



General Packet Radio Service

GPRS,
step inside the **world** of
mobile multimedia services

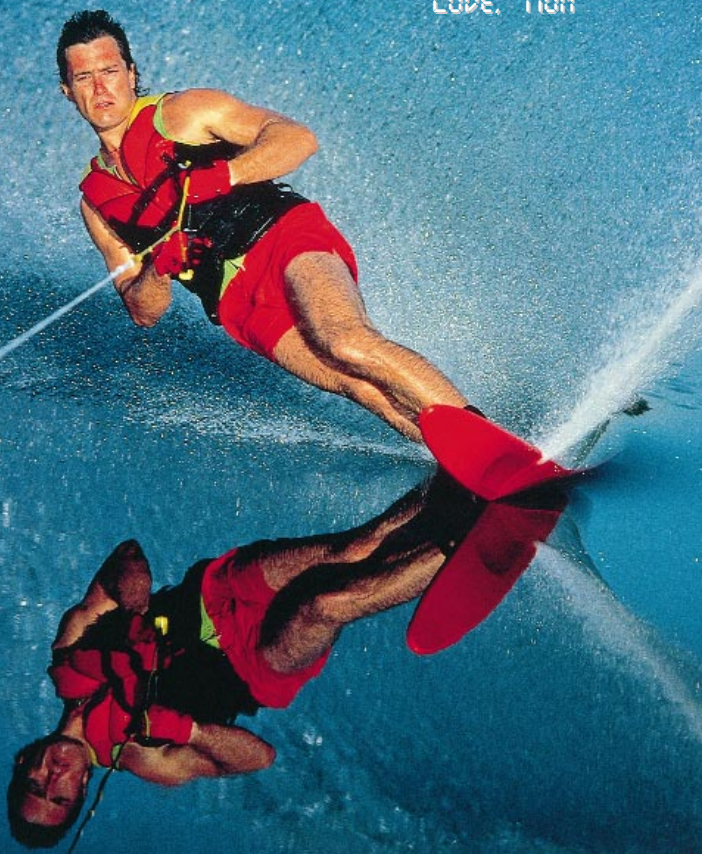


NORTEL
NETWORKS[™]

How the world shares ideas.

Hi boys. Dad trying his luck on water-skis.
Thought you'd be impressed!
Wish you were here

Love, Mum



Instantly send holiday snapshots to family and friends simply by connecting a camera to a wireless telephone.

General Packet Radio Service (GPRS), the next evolution of GSM, has arrived, opening the door to mobile Webtone services that will bring about dramatic changes in the way the world lives and works. The IP expertise behind Nortel Networks' GPRS solution assures the realization of the high quality data services you'll need to compete in all market segments. GPRS leads the way to Unified Networks, bringing together the world of IP and GSM to deliver any communication service, anywhere, anytime. It's all waiting and it all starts with GPRS: an advanced data solution for today.. your key to the future.

GPRS opens the door to unlimited services

In today's competitive marketplace GSM operators want to offer low cost, profitable, innovative services to increase revenues and expand their subscriber base. Our GPRS technology meets this challenge head-on, providing unlimited opportunities for GSM operators to offer advanced mobile data services to network subscribers in all market segments.

Our end-to-end GPRS solution contains all the components needed to build a complete service offering, from radio technology and data switching products, to service management functions. We deliver transmission rates in a GSM network with a **price performance level three times higher** than those offered using today's expensive and slow circuit switched method, with speeds



exceeding those even in the wireline world. And with **call set-up time reduced to a fraction of a second**, the door is open for data usage to become a lucrative commodity for operators who face a growing subscriber demand for instantaneous access to information sources and an endless variety of services and applications.

Webtone

Web = user-driven innovation, accessibility of rich multimedia content, rapid service evolution.

Tone = the implicit trust, on hearing a dial tone, that ubiquitous global connectivity is reliably present.

New life styles, new work styles...

Life styles are changing rapidly and subscribers, including individuals, businesses and corporate users alike, are expecting more mobile services. Ordering cinema tickets wirelessly, accessing up-to-date traffic information from your car, or viewing video clips of the latest news will soon become common events in everyday life.

For corporate users, accessing corporate intranets and downloading files quickly and efficiently will become essential business skills. The data application opportunities for business and industry are diverse, including remote equipment management, location identification for transportation companies, and remote information access for mobile workers. Mobile data technology affords added value to life styles and business processes leading to enhanced productivity, reduced costs and an overall increase in efficiency.

