

Focus on eHealth services:

Healthcare providers and businesses describe the importance of dark fibre networks for meeting future health and social care needs

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STOKAB

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1. Summary

This report has been produced by Provins for Stokab, the City of Stockholm's IT infrastructure company. Stokab's task is to provide a competition-neutral dark fibre infrastructure in the Stockholm region.

In this report, healthcare providers and businesses describe that access to dark fibre networks, especially when provided by an operator-neutral market actor that is active only at the wholesale level, is an important prerequisite for developing new eHealth services. A summary of the interviews follows, interspersed with quotations from a selection of the respondents:

New eHealth services are essential for the welfare society of tomorrow

E-health is going to play an increasingly important role in meeting the challenges ahead for the welfare society of tomorrow, in which an ageing population dramatically increases health and social care needs – and thus costs. In addition, it is becoming increasingly difficult to recruit healthcare professionals in the field of highly specialised care – which also entails new technical requirements.

"We are facing a major societal challenge in the form of an ageing population, at the same time as it is becoming increasingly difficult to recruit healthcare and social care staff. We must find smarter ways to work, where a simpler connection of eHealth services can generate large savings in health and social care."

Karin Bengtsson, process manager, Storsthlm[1]

The ongoing rapid development of new eHealth services will be critically important in this regard. E-health services improve the quality of care as well as quality of life for patients, while providing more care alternatives to healthcare providers. They can also generate huge savings in healthcare – approximately SEK 130 billion in the Swedish healthcare system alone.[2]

However, eHealth services also create a greater need for reliable, stable connections with high security and low latency. In this regard, a fibre-based competition-neutral IT infrastructure has been shown to be the most future-proof alternative. And although various eHealth services currently have different connection requirements, we should already be focusing on ensuring delivery of all aspects of future applications.

"We need to be able to offer more eHealth services in the home to improve the quality of care delivery, for patients as well as for healthcare staff. We have observed a great need for connections that can prioritise these welfare services with a guaranteed bandwidth and reliability. The access to open municipal networks in the Stockholm region simplifies the connection of additional eHealth services."

Susanne Bayard, CIO, Stockholm County health care area

Digital health and social care services are currently driving the expansion of the fibre network, a network which is also laying the ground for 5G, the next generation mobile network.

[1] Storsthlm is the new name for the Association of Local Authorities County of Stockholm (Sw. Kommunförbundet Stockholms Län, (KSL)) - a non-profit organisation formed by the 26 municipalities of Greater Stockholm. The aim is inter alia to support and develop the participating municipalities through collaboration. More information at: http://www.storsthlm.se/

[2] Värdet av digital teknik i den svenska vården (Eng. The value of digital technology in Swedish healthcare), McKinsey, June 2016

Openness is central to the connection of new eHealth services that need to interact through multiple layers, from the active equipment to the actual services. This creates neutral platforms where healthcare providers can procure eHealth services from a wide variety of suppliers and create solutions that are both scalable and open in order to exchange information with each other. This openness should exist through all layers, from connection via active equipment to the services themselves. This highlights the need for a fibre infrastructure but also that it should be delivered by an operator that is active only at the lowest (wholesale) level – all the way into people's homes.

"Fibre to households is the best alternative for fixed connections and for certain types of demanding eHealth services. In order to ensure high reliability, capacity and security for the connection to eHealth services, there are now some examples where one fibre in every household is dedicated exclusively to these types of services. Digital health and social care services are going to drive the expansion of the fibre network, regardless of whether you are connected through the mobile or fixed broadband."

Håkan Cavenius, co-author of the report "E-hälsolösningars krav på uppkoppling" (Eng. Connection requirements for eHealth solutions)

Businesses that develop, run and use eHealth services are already aware of the need for a fibre-based, competition-neutral IT infrastructure. Without access to dark fibre on equal terms, they would not be able to maintain the same high rate of development and growth. When there is also an operator-neutral market actor, that is active only at the wholesale level, and offers a ready-to-use fibre infrastructure, it puts businesses in a better economic position to develop their own businesses and technical solutions.

"Stokab's base structure of private and robust networks between our data centres is business critical. We would not be able to develop our operations without access to dark fibre. If we were to try something similar over the internet, it would require more comprehensive security solutions and we would lose the guaranteed bandwidth that the current solution provides."

Patrik Dahlman, founder of NOGUI

Fibre also provides virtually unlimited, dedicated bandwidth to the growing field of image-based and video-based eHealth services. At the same time, it can meet the extremely high demands for security and access that apply to health and social care.

