

**EDGE – OPCION TECNOLOGICA PARA LA EVOLUCION DE LA RED MOVIL
CELULAR DE COLOMBIA HACIA UNA INFRAESTRUCTURA DE TERCERA
GENERACION**



ANEXOS

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FACULTAD DE INGENIERIA ELECTRONICA Y TELECOMUNICACIONES
DEPARTAMENTO DE TRANSMISION
GRUPO I+D EN NUEVAS TECNOLOGIAS EN TELECOMUNICACIONES
POPAYAN
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**Tesis de grado presentada como requisito para obtener el título de Ingeniero en
Electrónica y Telecomunicaciones**

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ANEXO A. SOLUCIONES COMERCIALES DE INFRAESTRUCTURA

1. ALCATEL¹

1.1 Products by Category: Evolium Radio Access

Evolium Toolchain

The Evolium™ Toolchain is a set of radio-network optimization products for GSM, GPRS, EDGE and UMTS networks. It features the Radio Network Optimization (Alcatel 9156 RNO) tool; the Network Performance Analyzer (Alcatel 9157 NPA); and the Lucid Network Availability, Stability and Events Reporting (Alcatel 9158 LASER) tool. These three applications form an efficient complement of the Evolium™ Operation and Maintenance Center for Radio.

Evolium Base Station Controller – Alcatel 9120 BSC

The Alcatel Evolium™ Base Station Controller offers mobile operators a flexible radio capacity solution for GSM, GPRS and EDGE that meets both current and future needs. Available in configurations ranging from one to three cabinets, it allows mobile operators to introduce new services without changing basic radio structures.

Evolium Compact Transcoder – Alcatel 9125 TC

The Evolium™ Compact Transcoder, in mobile networks, provides service providers with higher performance, greater flexibility and better voice quality. It delivers total performance that's totally future-proof, all packed into a compact standard rack.

Evolium Micro Base Station – Alcatel 9100 μBS

Compact and modular, the Alcatel Evolium™ Micro Base Station for adapts to current and future needs by providing from two to six TRXs in dualband, GSM 900 and 1800 systems. A software download enables it to support GPRS.

¹ www.alcatel.com

Evolium Multi-BSS Fast Packet Server – Alcatel 9135 MFS

The Evolium™ Multi-BSS Fast Packet Server (MFS) for GPRS and EDGE houses almost all GPRS-specific hardware. It functions based on a packet control unit (PCU) and a Gb interface. The Evolium™ MFS allows hassle-free GPRS deployment with low entry costs, and is easily upgradeable to an EDGE infrastructure.

Evolium Multistandard Base Station – Alcatel 9100 MBS

The new-generation Evolium™ Multistandard Base Station for GSM, GPRS, EDGE and UMTS networks offers increased deployment flexibility, better radio performance and very high compactness. These basic modules allow service providers to deploy the combination of GSM alone, UMTS alone or a combination of GSM and UMTS networks together -- all in the same cabinet.

Evolium Operation and Maintenance Center for Radio – Alcatel 1353 RA (OMC-R)

The Evolium™ Operation & Maintenance Center for Radio is a flexible, easy-to-use solution which provides network Element (NE) management for Alcatel BSS voice and data services, including GPRS.

If you want more details, read attached file GSM-radio.pdf.

1.2 Evolium Toolchain

The Evolium™ Toolchain is a set of radio-network optimization products for GSM, GPRS, EDGE and UMTS networks. It features the Radio Network Optimization (Alcatel 9156 RNO) tool; the Network Performance Analyzer (Alcatel 9157 NPA); and the Lucid Network Availability, Stability and Events Reporting (Alcatel 9158 LASER) tool. These three applications form an efficient complement of the Evolium™ Operation and Maintenance Center for Radio.

Key Features

- RNO: allows operators to optimize existing radio networks for increased cost efficiency and quality; provides all the necessary services for optimization teams, underlined by a powerful MMI (man-machine interface).

- NPA: allows operators to analyze different parameters of network performance; consolidates quality-of-service information by day, week and month for up to two years thanks to the powerful storage and data-processing facilities of Metrica™ and NPR software.
- LASER: allows operators to define events based on alarms; provides synthetic display of alarms, events, operator commands and unavailability on selected MOs between two dates; generates reports for management and operational teams.

Key Benefits

- Provides the required services needed, by different operator teams.
- Soft integration with operators' information systems and methods.
- Modularity and scalability.
- State-of-the-art quality of service.
- Optimum time to market.

If you want more details, read attached file TCHAIN.pdf.

1.3 Evolium Base Station Controller – Alcatel 9120 BSC

The Alcatel Evolium™ Base Station Controller offers mobile operators a flexible radio capacity solution for GSM, GPRS and EDGE that meets both current and future needs. Available in configurations ranging from one to three cabinets, it allows mobile operators to introduce new services without changing basic radio structures.

Key Features

- Basic cabinet model handles up to 128 TRXs and 128 cells; adding a second cabinet boosts capacity to 288 TRXs or 214 base stations; a third cabinet increases capacity to 488 TRXs or 255 base station full-rate transceivers or nearly 100 base transceiver stations (BTS).
- The Evolium™ Compact Transcoder delivers a capacity of 192 A interfaces and up to 5,600 erlangs in maximum configuration Using 4:1 submultiplexing, the BSC and Transcoder combine four channels into one PCM30 64 Kbps time slot.
- Both the A-bis (BTS-BSC) and A-ter (BSC-Transcoder) interfaces are multiplexed, submultiplexing the A-ter (BSC and Transcoder) interface so Transcoder can be installed in a different location than the BSC.
- Implementing GPRS requires limited software upgrade and no hardware upgrade.
- Supports operation in 900 MHz, 1,800 MHz and 1,900 MHz bands.

Key Benefits

- Allows the addition of extension kits with no service interruption.
- Minimizes operating costs; lowers transmission costs; reduces site rental costs.
- BSC siting adaptability.
- Distributed processing for absolute security.
- Open technology.

If you want more details, read attached file BSC.pdf.

1.4 Evolium Compact Transcoder – Alcatel 9125 TC

The Evolium™ Compact Transcoder, in mobile networks, provides service providers with higher performance, greater flexibility and better voice quality. It delivers total performance that's totally future-proof, all packed into a compact standard rack.

Key Features

- Delivers a capacity of 192 A interfaces and up to 5,600 erlangs in maximum configuration.
- Using 4:1 submultiplexing, the Evolium™ BSC and the Evolium™ Compact Transcoder combine four channels into one PCM30, 64- kbps time slot.
- Both the A-bis interface (BTS-BSC) and the A-ter interface (BSC-Compact Transcoder) are multiplexed; submultiplexing the A-ter interface means that the Compact Transcoder can be installed in a different location than the BSC.
- Rack-sharing feature enables you to connect up to 24 BSCs on a single Compact Transcoder.
- MTBF of 165,000 hours -- almost 19 years.
- Has only one type of board: the MT120, which manages 120 voice channels.
- 19-inch compact standard rack is only two meters high, with only 3.75 liters per A interface.

Key Benefits

- Offers greater performance, flexibility and reliability.
- One type of board means easier logistics.
- Centralized software downloading for installation, maintenance and inventory, coupled with easier logistics, saves time and money.

If you want more details, read attached file TC.pdf.

1.5 Evolium Micro Base Station – Alcatel 9100 μ BS

Compact and modular, the Alcatel Evolium™ Micro Base Station adapts to current and future needs by providing from two to six TRXs in dualband, GSM 900 and 1800 systems. A software download enables it to support GPRS.

Designed to grow with a network, the product supports numerous applications in different environments by providing micro-cell, mini-cell and in-building cell coverage.

Key Features

- Four different module configurations: GSM 900 or GSM 1800; single-antenna or low-loss version.
- Versatile mounting: indoor/outdoor with cover, or indoor without cover.
- Volume (2 TRX per cabinet): H82 x W45 x D19 cm only (fully equipped, including cover).
- Weight (2 TRX per cabinet): 32.5 kg only (fully equipped, including cover).
- Receiver sensitivity: -107 dBm.
- Transmission output power : 2W (33 dBm) for single antenna; 4.5W (36.5 dBm) for low-loss version.
- Radio Frequency Hopping.

Key Benefits

- Increased coverage and capacity in tight and high-traffic environments.
- Enables service providers to catch more traffic while providing top-quality customer service.
- Delivers flexible solutions for numerous applications.

If you want more details, read attached file uBS.pdf.

1.6 Evolium Multi-BSS Fast Packet Server – Alcatel 9135 MFS

The Evolium™ Multi-BSS Fast Packet Server (MFS) for GPRS and EDGE houses almost all GPRS-specific hardware. It functions based on a packet control unit (PCU) and a Gb interface. The Evolium™ MFS allows hassle-free GPRS deployment with low entry costs, and is easily upgradeable to an EDGE infrastructure.

