Nokia HSPA

Upgrade to higher profitability with cost-optimized high performance Nokia HSPA

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Connecting People

True mobile broadband becomes a reality with Nokia HSPA Solution

There is little doubt that mobile operators have to contend with an increasingly competitive environment. They are being forced to offer services at ever lower prices, which threatens their profitability. At the same time, mobile data consumption is growing and operators must invest in advanced services that will generate new revenue streams and help win and retain subscribers.

Consequently, optimizing expenditure by minimizing the CAPEX needed to create new services and keeping OPEX under control, is high on most operators' list of priorities.

High Speed Packet Access (HSPA) technology is a big step in helping operators fulfil these conflicting demands. Building on the substantial investment that has already been made in WCDMA, HSPA promises fast access and ample capacity to provide advanced services for the mass market.

Best of all, Nokia HSPA provides all this with minimal investment, low delivery costs and simple implementation.

The 'must have' upgrade to WCDMA

Much anticipated, HSPA is a commercial reality today. HSPA comprises two central technologies that offer much faster data speeds than existing 3GPP Release 99 WCDMA:

- HSDPA (High Speed Downlink Packet Access), which offers speeds of up to 14.4 Mbps in the downlink. HSDPA's improved performance is achieved by new adaptive modulation and coding and by moving the control of the air interface from the Radio Network Controller to the Base Station for more efficient scheduling and faster retransmissions.
- HSUPA (High Speed Uplink Packet Access) offers data speeds of up to 5.8 Mbps in the uplink. HSUPA achieves its high performance through more efficient uplink scheduling in the base station and faster retransmission control.

For users, faster transmission speeds mean faster downloads and uploads and better services, such as high quality video streaming and rapid email.
For operators, as well as being able to offer these advanced services, HSPA brings much improved packet data throughput capacity which increases the number of users that can be supported at higher data rates on a single radio carrier. Put another way, operators can offer advanced services to the mass market at minimal cost.

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Fast, flexible and low cost to implement

Although Nokia HSPA is a major evolution of 3G radio access technology, it is available as a simple upgrade to existing WCDMA networks and provides new performance levels that coexist with existing WCDMA usage. Not only does this bring more value to operators' existing investments in WCDMA, but it also makes Nokia HSPA low cost and quick to implement.

In fact, with Nokia HSPA a straightforward remote software upgrade is all that is needed. It really is that easy. No new hardware elements need to be installed into Base Stations or Radio Network Controllers (RNC). This eliminates the delays and costs of field engineers visiting sites to install hardware.

Nokia I-HSPA – bringing data delivery costs to a new low

Nokia has already been working on an important further evolution of HSPA technology to bring new benefits to operators. The result is Nokia Internet-HSPA, or I-HSPA, a flat architecture that provides the first step towards Long Term Evolution (LTE).

Nokia I-HSPA uses a standard HSPA air interface with a simplified network architecture developed by Nokia and which is implemented by adding I-HSPA functionality to an existing Nokia WCDMA Base Station. The architecture channels all user data traffic via a direct link from the Base Station to the Intelligent Service Node, which is the gateway to the Internet and data services. Bypassing the RNC and Serving GPRS Support Node (SGSN) eradicates the costs of delivery arising from these two network elements. In addition, transmission costs are substantially lowered because leased Ethernet lines typically cost much less than leased E1/T1 lines.

With Nokia I-HSPA in selected base stations, WCDMA operators will be able to support high data usage cost-effectively and compete directly with data-only businesses such as public Wi-Fi hotspot providers.

HSPA is ready right now

There is no faster-paced industry than telecoms. The rate at which market share can be won and lost is simply staggering. Mobile data is one of the fastest growing areas and one in which operators must offer better services more quickly than their competitors.

With Nokia HSPA, operators can take the initiative away from other providers relying on alternative future wireless broadband technologies. Nokia HSDPA has been undergoing intensive customer field trials since mid-2005, which have successfully proven the system's high performance. Being available now in commercial networks, Nokia HSDPA gives operators a way to win new business immediately. And with Nokia HSUPA becoming a commercial reality in mid-2007, operators will be able to further extend their lead.

Being based on proven and well-established commercial WCDMA technology is a big advantage. Operators can be certain that HSPA is a mature technology with proven performance throughout the chain – from devices through the radio access system to the core network.

