ERICSSON LTE AND SAE

The next step in mobile broadband

ERICSSON

TAKING YOU FORWARD

Ericsson Evolved Packet Systems (LTE and SAE)

Natural evolution choice

- Ideal for GSM/WCDMA/HSPA, CDMA, TD-SCDMA and new greenfield operators
- Hand-over and roaming for ubiquitous mobile broadband coverage from day one
- Offers high bit-rates, high capacity and low latency
- Supported by major operators and vendors

Broadband for all

- Rural or urban; indoor or outdoor; fixed or mobile
- Benefits enterprises, consumers and society in general

Simplicity and flexibility

- Supports FDD and TDD in existing and new frequency bands
- Simplifes building and management of next-gen networks through self-optimization and self-configuration
- Protect the investment and ensure a smooth migration by reusing existing core network when migrating to a SAE based architecture
- Enables flat network architecture

Future-proof

- Builds on the success of GSM/WCDMA/HSPA and CDMA
- Offers huge economies of scale
- Capacity for convergence between mobile and fixed networks

There is now a well-defined, evolutionary roadmap for 3GSM operators to implement the 3GPP standard initiative, Long Term Evolution (LTE) and System Architecture Evolution (SAE), paving the way for massive performance leap to provide users with a superior mobile broadband experience and simplified technology.

In little more than a decade, the 3GSM technology track (GSM/WCDMA/HSPA) has achieved a 1,000-fold increase in the data bit-rate, while maintaining full backward compatibility with the very first mobile phones released on the market. Third Generation Partnership Project (3GPP) technologies will soon see downlink speeds of 42Mbps with High Speed Packet Access (HSPA) Evolution. LTE is positioned to build on this continued evolution by offering downlink speeds exceeding 100Mbps in the near future and well over 300Mbps in the next step.

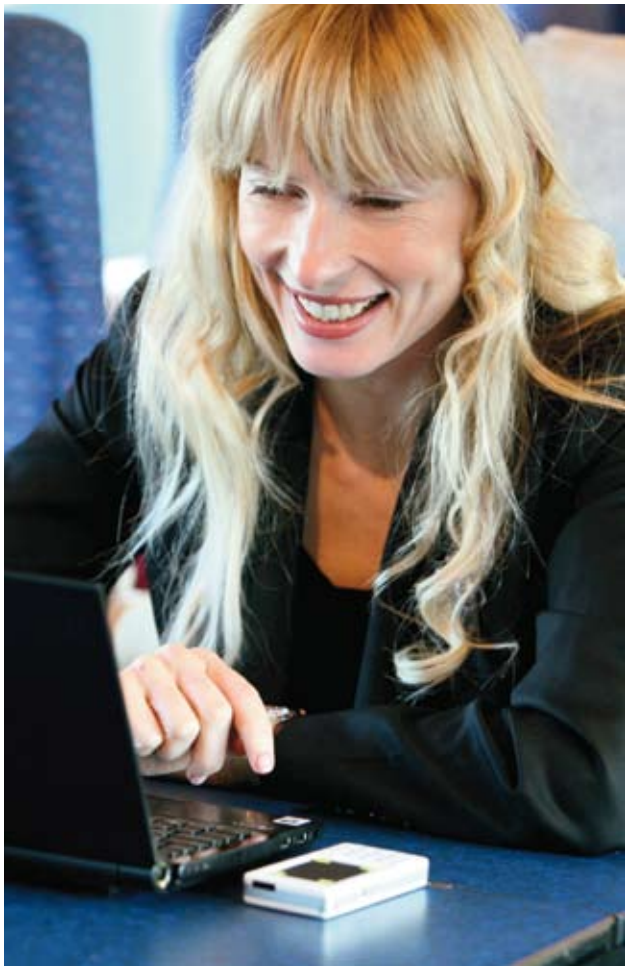
For mobile operators, the choice of technology will influence operations for many years to come. 3GSM technologies represent the future-proof evolution option, not only from an initial investment perspective, but also in terms of economy of scale and the ability to extend and continually enhance the solution over the next five to ten years.

Users race to mobile broadband

People are getting used to having broadband access inside and outside the home or office. They can already browse the Internet or send e-mails using High Speed Packet Access (HSPA)-enabled notebooks, replace their fixed ADSL connections with HSPA modems, and send and receive video or music using 3G/HSPA phones.

In a growing number of markets, net additions of mobile broadband subscribers already exceed those for fixed broadband. Globally, total mobile data traffic is expected to overtake total voice traffic in 2010, and already has in HSPA-enabled networks.

Out of the estimated 3 billion broadband subscriptions in 2013, some two-thirds will be *mobile broadband* subscriptions. By 2011, analysts predict that almost 200 million notebooks will ship annually, and Ericsson believes that at least half of these will have in-built support for mobile broadband via HSPA embedded modules.

