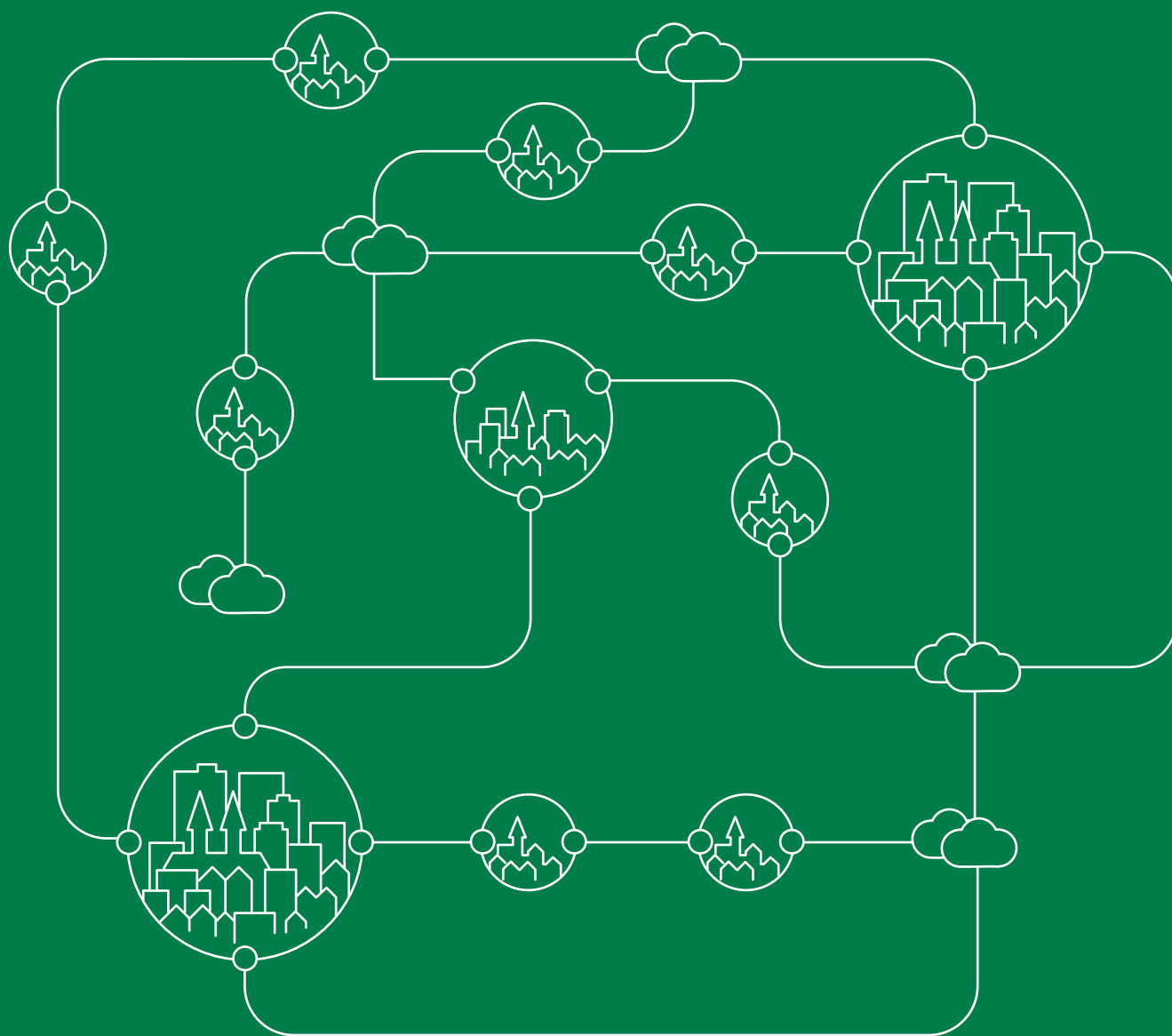


Robust transmission networks for Norway towards 2030

Targets and instruments

January 2022 – Executive summary



Summary

Digitalisation characterises society's development, and the pace of change is very rapid. All residents, businesses, public enterprises and critical functions in society expect access to secure and robust electronic communication networks and services. This enables them to participate in the digital community and take advantage of opportunities for efficiency, innovation, value creation and entertainment.

