STOCKHOLM
THE CONNECTED CITY
Stokab is owned by the City of Stockholm and provides a passive fibre-optic communications network within the Stockholm region. The company has been tasked with expanding, maintaining and leasing connections to this network. Our operations are intended to promote optimal conditions for IT development and thereby the positive development of the Stockholm region.

The network is open to everybody on equal terms and Stokab leases to all stakeholders who wish access. Since only “dark” fibre is leased, customers are responsible for their own active equipment.

Stokab was formed in 1994 to develop a competition-neutral infrastructure able to meet future communications needs, stimulate competition, promote diversity, offer freedom of choice and minimise the need for excavation on city streets.
Stockholm: The Connected City

Sweden has achieved major international success in a wide range of industries, from steel and forestry to security and retail. But in one industry, in particular, the country has excelled – telephony. Ever since American Alexander Graham Bell first received a patent for the telephone in 1876, Sweden has ranked among the world's leading telecom nations. What's more, the Swedish ‘telecom miracle' has largely been achieved in the Stockholm region.

Sweden owes its success in telecom to the contributions of countless individuals: brilliant inventors, daring entrepreneurs, far-sighted politicians and skilful government officials at the national and municipal levels. Even so, chance and luck have also played a major role in its success.

Today, Sweden – and the Stockholm region in particular – is one of the world's premier regions for information and communications technology (ICT) in terms of both technological development and use. The world's first ever 4G network was brought online here in 2009.

Stockholm enjoys 100-per cent broadband coverage, both fixed and mobile. Stokab's network is the world's largest open fibre network. In total, it stretches the equivalent of more than 30 times around the earth. It is 1.25 million fibre kilometres long, 5,500 cable kilometres long and boasts 600 crossover connections (nodes) and more than 15,000 access points (ODF).
In a report entitled Networked Society City Index 2013, Ericsson compared the ICT maturity of 31 cities based on their economic, social and environmental development. Stockholm ranked no. 1, followed by London, Singapore and Paris.

Today, Stockholm’s Kista region is one of the world’s leading mobile technology clusters. In 2012, Kista Science City was home to 10,000 companies employing a total of 72,000 staff, of which 1,200 were ICT companies with 24,000 staff in total.
Drottninggatan Street: Where it All Began

In 1876 Lars Magnus Ericsson (1846 – 1926) opened a small electromechanical workshop, LM Ericsson & Co., at 15 Drottninggatan Street in Stockholm. Among other things, his business consisted of repairing telegraph and measuring equipment. That same year, the American Alexander Graham Bell patented the telephone, and his invention was demonstrated the following year in Sweden.

Ericsson’s interest in telephones was piqued when a number of Bell’s devices were brought to his workshop for repairs. In December 1877, Ericsson bought a pair of telephones with the intention of using them as prototypes from which to manufacture better models. This was completely legal because Bell had not taken out a patent for the Swedish market, which he likely considered too small to be of any interest.

In November 1878, Ericsson delivered his first telephones. He eventually developed many new designs. In 1880, Ericsson manufactured both his own telephones and exchanges. The following year brought an important breakthrough when the company won a contract to supply equipment for the new telephone networks in Gävle, Sweden and Bergen, Norway.

In December 1877 engineer Henrik Cedergren (1853 – 1909) constructed one of Sweden’s first ever telephone lines to facilitate communication between his father's jewellery
shop at 31 Drottninggatan Street and his home at 84 Drottninggatan Street. While Cedergren possessed technical skills, his greatest assets were his ingenuity and boldness as an entrepreneur, and he quickly realised the telephone's potential.

In 1880, Stockholm Bell opened the first local telephone network in Sweden. The company charged royally for its services, which irritated Cedergren, who tried to persuade it to lower its prices. When his efforts proved fruitless, he instead founded Stockholms Allmänna Telefon AB (SAT) in 1883.

Cedergren's vision, which few shared, was that the telephone should be available in the homes of ordinary people. He was not permitted to buy American equipment from Bell, however. It was after this setback that Cedergren contacted Lars Magnus Ericsson, who agreed to supply both phones and exchanges.