Key Features

- Fully compatible with Evolium™ GSM solutions and interoperable within any NSS environment.
- Shared transmission links allow existing A-ter and A lines to be reused for GPRS.
- Can handle up to 5,280 packet data channels (PDCH) simultaneously.
- Each powerful GPU board can handle a BSC, supporting up to 16 PCM links at 2 Mbps.
- Fully loaded Evolium™ MFS supports 22 BSCs.
- Can handle a raw data rate of up to 13.4 Kbps per radio channel-107.2 Kbps with eight time slots.
- In B7 release, GPRS is possible on all TRX of a cell and several GPU boards can be connected to one BSC.
- Supports operation in the 900 MHz, 1800 MHz and 1900 MHz bands.

Key Benefits

- No site visits required, just a software upgrade.
- Seamless growth.
- Optimized management of radio resources.
- Cost-effective operations.

If you want more details, read attached file MFS.pdf.

1.7 Evolium Multistandard Base Station – Alcatel 9100 MBS

The new-generation Evolium™ Multistandard Base Station for GSM, GPRS, EDGE and UMTS networks offers increased deployment flexibility, better radio performance and very high compactness. These basic modules allow service providers to deploy the combination of GSM alone, UMTS alone or a combination of GSM and UMTS networks together -- all in the same cabinet.

The Evolium™ MBS also comes in many configurations: a medi cabinet allows for concentrated power in a compact indoor unit, and a mini cabinet the size of a dishwasher fits into sites too tight for rival products. Meanwhile, small- and medium-sized outdoor cabinets enable operations in severe environments.

Key Features

- Small indoor cabinet: height of 130 cm corresponds to 3 subracks, with a footprint of 0.27 m²; available in AC and DC versions; backup batteries available for short interruptions of power supply.
- Medium indoor cabinet: height of 194 cm corresponds to 5 subracks, with a footprint of 0.27 m²; available in AC and DC versions; backup batteries available for short and long interruptions of power supply.
- Small outdoor cabinet: equipped with a built-in heat exchanger and closed air circulation; operates smoothly even in the most extreme climatic conditions.
- Medium outdoor cabinet: extension of the small outdoor cabinet; this extension can easily be done on site.
- Available for GSM 900/1800/1900.
- For GSM applications, maximum number of TRX is 12 (for medium indoor or outdoor cabinet).
- For UMTS and GSM/UMTS applications, maximum number of PAs (for UMTS) and TRX (for GSM) is 6 x UMTS + 8 x GSM or 24 x UMTS only (for medium outdoor cabinet).

Key Benefits

- Greater modularity: high performance, large capacity and easy reconfigurability allow you to adapt the capacity of each cell to your precise requirements.
- Optimal compactness: footprint only 0.27m² for indoor cabinets, and both omnidirectional and sectored configurations, with up to 6 sectors, are possible.
- Higher availability: two software versions can be supported simultaneously, so new versions can be downloaded quickly without interrupting the service.
- Superior reliability: fault-tolerant units offer maximal MTBF times and automatic recovery features; backup batteries provide instantaneous service continuity in case of power failure.
- Easier maintenance: built around a limited number of modules, so there is no need to stock loads of spare-parts; built-in smart facilities.

If you want more details, read attached file MBS.pdf.

1.8 Evolium Operation and Maintenance Center for Radio – Alcatel 1353 RA (OMC-R)

The Evolium™ Operation & Maintenance Center for Radio is a flexible, easy-to-use solution which

provides Network Element (NE) management for Alcatel BSS voice and data services, including GPRS.

It capitalizes on Alcatel's experience to meet operations and maintenance needs for scalable and seamless operations, as well as clear and real-time information.

Key Features

- Hardware plug-and-play capability.
- Wide choice of transmission option including X.25, LAN, WAN and others; distance and transmission support are not an issue.
- Access to network information with data on all network nodes displayed through hierarchical views.
- Powerful on-line documentation, using hypertext links and navigation technology.
- Fault, configuration, performance and security management.
- Open architecture, in line with TMN principles and standards recommendations (M. 3,100, X.7xx and GSM 12.20), means easy interfaces to network management centers and other systems via a comprehensive set of interfaces, including Q3.
- In addition to these interfaces, Alcatel offers a complete set of post-processing tools for network optimization (Evolium Toolchain).

Key Benefits

- Seamless operations and network scalability through distributed Manager/Agent architecture.
- Various management features provide clear, comprehensive, customized and real-time information on network faults, performance, configuration and security.
- Manages an entire region composed of thousands of cells.
- Operators save time and money on network monitoring.

If you want more details, read attached file OMCR.pdf.

1.9 Mobile Terminals

If you want more details, read attached file TERMINALS.pdf.

2. ERICSSON²

2.1 AXE 810

The best way to reduce product development time is to find re-usable solutions. Ericsson's Cello Packet Platform (CPP) for the transport network and the building practice for the new open AXE switching platform are excellent examples of this principle.

CPP originally began as a 3G project whose primary purpose was to provide a platform on which to build radio base stations and other products, such as a Radio Network Controller (RNC).

Today, however, the platform, consisting of hardware and software, can also be used with only minor modifications for access and media gateway products.

Configured as needed

CPP is a platform for ATM and IP communications which, when combined with various applications, becomes a complete product for a communications network.

Physically, the CPP is a magazine with slots for 28 circuit boards. Two switch modules occupy the outer positions, while the remaining 26 can be filled as required with line boards, processor boards, codecs, echo cancellers, et cetera. Each board contains a Device Board Module (DBM) with communication circuits for processors and memory. Each application adds its own components. All communication between circuit boards is handled by the switches and the magazine's backplane.

The CPP employs a modular and scalable design that allows several magazines to be stacked. It is also an open platform, meaning that Ericsson can purchase existing components or request that suppliers develop new components. Working with third-party suppliers, however, requires careful planning and technical expertise.

Saving time at the start

Continued refinement of CPP is intended to provide internal and external customers with greater integration, lower costs and improved functionality.

² www.ericsson.com

In the later phases of a project, it is difficult to realize significant time savings, but much time can be saved at the start.

The project phases that take the longest to complete are developing the circuit boards and designing ASICs (Application-Specific Integrated Circuits). It is therefore important to get started on the hardware as quickly as possible.

Baselines in the form of simple requirement specifications towards which design efforts should be directed are necessary for getting started quickly. They provide some degree of order, even though new requirements inevitably lead to design changes. Development then proceeds in increments, beginning with the basic functionality, which provides the systems department with a foundation on which to work.

Compact AXE

The AXE 810 is a new AXE generation that provides a switching platform for circuit- and packet-switched systems. It will be released in June of next year. Every effort will be made to provide fast deliveries and to help operators quickly become profitable. The new system has several unique features.

The new switch is extremely compact, taking only one twentieth as much space as previous generations. A complete node requires only three or four cabinets, which can be accommodated on a standard European shipping pallet, meaning that an entire switch can be delivered by air freight, pre-tested and ready to install. Installation, which previously took four weeks, can now be complete in a few days.

The AXE 810 is designed around GEM, the Generic Ericsson Magazine, which can be equipped with any kind of circuit board. The switch can easily be configured for the desired application, such as a local exchange, a transit switch or a mobile switching center. AXE 810 software can also be downloaded from a remote location.

In addition, the new AXE is based on fewer but more generic circuit boards that significantly shorten product development times. Months shrink to weeks.

Considerable time is saved by producing circuit boards that can be adapted and configured through new software to meet customer requirements.

The entire project was characterized by short lead times. The new APZ 212 33 central processor was developed in record time. Many phases of the project were conducted in parallel and with the help of simulations and frequent testing. By starting with a worst-case scenario in testing, some 90 percent of all tests were completed. In addition, the number of different types of cables has been reduced. In organizational terms, much time was saved by conducting the project with small project groups that then disseminated their results globally to Ericsson development centers.

Major breakthrough

Standard components are being developed for the AXE 810 that can be used for other platforms.

Many components are already re-used, but the goal is that standard interfaces will allow re-use across system platforms.

In early December, a major step was taken in the development of the AXE 810. At 7:00 p.m. on a Saturday night, engineers succeeded in connecting the first call through the 512K Group Switch, which can handle 256,000 simultaneous calls.

If you want more details, read attached file AXE 810.pdf.

2.2 IP Technology in WCDMA/GSM core networks

Mobility and the Internet, the two most dynamic forces in communications today, meet in the design and implementation of the mobile core network. Support for new end-user services and a common transport technology are the main drivers of integration of IP technology into our systems. The IP multimedia application plays a special role in providing these new end-user services. IP transport technology addresses the vision of multiservice backbone networks, based on a single network layer technology. Ericsson provides complete solutions and products to support deployment of new IP-based services and transport networks. Moreover, Ericsson's flexible core network architecture allows operators to address these drivers in an independent way.

