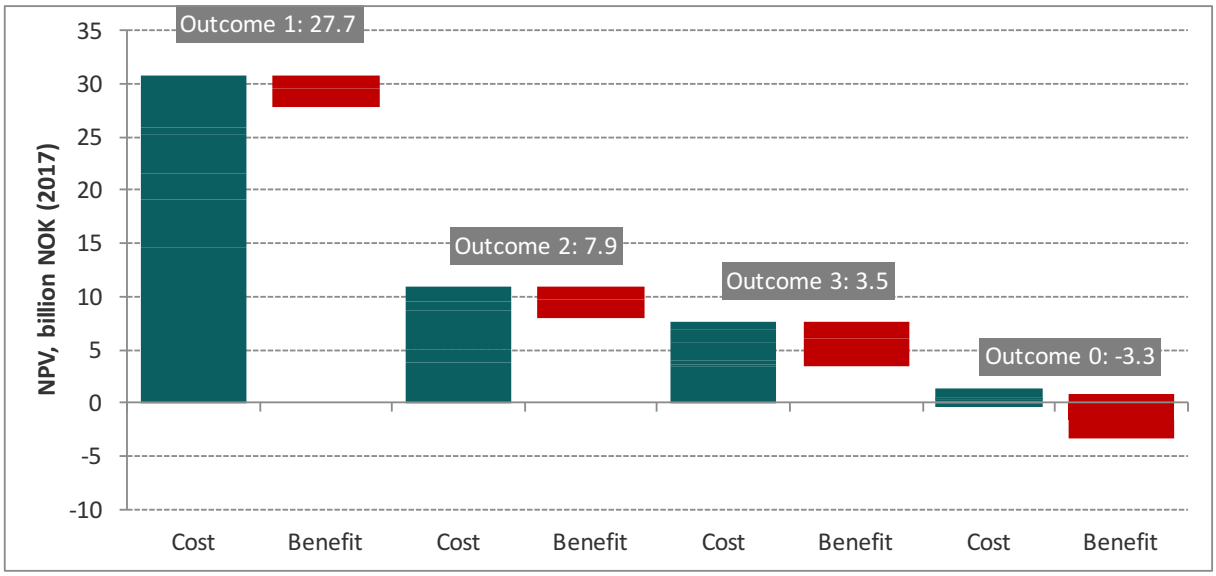

Figure 2. Summary of monetary costs and benefits

The monetary effects must be measured against the non-monetary benefits of the different outcomes. These benefits are tied to the quality of the communications solution for the affected user groups, which in turn enables them to deliver their services more efficiently and with better quality. For each outcome, we evaluate the user benefit against Outcome 0 based on eight quality parameters. The table below shows how each outcome is given a relative score on a scale from -- (clear negative benefit) to ++ (clear positive benefit) for each quality parameter, where score 0 denotes neutral benefit compared to the reference case.

	Coverage	Capacity	Availability	Robustness	Security	Functionality	Future proofing	Usability
Outcome 0	0	0	0	0	0	0	0	0
Outcome 1	+	-	+	++	++	++	--	-
Outcome 2	+	-	+	++	+	++	--	-
Outcome 3	+	0	+	++	+	++	+	-

The evaluation of non-monetary effects show that Outcome 1 through 3 all have benefits that are clearly higher than the reference outcome. The solution based on public mobile networks has the highest benefit, since it gives higher capacity and is more future proof than the solutions based on a dedicated PPDR network. Outcome 3 has a lower monetary cost and also higher non-monetary benefits than Outcome 1 and 2, and will therefore always be preferred over those outcomes. This conclusion is robust even if we change several important cost parameters in favor of Outcome 1 or 2.

The net cost of Outcome 3 is estimated to be around 6.8 billion NOK higher than for Outcome 0 over the analysis period of 35 years. This is a relatively moderate amount, and the annual cost is for example much lower than for the existing Tetra-based PPDR network in Norway. We believe that the added user benefit from having a tailored solution for PPDR users clearly outweighs the difference in monetary cost.

A solution for PPDR users in public mobile networks can be realized in several ways. In the UK, the Home Office will buy PPDR communications as a service from a mobile operator, as the result of a public procurement process. A similar agreement with one or more mobile operators can probably also be implemented in Norway. We still believe that regulatory measures should be imposed so that the mobile operators are obliged to offer the special functions required by PPDR users, if all frequency resources are made available to mobile services. This will ensure that an agreement can be made on reasonable terms. This report takes no position as to how such regulation should be implemented.