Theme: 5G
Talk is cheap, but data is golden

In the future, 5G will connect 6-7 billion people and exponentially more devices in different networks. This technology will improve conditions for innovations in communication, education, health care, automation, connected cars, intelligent transport, security, productivity, gaming, entertainment, operational control and much more. Large-scale investments and increased productivity can boost the potential for economic growth.

In the 5G communication of the future, subscribers will always be connected. Large quantities of data – distributed quickly, securely and with energy efficiency – will lay the groundwork for new services, reduced resource use and higher profitability. Via their own networks, companies will be able to use data with the help of sensors and software to create self-regulating systems that respond to deviations; whatever can be measured can also be controlled. In order for this information to be available wherever and whenever needed, 5G will be integrated with cloud services, creating two-way communication between data from connected devices and companies' IT systems. More and more computing power will be moved to connected devices in order to reduce complexity, and with cloud services software can be updated and new functions added on a continuous basis.

There has been a technological leap every ten years

The big difference between 5G (short for fifth generation wireless technology) and 4G is expectations about the emergence of a business-to-business (B2B) market related to the connectivity of physical objects and processes in networks. We have previously written in *Investment Outlook* (November 2020) about how the fourth industrial revolution is expected to develop around connected networks. Suppliers, customers, manufacturing equipment and processes will be connected via mobile systems, which will provide opportunities for more proactive decisions, better quality, increased automation and more flexibility. We have described how health care will be improved by new connected technology enabling remote diagnosis and treatment (*Investment Outlook*, May 2021) as well as how digital education will grow rapidly as more and more people gain access to flexible broadband connections (*Investment Outlook*, September 2021).

Technological improvements mean shorter response times, broader use of frequency bands and more devices that can be connected at lower cost. Together with advances in multi-antenna technology with more transmitters and receivers, this creates a more robust network – which means that connections based on WiFi and cable will disappear. In the table below, we provide an overview of how mobile networks have developed over the past 30 years and the difference between 4G and 5G, as well as how application areas have changed.

Network capacity in mobile networks has grown dramatically since the early 1980s, when the first generation of mobile phone services enabled speech without using landline networks. In the 1990s, the texting function was introduced in 2G, along with limited data transfer. Mobile internet appeared with the advent of 3G. When 4G was established, it enabled innovations for consumers such as the app economy, e-commerce by mobile phone and streaming. This facilitated the expansion of global services from such companies as Amazon, Facebook, Uber and Netflix.

Opening the way for critical communication and differentiation

The 5G standard is up to 100 times faster than 4G and can connect to 100 times more devices. Its radio signals have wider bandwidth, more data content and faster response time. The system can be used in more frequency bands. That means its application will be expanded to include critical (emergency service) communication. A quick response time – latency – enables new technology areas for mobile networks such as private networks in manufacturing and automation solutions. For telecom operators, it will enable increased differentiation of services, with ultra-high frequency bands in metropolitan areas that provide high speed and capacity, requiring many times more base stations, combined with lower frequency bands for wider coverage is less densely populated areas with a smaller number of base stations.

International standard

Network functions are being developed through an international cooperative organisation for common specifications and protocols, the 3rd Generation Partnership Project (3GPP), which specifies a standard that developers use. This covers radio communication, reliability and response times as well as energy consumption and mitigation

Technological advances in mobile networks

Mobile generation	2G	3G	4G	5G	CAGR*
Year	1990	2000	2010	2020	1990-2020
Applications	Calls, texts	Mobile internet	App economy	Industry 4.0, IoT	Yearly change
Highest data traffic (bits/second)	10 Kbps	2 Mbps	300 Mbps	20Gbps	62%
Bandwidth efficiency (bits/sec/hertz/cell)	0.04	0.12	2.6	7.0	19%
Response time for signal to and from, milliseconds (latency)		100 ms	8 ms	2 ms	22%
Energy use, capacity utilisation	100%	100%	28%	1.4%	-13%

* Compound annual growth rate
Source: Ericsson

of disruption risks. Standards for machine learning and augmented reality/virtual reality (AR/VR) are also being developed by the organisation. Combined with cloud services, 5G technology is expected to facilitate innovations at companies and improve the potential for new services.