The main parts of this article describe how the requirements for the two main drivers for IP technology are met in the mobile core network. Paying special attention to support for the IP multimedia application, the authors describe how support for IP applications is implemented. They then describe how IP transport technology can be supported, including site configurations and specific issues like quality-of-service and network redundancy.

If you want more details, read attached file WCDMA-GSM Core Network.pdf.

2.3 Ericsson's IP-based BSS and radio network server

The IP-based base station system (IP BSS) is designed to support both GSM BSS and TDMA-EDGE (EGPRS-136) radio access networks. It provides a future-proof path to the GSM EDGE radio access network (GERAN), since it has been optimized to handle a mix of data (GPRS and EDGE) and real-time services, such as voice traffic.

If you want more details, read attached file BSS-IP.pdf.

2.4 The RBS 2206—A flexible ticket to third-generation wireless systems

The migration from second-generation to third-generation mobile systems is one of the core issues facing the industry as it enters into the new telecoms world. Ericsson is committed to making this migration as seamless as possible for the operator. One of Ericsson's cornerstone products is a new, indoor macro-base station—the RBS 2206.

If you want more details, read attached file RBS 2206.pdf.

2.5 Family of RBS 3000 products for WCDMA systems

Ericsson is the first company to take WCDMA technology out of the laboratory and test it in a real environment. At the end of 1999, Ericsson had seventeen WCDMA test systems in operation in Asia, Europe and North America.

The RBS 3000 product line is a comprehensive family of macro, mini and micro radio base stations (RBS) that were designed using input from second-generation mobile systems.

If you want more details, read attached file RBS 3000.pdf.

3. LUCENT TECHNOLOGIES³

3.1 UMTS Solution

Description

In the race towards end-to-end 3G mobile networks, Lucent Technologies is uniquely placed to become the next-generation leader, thanks to our unmatched network design and deployment expertise across all the wireless technology standards. UMTS is based on Wideband CDMA technology, which represents a fundamental change away from familiar GSM technology. Lucent is one of the world's largest communications equipment suppliers, the undisputed market leader in wireless CDMA networks, and the leading supplier of IP/ATM packet switching networks (on which UMTS core transport is based) to service providers.

Lucent 3G solutions are based on a range of future-proof, innovative, yet standards-based platforms under the Flexent™ banner which are fully upgradable to support all envisaged 3G evolution and convergence paths, whatever the air interface. The main elements of our solution are the Flexent™ OneBTS™ base station platform, the Flexent™ Wireless Router platform, and the Flexent™ Mobility Server platform. These elements are fully supported by, and integrated with, our innovative Softswitch network architecture for seamless voice/data convergence, leading the market in the evolution towards the all-IP network.

Value description

- Accelerating time to revenue. Lucent's unparalleled experience in commercial implementation of the underlying UMTS technologies is critical to ensuring rapid infrastructure and service deployment. Furthermore, Lucent's in-depth understanding of the 3G marketplace means that it is able to provide network operators with detailed, accurate business modelling and planning – providing the fast track to a profitable UMTS business.
- Reducing costs. Lucent's highly innovative products and deployment tools mean significant reductions in infrastructure and roll-out costs, and the fact that Lucent's products are future-ready means that the network operator's capital expenditure is protected in the long-term.
- Minimising risk. The Lucent Worldwide Services division, the largest single networking services organisation in the world, will help to ensure rapid, risk-free system deployment and ongoing support. Access to the unmatched knowledge base of Bell Labs also reduces risk and delivers proven, reliable products and services.

³ www.lucnet.com

- Driving future revenue generation. Lucent is actively driving the creation of essential revenue-generating services through leading edge products, industry-wide initiatives and partnerships with value-add mobile service providers. What's more, thanks to its strong relationships with leading terminal manufacturers, Lucent is able to ensure availability of a diverse portfolio of compatible mobile devices.

Features

- Mobile Services and Applications. Lucent's Mobile Applications and Service Delivery (MASD) solutions enable mobile operators to rapidly introduce compelling end user services, driving additional network traffic and providing access to new voice and data revenues. By working closely with customers from the outset, Lucent is able to plan, test, integrate and deploy a tailored suite of services that is aligned with the network operator's business plan and target markets.
- Core Network. The flexible and scalable Lucent core network solution has been designed with the all-IP future in mind. For the network operator this means investment protection and smooth, cost-effective implementation of future releases of the 3GPPP UMTS standards. Furthermore, the network elements support open programming interfaces to enable rapid integration of the value-added services required to ensure ongoing revenue generation.
- Transport. The UMTS transport network utilises packet-based technologies such as ATM and IP. Lucent is the leading supplier of multi-service (eg. IP & ATM) network infrastructure with 28.7% of the world wide market (source: Dell'Oro Group Q1 2001). Lucent also has a wide portfolio of optical network products to create a cost effective, high capacity back-haul solution. For network operators this means a reliable, flexible and scalable transport solution. Furthermore, conformance to open standards minimises the risk of interoperability issues and supports rapid integration.
- Access Network. The UMTS access network is based upon Wideband CDMA (Code Division Multiple Access) technology. Having already deployed over 49,000 CDMA base stations worldwide, Lucent has unparalleled CDMA expertise and experience. This ensures highly scaleable and innovative products – protecting operators' investments and ensuring optimal system availability. Lucent has also developed a suite of best-in-class RF deployment tools (eg. OCELOT™) to facilitate fast, cost-effective deployment of reliable access networks utilising the minimal number of base station sites and minimising drive-testing.
- Terminals. To take full advantage of 3G multimedia services, end-users will require many different formats of mobile device – from conventional mobile phones through to multi-media PDAs (Personal Digital Assistants), Pocket PCs and beyond. Lucent has built strong relationships with leading terminals manufacturers to compile a diverse portfolio of cutting-

edge terminals. Volume agreements with these manufacturers will help to ensure product availability for Lucent's customers. Furthermore, comprehensive interoperability testing at Lucent's laboratories is helping to ensure terminal and infrastructure compatibility – significantly reducing the risk of brand-damaging post-launch problems.

- **OA&M.** Lucent delivers a suite of integrated Operation, Administration, & Maintenance tools that shield the operator from the complexity of the UMTS system, enabling fast, cost-effective network management and customer care. For the network operator this means optimal resource utilisation, cost reduction, improved customer satisfaction and, ultimately, sustainable revenue generation. In particular, Lucent's highly sophisticated packet billing solution enables operators to charge their customers according to complex parameters such as service type, bandwidth, Quality of Service, node address, etc.

If you want more details, read attached file UMTS.pdf.

3.2 Flexent® Mobile Switching Centre (MSC)

Description

The Flexent® IP Multimedia Subsystem is Lucent's advanced switching solution for the Universal Mobile Telecommunications System (UMTS). This forward-looking solution offers smooth migration from 3GPP Release 99, acting as a traditional MSC, to the distributed packet switching architectures of Release 5 and beyond.

Lucent offers operators a UMTS network evolution strategy that optimises the value of existing infrastructure and provides a sound investment for the future.

The Flexent® IP Multimedia Subsystem comprises a Feature Server, Wireless Access Gateway (WAG), Trunk Access Gateway (TAG) and a Lucent Media Server (LMS).

The WAG and the TAG are media gateways that benefit from Lucent's common platform approach to network design and are controlled by the Feature Server. The LMS provides specialised resources for announcements, tones and conference bridges. The discrete elements of the Flexent® IP Multimedia Subsystem are linked by a local IP network.

The Flexent® IP Multimedia Subsystem offers an integrated solution that is both robust and flexible. As standards evolve, operators can unbundle the switch architecture in the creation of a

distributed IP-based switching environment. This can be accomplished without the need of forklift replacements.

At the heart of the Flexent® IP Multimedia Subsystem, the Feature Server performs mobility management and call processing and terminates signalling protocols. It also controls bearer gateways and provides information for OAM&P and billing functions.

The Feature Server is based on the Lucent Softswitch (LSS), a platform already proven in the wireline environment. LSS makes use of commercially available computing platforms to create a cost-effective, open and programmable solution. Such an approach means efficient service integration leading to rapid new-revenue generation.

If you want more details, read attached file MSC.pdf.

3.3 Flexent® Home Location Register (HLR)

Description

Lucent's Flexent™ Home Location Register (HLR) for GSM and UMTS implements a database that is used in the management of mobile subscribers. In addition to subscriber information it stores the current location of each User Equipment, enabling call routing. Integrated with the Flexent™ HLR is the Authentication Centre (AuC). This software generates authentication and ciphering data according to ETSI specifications, combating fraud and protecting revenues that could be lost to User Equipment cloning.

Value description

- Accelerating time to revenue. The extensive use of Network Equipment Building Systems (NEBS) certified, common computing hardware reduces the time to market. For operators this means that operators can implement the solution at an early stage of 3G deployment and be ready for the expansive growth in both subscribers and subscriber services in the very near future.
- Reducing costs. Because of the modular approach, operators are able to grow their S-DHLR linearly with subscriber numbers. This has a very positive effect on capital expenditure, as investment is only directed there, where and when it is really required. The distributed architecture allows operators to make considerable operational expenditure savings in transport cost as not all HLR traffic has to travel to a central point but can be kept local.