Nokia HSPA – lower costs, faster time to market

Since the earliest stages of the development of its WCDMA solution, Nokia has taken the needs of HSPA into account. Nokia designers were, and still are, determined to provide operators with the most cost-effective upgrade path available and allow them to gain maximum return on their WCDMA investments.

One of the most important benefits of this approach is that installed Nokia WCDMA Base Stations and RNCs can be upgraded to full HSPA capability through a simple, remote software upgrade. Eliminating the need for site hardware changes brings major savings – in time, cost and disruption caused by field engineers travelling to sites to upgrade hardware. This feature alone, with its cost savings and fast time-to-market benefits, differentiates the Nokia HSPA solution.

Nokia HSPA – nothing is left out

Nokia HSPA is a true end-to-end system, encompassing devices, radio access, transport, core network and operator services. Using its expertise, Nokia can help operators to optimize their HSPA to achieve the lowest costs and highest performance.

Nokia believes that it offers the most complete solution available that totally addresses every single technical and commercial issue that operators face in implementing and evolving HSPA.

Radio access – focus and flexibility in implementation

Today, operators can start implementing Nokia HSPA by upgrading existing WCDMA base stations to HSDPA through a simple software application. Nokia HSDPA is fully backwards compatible with 3GPP Release 99 WCDMA, enabling its introduction into networks gradually.

Operators need only implement HSPA at selected sites to give coverage for traffic hotspots, ensuring only minimal CAPEX is needed.

The cost-effectiveness of Nokia HSPA is further enhanced because HSDPA and WCDMA (Release 99) traffic can be integrated into the same carrier. This allows both traffic types to be shared by a carrier, which is a highly efficient way to use base station resources. As HSPA traffic volumes grow, specific carriers can be fully dedicated to HSPA, leaving other carriers to cope with WCDMA traffic. Carrier configuration can be changed at any time as traffic profiles change, eliminating the need for extra investment.

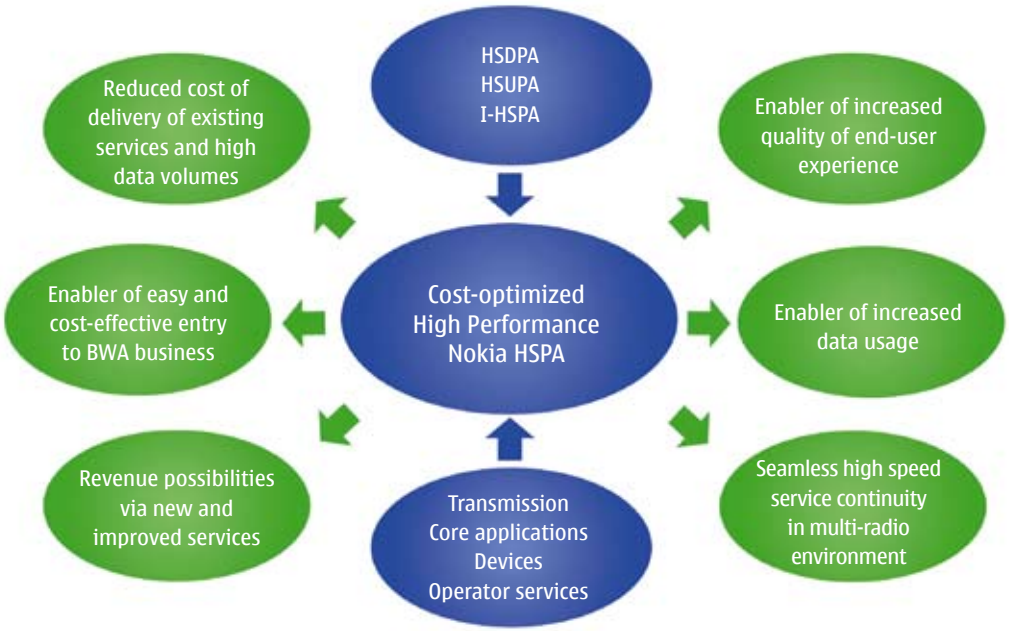
The high performance radio network

Nokia HSDPA's radio performance is proven in the field to provide leading download speeds and network response times. Nokia's innovative design also enables fast upload speeds of 384 kbps, which have been supported since early Release 99 Nokia WCDMA networks. Fast uplink reduces the round trip time, which improves the performance of applications running over HSDPA.

Network performance is further improved by rolling out Nokia HSUPA to boost uplink speeds. Again, with Nokia this requires just a software upgrade for fast and low cost implementation.