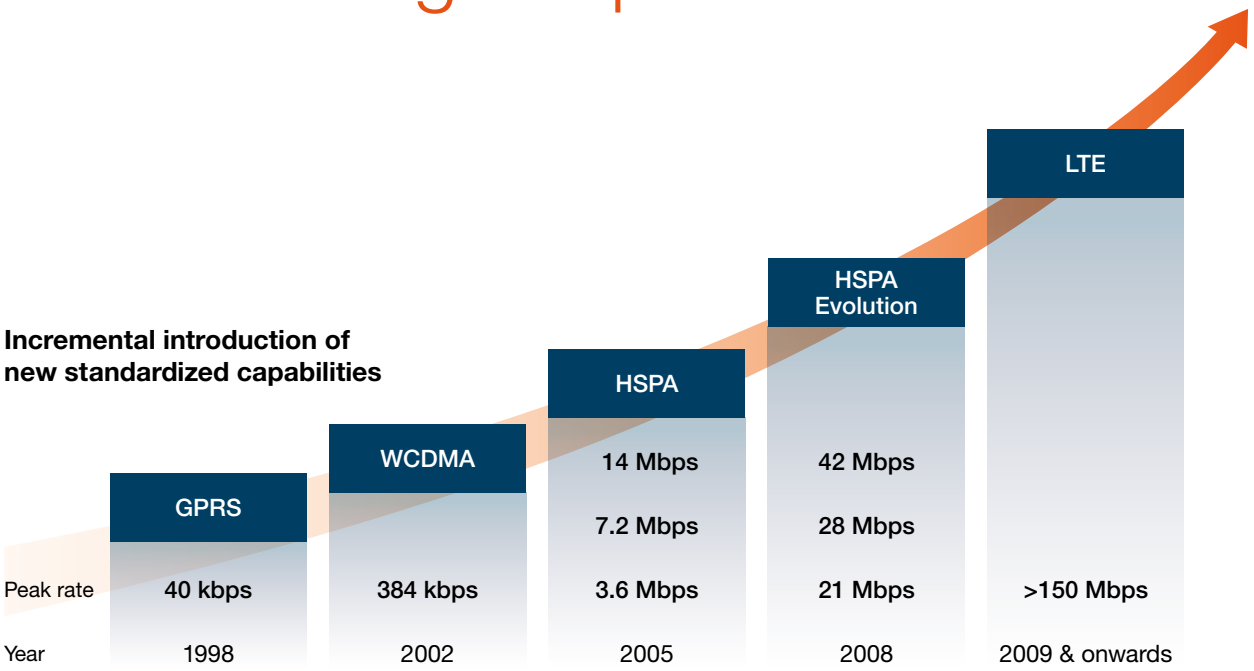


With current user download speeds of up to 21Mbps and upload speeds of up to 5.8Mbps, HSPA offers users fixed-line broadband speeds from their notebooks and other devices anywhere there is coverage. These data rates are poised to increase substantially, and operators will be able to more than double their system capacity and reduce latency for interactive services.

With reduced latency (which is the time it takes for a message to travel from an end-user device to the data network and back again), users will enjoy shorter response times for interactive applications such as mobile office and gaming, as well as fast Internet access for audio and video downloads. Additionally, the faster uplink will improve user experience of mobile broadband services such as video conferencing, uploading user-generated content and sending e-mail with attachments.

For users, such capabilities mean a simpler, but enhanced, mobile experience. It helps bringing people closer together and gives them more flexibility and control over their daily work and private lives. They also begin to realize the potential for mobile vertical applications in areas such as healthcare, public safety, travel and transport, utilities and manufacturing.

HSPA setting the pace



1000 x Higher Peak Rate in 10 years						
3GPP	R99/1999	R5/2002	R6/2005	R7/2007	R8/2008	R8/2008 (LTE)
Peak (DL)	0.384 Mbps	14 Mbps	14 Mbps	28 Mbps	42 Mbps	150 Mbps
Data Rate (UL)	0.064 Mbps	0.384 Mbps	5.8 Mbps	12 Mbps	12 Mbps	50 Mbps
Enhancements			UL: 2ms TTI	DL: 64QAM or 2x2 MIMO UL: 16QAM	DL: 64QAM + 2x2 MIMO or Multicarrier (64QAM) UL: 16QAM	
Commercial Availability	2001	2005	2006/2007	2008/2009	2009	2009

Figure 1. Evolution of the 3GPP family of standards.

In January 2009, there were more than 235 commercially deployed HSPA networks, serving more than 76 million subscribers in over 105 countries worldwide, and these figures are growing rapidly. The GSM Association estimates that the number of HSPA subscribers will grow to over 800 million by end 2013.

There is already a burgeoning ecosystem of mobile broadband device makers, network vendors, application developers and enterprises around the technology. For example, there are more than 1,000 HSPA-enabled devices from over 140 suppliers on the market – including phones, notebooks, PC modems and wireless routers. This gives the 3GSM family significant scale advantages.