- Minimising risk. The Lucent S-DHLR, which acts as single HLR but is physically distributed, limits the impact when system outage occurs, as a different node is able to assume the functionality of the effected equipment. This helps operators to build more resilient networks. In addition this architecture also helps operators when developing their 'disaster recovery' strategy.
- Driving future revenue generation. The common database approach enables future support for MAP and ANSI IS-41, allowing roaming between standards like GSM and UMTS with TDMA and CDMA. In addition, more and more subscriber services will become IP based and the S-DHLR will allow for seamless interaction between the mobile centric world and World Wide Web centric services of the future.

Features

- Very high scalability, whilst acting as a single virtual HLR. The Flexent™ HLR has been designed in anticipation of the expected distribution of call control servers and service control servers, though it acts as a single virtual HLR rather than multiple discrete HLR's. It is deployed on a distributed Intelligent Network architecture to store subscriber identities, subscriber service profiles, and details about User Equipment.
- Capacity can initially be scaled up to 20 million subscribers. In the future, operators will be able to increase this capacity figure in a 'pay as you grow' manner, through a per-subscriber software licensing fee, combined with purchase of additional hardware.
- Reduced cost of ownership. The high scalability means that operators can invest CAPEX (capital expenditure) wisely, growing capacity as required. The use of standard UNIX computing platforms and the distributed architecture means that existing hardware is added to, rather than replaced, as extra capacity is required. Operating expenditures are also saved, as many Global Translation Table and data segmentation complications are avoided.
- Standard computing platforms have an inherently lower cost compared with proprietary switch-based platforms. As UMTS networks migrate to an all-IP transport, only the network interface cards need to be changed.
- Architectural fit with an integrated services architecture. The Flexent™ HLR is deployed on the same platform as other service offerings (e.g. mobile number portability, pre-paid, etc.). Lucent envisages that all services will share the same database, with the HLR being one of those services. This simplifies subscriber administration and reduces duplication, lowering operational costs for operators.
- Disaster resilience. Employing a standard computing platform does not compromise the HLR's availability, which at 99.9999% benefits from the redundancy provided by the distributed architecture. In the event of a disaster, the cut-over is transparent, with transactions being

automatically routed around the point of failure. These measures ensure that operators can continue to generate revenues seamlessly.

- MAP/IS-41 network roaming. The Flexent™ HLR enables the same distributed database to support both MAP networks (e.g. GSM, GPRS, UMTS) and IS-41 networks (e.g. CDMA, TDMA, HDR). Transaction processing and database access is logically separated. Carriers with both MAP and IS-41 networks are able to support both with the same HLR.
- Lower risks through simple migration. The Flexent™ HLR is supplied with a software toolkit designed to handle the mass migration of subscriber data from legacy HLR's. The process first converts data from the current HLR into an ASCII text file, before importing it into the Flexent™ HLR. That way Lucent can accommodate legacy HLR's from different vendors. Subscribers can be progressively migrated to the Flexent™ HLR as the network is deployed and/or tested, requiring minimal disruption to either the legacy or the new network.

The Flexent™ HLR will ultimately evolve to a Home Subscriber Server (HSS) which introduces a new interface into the IP domain. The HSS is the master database for each user. It is responsible for keeping a list of features and services associated with the user, for tracking the location and means of access for a user. This means that HLR investments are protected as the UMTS standards evolve.

3.4 Flexent® Serving GPRS Support Node for UMTS (SGSN)

Description

The Serving GPRS Support Node (SGSN) provides mobility management (i.e. maintains mobile equipment location information to support applications such as Intelligent Networking and Location Based Services) and session management (i.e. QoS, security, attach/detach, routing & resource management).

Value description

- Accelerating time to revenue. Lucent's unparalleled experience in commercial implementation of the underlying UMTS technologies is critical to ensuring rapid infrastructure and service deployment. Furthermore, Lucent's in-depth understanding of the 3G marketplace means that it is able to provide network operators with detailed, accurate business modelling and planning – providing the fast track to a profitable UMTS business.
- Reducing costs. Lucent's highly innovative products and deployment tools mean significant reductions in infrastructure and roll-out costs, and the fact that Lucent's products are future-ready means that the network operator's capital expenditure is protected in the long-term.

- Minimising risk. The Lucent Worldwide Services division, the largest single networking services organisation in the world, will help to ensure rapid, risk-free system deployment and ongoing support. Access to the unmatched knowledge base of Bell Labs also reduces risk and delivers proven, reliable products and services.
- Driving future revenue generation. Lucent is actively driving the creation of essential revenue-generating services through leading edge products, industry-wide initiatives and partnerships with value-add mobile service providers. What's more, thanks to its strong relationships with leading terminal manufacturers, Lucent is able to ensure availability of a diverse portfolio of compatible mobile devices.

Features

- Cost-effective scalability. The Lucent Flexent™ SGSN is based on the flexible Lucent Flexent™ Mobility Server (FMS) platform that enables control and traffic bearer elements to be scaled independently to match changing usage requirements – i.e. “pay-as-you-grow”.
- High capacity. The Flexent™ SGSN offers the highest capacity SGSN on the market – this means fewer nodes for operators to deploy, faster deployment, simpler network configuration, more straightforward maintenance and reduced signalling traffic.
- Low cost of ownership. COTS (Commercial Off-The-Shelf) spare parts means competitive pricing and availability. Furthermore, Lucent's common platform development strategy (the FMS is the platform for other Lucent UMTS products including the Flexent™ CG and the Flexent™ RNC) means reduced training costs and spares inventory.
- Smooth migration path. The Flexent™ SGSN has been designed with future releases of UMTS standards (3GPP Releases 4 & 5) in mind, protecting capital investment and minimising the risk of future service disruption as the “all-IP” network becomes reality.
- High availability. The Flexent™ SGSN achieves carrier-class availability (99.999%) through the use of hot standby for critical components and the inclusion of Lucent's patented Reliable Clustered Computing (RCC) platform. For operators this means minimal ongoing maintenance costs and maximum service uptime for its customers.

3.5 Flexent® Gateway GPRS Support Node for UMTS (GGSN)

Description

The Flexent™ GGSN delivers unmatched packet data capacity and revenue-generating advanced IP services.

The Lucent Technologies Flexent™ Technologies GGSN, based on the successful Lucent SpringTide 7000 Wireless™ IP Service Switch, is the highest capacity GGSN on the market, capable of supporting hundreds of thousands of simultaneous individual connections. Furthermore, the Lucent SpringTide 7000 Wireless™ platform supports advanced functionality that enables wireless network operators to deliver a broad portfolio of revenue-generating services.

The Flexent™ GGSN has advanced functionality built-in, enabling the implementation of revenue-generating services without the need to purchase and integrate additional equipment.

If you want more details, read attached file GGSN.pdf.

3.6 Flexent® Radio Network Controller (RNC)

Description

The Flexent™ Radio Network Controller (RNC) is an adaptable, high capacity UMTS network element for call handling, operation and maintenance of multiple Flexent™ OneBTS™ base stations.

The Flexent™ RNC is primarily responsible for managing the radio resources, including call set-up and tear-down, the processing of voice and data traffic, and hard and soft handoff between cells. It has been specifically designed to provide a competitive, flexible and high capacity RNC product for operation in a UMTS network.

Lucent Technologies provides end-to-end UMTS network solutions, including Core Network and UMTS Terrestrial Radio Access Network (UTRAN) components. In addition to the Flexent™ RNC, Lucent's UTRAN offer also includes the Flexent™ OneBTS™ base station family (Node B).

The Flexent™ RNC is based on Lucent's Flexent™ Wireless Router. This innovative platform is deployed as a key component in multiple applications across Lucent's fixed and wireless product range. It is based on next generation Sun Microsystems cPCI computers, enhanced with Bell Labs software and purpose-designed Traffic Processing Units, to achieve Lucent's exacting carrier grade standards. The Flexent™ Wireless Router is central to future product evolution and as a result provides investment protection to Lucent's customers.

If you want more details, read attached file RNC.pdf.

3.7 Flexent OneBTS® Node B

Description

The Flexent™ OneBTS™ is a flexible radio platform that provides comprehensive support for all of the major 2G and 3G global radio standards and has been structured to address the oncoming explosion in demand for Mobile Internet data access. The OneBTS™ is a flexible radio access platform delivering cost-effective long-term performance and scope for growth. There are three versions, covering different types of customer application - Macrocell, Distributed and UltraSmall.