As well as providing high access speeds, HSUPA will transform the usability of mobile applications needing a fast uplink, like corporate email. Implementing Nokia HSUPA will achieve more balanced data rates in both directions. This further shortens round trip times to boost even downlink-intensive applications that require acknowledgements for the data they send.

What is Nokia High Speed Packet Access (HSPA) Solution



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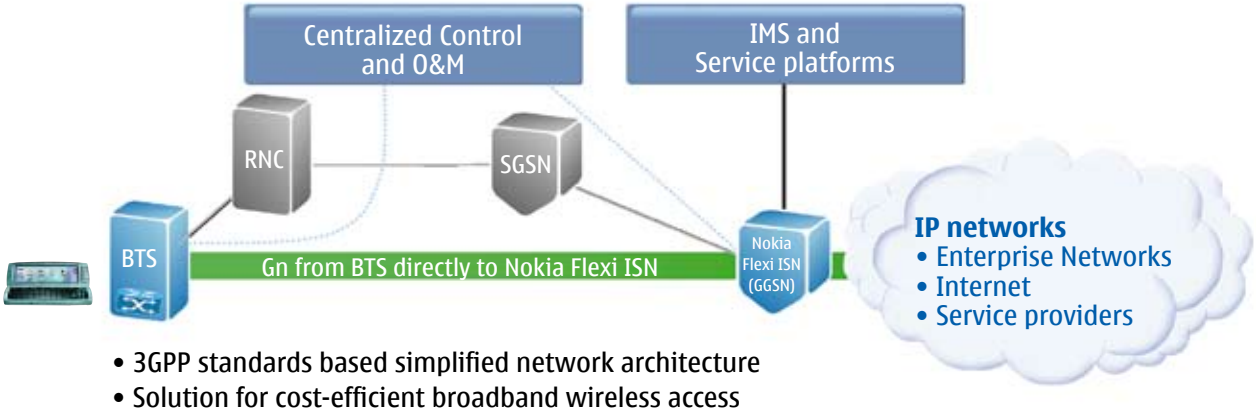
Packet-optimized Nokia Internet-HSPA



- 3GPP standards based simplified network architecture
- Solution for cost-efficient broadband wireless access
- Improves the delay performance
- Deployable with existing WCDMA base stations
- Transport savings
- Utilizes standard 3GPP devices

Nokia I-HSPA – capturing new revenue from public hotspot users

Looking still further ahead, Nokia has developed an evolution of HSPA that offers even lower delivery costs for high volume data users – Nokia Internet-HSPA, or I-HSPA. Although initially created by Nokia, I-HSPA is based on open 3GPP standards allowing other vendors to offer solutions in a free and competitive market.

With Nokia I-HSPA, a WCDMA operator can offer high data speeds extremely cost-effectively. The wide area coverage of Nokia I-HSPA makes an appealing alternative to Wi-Fi hotspots, for example, with minimal CAPEX commitment. The technology allows subscribers to use their conventional HSPA-capable terminals to access wireless broadband in busy locations and beyond. I-HSPA shares a carrier with normal WCDMA traffic. Just an I-HSPA adapter is needed to install Nokia I-HSPA into an existing WCDMA Base Station, creating a direct link from the Base Station to the core network and the Internet. Bypassing the conventional route through the RNC and SGSN with cost-effective transport technologies saves considerable transmission capacity and minimizes the CAPEX needed to build capacity in the network, allowing the operator to offer a highly competitive service.

Nokia multi-radio access – high speed, high quality everywhere

As mobile communications develops, new radio systems are being implemented alongside established technologies. Many operators now, or soon will, provide GSM/EDGE/WCDMA access for subscribers.

In keeping with this trend, mobile devices incorporate a range of radio technologies. These give the user seamless continuity as they move around and enable them to choose different applications without having to change devices.

Nokia is committed to the new multi-radio world, which is one reason why Nokia HSPA and I-HSPA can be easily integrated with existing WCDMA and GSM/EDGE networks. Today, Nokia, with its market-leading 2G/3G interworking solution, supplies more than half of the world's commercial WCDMA/EDGE operators.

Nokia HSPA

Nokia HSPA is the future-proof evolution of Nokia WCDMA that is simple and fast to implement and provides the capacity that operators need to be able to offer advanced services to the mass market at minimal cost.

