

Making the most of 2G investments while migrating to 3G HSPA and LTE

Nokia Siemens
Networks



Converged Core

Building up capacity and driving down costs with a single 2G/3G SGSN node

Mobile operators face tough challenges. They must cut OPEX to boost margins, make networks more efficient and flatter to keep pace with rising traffic, prototype new services to bring them to market quickly, and meet service level agreements to satisfy customers. It takes an evolutionary, software-based approach to master these challenges.

An approach that streamlines 2G and 3G access networks, simplifies the core network, and ensures investments made today continue yielding returns for many tomorrows to come. Nokia Siemens Networks has the answer to all these challenges: combined SGSN solutions designed specifically to cost-efficiently evolve your network all the way up to Long Term Evolution (LTE).

You can have it both ways, enjoying higher capacity and lower costs with a single combined 2G/3G SGSN including Direct Tunnel capability.

Powerful HSPA networks and flat-fee tariffs have sparked explosive growth in data traffic, but conventional networks cannot sustain such fast growth. Mobile network operators must boost performance capability or invest heavily to extend capacity. And as more people use 3G/HSPA services, the limited coverage and resulting system handovers will increase traffic in 2G GPRS networks. So, mobile operators are compelled to maintain and manage both 2G and 3G networks efficiently, deliver 3G/HSPA services at lowest cost, and evolve smoothly to next generation networks.

Combined SGSN from Nokia Siemens Networks lighten operators' financial load, up front and further down the road. No longer compelled to invest in or maintain two separate network elements to support both 2G and 3G access networks, operators enjoy considerable CAPEX and OPEX savings. What's more, simple memory and pre-processor upgrades bring legacy 2G SGSNs up to this combined standard. And as the first solution to introduce Direct Tunnel functionality, it simplifies the core network and reduces signaling. Best of all, our software-based approach and LTE-ready hardware future-proofs today's investments in 2G and 3G networks.



One element, no dedicated hardware or capacity reservations

Nokia Siemens Networks SGSN serves both 2G and 3G/HSPA users. Any or all 3G/HSPA users can also be connected to the Internet HSPA-enabled base station.

This platform uses capacity dynamically to serve any given traffic mix without having to dedicate capacity or hardware to 2G or 3G. And upgrading to 3G access support is remarkably easy.

Driving down costs with full HSPA support

Fully HSPA-enabled, our SGSN provides service to HSDPA, HSUPA, and I-HSPA users, with HSDPA supporting up to 16 Mbit/s and HSUPA supporting up to 8 Mbit/s.

Full-blown mobile broadband capacity

Today's SGSNs must do more than merely maintain a big database for multitudes of attached users, many of which are usually offline. SGSNs must also deliver high-quality mobility service to each user who goes on line. And that takes considerable transaction capacity. Our SGSNs provide the industry's best ratio of attached users and ability to provide service in very busy networks. Beyond that, they offer advanced features that can further improve and optimize attach capacity.