"Thanks to access to dark fibre, we can scale up the speed at any time without involving other parties. The advantages of dark fibre are high performance and reliability. Dark fibre gives us full control over which information that is transmitted through the network at a level few others can offer. Dark fibre makes us independent of suppliers' choices of technology. We don't have to adjust to them and can switch technologies when we are ready. The best thing for us would be if there was dark fibre everywhere equivalent to that found in Stockholm."

Bengt Bergholm, Head of IT, Praktikertjänst Röntgen

These businesses are also evidence of a massively growing sector that is creating new opportunities and opening markets for more high-growth companies – throughout Europe.

2. Introduction

The fibre infrastructure in Stockholm is well built out and accessible for households as well as businesses and public operations. Stokab, the City of Stockholm's fibre infrastructure company, is continuously building out this fibre network – with zero public funding and on market terms. The open fibre network has made it possible, for example, for four different 4G operators to deliver their services throughout Stockholm. The expansion of 5G on the same stable foundation is currently in planning.

Nearly 100 percent of the businesses and more than 90 percent of the households in Stockholm have the possibility to be connected to Stokab's operator-neutral fibre network. And this is a network that enables delivery of ultrafast broadband – speeds of 1 Gbit or faster.

A dual fibre connection to households/apartments paves the way for competition and new, innovative services where several different service providers can deliver services to properties as well as households and businesses on equal terms. It also enables services where the communication must be dedicated and reliable, such as the remote healthcare of the future, including features such as streaming video.

On behalf of Stokab, Provins has interviewed healthcare providers and businesses to have them describe their view on the need for dark fibre networks and the role that access to such networks plays in the development of eHealth services.

3. Fibre networks essential to connecting eHealth services

Demands on household connections are increasing as new technology provides opportunities to deliver health and social care in the home. A report “E-hälsolösningars krav på uppkoppling” (Eng. Connection requirements for eHealth solutions), investigates the need for eHealth solutions among people including those with multiple health conditions and elderly people, and shows how important fibre networks are becoming to the digital health and social care of the future.

The entire western world is currently experiencing a dramatic increase in the costs of health and social care. As our lifespans increase, so do our needs for care. The solutions include continued expansion of opportunities to deliver care in the home through new technology. It has been estimated that a widespread deployment of more eHealth services could save up to SEK 130 billion in the Swedish healthcare system[3].

- New eHealth services can improve people’s quality of life and enhance personal privacy and autonomy, for example by allowing older people to choose digital night-time monitoring instead of visits by health workers, says Karin Bengtsson, process manager, the Association of Local Authorities Storsthlm.

- We are facing a major societal challenge in the form of an ageing population, at the same time as it is becoming increasingly difficult to recruit healthcare and social care staff. We must find smarter ways to work, where a simpler connection of eHealth services can generate large savings in health and social care. The Association of Local Authorities Storsthlm has together with SLL[4] commissioned RISE[5], the Research Institutes of Sweden, to study the connection requirements for the new technologies.

- We need to be able to offer more eHealth services in the home to improve the quality of care delivery, for patients as well as healthcare staff. We have observed a great need for connections that can prioritise these welfare services with a guaranteed bandwidth and reliability. Access to open municipal networks in the Stockholm region simplifies the connection of additional eHealth services,” says Susanne Bayard, CIO, Stockholm County health care area.

Future-proof fibre networks

The report “E-hälsolösningars krav på uppkoppling” (Eng. Connection requirements for eHealth solutions) was based on the care needs of three selected patient groups: people with diabetes, people with depression and people with multiple health conditions. The groups were selected based on a collaborative project among the three metropolitan regions of Stockholm, Göteborg and Malmö, which represent nearly half of the Swedish population. These patient groups were also assumed to have very different requirements for their internet connections in terms of

[3] Värdet av digital teknik i den svenska vården (Eng. The value of digital technology in Swedish healthcare), McKinsey, June 2016

[4] Stockholm County Council (Sw. Stockholm Läns Landsting (SLL)) is responsible for that all inhabitants in the County receive the healthcare and dental care they need. The operations comprise everything from healthcare and health enhancing work to research and development. The number of children and elderly are increasing more rapidly than other age-groups in the Stockholm County Council. Combined with the fact that the lifespan of the inhabitants continues to increase, this puts high demands on the healthcare. To read more about the future healthcare and welfare: http://www.sll.se/verksamhet/halsa-och-vard/framtidsplanen/

[5] RISE, Research Institutes of Sweden, is the Swedish research- and innovation partner for the industry and for society. RISE is located in several places in Sweden and in Europe, and provides a broad spectrum of excellences, research- and innovation services and cross-border business areas for industry, academy and the public sector. The aim is to contribute to increased competitiveness and a sustainable social development. More information: www.ri.se

security and reliability.

