

## **PRESS BACKGROUND**

### **EFFICIENT TRANSPORT NETWORK FOR INNOVATIVE BROADBAND SERVICES**

*The rapid development of fixed and mobile broadband has created new opportunities for operators to deliver any broadband service, to any device, anywhere. In this environment, that Ericsson calls Full Service Broadband, an efficient transport network is fundamental. Ericsson's transport and access portfolio offers flexibility, high capacity and market-leading reliability. The portfolio has been acknowledged by operators for well over a decade, with nearly 2 million platforms deployed around the world.*

Ericsson is long-established in telecommunications transport. This is one of the less visible parts of the network, but, just like the electricity grid, if it goes wrong, everyone soon knows about it. It provides the underlying capacity for all services, using a mixture mainly of optical fiber cables and microwave radio links, extending from the network core, through metro and into access areas. Globally, optical transport alone is a USD14 billion a year business, and one in which Ericsson has increased its global role through acquisitions, notably of Marconi and Axxessit. Though carrying less bandwidth, microwave radio transport reaches many more places and is a market worth USD 5 billion each year. For example, 60 percent of mobile base stations are connected to the network by radio but as mobile data services grow, fiber connection is becoming more significant.

The term "transport" includes not just the design of point-to-point links – often called transmission – but design for network resilience, including automation for service recovery and for service initiation. This richness of features was triggered first for synchronous digital hierarchy (SDH) optical networks and is an area where Ericsson is a technology leader.

Transport is essentially about design for medium to long term capacity – months to years – but its flexibility can be invoked to operate in less than a tenth of a second to overcome network faults. It covers a wide range of technologies, from internet protocol (IP) switches through laser optics and Ethernet platforms, to microwave radio links.

Much transport technology involves "multiplexing," in which each user's channel is combined with others onto one cable or radio link so that no user can affect the activity of others. This reduces the number of cables needed and allows many channels to be boosted by a single device for longer distance links, or switched simultaneously for protection against cable faults. We have come a long way since the days of wooden poles with masses of copper wires, one pair for one channel for each telephone customer.

Like PCs, multiplexing takes advantage of Moore's Law – which doubles the available complexity of devices approximately every 18 months and so drives down costs – regarding silicon. To illustrate this concept, if a Boeing 747, first developed in the late 1960s, had fallen in cost at the same rate as bandwidth, it would now cost about the same amount as a pizza.

## High capacity optical fibers

Channels or streams to be combined can be any mixture of telephony, TV and data services of any bandwidth. The number of combined channels is constantly increasing. With optical fibers, it is routine to digitally multiplex the equivalent of 130,000 telephony channels into a single 10 gigabit (10 plus 9 zeros) per second signal, usually written as 10Gbps (or 10Gbit/s). Ericsson has delivered 40Gbps systems to customers around the world and is working on 100Gbps.

These multi-Gbps signals can be further combined onto one optical fiber by analogue multiplexing. This involves using laser light of different colors, typically 10 or 20 but optionally up to 160, in wavelength division multiplexing (WDM). Ericsson has WDM products suitable for both metro and core networks and has delivered some of the highest performance WDM systems in the world, in demanding environments such as deserts and coastal waters.

The mainstay of most transport networks is SDH (similar to SONET in North America). It has evolved into Next Generation SDH that includes steadily increasing packet functionality and has brought an inheritance of carrier class features – such as robustness, resilience and efficient network management – to the packet world.

Ericsson's Marconi Optical product range has a massive installed base and includes add-drop multiplexers (ADMs) in both time domain multiplexing (TDM) and WDM form, as well as a wide range of multi-service provisioning platforms (MSPPs) in the Next Generation SDH category; these give flexible connectivity for any service across packets, TDM and WDM. In addition there are transport platforms optimized for Ethernet connectivity, scalable to high capacity and designed to fit existing network management for transport.

## Microwave radio

Although fiber gives the lowest cost for high capacity, microwave radio provides greater flexibility and lower first-in cost. It also gives lower costs than capacity leased from other operators. This is a big factor both for operators who focus on lower-spending customers and for those who offer high bandwidth for mobile data services. Users include mobile operators and fixed operators, as well as the enterprise segment.