SAT provided free telephones to customers who subscribed to its service and Cedergren's entrepreneurship created a network effect. The more people who obtained a telephone, the more people it was possible to reach by phone and the greater the benefit customers had from their investment.
Stockholm Becomes a Leader in Telecom

Fierce competition arose between Stockholm Bell and SAT, which drove prices down and facilitated the telephone’s rapid adoption. The majority of other European countries' telecom services were controlled by state or private monopolies, so prices were significantly higher and telephones were less common. In 1885, Stockholm boasted around 5,000 subscribers – more than any other city in the world.

By the turn of the 20th century, Sweden had one of the world's highest rates of phone adoption. At that time, there were a total of 84,000 telephones in service or 163 per 10,000 residents. The comparative European average was less than 20 per 10,000 residents. Stockholm had 29,000 telephones or 960 per 10,000 residents. By comparison, New York had 27,000 (150/10,000), London 20,000 (47/10,000) and Paris 18,000 (71/10,000). Only Berlin had more telephones than Stockholm – 37,000 – although compared to its population, it ranked far below Stockholm in terms of availability (218 per 10,000 residents).

Telephony in Stockholm had developed so far that, according to an 1897 edition of the humour magazine Nya Söndags-Nisse, only one thing was lacking about it:

‘All that remains is to make the telephone portable, so it can hang beside your ear, even when you walk around in the city’.
From Competition to Monopoly

One factor that played a decisive role in the early and rapid spread of the telephone in Sweden was the relative initial passivity of the national government, national parliament and the Swedish Telecommunications Administration, Telegrafverket (later renamed Telia), which was formed in 1853. They imposed no requirement to obtain any other permit to erect telephone cables than the relevant property owner's consent.

In the summer of 1877 a Norwegian engineer demonstrated the newly invented telephone for Sweden's King Oscar II and civil servants from the Telecommunications Administration. The Administration's director-general envisioned that the telephone might, at best, be used by customers to compose and announce the contents of telegrams.

When a number of private telephone companies later wanted to establish regional lines, the Telecommunications Administration actually tried to prevent them from doing so, although initially only with limited success. SAT applied for permission to construct a telephone line between the major regional cities of Stockholm, Gothenburg, Malmö and Sundsvall. The Administration protested the move and SAT’s application was rejected in 1888. Instead, the Administration itself was granted both permission and funds to construct a line between
Stockholm and Gothenburg. In conjunction with this project, the Administration also established a public telephone network in the capital.

Before long the Administration moved to gain complete control over the telecommunications system by buying up private companies and building a national telephone network. The plan quickly advanced everywhere, except for in Stockholm. In Stockholm, SAT had quickly overtaken Stockholm Bell and assumed a dominant position on the market. In 1888, SAT purchased a majority holding in Bell and combined the two networks. For the next 30 years, fierce competition raged in Stockholm between SAT and the Telecommunications Administration.

After many years of debate, on 5 June 1918 the Swedish national parliament approved the Administration’s purchase of SAT’s Stockholm network. The cost of running the manual networks had risen sharply and there was a desire to introduce automatic exchanges. The move strengthened the hand of those who wanted to merge the networks. The increase in costs caused by World War I had also dealt a blow to state finances. The Swedish government and parliament wanted to raise telephone tariffs across the board, and in Stockholm, in particular. In Stockholm, the Telecommunications Administration had been forced to keep prices lower than in other parts of the country because of the competition from SAT.
The day after the Administration and SAT signed their sales agreement, SAT and LM Ericsson signed a merger agreement. The merger allowed the companies to consolidate their position, which was important, not least of all because LM’s facilities in Petrograd and SAT’s network in Moscow had been confiscated after the communist coup d’état of November 1917.

The newly formed company was named Allmänna Telefon AB LM Ericsson. ‘Allmänna’ was removed from the name in 1926 because it gave citizens of Spanish-speaking countries the impression that the company was German. (The Spanish name for Germany is Alemania.)

Networks were quickly combined after the Telecommunications Administration’s purchase and telecom tariffs in Stockholm were raised to the same level as those in the rest of the country. Admittedly, the monopoly created by the purchase was not legal, but the buy-out did nevertheless bring an end to more than 25 years of fierce competition and marked the beginning of a more than 60-year-long period characterised by a state-owned de facto monopoly.
The Electromechanical Exchange

One reason for merging the two telecom companies was the question of automation, an area where Sweden had begun to fall behind internationally. It is true that both SAT and LM Ericsson had developed their own patents for automatic exchanges. But due to an agreement signed between LM Ericsson and the Telecommunications Administration, no cooperation concerning these patents was possible for the Swedish market. The merger between LM Ericsson and SAT changed this, and the new company was now able to build on the two merged companies’ R&D.