Norway's digital foundation is solid, with high availability and high quality in a Nordic, European and global context. In the future, the digital foundation will become even more important for the Norwegian society, and for an increasing number of important and critical services.

In Report no. 28 (2020-2021) to the Storting – **Our Common Digital Foundation** the Norwegian government promoted a 'National Strategy for a Secure and Robust Electronic Communications Infrastructure'. The backbone of our common digital foundation is the national, regional and local transmission infrastructure. The security of the digital foundation includes the three dimensions **availability, integrity and confidentiality**. This report focuses on availability and describes targets for resilience, redundancy and diversity in our national transmission infrastructure and connections to abroad.

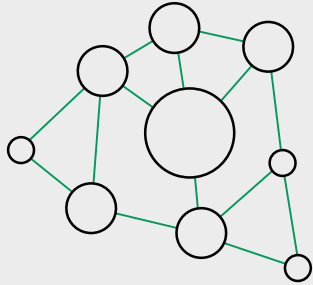
Nkom keeps statistics of incidents in electronic communication networks and services that affect, or have the potential to affect, a large number of end-customers and vital functions in society. Fibre breaches are the most frequent cause of reported incidents. To reduce vulnerabilities and consequences of incidents related to the physical fibre infrastructure, Nkom describes targets related to resilience and redundancy in the transmission networks.

Electronic communication network and services outages are also caused by software or hardware failures, configuration failures or failures of equipment, such as power, cooling and ventilation. To reduce the overall consequences for society of unintended and deliberate failures of systems for the production and operation of transmission services, Nkom also describes diversity-related targets based on autonomous and independent transmission networks.

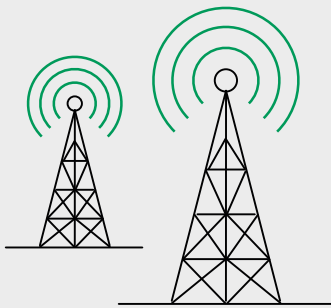
The report presents a total of four targets for the transmission infrastructure within Norway and out of Norway, see Figure S.1, page 4. The targets will contribute to safeguard the needs of society in normal conditions and during times of crisis. In addition, the targets will facilitate increased competition in the market, business development and innovation.

Targets for robust national transmission networks

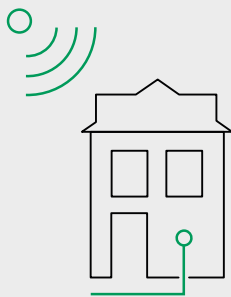
Figure S.1



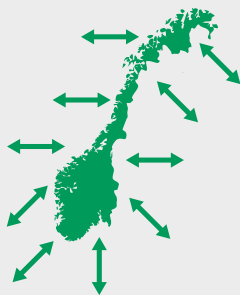
Robust transmission networks throughout the country



Collectively, commercial mobile operators use several autonomous transmission networks