Microwave products from Ericsson, MINI-LINK and Marconi LH, (long haul), offer a range of modulation formats to suit different geographical conditions and include many features that minimize costs for installation and operation. Examples are Ethernet switching, SDH add-drop multiplexing and also flexible connectivity for PDH and ATM, formats that are widely deployed in mobile networks. Having all these features in the same platform supports smooth network evolution, especially migration from TDM to packet data.

The rapid growth in data services, notably on high speed packet access (HSPA) has driven operators to deploy packet-based transport into base stations, for better economy and capacity in carrying new services. Once HSPA is deployed, user demand for capacity can quadruple in a few months. To support this, Ericsson has built a range of powerful Ethernet capabilities into its base stations and associated equipment.

## Next Generation Access

As service bandwidths grow, many early deployments in copper access for business and residential use are being upgraded from digital subscriber loop (DSL) to very high speed DSL (VDSL) and to VDSL2, which is even faster. Price competition between operators is tough in this area and Ericsson has pioneered the EDA product family with particularly low installation costs.

VDSL and VDSL2 link homes by copper to nearby equipment cabinets, linked in turn by optical fiber connections to the operators' central buildings. In passive optical networks (PONs), a single

fiber connection is physically split to support many cabinets, or else direct connections to homes or businesses or mobile base stations, for higher capacity per end point. In different regions there are variants EPON and GPON; however the latter is becoming more globally adopted, and is supplied, for example, by Ericsson in North America.

FTTx denotes access systems that use fiber to the cabinet (FTTC) or fiber to the home (FTTH). Fiber may be PON-style or alternatively point-to-point, and may be pulled into ducts or blown into micro-ducts by air jets. Ericsson builds all of these systems.

VDSL2 and FTTx are classed with HSPA as Next Generation Access (NGA). The capacity of NGA systems is high enough for them often to act as network transport, rather than just as access.

## Packet networks

In IP packet networks, aggregation frequently replaces multiplexing. In this case, packet streams of multiple users are also combined into one, but in a statistical way, such that capacity not used by one is dynamically available to others. A simple form of aggregation is used on the internet, giving "best effort" service. Additional features provide better control of capacity for each user, especially for business services, to give predefined quality of service (QoS).

Transport products have evolved to include packet aggregation and QoS, because service delivery needs both planning of long term network connectivity, and tuning of its performance for optimum QoS. In packet networks, transport functions are specified at open systems interconnection (OSI) layer 2, which provides protocol-specific switching, and to a limited degree at layer 3, which provides IP routing. In contrast, service-specific functions are more complex and span layer 2 to layer 7.

Ericsson has multi-service platforms that provide packet connectivity via SDH, via WDM and via native Ethernet ports. They are successful in the fast-growing Metro Ethernet segment and meet Carrier Class Ethernet requirements, with support for QoS across a range of applications, including IPTV and business services. The platforms are used in many locations, from customer premises to service nodes to optical backhaul links in mobile networks.

## Network management

Network management – mostly maintenance and service administration - has evolved with networks, supporting convergence between platforms and simplified service provisioning. Ericsson supplies a large part of operators' requirements, managing both infrastructure and services.

*Ericsson is the world's leading provider of technology and services to telecom operators. The market leader in 2G and 3G mobile technologies, Ericsson supplies communications services and manages networks that serve more than 185 million subscribers. The company's portfolio comprises mobile and fixed network infrastructure, and broadband and multimedia solutions for operators, enterprises and developers. The Sony Ericsson joint venture provides consumers with feature-rich personal mobile devices.*

*Ericsson is advancing its vision of 'communication for all' through innovation, technology, and sustainable business solutions. Working in 175 countries, more than 70,000 employees generated revenue of USD 27.9 billion (SEK 188 billion) in 2007. Founded in 1876 and headquartered in Stockholm, Sweden, Ericsson is listed on the Stockholm, London and NASDAQ stock exchanges.*

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