- When we compared the needs in detail, we discovered that the differences were actually not that big. Sure, there are exceptions, such as when hospitals want to transmit radiological images in 3D, but otherwise there are surprisingly few differences, says Håkan Cavenius, a co-author of the report.

The basic requirements that must be met to connect eHealth services include good coverage, high quality and high reliability. That applies regardless of whether the users live in cities, small towns or rural areas.

- But instead of focusing on finding different models for the different groups,it is better to set our sights on future applications as well, says Håkan Cavenius.

- Fibre to households is the best alternative for fixed connections and for certain types of demanding eHealth services. In order to ensure high reliability, capacity and security for the connection to eHealth services, there are now some examples where one fibre in every household is dedicated exclusively to these types of services.

Fibre-connected homes meet the requirements

Cavenius emphasises that the authors of the report are technology-agnostic and the report illustrates a range of solutions for each eHealth service and patient group based on both fixed and wireless technologies – but there is no getting around the importance of fibre networks.

- Fibre is the most future-proof alternative we have. Meanwhile, mobile networks are a logical complement to fibre, especially for applications that demand high mobility outside the home or the healthcare facility," says Håkan Cavenius.

Most eHealth services require a connection with high bandwidth, good reliability and low latency. High bandwidth is needed for video services of various kinds, for example, while low latency is essential to alarms and various sensors. These requirements are already met in fibre-connected households. Outside the home, the hope is that the next-generation 5G mobile network can achieve a level of service comparable to fibre.

- As new wireless technologies emerge, with higher bandwidth and lower latency, the need for a more expansive fibre network to connect the base stations also increases, says Håkan Cavenius.

The fibre network is an indispensable foundation for the mobile networks, especially for the development of the next-generation network.

- Digital health and social care services are going to drive the expansion of the fibre network, regardless of whether you are connected through a mobile or fixed broadband.

Open solutions are important

Openness is a key aspect of the development, according to the report. Different technical solutions must be able to co-exist on the same connection, but also share information, something that is currently limited by legal and organisational barriers, for example. It would be desirable, for instance, if the County Councils healthcare operations could share the connection and certain equipment with municipal social care operations, something which is not happening today. The openness is needed to prevent eHealth solutions from being isolated from each other instead of interacting on a shared platform. This openness should exist through all layers, from connection via active equipment to the services themselves.

At present, multiple, concurrent eHealth services means that the home is also cluttered up with several sets of connections, gateways and other equipment. For example, many personal alarms in use today rely on the GSM network, which creates a “silo” with obvious limitations, as well as an access technology that we can eventually expect to phase out, according to Cavenius.

- We need, he says, a route to coordination, perhaps via a new government agency role that can ensure that the services can share information in a secure and reliable way.

Cavenius stresses that the connection is only a small link in the chain necessary for the successful expansion of an effective digital health and social care system.

- There are several key issues that have to be resolved here, including changes in the working methods of healthcare and a new approach on the part of healthcare providers, patients and families. Above all, enhanced cooperation is critical to creating effective working methods for providing health and social care in the future, says Håkan Cavenius.

- We need to achieve better resource allocation and cooperation in the field. At present, mechanisms for doing this are lacking in many respects.

Two interviews with representatives of businesses in the healthcare sector follow. They describe the importance of access to dark fibre networks to their growth and development potential.

4. Development of pioneering eHealth services requires the security and bandwidth of fibre

NOGUI is at the absolute forefront of development of new eHealth services. They manage server and application operation and are developing the biggest eHealth service in Sweden, with more than four million connected Swedes.

- We have the largest eHealth service platform in the Nordics, with four data centres in Stockholm, all interconnected via dark fibre from Stokab, says Patrik Dahlman, founder of NOGUI.

- Right now, we have 40 gigabits between our data centres, which means that our own equipment is the source of any limitations we experience. You cannot get comparable guaranteed bandwidth from an internet service provider. All other alternatives would be much more costly. Stokab's base structure of private and robust networks between our data centres is business critical.

Highest standards for security and operation

NOGUI specialises in application operation and server operation for e-services in health and social care on a national basis. They have developed a private cloud service that extends across several different data centres.