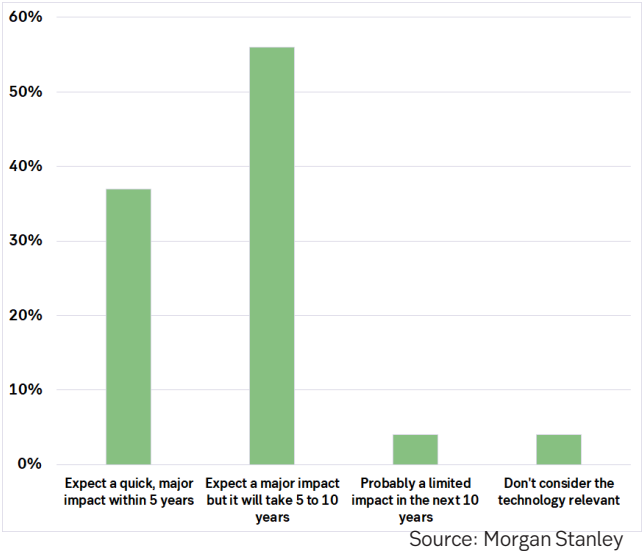
Tripling the number of fixed broadband subscribers by 2026
With 5G, consumers will notice increasingly fast connections, shorter delays, larger volumes of data and improved service experiences. Creating new services for private individuals will largely be determined by how companies use the new technology to create innovations in computer gaming, sport on TV or on mobile phones, e-commerce, financial services, health care, driving and more. Access to fast broadband will increase for many households. Today there are roughly 60 million fixed broadband connections via 4G and 5G. By 2026 it is estimated that the number may triple to more than 180 million, with 5G expected to account for 40 per cent of the total. Fixed wireless broadband communication is expected to have a 12 per cent global market share of households in 2026. Assuming 3-5 people in each household, this means around 650 million people are expected to have access to a wireless broadband connection within 5 years.

5G is the technology that will affect manufacturers' business models and operations the most
The Internet of Things – IoT – is a system of smart devices and sensors connected in a network through mobile systems. The business case for this may be higher internal efficiency and a better customer experience. The investment bank Morgan Stanley recently conducted a study on the expected impact of new technology by sending a survey to 28 global companies in the automotive, aviation, chemistry, manufacturing, mechanical engineering and pharmaceutical sectors, among others. The biggest impact on their operations over the next 5 years is expected to come from connectivity when 5G and IoT are combined. This is expected to have a bigger impact than new production technology (3D printing and robotisation) and increased intelligence (artificial intelligence, blockchain and machine learning). This is also confirmed by Google's search history during 2021, with 5G being the fastest growing search topic. We believe 5G, device connectivity and data collection will facilitate robotisation, automation, self-driving technology and other technological advances supported by data analysis.

Asked how quickly 5G technology is expected to be implemented in their own organisation, 37 per cent of the companies taking part in the survey indicated that it will happen quickly, with a big impact within 5 years. A majority indicated that they expect it to happen within 5 to 10 years.

More than 60 per cent of the companies plan to invest in 5G technology
Of the companies surveyed by Morgan Stanley, 9 per cent have already initiated investments in 5G technology or expect to do so within 2 years. Just under 40 per cent of the companies have no such plans today. More than 60 per cent are planning investments in business-to-business (B2B) solutions, which confirms that there is great future market potential, but with some uncertainty in the near term.

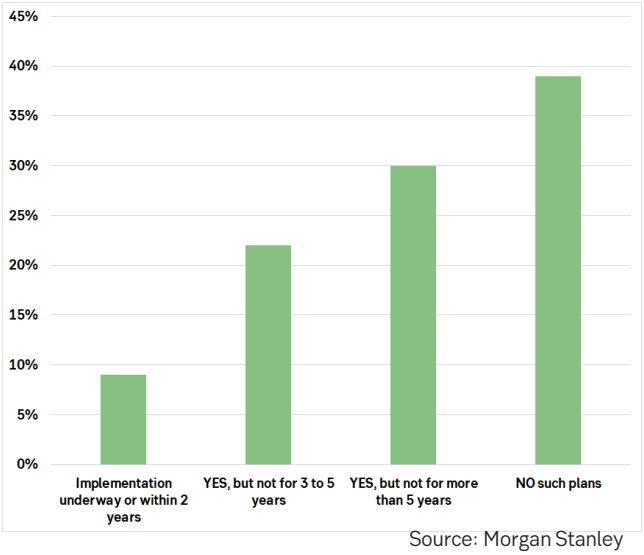
Expected impact of 5G and over what period of time



Source: Morgan Stanley

The chart shows how the companies taking part in the survey think 5G will affect their operations, based on four possible responses.