Value description

Lucent provides a growth path to protect base station investments. The same Flexent™ OneBTS™ unit can support both GSM and UMTS and will conform to release 99 and R4/R5 standards. Where UMTS is being added alongside an existing GSM network the Flexent™ OneBTS™ can be co-located with the GSM base stations of both Lucent and other suppliers. Our modular system architecture allows selective deployment of UMTS technology, growing a network in line with coverage and capacity requirements. Lucent's use of Intelligent Antenna technology for both uplink and downlink provides for managed capacity and performance growth allowing operators to grow their networks incrementally and avoid costly cell splitting as with conventional networks.

If you want more details, read attached file NodoB.pdf.

3.8 Flexent® Operations Maintenance Center (OMC)

Description

UMTS is bringing new opportunities and new challenges for network operators. The Universal Mobile Telecommunications System (UMTS) will enable new services to enhance the private and professional lives of end-users and potentially generate huge revenue streams for the network operators. However, before they can tap into these revenue streams, network operators must overcome many new and diverse challenges.

One such challenge is managing the highly complex, multi-service UMTS network to ensure optimal revenue generation. A UMTS network consists of many functional elements and utilises several different underlying technologies; a sophisticated yet easy-to-use management tool is required to ensure maximum efficiency, availability and, ultimately, profitability.

Lucent Technologies can help network operators overcome these challenges

Thanks to its unmatched experience in wireless communications and data networking, Lucent Technologies is uniquely positioned to help network operators overcome the challenge of complex network management.

Lucent's Flexent™ Operations & Maintenance Centre (OMC) is a state-of-the-art operations and maintenance platform designed specifically for UMTS. This centralised OMC solution will help to ensure that UMTS network operators deliver the high system availability and quality levels that their customers demand.

If you want more details, read attached file OMC.pdf.

4. MOTOROLA⁴

4.1 i.250 Innovative Convergence™ (2.5G) Platform

Overview

The i.250 platform leverages Motorola's extensive experience in delivering world-class cellular solutions since the birth of the wireless industry. The key platform components are as follows:

- Comprehensive reference design on handset.
- Industry-proven GSM software engine with mature, field-certified GPRS technology.
- User-friendly development tools such as man-machine interface (MMI) toolkit for rapid user interface development.
- Production test planning and pre-FTA test services.
- Highly integrated chipset that supports GPRS Class 8 operation for GMSK modulation formats and is EDGE-receive and GPRS Class 12 capable.

Design Challenges

As the GSM/GPRS marketplace continues to expand, market requirements are increasingly demanding: products need to be smaller in form factor, more cost effective, and delivered to market quickly. To help manufacturers meet these requirements, Motorola offers a comprehensive system solution with its 2.5G Innovative Convergence (i.250) platform. Featuring fully integrated

⁴ www.motorola.com

hardware, software, and support services, this platform enables the rapid development and deployment of cost-effective GSM/GPRS handsets. The platform is flexible and scalable: it can support the high-volume production of economical phones as well as the use of higher-tier feature sets, and it provides a migration path to next-generation technology.

The i.250 platform significantly reduces both time to market and the effort and cost of incorporating value added features such as Smart key entry method and WAP browser capability. Table 1 summarizes the platform's key benefits and their value. Another feature of the platform enabling manufacturers to quickly build GSM/GPRS products is its organization into three development environments, which can simplify the design cycle from concept to production.

Feature	Benefits	Value Proposition
Most comprehensive system solution in the industry	<ul style="list-style-type: none"> • Comprehensive reference design. • Proven GSM/GPRS software package. • Comprehensive development tools. • Tests and services. • Integrated chipset. 	<ul style="list-style-type: none"> • Reduces time to market. • Optimizes ease of system integration and interface design. • Reduces qualification/certification time. • Eases product customization and differentiation. • Streamlines procurement.
Technological expertise	<ul style="list-style-type: none"> • Proven system design and software. • Motorola's wireless experience. 	<ul style="list-style-type: none"> • Minimizes design risks and shortens development cycle. • Enables design team to quickly adopt a total solution. • Offers competitive size and battery life.
High level of system integration	<ul style="list-style-type: none"> • Reduced part count (as low as 125). • Embedded memory, which simplifies PCB design. • Reduced "de-sense" effect. 	<ul style="list-style-type: none"> • Decreases time to market and manufacturing cost. • Saves system cost (fewer components). • Minimizes platform development time. • Improves radio manufacturing cycle time and quality.
Flexible, scalable architecture	<ul style="list-style-type: none"> • High level of software and hardware re-use. • Smooth next-generation migration. 	<ul style="list-style-type: none"> • Supports different tiers of product features. • Quickens time to market for derivatives. • Provides path to applications like PDA phones and beyond.

Table A.1. Key Benefits of i.250 Platform

As the GSM/GPRS marketplace continues to expand, market requirements are increasingly demanding:

- Products need to be smaller in form factor.
- More cost effective.

- Delivered to market quickly.

To help manufacturers meet these requirements, Motorola offers a complete system solution with its 2.5G Innovative Convergence™ (i.250) platform. Featuring fully integrated hardware, software, and support services, this platform enables the rapid development and deployment of cost-effective GSM/GPRS handsets.

The platform is flexible and scalable in order to:

- Support high-volume production of economical phones.
- Enable the use of higher-tier feature sets.
- Provide a migration path to next-generation technology.

The i.250 platform's key offerings include:

- Complete platform and reference design of GSM/GPRS handset for rapid time to market.
- Low-tier to high-tier feature sets.
- Migration path with high level of software and hardware re-use.
- Embedded memory that enables different feature combinations.
- Derivatives: voice, voice/data, multimedia.

i.250 Components

The i.250 platform provides a solution built around four main components that enables Motorola to offer cost-effective world-class solutions to the GSM/GPRS handset market. The five key components that compose the chipset are:

- DSP56621 Baseband Processor.
- MC13712 Dual-Band GPRS Front End IC.
- MC13713 Integrated Power Management and Audio Circuit.
- MMM6010/6011 Dual-Band GPRS Power Amplifier Module with Antenna Switch.
- MC13715 Charge Control and Protection IC.

The platform chipset helps to lower overall system cost through higher integration, resulting in a part count as low as 125 -- a full 50 percent lower than the 250-part industry average available in products today. Fewer components equal a simplified printed circuit board (PCB) design, reduced

inventory and assembly costs, and a higher assembly yield. One of the platform's key cost savings is the inclusion of embedded memory in the Baseband Processor.

2.5G Parametrics

Description	Comments
2.5G Innovative Convergence™ (i.250) Platform	Complete GSM/GPRS cellular subsystem including chipset, communication engine software, plus integrated design and development tools.

Table A.2. 2.5G Parametrics

If you want more details, read attached file i250A.pdf and i250B.pdf.

4.2 i.300 Innovative Convergence™ (3G) Platform

A cutting-edge chipset. Powerhouse GSM/UMTS software engine. Industry-leading development environment. And among the most sophisticated imaging and video functionality available for handset products. Once again, Motorola puts state-of-the-art technology at your fingertips—this time, in a new solution for meeting the challenge of 3G: the i.300 Innovative Convergence (3G) Platform. This comprehensive, flexible platform gives you the silicon, software, and support you need to build feature-rich multimedia phones and video-communicators. With the i.300 platform, your products have the highest possible data speeds. What's more, they deliver the mobile voice, images, data and video communications capabilities tomorrow's consumers will demand.

3G Features

Designed to function as a seamless, integrated whole, the i.300 platform solution:

- Reduces your 3G development and integration costs with innovative architecture.
- Uses GSM/UMTS software engines to maximize performance and compatibility with today's networks.
- Includes state-of-the-art image and video capture and compression technology.
- Simplifies and eases application development with compact, ultra-fast Java technology and industry-leading mobile development tools.
- Provides a full range of multimedia and "infotainment" support, such as Internet access, still imaging, and streaming video and audio.

- Features a chipset and communication software capable of supporting GSM, EDGE, and W-CDMA services.
- Supports the Bluetooth™ platform solution from Motorola, a comprehensive system solution with exceptional performance and high-quality audio.

i.300 Components

The i.300 platform provides a solution built around key main components that enable Motorola to offer cost-effective, world class solutions to the 3G handset market for GSM, EDGE, or W-CDMA services. The key components that comprise the chipset are:

- Motorola baseband processor.
- ARM core-based Dragonball Applications Processor.
- 3G Transmit Modulator IC.
- Multi-Band GSM/UMTS Receiver IC.
- Multi-Band W-CDMA/UMTS Direct Conversion Receiver IC.
- W-CDMA/GSM/EDGE Digital Transceiver IC.
- Synthesizer.
- Power Amplifier Modules.
- Power Management and Audio Interface IC.

3G Parametrics

Description	Comments
3G Innovative Convergence™ (i.300) Platform	• Complete GSM/UMTS Platform including chipset, communication engine software, plus integrated design and development tools

Table A.3. 3G Parametrics

If you want more details, read attached file i300.pdf.

