



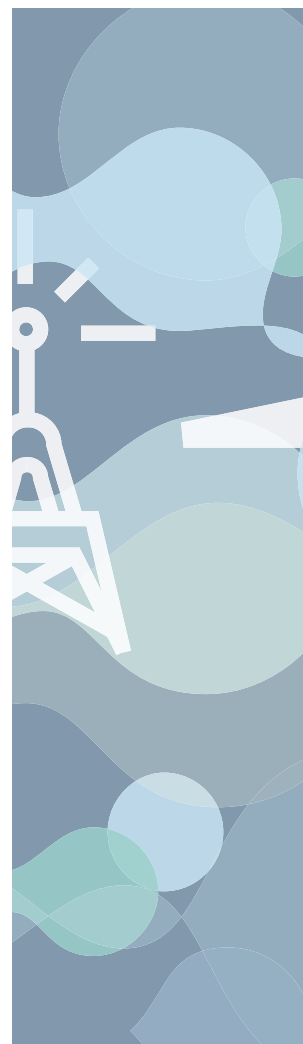
MOTOROLA GPRS++ SOLUTIONS

*EXTENDING PERFORMANCE, OPENING REVENUE STREAMS AND
REDUCING EXPENSES FOR GSM/GPRS NETWORK OPERATORS*

As more customers experience the conveniences and advantages of the new high-speed, data-based wireless services, they're asking for — and expecting — a more robust selection of mobile applications from their wireless network providers.

To succeed in this demanding marketplace, you need to ensure your network can deliver ever-greater performance as you move to the new generation of high-speed services. Along the way, you must maintain lowest possible capital expenditures (CapEx) and operational expenditures (OpEx), while also increasing Average Revenue Per User (ARPU).

We're committed to helping you meet these diverse and demanding needs. This is why we have enhanced the industry leading General Packet Radio Service (GPRS) solution to offer significant speed and capacity gains. This leading-edge infrastructure and software solution, known as Motorola's GPRS++, increases bandwidth, capacity and quality in your GSM/GPRS network, to enable feature-rich new services and lowest capital and operational expenditures. All so you can gain new ability to meet customer needs — and open untold business opportunities.



GPRS++



GPRS++

WHY MOTOROLA'S GPRS++?

It's no small task to maximize ARPU, satisfy customers and manage CapEx and OpEx. Motorola's GPRS++ offers an elegant solution to meet these imperatives. Here are the quick reasons why:

- **New speeds, new revenues, right now.** Motorola's GPRS++ delivers far faster data throughput and greater capacity, enabling a range of new services that ultimately increase customer satisfaction and service revenues. And it's available now for rapid incorporation into your GSM/GPRS infrastructure.
- **Market differentiation.** The greater speeds and capacity made possible by GPRS++ deliver unique, advanced features that can set your network offerings apart from the competition.
- **Reduced operational cost.** Our GPRS++ solutions offer superior network functionality, with network monitoring and optimisation to reduce your cost in hardware and software.
- **More stable coverage.** Because the fast coding schemes of our GPRS++ systems operate successfully in challenging radio conditions, your customers can enjoy high-speed data services more consistently — and you'll reduce the need to add additional cell sites, holding down CapEx.
- **Services and support to excel.** We can provide full design and optimisation of your GPRS core and Radio Access Network (RAN) to make transitioning easier — and enable you to focus on attracting new customers and reducing churn.
- **Reuse, adapt, extend into 3G.** GPRS++ provides a cost-effective migration path to 3G networks, maximising your return on investment to reduce CapEx.
- **Industry-best track record.** You benefit from our proven market leadership in IP technology, evidenced by scores of successful deployments and our complete, end-to-end solutions that include handsets, networks, applications and ongoing operational assistance and support.

