

Market

The Group is active on the market for products needed to upgrade data and telecommunications networks, including sensors. The sharp increase in traffic in these networks means that operators now have a substantial investment requirement, which in turn means that Sivers Semiconductors' market is significantly outgrowing traffic volumes.



The most important factor behind the rapid increase in traffic is the increased use of video. An increasing proportion of the content on the Internet consists of video, and users spend more and more time streaming video of increasingly higher image quality, which requires large bandwidth. Video traffic on mobile networks is expected to account for 77 percent of all mobile data traffic by 2026, compared to 66 percent in 2020¹⁾.

Another important factor is the rapid expansion of very large data centers, from companies such as Google, Amazon, Microsoft and others offering cloud services. The number of large data centers is expected to increase from 338 in 2016 to 628 in 2021, and traffic within these will quadruple in the same period.

Wireless

Traffic increases create a substantial investment requirement by telecom operators. Annual investments in millimeter wave components for 5G systems are expected to grow from USD 188 M in 2020 to USD 2,500 M in 2026.²⁾ This means that the market for products needed to upgrade infrastructure, i.e. the

Group's market, is growing significantly faster than traffic volumes.

A high proportion of operator investments is made in the expansion of 5G, the fifth-generation mobile network. 5G uses the millimeter wave spectrum, which gives lower transmission cost and greater bandwidth. The capacity of 5G is 10–100 times greater than 4G.

In 2020 the distribution of 5G networks really took off. Ericsson estimates that by the end of 2026, 5G will cover 60 percent of the world's population, compared to 5 percent at the end of 2019.

The growth of 5G in Europe was stimulated by the European Telecom Authority, CEPT, which opened the 57–71 GHz band for unlicensed 5G throughout Europe at the start of the year.

South Korea is the country where the roll out of 5G services has proceeded the furthest. Since the launch in April 2019, growth has been dramatic. At the end of 2019, the number of 5G subscribers was 4.7 million and ended 2020 with nearly 12 million. The average data usage per subscriber was 27.3 GB at year-end 2019 and 26.6 GB at the end of 2020.³⁾

The expansion of wireless networks also means increased demand in fiber optics, including in data centers and in the operators' backbone networks. The market is also growing for fiber to homes (FTTH), driven by the fact that consumers want to be able to transmit high quality video and that the cost to install fiber the last stretch to homes has been reduced.

Alternatively, housing and small businesses can receive wireless broadband via Fixed Wireless Access (FWA), where the last part of the transmission to the subscriber is wireless. FWA is the first area where 5G mmWave can be used for fixed broadband connection. According to SNS Research, total operator revenue from FWA globally will increase by an average of 84 percent per year, up to more than USD 40 billion by 2025.

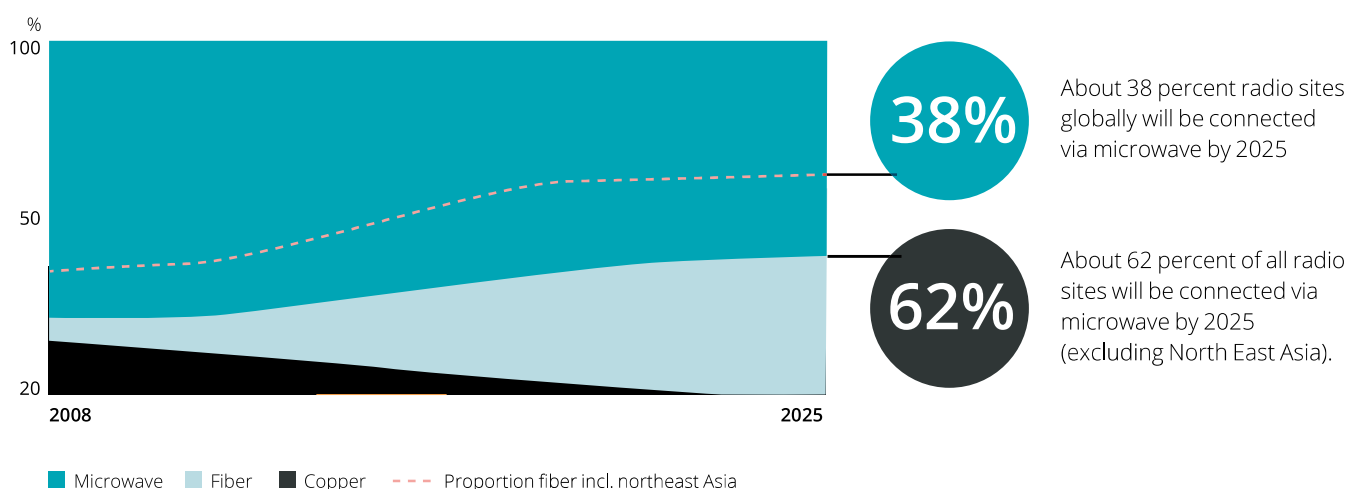
An important part of Wireless' market is system manufacturers, such as Ericsson, Nokia and Huawei, which in turn supply telecom operators such as Telia, Verizon and NTT Docomo. Another potential customer base is product companies, which develop products used in operator networks (fixed and mobile) without offering total system solutions. Examples of Sivers

¹⁾ Ericsson Mobility Report Nov 2019.