After lengthy discussion and intense international competition, the Administration decided in 1921 to allow LM Ericsson to build an as-yet-untried automatic exchange for installation in Stockholm. The local company was chosen even though there were a number of exchanges in use around the world manufactured by foreign companies. LM Ericsson's first 500-point switching system was brought online in Rotterdam, Netherlands, in 1923. Later that same year, a pilot telephone exchanged nicknamed 'Jeriko' was also opened in Vasastan, Stockholm. The exchange remained in operation until 1985. The 500-point switch went on to become the world's most widespread electromechanical telephone system. Sales did not start to decline until the 1970s and the last 500-point switch was manufactured in 1982.
Telecentre at Tulegatan Street

During its first years of business LM Ericsson moved between four different addresses in the Stockholm district of Nedre Norrmalm. In 1884 the company finally set up office in the first building it had specially commissioned to be built. The lot was located at 5 Tulegatan Street in the district of Vasastan. LM Ericsson grew and gradually expanded its premises, in part along Rådmansgatan Street on the same block, and also two blocks further north, at 15 – 19 Tulegatan Street. Eventually, LM Ericsson’s offices occupied the entire block of 15 – 19 Tulegatan Street.

In 1925 the company moved its head office to the newly-built Södra Kungstornet tower on Kungsgatan Street. Still today, passers-by will see that one of the angels positioned close to the tower’s top holds a gold-plated telephone.

Interestingly, Stokab now has its offices on the block between Ericsson’s former buildings on Tulegatan Street. Spotify’s head office is also located on an adjoining block. Spotify was established in 2006 by Daniel Ek and Martin Lorentzon. The company provides a service for listening to streamed music over the Internet.
LM City at Midsommarkransen

In the mid-1930s it became clear that LM Ericsson would need to leave inner-city Stockholm to be able to expand its operations. A number of alternatives were considered, including moving to another region where property costs were lower than in Stockholm.

The City of Stockholm submitted a bid to LM Ericsson that led to an agreement between the two parties on 17 August 1937. The agreement meant that LM would move its operations to the Stockholm district known as Midsommarkransen. The City agreed to lay water and sewage pipes and to build roads and lay a tramline that would service the area.

In 1940, LM Ericsson moved into its new premises at the site that came to be called Telefonplan (Telephone Square). The company’s Telefonplan offices are among the most internationally-renowned examples of functional Swedish architecture and of thoroughly Taylorist factory organisation. A residential area also grew up around the offices. ‘LM City’, as it came to be known, mirrored a welfare state, in which the company assumed major responsibility for cultural and leisure activities and for social services.

Gradually, the facilities were expanded to include more offices and laboratories. During the post-war era, LM City grew to become one of the world's leading centres for fixed-line telephony. The company conducted R&D and manufactured exchanges and transmission equipment there.
The Electronic Revolution

The telephone exchanges that LM Ericsson produced in the 1960s were still based on the same basic electromechanical technology developed with the advent of automation in the 1920s. The breakthrough in the 1970s of electronic telecommunications technology gave rise to a whole new way of developing, engineering and manufacturing telecom equipment. It was by no means certain that LM Ericsson would successfully navigate the challenges of this new era.

As early as 1963, LM Ericsson became the first company in the world to supply turnkey electronic telecommunications stations to the US Air Force. In 1962, work began on LM Ericsson’s first commercial computer-controlled telephone exchange system, AKE. A smaller exchange (AKE 12) was installed in the Stockholm County district of Tumba in 1968. Three years later, a large exchange (AKE 13) went online in Rotterdam, Netherlands.

In 1970, LM's CEO Björn Lundvall and Telecommunications Administration director-general Bertil Bjurel took the initiative to form a joint development company, Ellemtel. The move laid the foundation for a concentrated Swedish effort to promote the new telecom technology. Ellemtel was provided with office space in the district of Älvsjö, close to the cable works that SAT had founded in 1916 and which the merged company would later own.
In 1972, LM Ericsson’s management was faced with a crucial strategic decision. Under the direction of Ellemtel, the company had begun work to develop a highly advanced electronic telephone system, AXE. In time, AXE would go on to become the world’s first computerised digital telephone system. But the system would be several years in development. Within LM Ericsson, a proposal for a new AXE exchange was presented in 1971. It would be both ready to market more quickly than AXE and significantly cheaper to produce.