GPRS: THE RIGHT TECHNOLOGY, RIGHT NOW

If you're running a GPRS network, you have the infrastructure and services to deliver revenue-generating new services while supporting a smooth transition from a circuit switch environment to an IP network. You're ready to reap the benefits of capacity-on-demand and faster speeds, all made possible by the inherent efficiencies of the IP network.

Taking these benefits one step further, our GPRS++ network utilises Coding Schemes 3 and 4 (CS3&4), which maximise potential revenues by providing the fastest GPRS delivery system available today. You gain the capability to offer new, more robust applications that can run at 3G-like speeds as you evolve your network to deliver true 3G services.

ALWAYS-ON SERVICE DELIVERS SUPERIOR EXPERIENCE, EFFICIENCIES

A key GPRS advantage for the end user is the provision of a permanent virtual connection to the network, made possible by GPRS' use of packet data transfer. Customers can receive email in "background mode" or be kept in constant chat mode via Instant Messaging, for example. There's no need to reconnect before requesting a service and no setup delay. This "always-on" performance adds great convenience and immediacy to the customer's experience.

SPREADING NETWORK RESOURCES OVER A WIDER NETWORK BASE

The virtual nature of the GPRS connection adds another important benefit for end users and operators alike: Because network resources are not consumed during periods when a user is not actually sending or receiving data, the network is considerably more efficient for data applications than a circuit switch network. (Traditional circuit switch networks provide the user with a permanent connection for the duration of the service use, whether or not data is being sent.) The operator can conserve network resources over a wider customer base, helping to reduce capital outlays and operational costs. Consumers receive more cost-effective services, because they pay only for data received, and not a continuous connection.

SERVICE FLEXIBILITY TO MEET CHANGING USER DEMAND

In addition to the inherent benefits of GPRS described above, the Motorola GPRS++ solution provides operators with flexibility to seamlessly add additional voice capacity. This is achieved by optimising the load allocations between data and voice time slot requirements. When there is idle capacity in the data time slots these can be dynamically allocated to voice traffic. This voice-capacity scaling reduces pressure to add new infrastructure, ultimately reducing CapEx. In addition, time slot reallocation provides opportunities for new revenues that would otherwise not be realized.

NEW SERVICE AND REVENUE OPPORTUNITIES

Implementing a GPRS++ network offers many revenue-generating market opportunities.

Data Network Customers

- Business to Business – SMS/EMS/MMS, email and Oracle
- Business to Customer – Location Based Services, SMS/EMS/MMS, video, gaming and email
- Customer to Customer – Instant Messaging, SMS/EMS/MMS and email

Gaming Services (applications and content resale)

Network Billing Solutions

- Single Monthly Package
- Billing per Packet/Byte/Bit

Channel Market Revenues

- Water Industry – Meter reading
- Advertising – Content providers
- Oil Industry – Oil/gas data loading
- Security
- Industrial warehousing/distribution

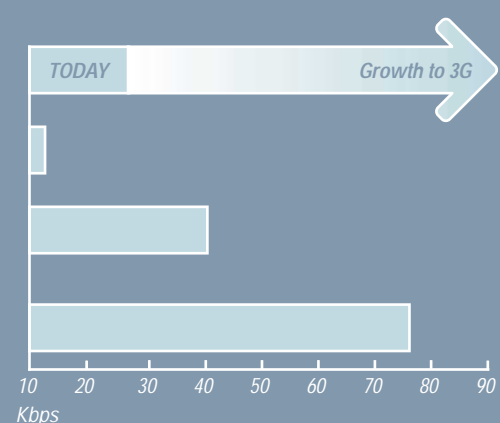
Today's applications require bandwidth of 10-30 Kbps, which can stretch the limits of CS1&2. With Motorola's CS3&4, you achieve more than twice the bandwidth of CS1&2, providing fast and efficient access times — especially as applications become more sophisticated on the route to 3G.