Plans to implement 5G in production



Source: Morgan Stanley

The chart above shows how the companies taking part in the survey invest in 5G or what they are planning.

The Morgan Stanley survey confirms that the market is growing but also indicates that it will take a few years before growth really accelerates.

Rapid growth for operators with connected devices
Today the majority of connected products have low complexity and have limited communication needs. Examples of this are connected electric meters that can report electricity usage,

voltage and current. Other examples are various sensors and position transmitters. One estimate is that globally there were 1.6 billion devices connected via mobile communication in 2020, with roughly half connected via 2G and 3G networks and half via 4G and 5G. This year, it is assumed that a majority of devices are connected with communication via 4G and 5G networks.

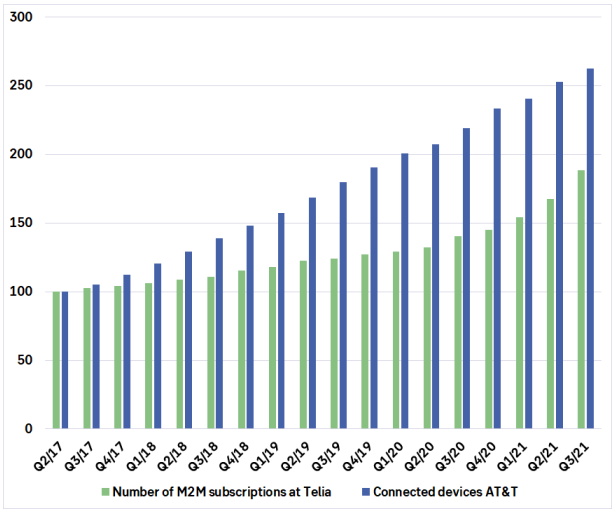
Two telecom operators, Swedish-based Telia and America's AT&T, publish figures on their subscriptions and connected devices. Telia has seen strong growth in subscriptions for machine-to-machine (M2M) communication, which represent one fifth of the total number of the company's subscriptions. These subscriptions have low average prices, around SEK 20 a month, and thus constitute a small though growing share of operators' revenues. Revenues are also positively affected by the volume of data generated from connected products.

Telia's subscription growth for M2M communication was positive in all regions of the Nordic and Baltic countries during the past quarter. In Sweden, the number of subscriptions increased by 46 per cent compared to the year before. Including all regions, the increase was 34 per cent. Growth was also positive sequentially – in other words, faster than during the previous quarter.

AT&T publishes figures on how many devices are connected in its operations. Growth is rapid and fairly steady, 20 per cent or more a year. In the chart below, we have indexed the change, using the figures for the second quarter of 2017 as 100.

It is clear that growth has been higher for AT&T, where the number of connected devices today is 160 per cent larger than in the second quarter of 2017. The US has invested faster and more extensively in 5G technology than European countries.

Change in the number of M2M subscriptions at Telia and connected devices at AT&T



Source: Telia, AT&T

The chart above shows the indexed change in the number of machine-to-machine subscriptions at Telia and the number of connected devices at AT&T since the second quarter of 2017.

For Telia, the number of subscriptions for M2M communication increased 90 per cent during the same period. However, growth at Telia accelerated in the past two quarters while AT&T has continued to have high, steady growth.

Since early 2017, average annual growth has been 23 per cent for Telia and 36 per cent for AT&T. This is on a par with what Ericsson, a Swedish-based global manufacturer of telecom networking systems, indicates is the expected growth rate over the next eight years (until 2030), for more than 25 per cent of service providers/operators. In all, Telia had 3.5 million subscriptions in M2M communication after the third quarter of 2021, and AT&T has 91 million connected devices.

Telenor, a telecom operator based in Norway, has global ambitions in this area via its Telenor Connexion division and is regarded as a global leader and visionary in the area, according to the consulting firm Gartner Group. Telenor was estimated to have 16 million connected devices in mid-2020.