- We maintain and administer hundreds of different servers and applications. We make sure they work 24/7. Healthcare is a challenging sector, with the absolutely highest standards for security and operation, he relates.

- While other sectors might cut quality corners, that is not an option in healthcare. The systems must be accessible around the clock, every single day of the year.

Meanwhile, the eHealth services sector is undergoing strong growth.

- The sector grows increasingly, both regionally and nationally. There are also a large number of private businesses eager to enter the market, which is a further catalyst for the county councils. Even though NOGUI is an business with few employees, the company is responsible for operating and developing one of the biggest eHealth services in Sweden, covering about four million Swedes and 150,000 care providers.

- Our strength is that we offer a highly automated platform that makes it possible to maintain high efficiency and short delivery times.

A new eHealth service was launched in the autumn that was built directly on NOGUI's robust platform. The app, called Healy, links the digital and physical chains of healthcare. Healy is run by Aleris X AB, which is owned by Aleris, the third-largest private healthcare company in Scandinavia.

Patients use the Healy app to see their doctors remotely for a diagnosis and treatment advice. The

unique aspect of Healy is that the virtual appointment can result in a physical doctor's appointment for further testing and treatment. This is all possible thanks to that the app can link the patient to an entire chain of healthcare, including labs, specialists and emergency clinics. The gains for the healthcare system include faster management and shorter waiting times for patients.

- Healy is among the first to use our platform, where we can scale up the service in seconds if necessary, with no downtime. It is an ultra-modern platform and we are on the forefront in Sweden in this regard, says Dahlman.

Fibre provides guaranteed bandwidth

The Stockholm region offers great opportunities to build up additional similar chains of care, thanks to the access to medical testing services and other clinics. There is also ample access to the robust infrastructure required for the eHealth services to grow and develop.

- We would not be able to develop this without access to dark fibre. If we were to try something similar over the internet, it would require more comprehensive security solutions and we would lose the guaranteed bandwidth that the current solution provides, says Patrik Dahlman.

The next step for NOGUI is additional data centres in more locations in Europe.

- We have customers that want us to set up data centres in France and the UK as well. The reason for this is that, by law, the information has to stay in each country.

5. Fibre networks provide full control over security and access

Praktikertjänst Röntgen is one of the largest private providers of radiology services in Sweden, which performs more than 350,000 examinations per year. The high-resolution radiological images are collected and processed in a central data centre in Stockholm that is connected with dark fibre from Stokab.

- Since we handle high-resolution radiological images in stacks of several gigabytes apiece, every department needs high-speed access to our data centre. Thanks to the access to dark fibre, we can scale up the speed at any time without involving other parties, says Bengt Bergholm, Head of IT, Praktikertjänst Röntgen.

The departments in Stockholm are all connected with dark fibre from Stokab.

- The advantages of dark fibre are high performance and reliability. Stokab's contract- and service organisation mean that we can trust that the connections will be accessible when we need them, says Bengt Bergholm.

Extra security with dark fibre

The radiological images taken at the company's clinics all over Sweden are sent to the data centre in Stockholm for processing and storage, where they are subsequently available for review by attending doctors. The digital platform also makes it easy for the doctors to consult other specialists if needed.

Constant access is critical to the businesses, of course. And so is extremely high security, according to Bengt Bergholm.

- We are dealing with sensitive personal data about the health conditions of individuals, which requires us to follow special laws and regulations. It is imperative that no one else can gain access to the data, and because we use dark fibre, we feel much more secure in that this will not happen, he says.

He believes dark fibre gives them full control over the information that is transmitted through the networks at a level few others can offer.

- We have greater control over our network than we would have if we had purchased this as a service, Bengt Bergholm explains.

Nothing but fibre offers equal efficiency

In other connections, all transmissions are encrypted, but using anything other than fibre for connection to the data centre is out of the question.

- Nothing else would provide the same efficiency, but would cost more and would be more complicated. Which in turn would make our services more expensive for the county councils, says Bengt Bergholm.

- Dark fibre makes us independent of suppliers' choices of technology. We don't have to adjust to them and can switch technologies when we are ready. The best thing for us would be if there

was dark fibre everywhere equivalent to that found in Stockholm.

He explains that another advantage of Stokab’s dark fibre is that the infrastructure is shared with others.

- We are allocated our own fibre pair in a shared cable. This makes the connection more economical compared to putting your own fibre cable into the ground or using a smaller operator.



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