4.3 MC13760 : GSM/DCS/TDMA/AMPS Multi-Protocol Transceiver

The MC13760 Multi-Protocol, Multi-Band Digital Transceiver IC combines, on a single Advanced BiCMOS chip, the major building blocks required for next generation multi-purpose, multi-band wireless products. The device includes the majority of the circuitry necessary for IF signal processing between the RF front end and the DSP and backend. The MC13760 contains two

fractional-N synthesizers, a re-configurable zero IF receiver with programmable bandwidth, receive A/D conversion, multi-rate data interface to the baseband DSP, direct launch digital modulator, full transmit support circuits, and general purpose support circuits such as D/A and A/D converters, battery save and tri-state control switches.

MC13760 Features

Intended for use in a combined GSM/TDMA/AMPS/iDEN portable wireless phone product in the 800/900/1800/1900 MHz bands. The MC13760 can be used over a wide range of RF and IF frequencies. The main PLL prescaler input is usable to over 2 GHz and the IF quadrature downconverter operates up to 400 MHz.

The MC13760 has separate receive IF inputs and a common zero-IF IQ receiver for TDMA and for GSM accommodating the receiver architectural need to use different IF frequencies and filters without the need for additional switches.

- Receiver Functions for all GSM/DCS/TDMA IS-136/AMPS Modes and Frequencies Including GPRS.
- Direct Interface to Motorola Baseband Processors, such as the DSP56690 through a Common Programming and Data Interface.
- Main Three Accumulator (24-Bit) Fractional-N Synthesizer:
 - Resolution Capability of 6.0 Hz.
 - Dual-Mode Charge Pump Output for TDMA TX VCO and all RX.
 - Independent Charge Pump Output for GSM/DCS TX VCO.
 - GMSK Lookup ROM for Direct Transmission in GSM/DCS Mode.
 - Digital 16-Bit Automatic Frequency Control.
- Secondary Three Accumulator (24-Bit) Fractional-N Synthesizer for use as an Accurate Frequency-Corrected Clock in GSM, or as an additional Low Frequency LO.
- Coarse Tuning of the VCO(s) via a 6-Bit D/A with ADAPT.
- Operates at 2.75 V Deep Sleep Mode with current as low as 50 μ A.
- Versatile Frequency Generation including Linear and Constant Envelope Modulation Paths, Ramp and Power Level Control, Direct Gain Control of the RFPA in the TDMA Mode.
- D/A Conversion of TDMA TXI and TXQ.
- Reference Crystal Oscillator with a Buffered Output, Compensation/Fine Tuning via 9-Bit D/A.
- Receiver Gain Adjustment and Bandwidth Down to 6.0 kHz Programmed over the SPI Bus.
- A/D Conversion of RXI and RXQ to 8-Bit or 10-Bit Resolution.

- Types of Applications:
 - GSM/DCS/TDMA/AMPS Global Roaming Multi-Band Cellular Telephone.
 - VHF/UHF 2-Way or Trunked Radio, iDEN, Tetra, or Satellite Communication Radios or Telephones.
 - Hand-Held Wireless PDA's.
 - Wireless LAN's, Industrial Devices, ISM Band Products.
 - Any New Device Containing Some Combination of the Above Functions.

MC13760 Parametrics

VCC	ICC	GSM Receiver	TDMA/IDEN Receiver	Fractional -N PLL	Direct Launch GSM Transmitter	System Applicability	Case No./Package
2.65 to 2.90 V	Transmit 20 mA						
4.78 to 5.22 V (Charge Pumps)	Transmit 30 mA	Yes	Yes	Yes	Yes	GSM/DCS, TDMA, IDEN, AMPS	1285/ BGA- 104

Table A.4. MC13760 Parametrics

If you want more details, read attached file MC 13760.pdf.

5. NOKIA⁵

5.1 News. January 09, 2002

Nokia begins volume deliveries of 800 and 1900 MHz GSM/EDGE infrastructure, breaking ground for 3G services in the US. Major milestone is reached as Nokia becomes the first 3G vendor to ship EDGE network hardware in volumes.

Nokia has initiated volume shipments of commercial GSM/EDGE hardware to the US, the first such deliveries from any telecommunications vendor. The deliveries involve GSM/EDGE hardware for two major American operators, Cingular Wireless and AT&T Wireless, making these operators the first to implement the EDGE-based standard for the delivery of 3G services to their customers.

⁵ www.nokia.com

Further, deliveries for European and Asian operators in the 900 MHz and 1800 MHz frequencies are expected to commence in a few weeks' time.

"The commitments made to the deployment of EDGE by these leading carriers and others elsewhere in the world make it clear that EDGE is key to the creation of 3G services in the global wireless industry," says Timothy Eckersley, Senior Vice President, Nokia Networks. "As the only true global standard, GSM is the most widely adopted mobile technology in the world today, giving mobile consumers the possibility to enjoy seamless services and unparalleled innovation. EDGE is an important step in the evolution of this technology, allowing carriers to begin offering 3G services well ahead of other competing technologies. EDGE will enhance the spectrum efficiency of current GSM networks 3-4 fold and will enable data rates up to 473 kbps for GSM/GPRS subscribers."

"The constant evolution within GSM/EDGE for voice also boosts the network voice capacity and quality," continued Eckersley. "Adaptive Multirate codec (AMR) over GSM, and later over EDGE, keeps GSM in the lead for cost-efficient voice service. EDGE is clearly an excellent choice for operators to offer 3G services in the fast-growing GSM market, whether increasing the capacity of existing GSM/GPRS networks or creating a smooth migration path from legacy TDMA systems."

EDGE (enhanced data rates for global evolution) features are part of the GSM specification defined by ETSI and 3GPP. Nokia's EDGE radio-network solution uses technology that leverages the radio spectrum of GSM to provide data rates as high as 473 kbps. The more efficient use of radio spectrum by GSM/EDGE will allow operators to optimize their available spectrum. As part of a global standard, EDGE brings the same benefits of global roaming and economies of scale that GSM brings.

Since 1999, Nokia has been delivering EDGE-capable UltraSite EDGE and MetroSite EDGE base stations. Adding EDGE to these base stations requires only a simple upgrade, and in the case of 800 MHz and 1900 MHz networks, typically only a software upgrade is needed.

Nokia is the world leader in mobile communications. Backed by its experience, innovation, user-friendliness and secure solutions, the company has become the leading supplier of mobile phones and a leading supplier of mobile, fixed broadband and IP networks. By adding mobility to the Internet Nokia creates new opportunities for companies and further enriches the daily lives of people. Nokia is a broadly held company with listings on six major exchanges.

5.2 Nokia UltraSite EDGE Base Station – Triple-Mode Function

Providing full multi-standard support, combinations of GSM, EDGE and WCDMA configurations can co-exist on the same site and even in the same base station cabinet. The triple-mode Nokia UltraSite Base Stations supports GSM and EDGE on 800, 900, 1800 and 1900 MHz frequency bands, both in single band and multi-band configurations, as well as WCDMA on the 2 GHz frequency band.

The Nokia UltraSite EDGE Base Station comes in four types: Indoor, Midi Indoor, Outdoor and Midi Outdoor, all of which are extremely compact and high capacity. Both indoor and outdoor versions are capable of hosting up to 12 GSM/EDGE TRXs in a single base station cabinet. For even higher site capacities, several cabinets can be chained together.

Main benefits

- High capacity base station with triple-mode functionality.
- Support for 3rd generation services with EDGE and WCDMA compatibility and improved GSM performance.
- Smooth evolution path from existing sites by co-siting solutions.
- Highly integrated and flexible PDH and SDH transmission options.
- Complete Nokia UltraSite Solution for integrating sites with maximum confidence and minimum effort.
- Unique Nokia SRC concept brings significant improvement to the current coverage footprint and improves capacity by boosting EDGE data rates.

If you want more details, read attached file 3-MODE FUNCTION.pdf.

5.3 Nokia UltraSite EDGE Base Station Indoor Highlights

Key functionality

Nokia UltraSite EDGE Base Station Indoor is a compact and high-capacity base station that can host up to 12 GSM/EDGE TRXs (transceivers) or six GSM/EDGE TRXs and three WCDMA carriers in a single cabinet. Up to nine BTS cabinets can be chained to provide a very high capacity site. The BTS features an improved link budget that helps achieve a wide area of voice and data coverage.



Figure A.1. Nokia UltraSite EDGE Base Station Indoor Highlights

Key benefits

- High capacity, triple-mode base station for cost-effective and seamless coverage.
- Compatible with GSM, EDGE and WCDMA to support 3rd generation services.
- Can help existing sites evolve through co-siting solutions.

5.4 Nokia UltraSite EDGE Base Station Midi Indoor Highlights



Figure A.2. Nokia UltraSite EDGE Base Station Midi Indoor Highlights

Key functionality

Nokia UltraSite EDGE Base Station Midi Indoor is a compact, high-capacity base station for GSM and EDGE networks. It can host six GSM/EDGE TRXs (transceivers) in a single cabinet and features an improved link budget that achieves a wide area of voice and data coverage.