- Nokia HSPA is a software upgrade, no hardware changes are needed
- Nokia HSPA can be evolved to Nokia I-HSPA for low cost high speed data networks
- Nokia provides an end-to end offering from devices, through the radio access, core networks and transport to expert support services
- Nokia solutions provide multi-radio access that can meet the high speed, high quality needs of users wherever they are

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Nokia Transport is the smarter way to develop backhaul

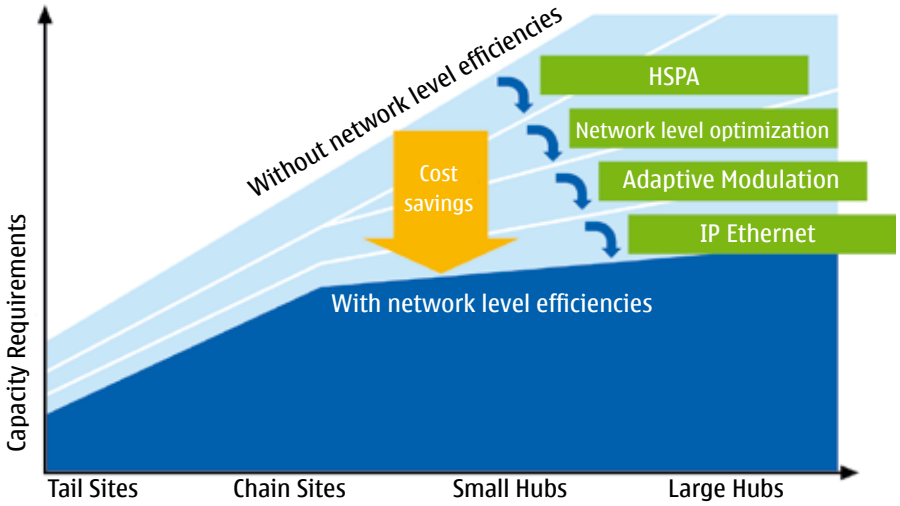
In the early days of an HSPA launch, there will be little impact on backhaul capacity. However, as users come to appreciate the high performance of data services enabled by HSPA, the higher data throughput generated must be taken into account when developing the transport infrastructure from the base station to the mobile network.

HSPA, like all the new radio access technologies, is optimized for packet-switched services which demand a transport network that can deal with a large share of packet traffic.

Nokia understands both transport evolution and radio network evolution and has produced its Cost-optimized Transport Evolution concept to help operators meet the challenge.
The concept focuses on the key backhaul segments, lower access and metro/regional access sites and shows how each segment can be optimized according to their specific needs.

With Nokia HSPA, cost-optimization extends to the transport network. Enhanced efficiency in the transport network reduces the required transport capacity. In the lower access level, HSPA brings higher transmission efficiency at the Iub interface. Although the capacity for each site needs to be dimensioned according to peak demand, up to four-fold efficiency improvements can be achieved at the network level, without compromising quality for the user.

Synergies between mobile and transport network



- HSPA networks benefit from a higher level of integration
- Efficiencies in the mobile network reduce the required bandwidth

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Nokia site solutions integrate the transmission units, including microwave radio indoor unit, with the Base Station to reduce site space and associated costs. A single network operations system that manages both the mobile and transport networks will help to reduce both CAPEX and OPEX. Nokia's flexible transport solutions provide capacity on demand, enabling transport to be scaled up cost-effectively as the use of HSPA-enabled services increases.

Nokia Unified Core Network: My services, my device, always best connected

The core network must be capable of supporting the demands of advanced user services that Nokia HSPA will enable operators to offer.

The simplified and holistic design of the Nokia core network enables operators to create cost-effective voice telephony, differentiate with innovative multimedia services and stay in control of the traffic. The Nokia Unified Core Network solution brings easy to use, personalized voice and multimedia connections.

The key solutions are:

- Nokia MSC Server System, the number one mobile soft switch that can reduce maintenance, transmission and site costs of mobile voice telephony by 30-70%
- Nokia voice over broadband solutions, such as I-HSPA, which enable a unified service experience across the various access solutions
- Nokia IP Multimedia Subsystem (IMS), which supports a range of multimedia services such as video sharing, over any access technology. Other solutions include Nokia Push to Talk, Presence and Messaging
- Nokia Flexi Intelligent Service Node (Nokia Flexi ISN) acts a centralized control point that interfaces with online and offline charging and subscription management systems. It provides access-independent connectivity to the operator's own services, third party and Internet based services, as well as secure access to corporate networks. Nokia Flexi ISN performs deep packet inspection and protocol based traffic analysis. Combined with subscription awareness functionalities, these features allow end user access to services to be controlled and charged according to the perceived value of the services and applications.
- Nokia Browsing Gateway, which simplifies surfing on handheld devices
- Nokia Charging solution, which provides the flexible online charging engine for all voice and multimedia services consumed by post- or prepaid subscribers.