Intensive internal discussions were held as to which path the company should take. The Telecommunications Administration cast its vote in favour of AXE and in May 1972, LM decided to invest in the new system. Work to further develop AKE was abandoned.

Ellemtel’s staff succeeded in solving the system’s technical problems in an ingenious way. As for the market, LM Ericsson was very lucky. The year after the decision was made to concentrate on AXE, the first oil crisis struck. The industrialised world fell into a severe economic slump. Orders for telephone equipment fell to very low levels just at the time when LM had little in the way of new equipment to offer. And once the worst crisis had passed, the world’s most modern telecom system, AXE, was ready to market.
The AXE project ultimately became one of Sweden’s largest technology-development projects. The development work was headed by Bengt-Gunnar Magnusson and in 1976 the first analogue exchange in Södertälje stood ready to be tested. It was brought into full service the following year. The digital version was later completed in 1978. AXE became one of Sweden's largest-ever export products and the world's best-selling telephone system.

AXE's international breakthrough came via an order from Australia, placed in 1977. The contract signed with Saudi Arabia in the following year was the largest in LM Ericsson's history. In 1979, production volume for the company's computerised system surpassed that of its electromechanical systems.

What made AXE so successful, and what has allowed it to maintain its leading position for so long, is that the system is made up of a number of interchangeable modules. As such, it can be developed and adapted relatively quickly to suit each individual customer's needs. It even proved able to be very successfully developed for mobile telephony systems, a capacity that its creators could hardly have had in mind when they built it.
The First Mobile Phone Systems

A crucial step forward was taken in 1956 when the Telecommunications Administration began to open mobile telephony systems in Stockholm and Gothenburg. These were the world’s first mobile systems, with automatic connection to the public telecom network.

The system was called Mobile Telephone System A (MTA). The exchanges were developed by LM Ericsson, while its subsidiary, Svenska Radio AB (SRA), produced base stations and phones. By the mid-1960s, the system had 125 subscribers.

In the same year that MTA was launched, development of the next generation system, MTB, also began. The mobile equipment for MTA weighed 40 kilograms and required so much electricity to power it that a car battery was barely sufficient. MTB made use of a new innovation, the transistor. This reduced energy consumption and the equipment’s weight to nine kilograms.

The Telecommunications Administration, LM Ericsson and SRA were again key players. In 1965, the MTB system debuted with 150 telephones in Stockholm and Gothenburg. Malmö was included some time later. MTA and MTB were retired in 1969 and 1983, respectively. At the time of its retirement, MTB had 600 subscribers. Typical subscribers included doctors, haulage contractors and travelling businesspeople.

In 1969 the Nordic telecom agencies agreed to form a joint group, known as NMT.
Because it would take several years to develop an automated system, the group decided to produce a manual system quickly instead. This system, known as MTD, was first introduced in 1971. This experience proved very valuable in later development.

Although he was the object of strong criticism from many sides, Östen Mäkitalo from the Telecommunications Administration's radio laboratory promoted the idea that a fully automated system should facilitate transfers between base stations during on-going conversations and automatic searches for all subscribers within the entire coverage area. As such, the company should wait until sufficiently advanced microelectronics had been developed that would make this possible. In the meantime, the engineers at the radio laboratory had managed to develop the MBS paging service and radio data system (RDS).

A key innovation that helped spur mobile telephony's breakthrough was conceived by the Telecommunications Administration's Laila Ohlgren in 1979. The NMT system was almost ready to be launched, but there were problems when connecting calls. If interference in the radio connection occurred while a user was entering a number, the connection could fail. Ohlgren's innovation meant that the user first entered the complete number and then pressed a special 'call' button. This increased the capacity in the network and lowered the risk that calls would fail to connect.
From Monopoly to Competition

The Telecommunications Administration achieved a monopoly on Swedish telephony services in 1918. Notwithstanding, it was significant that the Swedish telephone system was a de facto monopoly and not a de jure monopoly. What's more, within mobile telephony, non-local private mobile networks had existed in Sweden since 1965 – a crack in the monopoly that would eventually prove to be its undoing.