Application Requirements

GSM/TDMA Circuit Switched

Coding Scheme 1 and 2

Motorola GPRS++ Coding Scheme 3 and 4



A COST-EFFICIENT, CONTROLLED TRANSITION TO UMTS

Our GPRS++ solution provides Global System for Mobile (GSM) network operators with the first step on the evolutionary path to third generation mobile communications, Universal Mobile Telecommunications System (UMTS). When the time is right, migration to UMTS via Motorola's GPRS++ infrastructure will help ensure that your investment in GSM and GPRS is protected.

This is possible because our GPRS++ network subsystem (NSS), including the GPRS Support Node (GSN) and Location Register, are functionally separate from the base station subsystem (BSS). In direct comparison to other network suppliers that require significant hardware and software upgrades, this distributed core network architecture approach — developed and refined in part through our substantial

“real world” experience in transitioning our Code Division Multiple Access (CDMA) networks to UMTS (W-CDMA) — allows for considerable reuse of GPRS elements, ensuring long-term utilisation of the existing investment footprint.

As you begin a transition to UMTS, you can continue to gain valuable revenue streams on your GPRS networks. We can offer flexible options to migrate with low risk and low cost, ensuring GPRS-based services are maintained. Once UMTS services are initiated, customer movement between GPRS and UMTS will be seamlessly managed with effective handover techniques already deployed in our pioneering CDMA networks. This will facilitate high-quality customer service and help maximise your revenue opportunities.

MOTOROLA'S GPRS++ ARCHITECTURE

The GPRS++ architecture encompasses all network functionality to deliver a complete solution, from the access networks to core transport and software platforms.

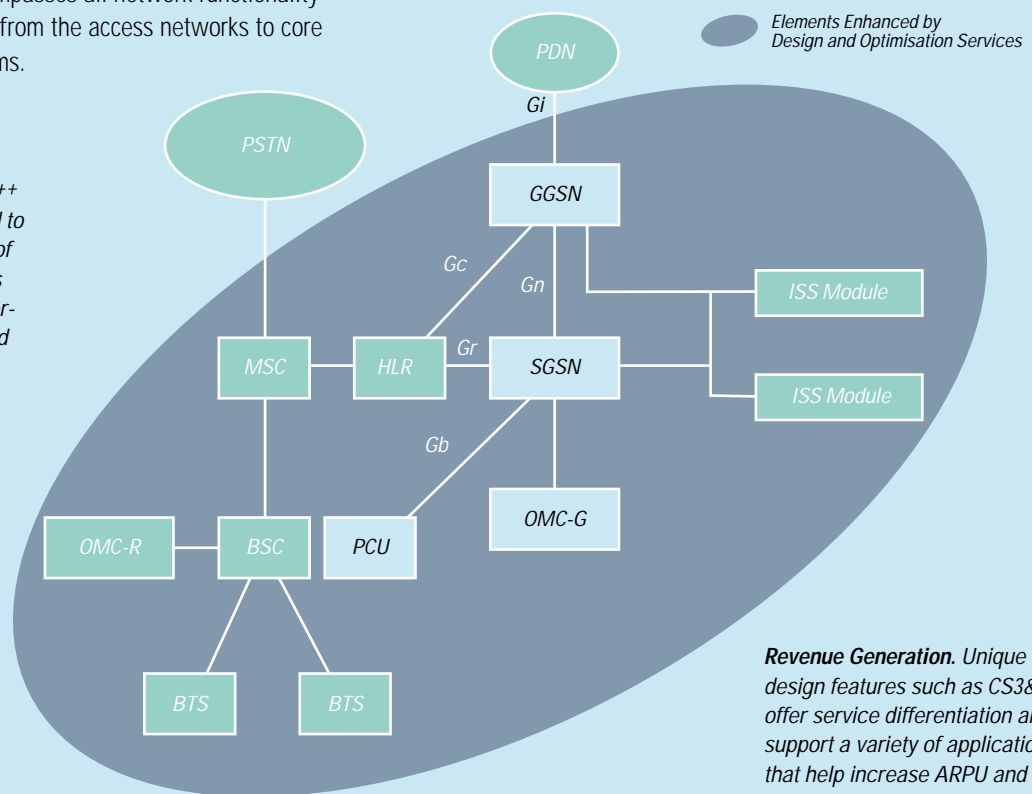
Quality of Service. Our GPRS++ solutions have been designed to provide the top-flight Quality of Service (QoS) your customers demand. Our networks are performance leaders in measured statistical categories such as fewest dropped calls and call success rates.