... with the Net in the palm of your hand...

The Internet has become a critical resource for millions of people worldwide, with many individuals doing their shopping on-line, and corporations sharing information and communicating around the globe via their corporate intranets. There will be an estimated 1 billion Internet users by 2005 and today's Internet traffic has already surpassed voice traffic (Source: Internet Users Forecast IDC, 1998).

The case for a mobile Internet is a clear one with the explosion in GSM penetration rates in parallel to Internet demand. Considering that a large percentage of all Internet traffic runs on Nortel Networks systems and that we hold a leading position in data switching, IP, and radio technology, Nortel Networks is extremely well positioned to bring mobile Webtone to GSM operators.



From your in-car GPRS terminal, you can reserve and pay for concert tickets and even download the latest travel information to find the quickest route to the show.



A last minute meeting? No problem! Simply access your shared intranet calendar, quickly download your presentation from the corporate web site, and you're ready to go.

... it's all possible with GPRS

The explosive demand for mobile communications and the tremendous growth of the Internet present an exciting opportunity for GSM operators to capture new markets by provisioning a variety of exciting new data applications. With our GPRS solution, easy access to high speed data packet services is easily achieved, enabling operators to respond quickly to market demands and quickly gain a competitive edge.

GPRS

superior technology

GPRS is a packet radio access technique based on GSM radio which transfers data efficiently, thus optimizing the use of network resources. The advantage of GPRS is that it takes into account the bursty nature of data traffic and effectively optimizes spectrum use by dynamically sharing time slots between different users. As a result, multiple users can make data calls using the same time slots. GPRS supports direct end-to-end IP connectivity, transparent and non-transparent data, and standard data protocols such as TCP/IP and X.25. Applications can be based on Point To Point service and Point To Multipoint service.

GPRS - network architecture

Our GPRS solution, designed to minimize the hardware impact on the network, involves a simple overlay to the core (NSS) GSM network. With the simple addition of a few key modules, network operators can provide value-added data services to subscribers quickly, whenever and wherever the need arises. The three core modules required are the PCU (Packet Control Unit), SGSN (Serving GPRS Support Node), and GGSN (Gateway GPRS Support Node). The PCU manages channel and radio link control and provides the standard interface to the SGSN. Based on our Passport™ product, the PCU converts frames from the radio part into packets and vice versa. Additionally, it features a Quality of Service functionality, load sharing and flow control.

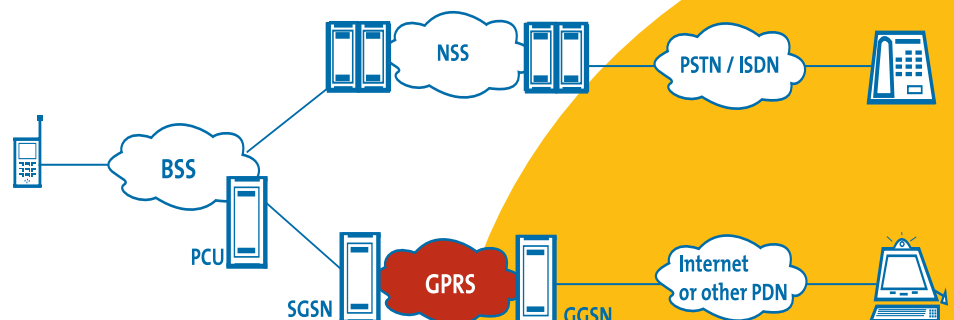
Based on Passport™, the SGSN, primarily responsible for mobility management, detects mobile stations in the local area for the transmission and receipt of packets. Additionally, it locates and identifies the status of mobile stations and gathers crucial call information, an essential aspect of billing. The SGSN also controls ciphering, compression and interaction with GSM circuit switched services for mobile paging and Short Message Services (SMS).



Your team just won! Watch game highlights or download game statistics. Don't miss any sports news on your way home from work.

The GGSN acts as a gateway between GSM networks and public data networks. Based on the feature rich Bay Networks Contivity™ Extranet switch, the GGSN can connect directly to the Internet using IP over a variety of physical and tunnelling protocols. The GGSN also functions as a fire wall, to ensure that all incoming and outgoing data is authorized adding security to your network.

Thanks to the unique and open platforms offered by Passport™ and the Contivity™ Extranet switch, the GPRS network components support all wireless functions, from the Inter-Working Function (IWF) for today's circuit switched functionality, to future protocols such as Enhanced Data rates for GSM Evolution (EDGE) and Universal Mobile Telecommunication System (UMTS).