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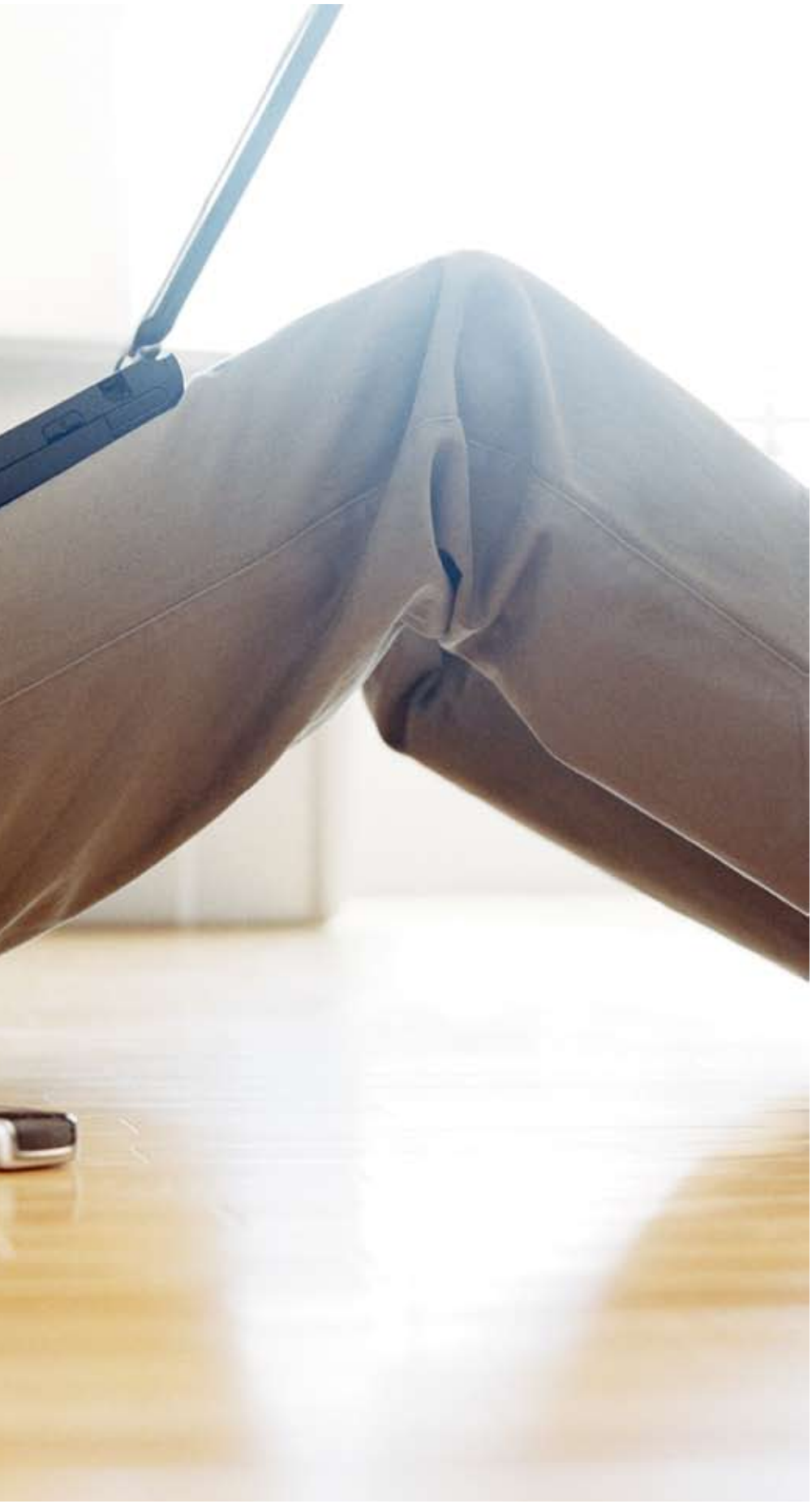


Nokia devices – leading technology and user experience

As the world's leading mobile phone producer, Nokia is committed to making available competitive HSPA-enabled devices that are aligned with operator launches to the mass market. Nokia has a strong track record of being first to launch and prove new radio technologies in its terminals – Nokia made the first 3G WCDMA packet data call and was first to introduce a commercial EDGE terminal.