Sweeping deregulations were introduced in Swedish telecommunications in the 1980s and 1990s. The European Commission also began to increasingly support competition, both in telecommunications and other industries.

In Sweden, new telecom legislation came into effect on 1 July 1993. At the time, it was perhaps the world’s most liberal telecom law. The law established the right of any operator who had permission to operate a telephone network to connect calls to all other networks. The fees charged for doing so were to be fair and reasonable, it stated. A new government agency, the Swedish Post and Telecom Authority (PTS), was to ensure that the spirit of the law was adhered to and was tasked with mediating disputes between stakeholders. The Telecommunications Administration was converted into a limited liability company and renamed Telia.
Both politicians and trade unions, together with the Administration itself, objected to the deregulations. LM Ericsson's attitude towards increased competition in telecommunications was initially non-committal.

More than anything else, it was development within mobile telephony that drove the liberalisation of the telecom markets. Prior to the mid-1980s, not even key stakeholders in the telecom industry believed that development within mobile telephony would be anything like as rapid as it proved to be. In 1981, the Telecommunications Administration estimated that the NMT system would have 40,000 subscribers by 1990. Instead, there were 500,000. In 1990, the Administration predicted that the GSM system would have 25,000 subscribers by 1994. The actual figure was 423,000.

In the early 1980s, American telecom giant AT&T asked consultancy firm McKinsey to assess the size of the world market for mobile phones by the beginning of the new millennium. McKinsey conducted an extensive analysis (and received a proportionate fee for its efforts), before it presented its prediction: 900,000 subscriptions. In fact, the number of mobile subscriptions at the beginning of the year 2000 proved to be 400 million.
One important precondition for mobile telephony’s expansion was, quite naturally, the technical development that produced lighter, better and cheaper telephones. But the Swedish telecom miracle proves that the technology was not the only contributing factor. If that were the case, the disparities between different countries would not have become so great.

What were also needed were entrepreneurs who could see mobile telephony’s potential and who had the ability to create a mass market. Moreover, legislation was required that made it both possible and profitable for people to develop and exploit the new technology. Once the mobile expansion had begun in earnest, it too contributed to continued, rapid technological development. Manufacturers saw a growing market and development costs could be spread across several devices, which helped prices fall even more quickly.
In the late 19th century it was daring entrepreneur Henrik Cedergren who, before anyone else, believed that the telephone had a future as a mass-produced product and who dared to focus his energy on developing the market. In the late 20th century, his counterpart was telecom pioneer Jan Stenbeck (1942 – 2002). Stenbeck was Sweden's most successful entrepreneur of his era.

Stenbeck had the ability to identify early on new business opportunities created by technical and economic changes in the surrounding world, particularly within telephony and media. One precondition for Stenbeck’s dynamic enterprise was that he had access to a stable financial base from which to act, namely Kinnevik, a group of companies with its roots in special steel, forestry and hydroelectric power.

Jan's father, Hugo Stenbeck Sr., had helped to found the investment company Kinnevik in 1936. In reality, it was Jan's elder brother, Hugo Stenbeck Jr., who was intended to take over responsibility for the business after his father. Jan moved to the US, where he devoted himself to various business activities, including mobile telephony. But in 1976 Hugo Stenbeck Jr. died at the age of 42. Then his father died in the following year. Now it was 34-year-old Jan's turn
to take over the reins as principal owner and the driving force behind Kinnevik, although not before overcoming a bitter and public family feud.

As such, it was pure chance that gave Sweden an Americanised entrepreneur as the principal owner of a large and profitable industrial group. Because Jan had not been groomed to take over management of the company, he was able to use its resources to build something new based on his own ideas without sentimentality interfering.

In 1981 Stenbeck bought the largest private mobile network in Sweden, Företagstelefon, which he then renamed Comvik. That same year, Comvik launched an automated mobile telecom network. A fight erupted between Comvik and the Telecommunications Administration when Comvik requested that the Administration's director-general, Tony Hagström, give permission for automatic transfers from Comvik's network to the fixed telecom network. Hagström rejected the request on 1 October 1981, the same day that the Administration opened a new, modern mobile telephone system with automatic transfer, NMT 450.