Key benefits

- High capacity base station for cost-effective, seamless coverage.
- GSM and EDGE compatible to support 3rd generation services.
- Can help existing sites evolve through co-siting solutions.

5.5 Nokia UltraSite EDGE Base Station Outdoor Highlights



Figure A.3. Nokia UltraSite EDGE Base Station Outdoor Highlights

Key functionality

Nokia UltraSite EDGE Base Station Outdoor is a compact and high-capacity base station that can host up to 12 GSM/EDGE TRXs or six GSM/ EDGE TRXs and three WCDMA carriers in a single cabinet. Up to nine BTS cabinets can be chained to provide a high capacity site. An improved link budget achieves a wide area of voice and data coverage.

Key benefits

- High capacity base station for cost-effective, seamless coverage
- Compatible with GSM, EDGE and WCDMA to support 3rd generation services
- Can help existing sites evolve through co-siting solutions
- Gives the freedom to select from a wide variety of cost-effective sites for deployment

5.6 Nokia UltraSite EDGE Base Station Midi Outdoor highlights

Key functionality

Nokia UltraSite EDGE Base Station Midi Outdoor is a compact, high-capacity base station for GSM and EDGE networks. It can host six GSM/EDGE TRXs (transceivers) in a single cabinet and features an improved link budget that achieves a wide area of voice and data coverage.

Key benefits

- High capacity base station for cost-effective, seamless coverage.
- GSM and EDGE compatible to support 3rd generation services.
- Can help existing sites evolve through co-siting solutions.

5.7 Nokia MetroSite EDGE Base Station Highlights



Figure A.4. Nokia MetroSite EDGE Base Station Highlights

Key functionality

Nokia MetroSite EDGE Base Station is a compact, 4-transceiver (TRXs) base station transmitting at 5W output power. A single cabinet can house both GSM900 and GSM1800 TRXs for dual band networks and GSM and EDGE transceivers can be mixed in the same cabinet, providing a smooth data evolution. Intended as a multimedia platform, the base station enables 3G services on existing frequency bands, 900/1800/1900 MHz. Its compact size and integrated system elements help achieve fast rollout.

Key benefits

- Cost-effective microcellular solution enables ten-fold capacity and infill coverage.
- Secures high-quality mobile multimedia services.
- Can house both GSM900 and GSM1800 TRXs for dual band networks, and a mixture of GSM/EDGE TRXs for smooth data evolution.
- Compact design simplifies site acquisition and enables fast rollout.
- Integrated system elements help reduce site costs.

If you want more details, read attached file MetroSite.pdf.

5.8 Nokia UltraSite EDGE Transmission Units Highlights



Figure A.5. Nokia UltraSite EDGE Transmission Units Highlights

Key functionality

The integrated transmission units can be installed in Nokia UltraSite GSM/EDGE Base Station, Nokia MetroSite GSM/EDGE Base Station or Nokia MetroHub Transmission Node. The transmission units provide E1 or T1 wireline interfaces, as well as support for Nokia FlexiHopper and MetroHopper microwave radios. FXC RRI transmission unit enables connection to two microwave radio outdoor units via unique Nokia Flexbus interface. FXC E1 and FXC E1/T1 units provide either 4x2 Mbit/s (75 or 120 ohm) or 4x1.5 Mbit/s (110 ohm) wireline interfaces. All FXC cards provide cross-connect functionality, enabling grooming, branching as well as loop protection.

Key benefits

- Integrated concept - no additional site space needed.
- Multipurpose usage: UltraSite GSM/EDGE, MetroSite GSM/EDGE and MetroHub environments.
- Provides cross-connect functionality with 8 kbit/s granularity, enabling efficient grooming.
- FXC RRI supports 2 Nokia radios with up to 300m distance - single coaxial cable per radio.
- Low power consumption, e.g. the power consumption of a FXC RRI unit is less than 8 W.

5.9 Nokia EDGE Network Planning Service Highlights

Key functionality

Nokia provides a comprehensive set of Network Planning Services for 3rd generation EDGE network customers, when expanding their packet switched traffic in mobile networks. The objective of these services is to support the Customer in the planning of the network to ensure that the new services and technologies, together with the existing networks, form an integrated platform for the Customer's business. Nokia EDGE Network Planning Service consists of the following four modules: Radio-, Core-, Cellular Transmission- and Transport Network Planning.

Key benefits

- Global planning organisation with local presence to support wide and efficient use of resources and skills.
- System approach including radio, core, cellular transmission and transport network planning.
- Proven processes for turn-key deliveries via Nokia's long experience in network planning for turn-key projects.
- Faster learning curve for the operator through working together with Nokia.
- Cost efficiency due to more efficient use of network resources.

6. SIEMENS⁶

6.1 Base Station Subsystem

Equipment for Present and Future Mobile Networks

⁶ www.siemens.com

The ever growing demand for mobile voice and data communication constantly raises customer expectations and increases competitive pressure on operators. Broad coverage, high capacity and advanced services are essential to satisfy customer requirements and keep pace with changing market demands. Siemens provides products and solutions to satisfy those demands in all phases of an operator's life cycle, thus ensuring a flexible, high-quality and cost-effective network.

On the way towards UMTS Siemens offers base stations with a secure future including features such as pico cells, HSCSD, GPRS and EDGE. In the highly complex mobile communication network the Base Station Subsystem (BSS) consists of the Base Transceiver Station (BTS), the Base Station Controller (BSC), the Transcoding and Rate Adaptation Unit (TRAU) and the Operation and Maintenance Center (OMC-B).

Benefits

- Reduced energy consumption.
- Efficient transmitters for significantly improved mobile radio networks.
- Lean use of materials, which results in additional transmitter space and greatly improved recycling.
- Homogeneous set of features.
- Familiar hardware and software platforms.

If you want more details, read attached file BSS.pdf.

6.2 BSC

The Base Station Controller (BSC) within a mobile network is a key component in handling and routing information. Siemens offers operators a flexible configuration, providing cost and resource effective solutions.

The Siemens Base Station Controller (BSC) provides a maximum on flexibility for your networking layouts, thanks to remote installation of the switching equipment. No raised floor or air conditioning is required due to the BSC's reduced power consumption of max. 475 W. This makes both cost-effective and economical network solutions possible. Being the most compact BSC on the market, the Siemens BSC offers an extremely compact solution for optimal BSC-BTS network configurations. Thanks to the BSC's compact design (less than 360 liters) and low heat generation, the operator now has the option of placing the BSC remotely close to the base stations or centrally with the switching equipment. It concentrates the traffic towards the MSC. In addition, the BSC

supports various BSC-BTS configurations (e.g., star, multidrop and loop) and a star configuration towards the TRAU.

Benefits

- A compact solution with only 360 liters' volume.
- Modular BSC hardware expansion of up to 4320 ports.
- Phase 2+ compatibility.
- No air conditioning required.
- Flexible BSC-BTS configurations.

Features

- Up to 500 TRX and up to 250 cells.
- Full support of advanced GSM Data services: HSCSD, GPRS and EDGE.
- Dual band operation.
- Various *Abis* interface configurations (star, multidrop, loop).
- Various transmission media (e.g., microwave, PCM30/PCM24, satellite).

If you want more details, read attached file BSC-TRAU.pdf.

6.3 TRAU

Transcoding and Rate Adaptation Unit

The Transcoding Rate Adaptation Unit (TRAU) is a key component in handling and routing information. Siemens offers operators a flexible configuration, providing cost and resource effective solutions.

Siemens Transcoding Rate Adaptation Unit (TRAU) is a stand-alone unit that can also be located close to the Mobile Switching Center (MSC) site. This allows optimal use of the 16 kbit/s channel submultiplexing and reduces your leased line costs. The modular capacity of the TRAU is expandable up to 480 traffic channels per rack. Full Rate, Half Rate and the Enhanced Full Rate can be easily activated by software and used simultaneously by the same transcoder hardware. This eliminates the need for hardware upgrades when new speech codes (e.g. AMR) are introduced. Highest reliability is ensured by using redundancy in all board components.

Benefits

- A compact solution with only 360 liters' volume.
- Maximum flexibility in network layout.
- No air conditioning required Phase 2+ compatibility.

Features

- Full support of advanced GSM Data services: HSCSD, GPRS and EDGE.
- Dual band operation.
- Various Abis interface configurations (star, multidrop, loop).
- Various transmission media (e.g., microwave, PCM30/PCM24, satellite).
- Cell broadcast.

If you want more details, read attached file BSC-TRAU.pdf

6.4 BS-40/41

An all-round solution

The Siemens BS-40/41 is an extremely compact, all-in-one rack base station. It is designed for rapid deployments, where easy commissioning and installations are required. Rapid network rollout translates into rapid return on investments, even in areas of heavy coverage.