If we assume an average subscription price of SEK 20 for each connected device per month, at Telia that translates to annual service revenues of SEK 840 million with today's subscriptions and SEK 3.8 billion at Telenor – equivalent to just over 1 per cent of Telia's service revenues and just over 3 per cent of Telenor's. The two companies do not specify how their revenue streams from data transfer are affected, but if we assume that half their revenues are from subscriptions and half from data, the share from connected devices doubles. With growth of 20-30 per cent, that share will gradually increase. As more and more companies choose to invest in their own networks, market potential increases. With 5G and advances in the Internet of Things (IoT), operators will need to shift away from selling SIM cards for voice and data traffic towards supporting companies in their transformation to more data-driven operations. One way is to offer not only frequency bands that the operators have a licence for but also combine it with selling a package that includes hardware, software and operational services.

Major market potential for private networks

There are numerous estimates of the market potential for 5G and IoT in the B2B market, but different periods are covered and different services and products are included in the forecasts of companies and industry consultants.

Ericsson estimates future revenue potential of around USD 700 billion for service providers/operators between now and 2030. The consulting firm ABI Research notes that the global service market for operators in private networks is expected to total USD 5.9 billion in 2024.

According to Grand View Research, based in California, the global market for private 5G networks totalled USD 920 million in 2020 and is expected to grow by 38 per cent annually over the next seven years. US-based telecom operator Verizon expects the global market in IoT – which covers base stations, computers/processors, software and sensors – to grow by 20 per cent annually to USD 8.8 billion in 2025. Wireless hardware and software provider Qualcomm states that globally, 5G may generate annual investments and development projects worth around USD 265 billion.

Winners among Swedish and Nordic listed companies
Which companies benefit the most from 5G will depend on how strong their innovation capabilities are. One sector that has benefited for some time is network infrastructure companies such as Ericsson and Finnish-based Nokia, with everything from increased investments in new base stations and software to operational and maintenance services. In our view, investments in 5G will be larger and will continue over a longer period than previous generational shifts. One external consultant, IHS Markit, believes the investment period for 5G may last up to 15 years and investments may be larger than during earlier generational shifts. That is because, with more frequency bands available, the number of base stations will increase, especially in metropolitan areas, where the expansion will largely take place using high frequency bands with smaller coverage areas but better quality. The expected growth of private networks in many sectors should also contribute to increased expansion in infrastructure such as base stations and software, which will create a larger market for 5G in the years ahead. Stringent security requirements in critical (emergency service) networks may also increase the demand for software. This may also increase competition from large technology companies with substantial resources and innovation capabilities.

Telecom operators will benefit from greater market potential. Nordic operators such as Telia, Tele2 and Telenor should be able to expand their offering and increase revenues. The churn rate – a metric that calculates the number of customers that stop using a service – can be reduced when the range of subscriptions and services is expanded. In addition to being affected by an increase in the number of connected devices, revenue potential is also affected by the expected growth in data volume, measured in gigabytes, especially with price models that can generate USD 1-15 in revenue per gigabyte of data.

Industrial companies can benefit from more efficient production as well as closer collaboration with their customers if they successfully increase the value of the content in their product range, for example by offering customers services that are more critical to their operations. New payment models can also be created, which can reduce revenue and earnings volatility. Examples of large industrials based in Sweden or with a major presence there are ABB, Hexagon, Epiroc, Husqvarna, Sandvik, SKF, Volvo and Traton.

Summary
The rollout of 5G and the transition of companies to the new technology are only the start of an investment wave that may continue for the next 10-15 years. Industrial companies consider 5G and connected products to be among their top technological development priorities right now. 5G technology creates greater potential to increase the volume of process and customer data, which can be used to boost revenue potential via new services and to improve internal efficiency. A number of companies have already started to invest in their own 4G networks, which are gradually being replaced by 5G, but according to a Morgan Stanley survey, the majority of such investments are expected to take place within the next 3 to 5 years. The number of connected devices is growing rapidly and is expected to increase by billions of units over the next few years. Compared to previous shifts in mobile networks, a large proportion of future value creation will take place in software development. Companies that are early adopters in this transition and that can take advantage of the new technology will be winners in the long term. Swedish and Nordic companies ranging from infrastructure providers and telecom operators to industrials and service companies are potentially among these winners.

Contact information

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