Comvik then approached the Swedish government, which, in turn, requested that the Antitrust Ombudsman and LM Ericsson submit a statement on the matter. The Antitrust Ombudsman took Comvik's side in the dispute. On the other hand, LM Ericsson's CEO, Björn
Svedberg, supported the Telecommunications Administration. He claimed that a national mobile telephone network protected from competition was a precondition for the rapid expansion of mobile telephony in Sweden and, thereby, also for industrial success and for safeguarding LM's workforce in Sweden.

The government decision handed down in 1981 saw Comvik's application approved. Today, the minister responsible for the decision, Centre-Party Communications Minister Claes Elmstedt, is a forgotten hero. The decision proved pivotal to the success of the future Swedish telecom miracle and to Ericsson's major achievements. Nonetheless, the decision had been made contrary to the wishes of Ericsson's management. The government's motive for accommodating Stenbeck was hardly a product of any kind of visionary view of mobile telephony. Rather, it was based on the view that a little competition was a good thing in a marginal sector of the Swedish telecom market.

Thanks to Jan Stenbeck's company, from the early stages Sweden experienced tough competition within mobile telephony, just as Stockholm had within fixed telephony in the 1800s. This lowered prices and increased mobile phone use. Stenbeck launched new ideas intended to sell more phones and increase their use. In 1993 his company began to pay compensation
to resellers who sold subscriptions, which led to major discounts on mobile phones, an idea that was strongly reminiscent of Cedergren’s free telephones. In 1997, prepaid SIM cards were launched.

In 1991, Stenbeck’s Tele2 was the first company in Sweden to offer a commercial Internet connection service. In those days few people knew what the Internet was and the Telecommunications Administration was thoroughly uninterested in it. The Administration had commissioned several English consultants to evaluate the Internet, and they had concluded that it was an unstable technology with no future. The Administration wanted to offer a service that it had developed itself instead, TeleGuide. The project was discontinued after just 18 months. Its losses totalled SEK 400 million.
Mobile Cluster at Kista

Kista is close to Stockholm and lies within the large Järvaflättet district, which began being developed around 1970, just when the electronics revolution began gathering speed. At the time, however, there were likely few people who understood that the world was embarking on a new industrial revolution.

In 1973 the City of Stockholm formed the company Stockholms Mark- och Lokaliseringbolag (SML), now known as Stockholm Business Region. One of its main tasks was to encourage businesses to establish themselves in the industrial estate that had been built between the E4 Highway and the residential areas at Kista and Akalla. The then Mayor of Stockholm, John-Olle Persson, who was also SML's first chairperson, came to have a decisive impact on Kista’s development.

The companies that the City tried to entice to Kista would run operations that did not create noise pollution or damage the environment in any way. In the beginning, there were certainly no plans to make the site the home of a high-tech electronics cluster. Instead, Kista was viewed more as an area suited to light industry.

However, in the mid-1970s Sweden and the entire industrialised world were hit by a deep and long-running economic crisis, which meant that development at Kista was initially quite
sluggish. The first electronics companies to move to Kista (1976 – 1978) were two subsidiaries of LM Ericsson (SRA and Radioindustrins Fabriks AB (RIFA)) and IBM’s Swedish subsidiary.

Arninge in Täby, in particular, but also Kungsängen were discussed as possible locations for SRA. One factor that was against Kista was LM’s requirement that it own the land it would build on, whereas the City was only interested in leasing plots of land. The problem was solved through a land exchange between the City and LM that gave the company its own land at Kista and saw the City take over SRA’s property at Kungsholmen.

In hindsight, these establishments appear as the natural beginnings of an ICT cluster. In the mid-1970s this was no certainty, however. Admittedly, Stockholm had been a world-leader in telephony for 100 years already. The city’s telephony cluster lay in the Söderort district, with a host of facilities running from LM Ericsson at Midsommarkransen to the Telecommunications Administration at Farsta. Moreover, at the time, the LM subsidiaries that were established at Kista were viewed as secondary businesses.
Ericsson Goes Mobile

LM Ericsson had supplied equipment to Sweden’s mobile telephone networks since the 1950s. This was only a very small part of the company’s operations, however, and management’s interest in the area was quite limited. In and around 1980, Ericsson was more interested in developing a different area alongside its core business of fixed telephony, one in which electronics were creating new opportunities – office automation.