²⁾ Market&Markets 5G infrastructure, SNS FWA 5G, Mobile experts and internal design wins and customer forecasts.

³⁾ Tefficient Public Industry Analysis.

Global backhaul media distribution



Source: Ericsson Microwave Outlook Report, 2020

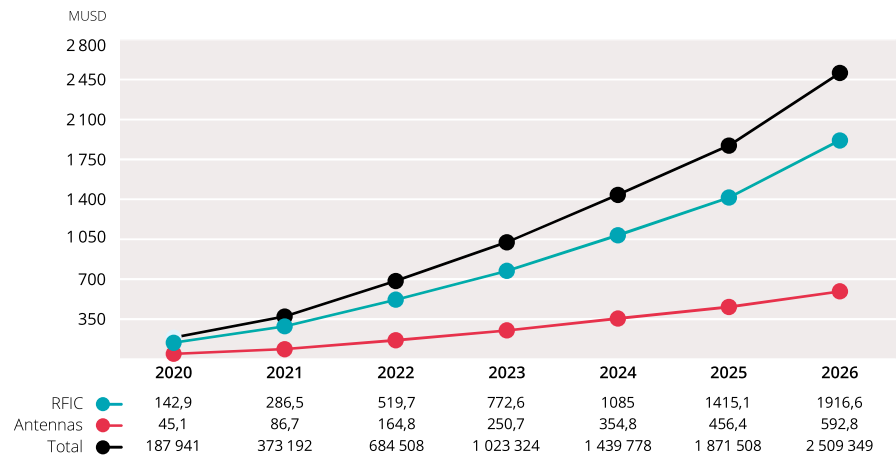
Wireless' customers that develop and sell this type of product include CCS, Cambium and 8devices. The market for wireless broadband access constitutes a specific segment, where many smaller independent WISPs (Wireless Internet Service Providers) complement the large nationwide operators. Deliveries are made directly or through partners.

At the beginning of 2020, MicroNät launched a wireless broadband network in Örnköldsvik. The British operator Ontix launched a wireless network in central London. Both of these networks include key components from Siverts Wireless.

Photonics

Sensors is a promising growth area in both consumer and industrial electronics. Demand for optical sensor units is driven by factors including rapid technological advances in driver assisted/driverless cars, consumer biometrics, hazard and metrology, security, augmented and merged reality. The Internet of Things (IoT) is another growth area, where the number of access points to mobile networks is expected to grow by an average of 23 percent per year between 2020 and 2026.¹⁾

Total market for millimeter wave component 5G RF 2020–2026



Source: Market & Markets 5G infrastructure, SNS FWA 5G, Mobile experts and internal design wins and customers forecast.

Photonics delivers to several Fortune 100-customers located in Silicon Valley directly or via partners. Photonics received an important follow-up order from a US Fortune 100-company relating to optical semiconductors for pre-series production, and a development order from a new Fortune 100-customer. Both these customers are some of the world's largest tech companies.

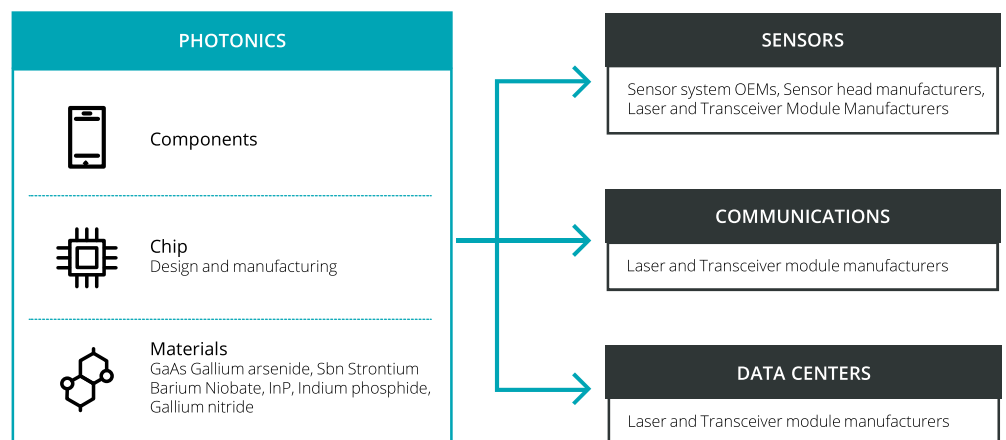
Companies that offer cloud storage solutions are another important customer group, with optical communications devices as key component. Photonics has sold a total of more than 25 million chips for fiber to the home, mainly to China and India.