Separately, 2x2 MIMO doubles the potential downlink data rate from 14 to 28Mbps, using multiple transmit and receive channels and antennas to improve performance and throughput. Ericsson will release this functionality commercially in 2009.

By combining 64QAM and 2x2 MIMO, data rates of up to 42Mbps can be achieved in the HSPA downlink. Furthermore, in the HSPA uplink, the introduction of 16QAM provides data rates of up to 12Mbps. Potentially, the use of multiple carriers will deliver even higher speeds of 80Mbps or more.

In line with continuous improvements to the radio interface, the core network is also being enhanced and optimized. In step with HSPA, the 3GPP reference architecture is being enhanced with a '3G One Tunnel Solution' to optimize the capacity of installed core networks to deliver mobile broadband services more cost efficient.

LTE preparing to take the baton

While HSPA will deliver sufficient capacity and speed for many years to come, LTE offers operators an additional capacity and speed booster. Scheduled to be commercially available in 2009, LTE will significantly enhance the mobile broadband experience for users, who will be able to enjoy more performance-demanding applications like interactive TV, advanced games or professional services.

LTE and SAE provides a clear evolution path to meet future demands for a high-capacity system that supports multiple spectrum bands. As well as providing smooth migration of current 2G and 3G systems, LTE will also make use of other radio spectrum (including TV bands) for future mobile communications. The standard is specified for data rates of at least 100 Mbps in the downlink and Radio Access Network (RAN) round-trip times (latency) of less than 10 ms. In fact, the technology allows for speeds of 300Mbps – and potentially higher – and Ericsson has already demonstrated LTE at data rates of 160Mbps.

LTE offers mobile operators several important benefits. By building on the commercial success of existing GSM/WCDMA/HSPA services, LTE and SAE will have distinct scale advantages as operators deploy it as a capacity and speed extension to their existing network.

Operators gain deployment flexibility and simplicity from LTE. It offers a choice of carrier bandwidths – from 1.4MHz to 20MHz – and supports both Frequency Division Duplex (FDD) and Time Division Duplex (TDD) access in the same hardware platform. Fourteen paired and eight unpaired spectrum bands have so far been identified by 3GPP for LTE, and there are more to come. This means that an operator may introduce LTE in 'new' bands where it is easiest to deploy 10MHz or 20MHz carriers, and combine this with existing networks to eventually deploy LTE in all bands.

With the strong HSPA ecosystem in place – and LTE being the natural migration choice for most mobile operators – LTE modules will be embedded in many devices, including notebooks, ultra-portables, gaming devices and cameras. Since LTE supports hand-over and roaming to existing mobile networks, all these devices can have ubiquitous mobile broadband coverage from day one.

Looking beyond LTE, the International Telecommunication Union (ITU) defines '4G' as network technology with throughput of 100 Mbps for wide area/mobile use and 1Gbps for hotspot coverage to be applied in new spectrum bands with 100MHz channels. Such systems will be commercially available to meet these requirements long beyond 2010. This means that LTE, more than any other technology, meets key 4G requirements.

A winning combination

LTE radio network products will have a number of features that simplify the building and management of next-generation networks. For example, features like plug-and-play, self-configuration and self-optimization will simplify and reduce the cost of network roll-out and management. Basic mechanisms for this are already built into the LTE specifications, based on 30 years of experience from the cellular industry.

In the core network, the next step is to migrate to Evolved Packet Core based on SAE in the architecture evolution specified together with LTE in 3GPP – the Evolved Packet Core System Architecture Evolution (SAE) – will deliver a multi access, flat two-node architecture for a cost-efficient payload path, end-to-end simplified QoS, excellent scalability and cost-efficient deployment for the delivery of wide range IP services. Furthermore, for operators evolving to LTE/SAE from GSM/WCDMA/HSPA, this approach will maintain full backward-compatibility with legacy networks. SAE also accommodates 3GPP2 access technologies like CDMA/CDMA 2000 and non-3GPP access technologies like WLAN. The industry has put a lot of effort into ensuring migration is equally smooth for GSM/HSPA, CDMA and TD-SCDMA operators.

This means LTE can be deployed in parallel, and coexist efficiently, with existing networks using simplified, IP-based core and transport networks that are easy to build, maintain and introduce services on. Existing HSPA, CDMA and TD-SCDMA operators can use LTE (FDD and TDD respectively) to add capacity and performance; while greenfield operators can deploy LTE directly. GSM operators can theoretically evolve to LTE directly; although Ericsson believes that most will first evolve to HSPA and benefit from its existing superior economies of scale.

For mobile operators, the choice of technology will influence operations for many years to come. 3GSM technologies represent the future-proof evolution option, not only from an initial investment perspective, but also in terms of economy of scale and the ability to extend and continually enhance the solution.

LTE and SAE will significantly enhance the mobile broad-band experience for users, who will be able to enjoy more performance-demanding applications like interactive TV, advanced games or professional services. For operators, LTE offers spectrum flexibility, seamless interoperability with existing technologies, along with cost-effective network roll-out and management.

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 189 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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