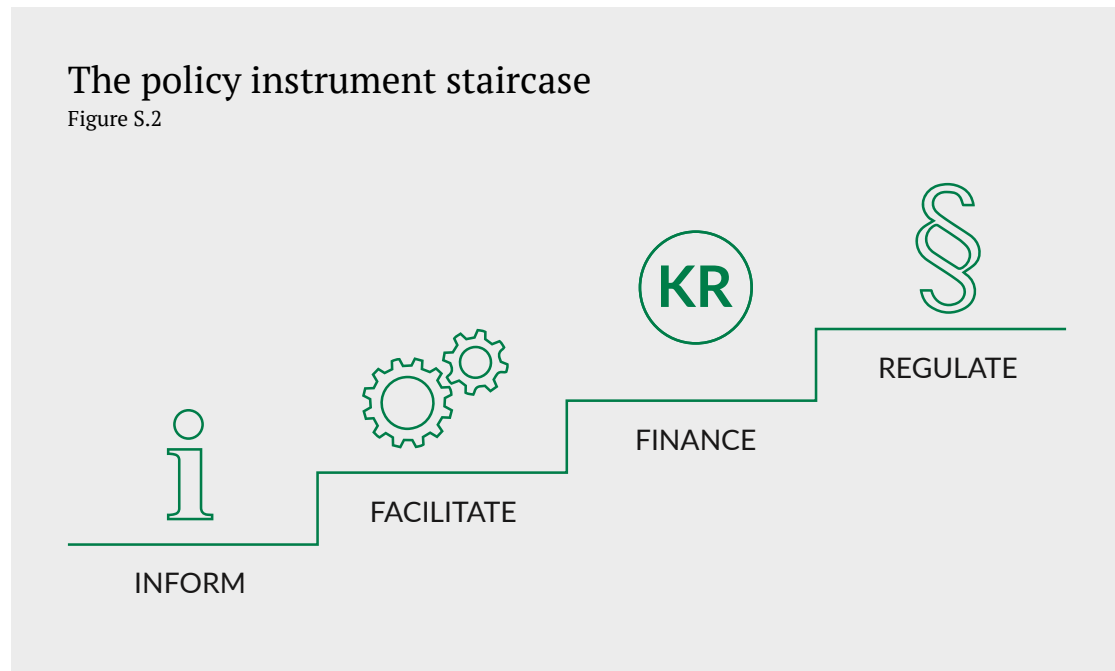


Households and businesses are offered at least two independent broadband connections



Norway has good coverage of high-capacity connections to several countries and from all regions of Norway

The targets describe different goals Nkom will work towards. Achieving the targets will be influenced by a number of conditions, such as market and technological development, the regulatory development, government-funded measures and other policy conditions. Within these conditions, Nkom will contribute to achieve the targets using various instruments; see the instrument staircase in Figure S.2.

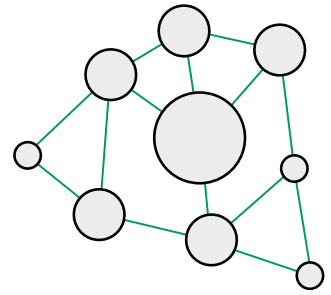


More about the targets, current status and development path

The targets are defined by Nkom on the basis of the National Strategy for a Secure and Robust Electronic Communications Infrastructure, as well as internal and external analyses and input from key players in the electronic communications market. Nkom has estimated the current status (2021) compared to the targets, and also estimated a development path towards 2025 and 2030, respectively, based on the expected market development, framework conditions and use of instruments from Nkom and other authorities. Estimated achievement of the targets is stated as a percentage and with a colour code. The colour code indicates the estimated gap in relation to the target for 2030.

TARGET 1:

Robust transmission networks throughout Norway



The target describes a state with a good coverage of transmission services with high availability throughout Norway. This means that each transmission network has good redundancy, is technically and operationally independent of other transmission networks (autonomous), and uses physical separate paths from other transmission networks.

1A

Several physically separated paths for transmission networks to densely populated areas

- There are several physically separated paths for transmission networks to densely populated areas in Norway, and these terminate in at least two physically separated transmission hubs in the densely populated area.
- Between densely populated areas with more than 60,000 inhabitants, as well as Bodø and Tromsø, there are at least four physically separated paths.
- Between densely populated areas with 10,000 - 60,000 inhabitants there are at least three physically separated paths.
- Between densely populated areas with 200 - 10,000 inhabitants there are at least two physically separated paths.

The target will ensure that communication to and between densely populated areas is maintained if one or more simultaneous transmission breaches occur, or in the event of the loss of one transmission hub.

1B

Each transmission network has well-developed redundancy

- Between the densely populated areas in Norway transmission network providers offer redundancy in their own networks.
- Between densely populated areas with more than 60,000 inhabitants, as well as Bodø and Tromsø, each provider offers redundancy across at least three physically separated paths.
- Between densely populated areas with 200 - 60,000 inhabitants, each provider offers redundancy across at least two physically separated paths.

The target will ensure that, in the event of one or more simultaneous transmission breaches in their respective networks, the transmission services of each provider can be maintained to all densely populated areas in Norway.

1C

Several autonomous nationwide transmission networks

- There are at least three autonomous nationwide transmission networks in Norway, which as a minimum cover all densely populated areas with more than 10,000 inhabitants.
- Densely populated areas with 200 -10,000 inhabitants are covered by at least two autonomous nationwide transmission networks.

The target will ensure that users in different locations in the country have the opportunity to choose from several autonomous nationwide networks.