Operability. Years of commercial GPRS network experience have allowed Motorola to develop optimisation routines and solutions to monitor and operate the network, increasing customer satisfaction and revenue.

Capacity and Coverage. Through our superior hardware and software offerings, we offer RAN/Core solutions that deliver consistent user access to services anytime, anywhere.

Cost of Ownership. Motorola leads the market on cost-effective GPRS networks. Proven operational reliability and high equipment reuse in the evolution to 3G helps manage CapEx and OpEx.

Revenue Generation. Unique design features such as CS3&4 offer service differentiation and support a variety of applications that help increase ARPU and reduce subscriber churn.



ACRONYM KEY

- BTS - Base Transceiver Station
- BSC - Base Site Controller
- Gb - Interface between SGSN and PCU
- Gc - Interface between the HLR and GGSN
- GGSN - Gateway GPRS Support Node

- Gi - Interface between internet and network via GGSN
- Gn - Interface between GGSN and SGSN
- Gr - Interface between the HLR and SGSN
- HLR - Home Location Register
- ISS Module - Internet Support Services Module
- MSC - Mobile Switch Controller
- OMC-R - Operations and Maintenance Center - Radio

- OMC-G - Operations and Maintenance Center - GPRS
- PCU - Packet Control Unit
- PDN - Packet Data Network
- PSTN - Public Switch Telephone Network
- SGSN - Servicing GPRS Support Node

THE MOTOROLA GPRS++ LEADERSHIP ADVANTAGE

When you work with Motorola, you benefit from our proven expertise and committed leadership in IP-based wireless networks. Our experience in developing and implementing packet-based networks began in the 1980s with our iDEN® systems, which provided a foundation for our first-to-market GPRS solutions. Now, thanks to our substantial experience in GPRS, we are able to offer you high-quality infrastructure and software solutions that work together to provide a responsive, fast and flexible network. Augmented by our software development power that is virtually unmatched by any other vendor, and an end-to-end range of handsets, services and support capabilities, we're well on our way to offering more than 800,000 subscribers access to 2.5 and 3G networks worldwide.

FIRST TO MARKET WITH A SUPERIOR GPRS SOLUTION

We were the first infrastructure provider to make GPRS commercially available, and our solution has also led the way in key performance criteria. In independent wireless tests conducted in Germany, Motorola GPRS networks were shown to provide the best throughput and latency as compared to other vendors in the evaluated networks. Our networks' Packet Control Unit (PCU) throughput was 54 percent greater than the nearest competitor, with core network latency 24 percent quicker and PCU latency 28 percent faster. Thanks to the faster throughput and reduced latency of our GPRS systems, fundamental quality of service is better.

This record of performance achievement continues with our GPRS++ network, which adds CS3&4 to provide operators even better performance — and new opportunities to differentiate with high-speed data services.

DIFFERENTIATING YOUR SERVICES WITH CS3&4

Building on the superior capabilities of our CS1&2 networks, our CS3&4-based GPRS++ solution amplifies these customer-winning benefits by delivering up to 60 percent more throughput than previously possible. Moreover, it is the only network solution that extends throughput to 3G-like levels without hardware upgrade. The CapEx cost advantages are significant, and you gain the ability to immediately pursue new revenue opportunities promised by the more sophisticated services, without needing to invest in 3G infrastructure.