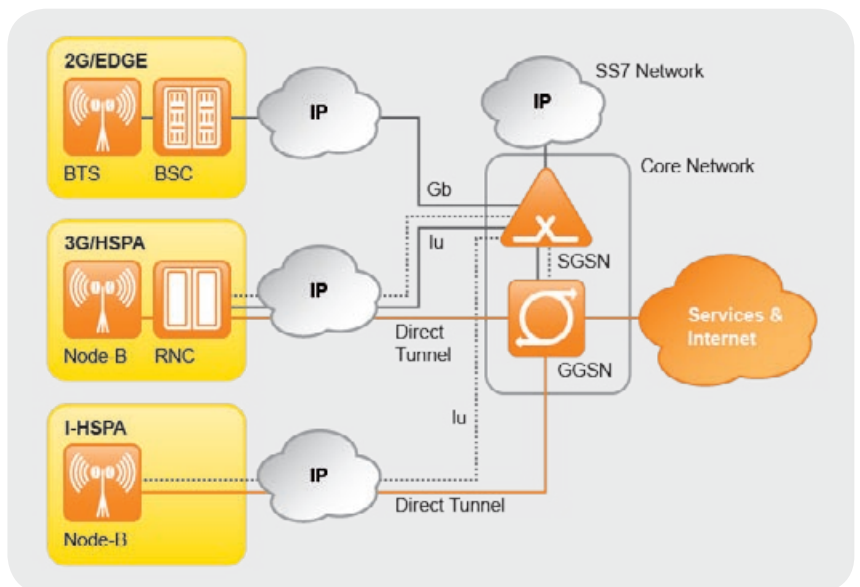


Figure 1: Nokia Siemens Networks SGSN dynamically serves several different access networks.

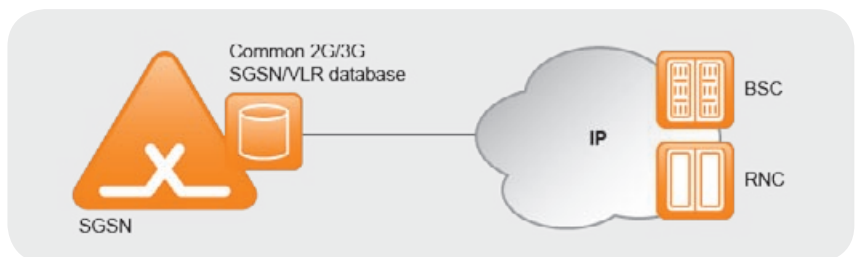


Figure 2: First come, first served: Nokia Siemens Networks SGSN shares database capacity between 2G and 3G.