Estimated development path for target 1

Table S.1

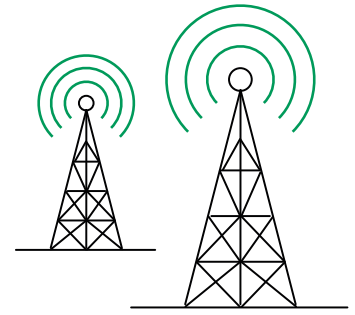


The estimated percentage achievement level for 2021 is uncertain.

Achievement of the target will primarily depend on increased **demand** as a consequence of more digitalisation and growth in the districts. Nkom will also contribute by **informing** the demand side, such as promoting the importance of safety on purchasing electronic communications services. Nkom also **facilitates** through regional vulnerability analyses, among other things. It may also be relevant to finance via government-funded reinforcement programmes and/or to **regulate** by, for example, setting more detailed requirements on the level of redundancy in the transmission networks.

TARGET 2:

Collectively, commercial mobile operators use several autonomous transmission networks



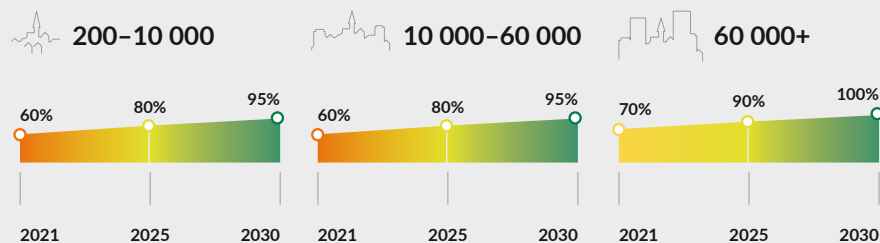
The target will ensure that outage of one transmission network in an area does not lead to simultaneous outage of all mobile networks in the area.

Mobile operators use several autonomous transmission networks

- For all densely populated areas with more than 10,000 inhabitants the mobile operators in total use at least three autonomous transmission networks.
- For all densely populated areas with 200 - 10,000 inhabitants the mobile operators in total use at least two autonomous transmission networks.

Estimated development path for target 2

Table S.2



The estimated percentage achievement level for 2021 is uncertain.

For the target to be achieved, there must be a good coverage of transmission networks throughout the country. The instruments to achieve target 1 therefore indirectly facilitate the achievement of target 2. **The demand side** may influence mobile operators to “pull in the direction” of target 2. The electronic communications authority will then play an important role in providing objective **information** and **guidance** to the demand side. The electronic communications authority otherwise has little opportunity to influence the mobile operators’ choice of transmission providers in order to achieve the target, since this would represent deep intervention in the strategic and commercial aspects of the operators’ business and operations.



TARGET 3:

Households and businesses are offered at least two independent broadband connections

The target will ensure that households and businesses are offered at least two independent broadband connections with sufficiently high capacity to meet current and future service needs.

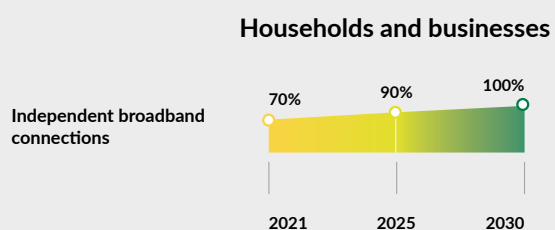
Two independent broadband connections to households and businesses

- All households and businesses are offered at least two independent broadband connections

Estimated development path for target 3

Table S.3

The estimated percentage achievement level for 2021 is uncertain.



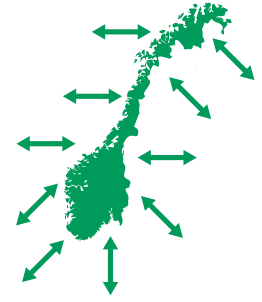
A condition for offering households and businesses at least two independent broadband connections is that there is good transmission network coverage throughout the country. The instruments to achieve target 1 therefore indirectly facilitate the achievement of target 3. **The demand** for broadband and independent connections will have an impact on the achievement of the target.

Nkom provides **information** and **guidance** to municipalities, the County Governor, and other public and private enterprises concerning risks associated with the use of electronic communication. Nkom will also be able to provide **information** and **guidance** to end users on the importance of independent broadband connections all the way to households and businesses. Furthermore, Nkom has established the electronic communications portal (Ekompportalen) to facilitate more cost-effective development of high-speed broadband.