Nokia operator services – expert end-to-end support

As well as all the network elements for HSPA implementation, Nokia provides a comprehensive set of services to help operators get the most benefit from Nokia HSPA. Nokia services cover the entire process of planning, building and optimizing networks and services, enhancing network performance, training and improving operations.

Nokia supports operators from the initial stages of HSPA implementation with a range of services that help to identify and develop the user services needed to win the mass-market.

Nokia solutions such as 'Boost Videosharing' and 'Get Music to Network' help ensure that users get the service quality they expect from day one. Once launched, Nokia Service Management can be used to monitor and manage the user experience of services throughout the network.

Nokia Software Support Services also simplify the software implementation of HSPA while Nokia support services ensure optimum availability and performance of the network.

Nokia Planning and Optimization services maximize the HSPA performance while minimizing the investment in new equipment and transmission lines. Nokia Learning Solutions will build on this experience to help operators realize the full potential of their personnel resources.

Faster access drives up mobile data traffic

Time and time again, experience shows that when a new mobile radio technology is introduced, operators' revenue and data ARPU go up. It happened with GPRS and EDGE, and it happened with WCDMA.

With EDGE, for example, in October 2005 the GSM Suppliers Association (GSA) released figures from a survey showing major increases in data consumption and ARPU for operators with a commercial EDGE deployment. All EDGE operators surveyed reported continuously growing data usage, with one operator in Europe claiming that ARPU for an EDGE user is 19% higher than for a GPRS user.

HSPA is poised to follow the same pattern.

Operators launching HSPA early will be able to use the low cost of data delivery and faster access to achieve a strong competitive advantage and win market share. Their image as an advanced mobile operator offering fast mobile Internet access will be established and bring many benefits – higher data ARPU, more revenue, lower churn, greater market share and more.

HSPA is likely to first catch the attention of the most lucrative of mobile subscriber segments - corporate users.