When the NMT networks were first being built, Ericsson management initially wanted to supply AXE exchanges. The Telecommunications Administration was not satisfied with this offer, however, and instead requested an AXE exchange adapted to suit mobile telephony, which LM agreed to. The resulting MTX exchange became the basis for Ericsson’s ascent to the position of world-leader within mobile systems. The world's first cellular mobile system, an NMT system supplied by LM Ericsson, was brought online in Saudi Arabia in 1981. Later that same year, the NMT 450 was launched in Sweden.

The analogue NMT system was the world’s first modern mobile telephone system. It gained a large international market and became an important factor in later Nordic successes within mobile telephony.
In January 1983 Ericsson bought SRA outright and renamed it Ericsson Radio Systems (ERA). Åke Lundqvist was CEO from 1977 to 1988 and played a key role in helping the company transition to mobile telephony. Long before Ericsson’s management, Lundqvist realised the huge potential of mobile telephony.

Lundqvist convinced LM Ericsson’s management to both adapt the AXE exchange to accommodate mobile telephony and to market complete mobile telephone systems. He initiated a number of strategic acquisitions intended to augment Ericsson’s expertise in mobile telephony.

Åke Lundqvist fostered SRA's/ERA's culture as a non-bureaucratic organisation characterised by a pioneering spirit, experimentation, direct communication and freedom to openly express opinions. His advice to his younger colleagues was: 'If you want to know how to do something, first find out how they do it at head office. Then do the opposite.' For its part, the head office at Midsommarkransen was inclined to call the operations at Kista ‘Dinky Toys': it manufactured mere toys, not real telephones with cords.

Because Ericsson’s management was focused on things other than mobile telephony, SRA/ERA was long able to operate as a small, autonomous entrepreneurial organisation.
within the framework of the more bureaucratic corporate giant, a factor that contributed to its success.

Ericsson had achieved a strong position within NMT, but its major breakthrough came through the digital GSM system. In 1982, the European Conference of Postal and Telecommunications Administrations (CEPT) decided to appoint a joint standardisation group. It was given the name Groupe Spéciale Mobile (GSM). The group's first meeting was held in Stockholm and the Swedish Telecommunications Administration was assigned a central role in the work to achieve its aim. The head of the Administration’s radio laboratory, Östen Mäkitalo, produced a draft of a standard for a digital system in 1982 that closely resembled the model chosen by the European Commission and adopted by 13 countries five years later.

GSM proved to be a major success and the system has greatly contributed to Europe's leading position in mobile telephony. During the 1990s, Ericsson became the only company in the world able to supply mobile systems for all existing standards.

Ericsson went on to gain over 40 per cent of the world market for mobile telephone systems. Within the mobile phone market, however, the company’s success was much more limited and its operations were later sold to Sony.
Twenty Years of Stokab

One important part of Stockholm’s modern ICT history is the company Stokab, founded by the City of Stockholm in 1994. The deregulation of the telecom market, which had taken place the year before, was the reason for establishing the company. Despite proposals by a number of national parliamentary parties to divide up what was then the Telecommunications Administration into an independent, neutral infrastructure organisation and a service organisation, it remained intact and instead became the company Telia.

Stockholm’s politicians believed that a neutral stakeholder was needed who could provide basic IT infrastructure to all on equal terms in order to generate competition, diversity and a range of choice within telecommunications and data. To achieve this, the IT infrastructure company Stokab was formed through a political consensus. The company’s mission is to build, lease and maintain a passive fibre-optic network to help foster favourable conditions for IT development and the positive development of the Stockholm region.
Because Sweden was among the first EU countries to open its telecom market to competition, it was difficult to simply copy others’ solutions. Other countries, however, have since copied a number of the creative institutional solutions generated in Sweden during these years. One of these is known as the Stokab Model; that is, the way in which the fibre-optic-based municipal network in Stockholm is organised.