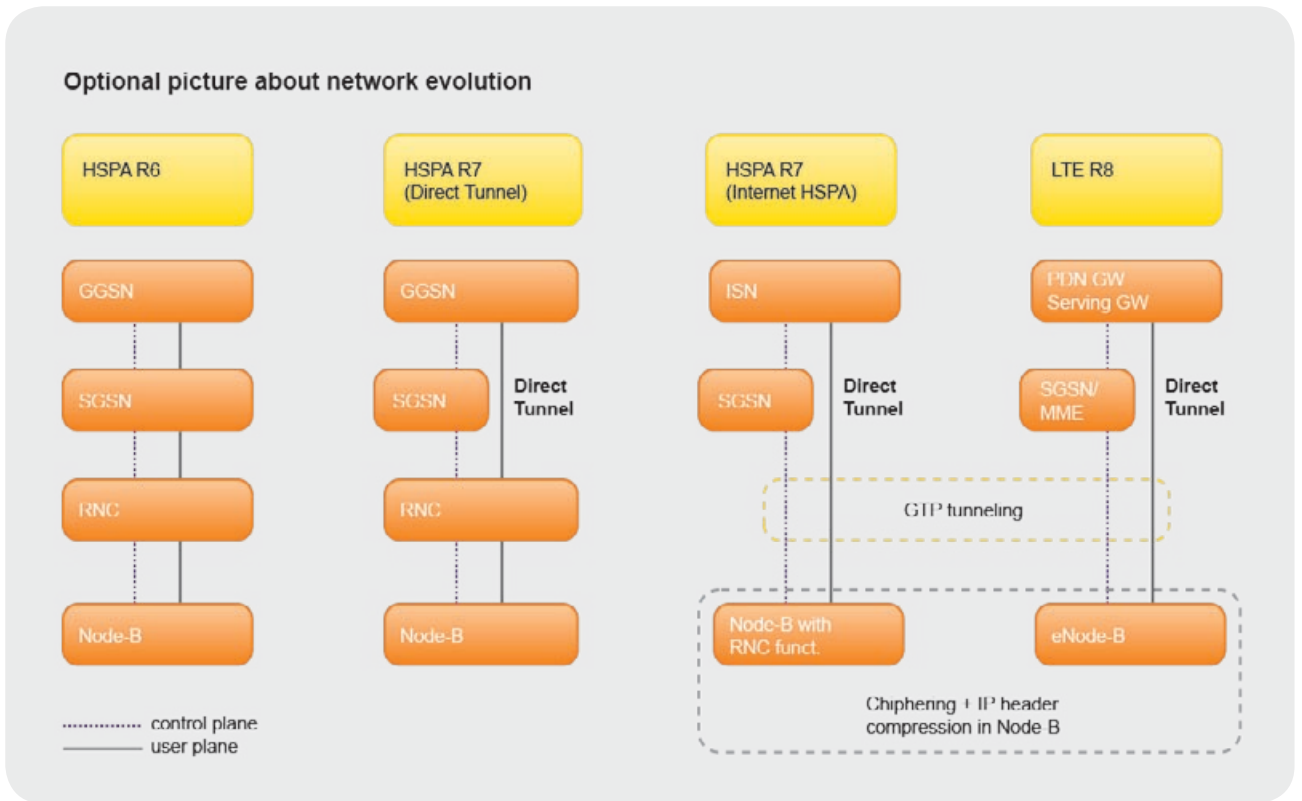


Figure 3: Network evolution towards LTE

Stepping up to LTE with flat architecture and Direct Tunnel

This solution's user plane leverages the 3GPP Direct Tunnel approach to enable flat architecture and substantial CAPEX savings. Direct Tunnel architecture charts the most viable evolutionary course for WCDMA. Offering cost-effective broadband wireless access in today's HSPA capable networks, this solution combines the LTE/SAE simplified network architecture's most workable innovations. The 3GPP Consortium standardized this flat network architecture in 3GPP Release 7 for WCDMA and in Release 8 for LTE.

I-HSPA introduces the first true flat architecture to WCDMA. Standardized in 3GPP Release 7 as Direct Tunnel with collapsed RNC, it ensures interoperability with existing WCDMA core networks and 3GPP terminals.

An SGSN in flat, Direct Tunnel-enabled architecture allows a tunnel to run straight from an RNC or I-HSPA-enabled base station to the GGSN. Nokia Siemens Networks SGSN enables this Direct Tunnel to be implemented in any existing 3GPP-compliant 3G network equipped with current RAN and GGSN.

30% core network OPEX and CAPEX savings with Direct Tunnel
 Direct Tunnel can cut combined OPEX and CAPEX by as much as 30% in heavily trafficked networks, with these benefits beginning to make a major impact when the monthly throughput per active 3G user exceeds some 100 Mbytes. In extremely busy, big European networks with some 6,000 base station sites and average HSPA traffic per base station ranging from 2.5 to 14 Mbit/s, CAPEX savings can range from 55% all the way up to 90%.

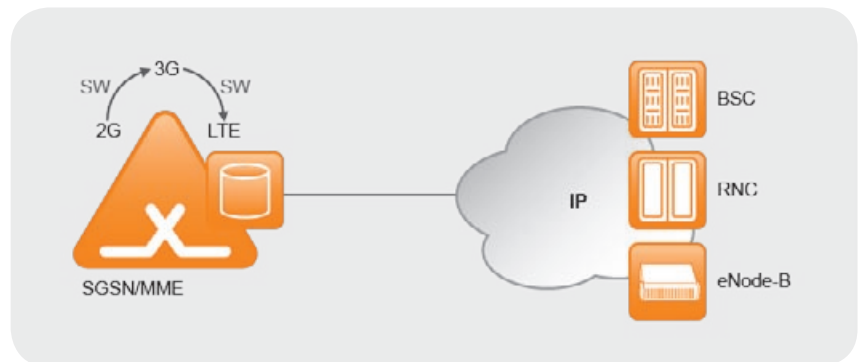


Figure 4: Software paves this SGSN's evolutionary path towards LTE. 2G SGSN SG5 and later support upgrades for MME.

Scale up today and stride towards tomorrow

A highly available carrier-grade solution, Nokia Siemens Networks SGSN is also remarkably flexible. It lets you grow element capacity whenever you wish to satisfy growing demand.

Evolve towards LTE while protecting your investments

The Nokia Siemens Networks SGSN charts the best evolutionary course to LTE. A software upgrade is all it takes to move up to LTE and combined Mobile Management Entity (MME) functionality. Beyond merely providing SGSN service to 2G and 3G networks, the combined SGSN/MME in LTE also controls traffic plane handling, performs session and mobility management, and manages mobility and paging for LTE access networks and related mobility scenarios.