¹⁾ Ericsson Mobility Report Nov 2019.

Siverts Photonics in the value chain



The Group's photonics business area, Photonics, operates within three levels of the value chain – components, chips and materials. These products are then included in systems that Siverts Photonics' customers deliver to, for example large data centers.



CCS Customer Case

Metnet 60G integrated with Sivers Semiconductors 60 GHz mm Wave radio/ antenna solution



For more information: www.sivers-semiconductors.com and www.ccsl.com

If possible, operators would build fiber networks everywhere; however, in some locations, this is simply not practical, or economically viable. With the Metnet 60G solution CCS assist service providers to extend the reach of their fibre assets to deliver the services wherever they are needed.

CCS Metnet 60G consists of CCS's own software integrated with Sivers Semiconductors 60 GHz mmWave radio/ antenna solution and Renesas IDT modems configured with the Blu Wireless IPR to provide gigabit connectivity to the global market. CCS has established a global relationship with ADTRAN to deliver industry-leading solutions to service providers. CCS rigorously evaluated the market and selected Sivers Semiconductors as a key technology partner when designing the integrated hardware platforms for today and tomorrow

Challenge

- Help operators build hybrid fibre-wireless networks delivering the lowest overall network TCO
- Address the 60 GHz market for FWA and mobile backhaul
- Design a complete best-in-class 60 GHz solution
- Reduce time to market
- Achieve scale to business and manufacturing

Solution

- CCS software together with Sivers Semiconductors 60 GHz mm Wave radio/antenna solution and Renesas IDT modem and Blu Wireless IPR – **Metnet 60G**
- Sales and manufacturing agreement with ADTRAN reaching hundreds of service providers across the globe

Result

- Maximize the full-fiber service ambition at a fraction of the cost
- Engineering project completed thanks to close collaboration between the engineering and management teams of CCS and Sivers Semiconductors
- Highest capacity per node, use of all six channels in the 57–71 GHz band, and best range performance

"After an extensive search, we concluded that Sivers Semiconductors offered truly unique capabilities and performance that we could integrate within our hardware platform and utilise to deliver a differentiated solution – offering highest capacity per node, use of all six channels in the 57-71 GHz band, and best range performance"

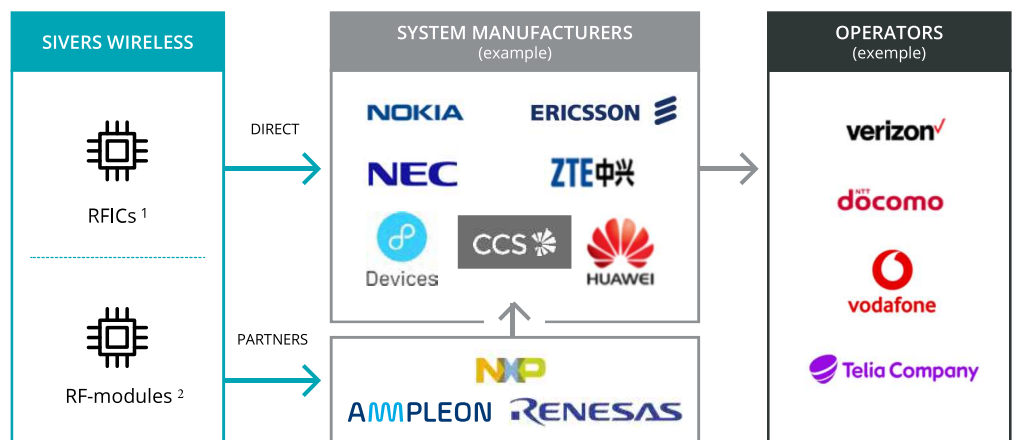
Martin Harriman

Executive Chairman, CCS

Sivers Wireless in the value chain



Within the wireless business segment, Sivers Wireless mainly delivers to system manufacturers who in turn deliver to telecom operators. Deliveries are made directly or through partners. The system manufacturers and operators mentioned above are examples of potential customers.



¹ Radio-frequency integrated circuit A chip that transmits and receives radio waves. For example, RF chips are found in portable telephones, cellphones, Wi-Fi devices, wireless routers, wireless base stations, satellite transceivers and microwave equipment

² RFIC and PCB antenna that are integrated into one unit.