The best of both worlds

We are confidently moving into the future and taking with us the best of the TELECOMMUNICATIONS and IP worlds: by bringing together our award winning Passport™ data switch and the industry leading IP expertise of Bay Networks, we are creating the perfect synergy for delivering an IP strong and technology rich GPRS solution. You can be assured of a high quality wireless data network for the delivery of secure and feature-rich services to both individual and corporate subscribers.

Outstanding IP expertise

The GGSN is based on the Bay Networks Contivity™ Extranet Switch, a tunnelling platform initially designed to provide a gateway from remote access points in the Internet into a corporate intranet via advanced tunnelling technologies. In the GPRS network, the Contivity™ platform provides a high performance, scalable, and secure gateway to the Internet using standards based tunnelling protocols.

The GGSN only accepts traffic from authenticated, encrypted, tunnelled connections, and all traffic activities going in and out of the GPRS network are securely logged, a critical aspect of billing. All of these elements, along with Bay Networks' technological expertise in areas such as IP address management, IP tunnelling, Radius and LDAP security, authentication, bandwidth management, routing, fire wall filtering and Quality of Service management, effectively ensure maximum security, high performance and complete ease of operations.

Internationally Acclaimed Passport™ Portfolio

Nortel Networks offers technology rich, robust GPRS networks to GSM operators. Two key network components, the SGSN and PCU are based on our internationally acclaimed Passport™ product, a packet switch that delivers responsive, reliable and cost-effective networking solutions on a high-performance networking platform. With over 13000 Passport™ switches deployed worldwide, Passport™ has gained praise among customers and international recognition through numerous awards from trade journals and a variety of renowned data organizations.

References for Passport™ are numerous, being at the heart of a variety of global data networks such as Reuters, SITA, also a voice network and La Caixa savings bank. Passport™ is the obvious choice for the Nortel Networks' GPRS platform, assuring reliability, high performance and robustness.



A critical piece of equipment is down. The fault is easily detected via a wireless signal sent directly to a laptop by fault monitoring equipment. Recommended corrective actions are accessed via the corporate intranet and the necessary repairs are quickly completed.



Moving confidently into the future

In a competitive marketplace, operators offering high-speed data access are expected to attract high value subscribers and generate significantly higher revenues per subscriber. Nortel Networks is laying the road map for operators to deliver advanced data solutions from GPRS and EDGE to the third generation UMTS, ensuring that subscribers have access to advanced data services every step of the way.

Our GPRS solution is ideal for operators in the run up to UMTS. It is based on an IP backbone to lay the foundation for the Unified Networks of the future. While radio infrastructure will alter for UMTS, network operators will benefit from the use of the same GPRS core network components, the GGSN and the SGSN.

GPRS and EDGE will enable GSM operators to develop a wireless data dependent subscriber base, positioning themselves in the market for delivering more value-added data services with the third generation UMTS.

Our GPRS solution is the first step for mobile operators toward Unified Networks, bringing together the world of IP and GSM: global, scalable, high-capacity public and private networks built on innovation, IP technology, and application-focused thinking. Unified Networks brings you the benefit of putting voice and data traffic over one single IP backbone, allowing service transparency across multiple networks and management by one core system.

Nortel Networks is uniquely positioned to build true Unified Networks thanks to proven leadership in telephony, IP-based data, wireline and wireless networking. With a Unified Network at the heart of communications, you can leverage existing infrastructure to capitalize on the promise of delivering Webtone and offering true unified solutions: simplified network operation, reduced equipment and maintenance costs, improved flexibility and increased revenue with low cost service creation and high quality services, all adding up to a competitive edge in the marketplace.

Working with our customers

Nortel Networks has various GPRS trials scheduled throughout the year to demonstrate the superior technology of our GPRS solution and the many benefits it will bring to operators. These trials range from a simple core network to a complete end-to-end solution with optional provisioning of GPRS terminals and a middle-ware platform.

Efficient deployment strategy

Fast deployment means faster time to market and, most importantly, faster pay back time. With the simple addition of a few components to the existing core GSM network, the network is quickly up and running and new services, new customers, and more revenue are quickly realized.

Investment on Demand

With our GPRS solution you can offer high-speed data services with minimal initial investment, and gain the benefits of Passport™ and Contivity™, which are both scalable and cost-effective. Scalable: the network can easily grow as subscriber numbers increase from hundreds to millions. Cost-effective: simply add a few components to the network at limited expense.

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