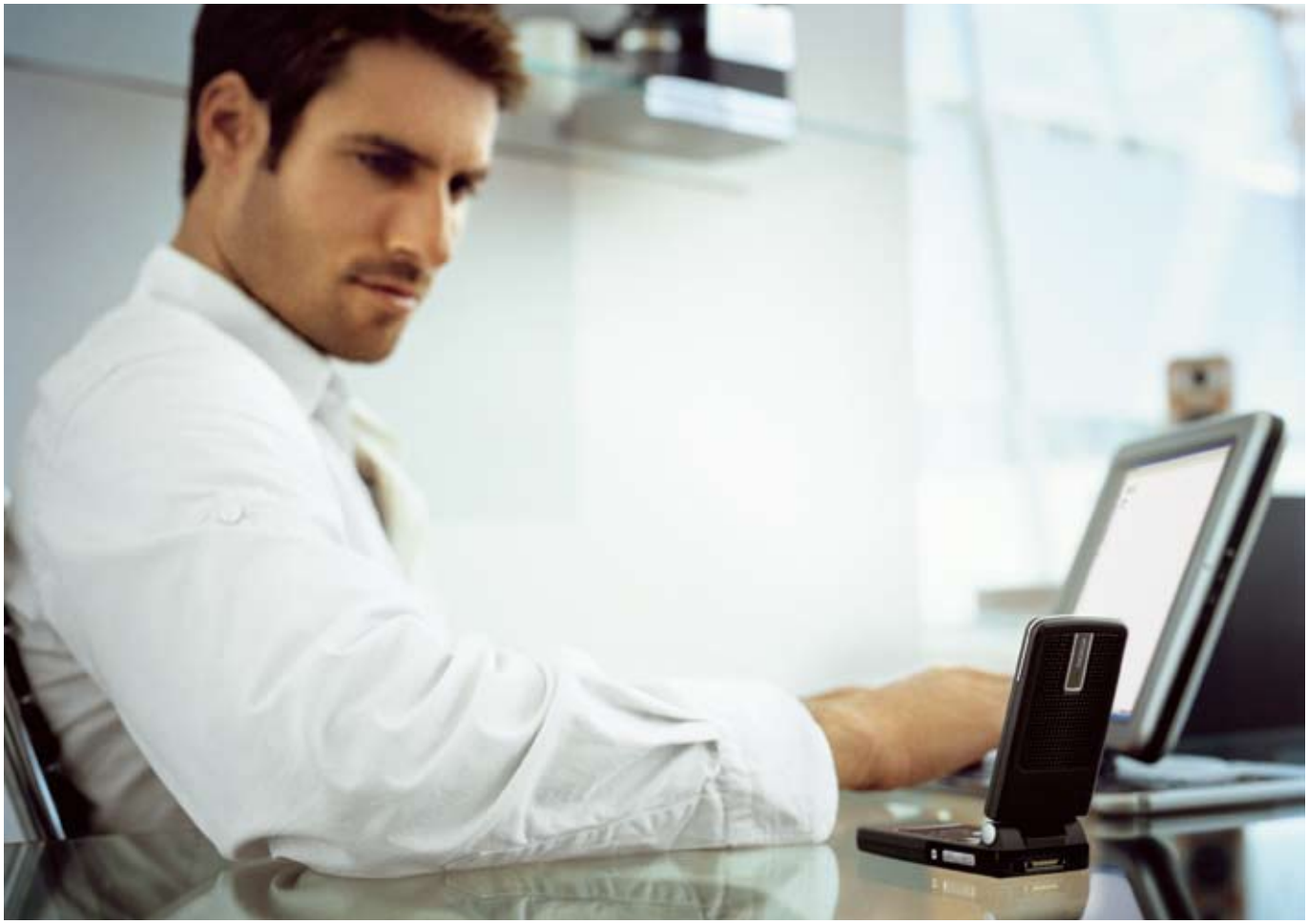
HSPA offers faster corporate services

The fast download speeds of HSDPA will bring major benefits to many business users. Businesses tend to be very bandwidth hungry users of mobile services and push the capabilities of EDGE and WCDMA technology to their limits. With HSPA they will experience a new level of capability, no longer will they need to even think about the size of the files that they send and receive.

Corporate services, such as receiving emails with large attachments, browsing the Internet and corporate intranets, and downloading large files like slide presentations will become fast and efficient over HSDPA, making WCDMA the preferred mobile business technology.

With the launch of HSUPA and the associated raising of the uplink speed, other business applications will benefit, such as sending large emails, video conferencing and uploading high quality images and other large files from users in the field.

Mobile laptop business users are likely to be among the first to use HSPA technology with plug-in cards among the first HSPA devices available.



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Higher network quality plus lower tariffs equals more users

The faster access speeds of HSPA services are just part of the story. The extra capacity will enable operators to aim exciting new services at the mass market. What's more, the lower tariffs that will become possible thanks to the low data delivery costs of HSPA will attract many users to see the mobile Internet as a realistic service for them.

Content-to-person services such as Internet browsing or downloading music, multimedia or other content will benefit first from the introduction of HSPA. Later, person-to-person services built on IMS networks, for example, will benefit too. Video calling, video sharing, and new applications such as uploading large photo and video files to servers via the mobile network will make full use of the high quality images and videos enabled by fast developing new devices with their megapixel camera capabilities.

Nokia HSPA – low network impact, high revenue effect

HSPA offers benefits to mobile operators and subscribers that far outweigh the costs and effort of implementation. With Nokia radio access network, upgrading to HSPA is as straightforward as it gets. The simple software upgrade to existing Nokia WCDMA base stations means no mandatory hardware installation, no site visits and no hassle.

Furthermore, with Nokia, operators have all the support they need for all aspects of HSPA implementation. Nokia HSPA encompasses transport solutions, the core network, devices and extensive support services that are all aligned to achieve the most cost-effective implementation.

With Nokia, operators can bring HSPA to market quickly, cost-effectively and with the highest network performance. All of which will enable them to offer their subscribers exciting new services at groundbreaking prices that will move the mobile Internet into the mass market.

The Nokia WCDMA RAN is a future-proof system because it has been designed from the outset to support flexible evolution to HSDPA, HSUPA and I-HSPA without the mandatory hardware changes that can create such a discontinuity for operators. Additionally, Nokia I-HSPA brings a further evolution to high capacity data-only networks.

With the cost-optimized Nokia HSPA and Nokia I-HSPA solutions, operators have the flexibility and capability to tackle new market areas, win market share and boost data ARPU.

With Nokia HSPA, all the barriers have now been torn down.

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