Maximum capacities in Nokia Siemens Networks SGSN

	Two-cabinet configuration	One-cabinet configuration
PDP contexts	4 M	1.5 M
Attach Subs	3 M	1.5 M
2G throughput	500 Mbps	200 Mbps
3G throughput	1.5 Gbps	500 Mbps
Transactions/s	4400	1600



“Flat networks are characterized by fewer network elements, lower latency, greater flexibility, and lower operation cost.”

Unstrung Insider, 2007

**Big boosts for mobile broadband network's reliability and performance**

Market-leading performance and high capacity to satisfy HSPA and IMS demands – that spells good news for mobile operators. But the benefits don't end there: Extraordinarily high reliability, easy element upgrades, superior operability including system level trace and support for Nokia NetAct Traffica, and many more advantages make this SGSN a win-win proposition.

Efficient networking

Nokia Siemens Networks SGSNs accommodate many interfaces to ensure the best fit for your needs today and plans to evolve your network towards tomorrow. They offer all-IP networking capabilities in the form of both Gb and Iu interfaces over IP as well as SIGTRAN, and support multipoint implementation towards 2G and 3G RAN as well as for MSC.

Multiple access for more savings

Support for multiple access networks – 2G/EDGE, 3G/HSPA, and I-HSPA – cuts operating costs. With resources shared dynamically among access technologies, network planning and 3G/HSPA migration becomes so much easier. And again, all major technology upgrades are software-based.

Software upgrades to 3G, no dedicated 2G/3G hardware or capacity reserve required, the only Direct Tunnel-enabled SGSN, a unique evolutionary path to LTE, best-in-market capacity – there's a lot for operators to like about Nokia Siemens Networks SGSN.

Environmental conditions

Nokia Siemens Networks SGSN complies with the ETSI standards: ETS 300 019-1-1, ETS 300 019-1-2, and ETS 300 019-1-3.

Operating conditions

Nokia Siemens Networks SGSN meets EN 60950 and UL 1950 safety requirements, alongside the ETSI ETS 300019-1-3, Class 3.1E environmental requirements. The cabinet's earthquake resistance complies with Bellcore GR63CORE Zone 4, and the EMC emission and immunity features comply with the EN 300386-2 and FCC 15 Part 47 standards, respectively.