This model’s organisation of the new network industry departed radically from the traditional approach to organising such industries. For example, within telephony, electricity and railways, it was previously the uniform rule across the globe that production and distribution – from start to finish – were performed by one operator. When the Swedish telecom market was opened to competition, the old operator retained control of the infrastructure, which meant that, initially, new companies could only establish themselves within special niche markets.
The Stokab Model

The Stokab Model was based on two important insights. The first was that a dynamic development of the new markets opened up by the Internet and broadband required competition between operators with a free right of establishment. The second was that the high fixed costs of building municipal networks would constitute an obstacle to achieving this. It was neither desirable nor possible to justify the cost of digging up streets and running cable or pipes to properties multiple times for multiple suppliers.

The first insight was timely, while the other was far from trivial. In 1993, the Swedish electricity, postal and telecommunications markets were opened to competition, although the politicians and civil servants who had prepared the reforms did not fully understand how to manage the obstacles to competition posed by monopolistic bottlenecks within infrastructure. The result was that government departments, public authorities and courts were quickly overwhelmed with requests to resolve conflicts between new companies like Citymail and Tele2 and the incumbents concerning the right to access such infrastructure. Neither was it a given that the problem would be resolved as it had been in Stockholm, that is, through a neutral owner building and operating the basic infrastructure – the passive dark fibre network – and leasing it on equal terms to competing operators who would provide the active, ‘intelligent’ network.
components that power the network and/or sell network services to end-customers. As mentioned above, in the end Telia retained control of the infrastructure, but it was ordered to make it available to its competitors. In time, this proved to require a complex set of regulations. Another possible model for managing competition was to allow competing companies to form ‘infrastructure clubs’ so as to operate the infrastructure jointly.

In hindsight, the Stokab Model has proven to be a smart institutional innovation. The other models considered were encumbered by various problems. Without introducing certain measures, competition was not achieved. Assigning responsibility for the network to one company on the condition that it allows its competitors access to it requires extensive regulation. Allowing competing companies to form an infrastructure club can amount to the same thing as allowing them to build a cartel, which effectively chokes competition.

The Stokab Model was a new way of solving a classic problem within open competition legislation. One of the purposes of competition law is to act against companies that abuse their positions of dominance. One form of abuse occurs when a company uses its monopoly in one area of an added-value chain to limit competition in other areas.
More than 100 years after the competition between Stockholm Bell and SAT that drove prices down and facilitated the telephone’s rapid spread began, history is repeating itself. Stokab’s operator-neutral network has fostered major competition, low prices, a well-developed network and a high level of ICT use. Stockholm is considered to have the highest proportion of citizens and businesses using ICT solutions of any city in the world.

Stokab’s first customer was the Swedish Royal Institute of Technology (KTH), which required a fibre-based connection between its teaching facilities at Valhallavägen Street in inner-city Stockholm and Kista. The expansion of the network began in the commercial area of Stockholm's inner city and quickly spread to larger industrial estates. One important breakthrough came in the mid-1990s, when the Stockholm County Council decided to connect all its major healthcare facilities using fibre-optic cable, which created hand-over points in every municipality in the county. The move allowed the County Council to purchase telecom and datacom services as one service subject to competition, and thereby reduce its costs by 50 per cent, or SEK 60 million annually.

Over the years, Stockholm’s network has grown. Twenty years after its launch, more than 90 per cent of households and nearly 100 per cent of businesses in the City of Stockholm
are able to connect to the network. By the start of the new millennium almost all schools in the city were also connected to the network, which meant that it had been established in all of Stockholm's suburbs. In the early 2000s the network was further extended via Mälarringen, which connects separate municipal networks around the Mälardalen region. The fibre-optic network was also extended to cover Stockholm's archipelago, so that all its larger, inhabited islands are connected. By early 2005, practically all neighbourhoods in Stockholm's inner city were connected. In 2007, the extension of the Fibre to the Home project to multi-family properties began. Work was completed at the beginning of 2013.

According to research institute Acreo Swedish ICT, Stokab's network has generated a national economic profit of at least SEK 16 billion. This profit takes the form of more jobs, increased property values and lower broadband prices. The network has also allowed for the extension of the 4G mobile networks, with four operators. It also creates conditions conducive to developing services, including cloud services, smart e-services and other innovations.

Thanks to its well-developed open fibre network, Stockholm is well equipped to meet today’s challenges, and tomorrow’s.
About the Author

Anders Johnson is an author specialising in Swedish business history. He has written several books that discuss Stockholm’s telecom history.