The public authorities contribute to the **financing** of development through the broadband development support scheme. In addition, the Norwegian Ministry of Local Government and Regional Development (KDD) has proposed the introduction of a procurement scheme to ensure functional access to the Internet and telephone service for households and businesses that lack such services. The Ministry has also proposed a new legal basis for the introduction of an obligation to deliver a certain broadband speed. Any such delivery obligation, together with any procurement scheme, will constitute **regulation** that can contribute to achieving target 3.

TARGET 4:

Norway has a good coverage of high-capacity connections to several countries and from all regions of Norway



The target will ensure that Norway has a good coverage of high-capacity connections with low latency towards several countries and from all regions. In addition, the target will ensure that the traffic between Norway and abroad is spread across these connections.

4A

High-capacity connections with low latency from all regions towards several countries and continents

The following have been established:

- High-capacity connections from Norway to Finland, Sweden, Denmark, the British Isles, North America and Asia, with capacity and low latency adapted to the need for capacity-intensive digital services, such as data centres.
- Connections abroad from all regions.
- High-capacity connections with low latency between regions.

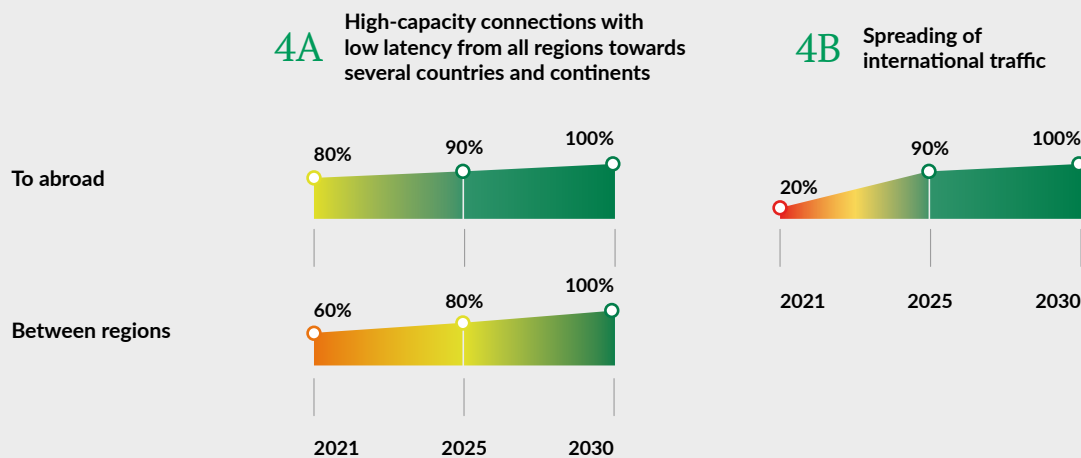
4B

Spreading of international traffic

The general international data, Internet and telephony traffic between Norway and abroad is spread across different connections to abroad and from different regions of Norway. The Norwegian providers have facilitated the re-routing of traffic on alternative connections in the event of breach or a need for the closure of an international connection.

Estimated development path for target 4

Table S.4



The estimated percentage achievement level for 2021 is uncertain.

The development and establishment of new high-capacity connections between Norway and abroad has essentially been driven by the Norwegian data centre industry. The government's data centre strategy from 2021 envisages continued market-driven development of new connections between regions, and between Norway and abroad. Through industry dialogue, Nkom will continuously assess how the electronic communications authority can best provide **information** and **guidance** that contribute to strengthening the 'digital highways' within Norway and abroad.

Telia Carrier has received public funding to spread the routing of international traffic between Norway and abroad across multiple connections. The funding has contributed to the **financing** of a new international connection between Kristiansand and Denmark.

In terms of **regulation**, the draft new Norwegian Electronic Communications Act contains proposals for the authority to draw up a regulation to ensure that traffic is carried on several cabling routes both nationally and out of the country, called redundant cabling routes. Furthermore, the current data centre strategy envisages more active regulation of security in the data centre industry, through, among other things, the Norwegian Electronic Communications Act.



Address for visitors: Nygård 1, Lillesand, Norway

Postal address: Postbox 93, NO-4791 Lillesand

Tel. no.: (+47) 22 82 46 00

nkom.no