Regulatory compliance

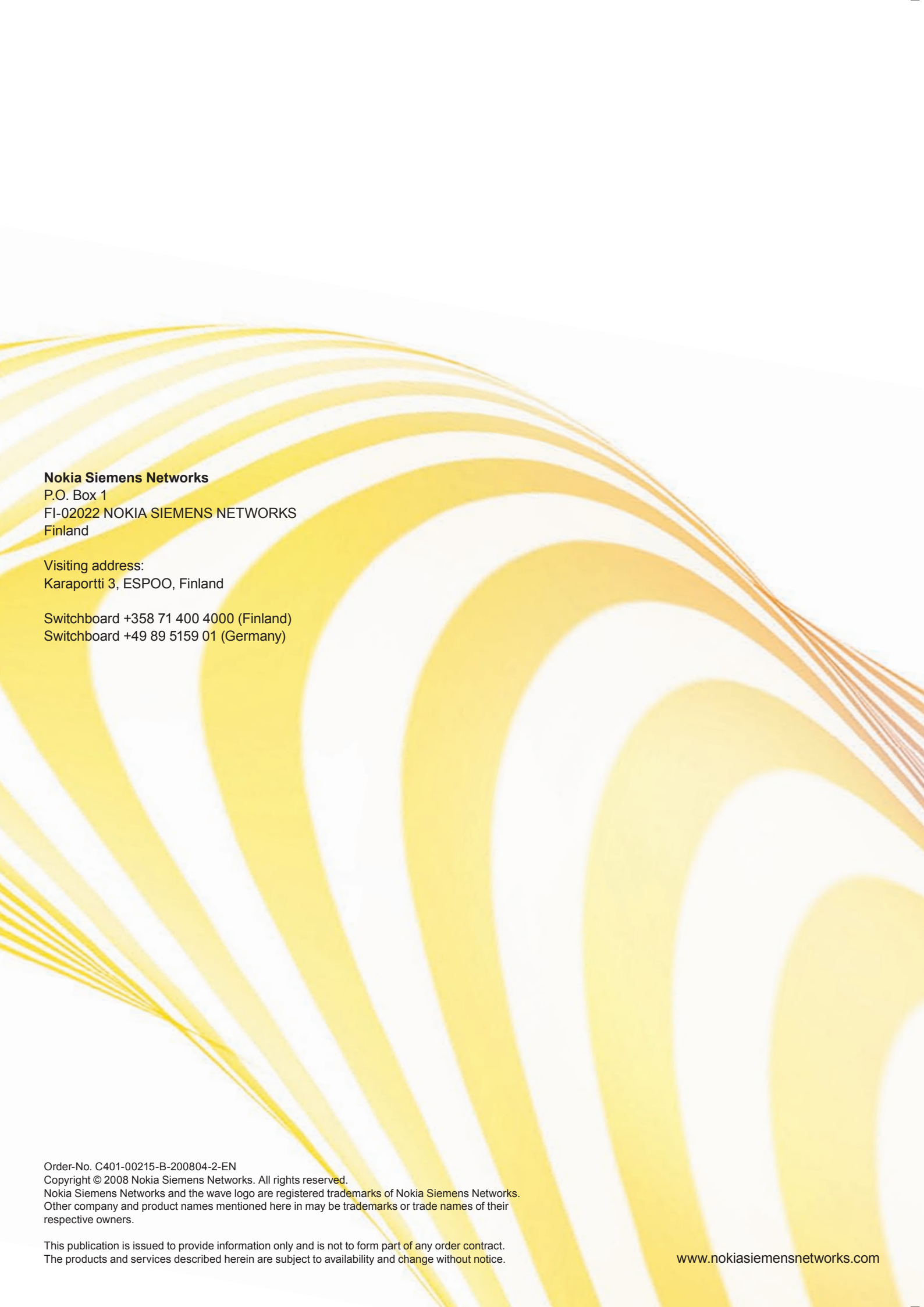
Nokia Siemens Networks SGSN is CE-marked and compliant with NEBS.

Technical specifications

- Height: 2000 mm
- Width: 2100 mm
- Depth: 600 mm
- Weight:
 - SGAC: 450 kg
 - SGBC: 350 kg
- Input voltage: -41.5 V to -72 V
- Power consumption:
 - SGAC 2100 W
 - SGBC 2750 W

Abbreviations and Glossary

BSC	Base Station Controller	Iu	Interface between the Radio Network Controller (RNC) and the Core Network
BTS	Base Station	LTE	Long Term Evolution
EDGE	Enhanced Data rates for GSM evolution	Mbps	Megabits per second
eNodeB	evolved NodeB (LTE)	MME	Mobility Management Entity
Gb interface	Interface between the base station system and the SGSN	MSC	Mobile Services Switching Center
Gbps	Gigabits per second	Node-B	Base Station (3G)
GPRS	General Packet Radio Service	RAN	Radio Access Network
HSDPA	High-speed Downlink Packet Access	RNC	Radio Network Controller
HSPA	High-speed Packet Access	SAE	System Architecture Evolution
HSUPA	High-speed Uplink Packet Access	SGSN	Serving GPRS Support Node
I-HSPA	Internet-HSPA, 3GPP standards-based, simplified network architecture that enables the base station to provide direct Internet access, bypassing the RNC and SGSN in the user plane	SIGTRAN	SS7 protocol family extension that uses IP Transport
IMS	IP Multimedia Subsystem (the subsystem provides IP multimedia services that complement the services provided by the circuit-switched core network)	VLR	Visitor Location Register
		WCDMA	Wideband Code Division Multiple Access



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