The promise is indeed becoming reality, as our GPRS++ networks with CS3&4 have been commercially tested on customer networks. In recent network performance analysis, end users are truly experiencing the service benefits of CS3&4, with availability levels as high as 95 percent.

EVOLVE TO UMTS WITH SPEEDS UP TO 75 KBPS

By utilising CS3&4, GPRS++ provides the capacity to efficiently deliver today's and tomorrow's evolving applications until the market transitions to UMTS. Though some claim data speeds of 140 Kbps are needed, most applications today require between 10-30 Kbps. CS3&4 can deliver services at speeds of up to 75 Kbps, comfortably managing today's needs and offering the bandwidth capability to evolve applications further on the road to true 3G services.

In real network demonstrations, we have demonstrated that GPRS with CS3&4 will efficiently bridge the data speed requirements as services evolve to 3G. This new flexibility will offer you new CapEx and OpEx advantages, as you can evolve your hardware and software as market needs demand.



Motorola offers the industry's leading portfolio of GPRS handsets, designed to be 100% compatible with both CS1&2-based GPRS networks and our faster, CS3&4-based GPRS++ networks.



3G

MOTOROLA LIFECYCLE SERVICES PROVIDE THE SUPPORT TO SUCCEED

More than supplying technology, we provide a total solution for the design, deployment, operations, performance and evolution of your GPRS++ networks. Our complete range of Lifecycle Services includes the following:

- **Design** and planning services utilise our unique GPRS System Planning (GSP) software to provide you a turnkey system design tailored specifically for your business size, strategy and objectives. We use the GPRS System Simulator (GSS) to validate the design of the GPRS network for a given application level performance. In this way, we minimise your CapEx and dimension our network efficiently so that it is more closely related to your business model. Services include: *GPRS Network Design and Planning Service, GPRS Simulation and Modelling Service*
- **Deployment** services offer complete installation, commissioning and integration of network elements to enable rollout of the GPRS/GPRS++ overlay into your existing GSM network. Services include: *Installation and Commissioning Services, Program Management, Application Integration Service*
- **Operations** services provide levels of support that match your requirements and existing in-house expertise, ranging from minimal on-call response to wholly outsourced assistance for the day-to-day operations, maintenance and support of the network. Services include: *Managed Network Operations Services, Network Security Assessment Service, Technical Information Products and Services*
- **Performance** services ensure top-flight operational efficiency and Quality of Service of your GPRS/GPRS++ network, utilising our proprietary GPRS System Simulation (GSS) tool, which offers a full end-to-end simulation, based on your specific network. Services include: *GPRS Simulation and Modelling Service, GPRS Network Optimisation Service, Application Performance Benchmarking Service*
- **Evolution** planning enables a fast start into the GPRS/GPRS++ revenue stream with a complete business planning and migration review service, which can include business modelling, network topology mapping, staff familiarisation and functional architecture proposals.

In addition, we offer a comprehensive Network Support Program (NSP), consisting of affordable, flexible packages that can help you successfully maintain high system availability while reducing operating costs. You can choose from varying levels of technical support, hardware support/replacement, and a variety of extended services, ranging from ongoing training to network reviews.

MOVE INTO THE FUTURE WITH GPRS++

Our GPRS++ network solution provides a cost-effective migration path to 3G networks designed to help you succeed in the markets of today and tomorrow. Bringing together the world of IP and GSM, our GPRS++ solution is engineered to offer you unique network capabilities and differentiated advanced features, so that you can increase customer satisfaction and drive revenues. At Motorola, we recognise that your business never stops evolving, and we look forward to working with you to ensure that your service evolution is successful, every step of the way.

MOTOROLA, INC.

INTERNET ADDRESS

www.motorola.com/networkoperators



MOTOROLA and the Stylized M Logo are registered in the U.S. Patent and Trademark Office.
All other product or service names are the property of their respective owners.
©Motorola, Inc. 2002.