The BS-40/41 uses the same shelter and rack size as the BS-240/241. Thanks to the integration of all essential components in one rack space requirements have been reduced to an absolute minimum.

Benefits

- Smooth network transitions in the future by using the same flexible internal structures and components as the BS-240/241.
- Full spectrum of combination options for a variety of cell configurations.
- High site efficiency due to reduced volume and small footprint.
- Designed for broad coverage applications and small to medium capacity demands.
- Compactness, flexibility and outstanding reliability.

Features

- Dual Band (GSM900/1800 and GSM900/1900).
- Housing up to 4 transceivers.
- No service interruption for TRX exchange.
- Integration of all necessary equipment (battery packs, link equipment, micro-wave equipment) possible.
- State-of-the-art technology, environmentally friendly, recyclable.

If you want more details, read attached file BS 40-41.pdf.

6.5 BS-240 / BS-241 / BS-240XL

Minimal footprint, maximum performance

The Siemens BS-24x base stations represent the latest advances in base station hardware. Increasing demands for higher capacity are now satisfied through significantly reduced volume and an expanded number of TRXs. As an operator, you have the choice between 12 and 8 carriers per rack.

Due to rack extensions, multiple configurations of up to 24 TRX in a single cell and up to 72 TRXs in a single site can be supported. With multiple cell configurations the operators needs are covered despite the demands imposed by different environments.

Benefits

- Highest reliability thanks to redundancy for all core modules.
- Installation time less than one hour.
- Perfect solution where space is limited (small footprint).
- Fully compatible with future applications.

Features

- Powerful Dual band base station (GSM900 / GSM1800 and GSM900 / GSM 1900).
- Modular architecture.
- Flexible internal structure.
- Site configuration of up to 72 TRX/site, up to 24 TRX/cell and 24 cells/site.
- No service interruption for rack extension or TRX exchange.

- Data rates up to 2 Mbit/s, which are ideal for EDGE.

BS-240/241/240XL is the new future-proof evolution of Siemens' BTS hardware. Highlights are configurations with up to 24 TRX, significantly reduced volume per TRX, and a future-oriented platform for all upcoming GSM enhancements. Brand new BS240-XL is our response to growing capacity requirements in limited space. And eases the way to integrated sites for GSM and UMTS.

If you want more details, read attached file BS-240.pdf.

6.6 BS-242 Pico

The Flexible Indoor Solution

The BS-242 Pico from Siemens mobile is the innovative base station solution for inbuilding deployments, which guarantees low cost of operation. This picocellular solution offers you flexible capacity, complete coverage and expanded service within buildings. All configurations can be realized, from 24 carriers in a single cell, to 24 individual carrier cells.

Benefits

- Access to new market segments, by delivering high-quality coverage within office buildings, hotels or exhibition centers.
- Modern, unobtrusive design blends perfectly into any environment.
- Easy and fast installation.
- Architecture prepared for future GSM features (e.g. EGDE).

Features

- Dual band operation in the same Server.
- Central power feeding to remote Agents.
- Modular system upgrade up to 24 Agents.
- Flexible extension of agents during operation - no service interruption.

If you want more details, read attached file BS-242 Pico.pdf.

6.7 BS-82 eMicro

More than merely Micro

The Siemens BS-82 eMicro base station utilizes a unique modular concept providing you with maximized installation flexibility for both indoor and outdoor sites. Thanks to the base station's compact size, multiple combining options and terrestrial interfaces, a wide range of urban and rural applications can be served. Stackable add-on modules satisfy individual needs and ensure almost unlimited flexibility with a minimum base cabinet volume: tailored solutions for business.

Benefits

- Multiple dual carrier units (DCU's) with twice the output power of other micro base stations.
- Cabinet extension responding to future capacity requirements.
- Architecture prepared for future GSM feature enhancements.
- Attractive and unobtrusive design.

Features

- Highly flexible modular architecture.
- Compact design: 4 TRX per cabinet, expandable to 8 (cascading 2 cabinets).
- No service interruption for rack extension or TRX exchange (hot plug-in).
- Add-on modules for maximum flexibility.

If you want more details, read attached file BS-82 eMicro.pdf.

6.8 Radio Commander

New Operation and Maintenance Center for Today's and Tomorrow's Networks

The Radio Commander introduces an all new concept for mobile network management by merging operation and maintenance for both second generation and third generation mobile radio networks on a single software platform.

The Radio Commander supports different radio technologies as well as the respective hardware equipment and is designed for a seamless evolution to third generation cellular networks. This

allows the operator to benefit from reduced training and operating costs in a highly competitive market.

Benefits

- Common platform concept, which allows management of both second generation (2G) and third generation (3G) networks on the same user interface.
- Additional management capabilities for the relevant existing and future technologies such as GSM, GPRS, HSCSD, Corporate GSM, EDGE, UMTS and TD-SCDMA.
- Optimization of the operator workflow.
- Future-proof system architecture.
- Reduced training and operating costs.

Features

- Common Management for different Radio Technologies.
- Integrated Tool Set.
- Scalability to support network growth for fast Time-to-Market.
- Extensive features to support multivendor operations.

If you want more details, read attached file Radio Commander.pdf.

ANEXO B. REGLAMENTACION DE PCS EN COLOMBIA

LEY 555 DE 2000⁷

(febrero 2)

por la cual se regula la prestación de los Servicios de Comunicación Personal, PCS y se dictan otras disposiciones.

El Congreso de Colombia

DECRETA:

Artículo 1°. *Objeto.* La presente ley tiene por objeto principal fijar el régimen jurídico aplicable a los Servicios de Comunicación Personal, PCS y establecer las reglas y principios generales para otorgar concesiones para la prestación de los servicios PCS.

La concesión comportará adicionalmente el permiso para el uso del espectro radioeléctrico atribuido para la prestación del servicio PCS y la autorización para el establecimiento de la red asociada a la prestación de los mismos, conforme a los reglamentos que expida el Ministerio de Comunicaciones.

Artículo 2°. *Definición.* Los Servicios de Comunicación Personal PCS son servicios públicos de telecomunicaciones, no domiciliarios, móviles o fijos, de ámbito y cubrimiento nacional, que se prestan haciendo uso de una red terrestre de telecomunicaciones, cuyo elemento fundamental es el espectro radioeléctrico asignado, que proporcionan en sí mismos capacidad completa para la comunicación entre usuarios PCS y, a través de la interconexión con las redes de telecomunicaciones del Estado con usuarios de dichas redes.

Estos servicios permiten la transmisión de voz, datos e imágenes tanto fijas como móviles y se prestan utilizando la banda de frecuencias que para el efecto atribuya y asigne el Ministerio de Comunicaciones.

Artículo 3°. *Redes de PCS.* Las redes de PCS forman parte de las redes de telecomunicaciones del Estado, hacen uso del espectro radioeléctrico atribuido y asignado para prestar los Servicios de Comunicación Personal, PCS, que interconectadas entre sí o a través de redes de telecomunicaciones del Estado permiten un cubrimiento nacional. Este espectro radioeléctrico se

⁷ www.pcs.gov.co

utiliza en células geográficas y pueden ser reutilizado dentro de cada área de cubrimiento. Para la conformación de redes complementarias se podrán utilizar otras bandas de frecuencia, incluyendo segmento satelital, previo otorgamiento de los permisos para el uso del espectro, por parte del Ministerio de Comunicaciones.

Estos permisos darán lugar al pago de las contraprestaciones correspondientes.

Artículo 4°. *Prestación de los Servicios de Comunicación Personal, PCS.* Los Servicios de Comunicación Personal, son responsabilidad de la Nación, quien los podrá prestar en gestión directa, o indirecta a través de concesiones otorgadas mediante contrato a empresas estatales, sociedades privadas o de naturaleza mixta.

Artículo 5°. *Principios generales de la contratación.* Los contratos estatales de concesión se adjudicarán previo el trámite de licitación pública, de acuerdo con los requisitos, procedimientos y términos previstos en la presente ley y demás disposiciones previstas en la Ley 80 de 1993, o las normas que las sustituyan, modifiquen o adicionen.

En ningún caso se podrá adjudicar el contrato de concesión a través del proceso de contratación directa.

El acto de adjudicación se realizará por el procedimiento de subasta y tendrá lugar en audiencia pública.

El Gobierno Nacional reglamentará el procedimiento de subasta buscando maximizar los ingresos económicos que pueda obtener la Nación.

En todo caso, para la licitación, concesión y operación del servicio se deberán observar los principios de igualdad, acceso democrático y trato no discriminatorio.

Teniendo en cuenta que los Servicios de Comunicación Personal, PCS son de ámbito y cubrimiento nacional y que el espectro radioeléctrico es un bien público de la Nación, la competencia para otorgar la concesión le corresponde a la Nación, a través del Ministerio de Comunicaciones. El Ministerio de Comunicaciones, en cumplimiento de sus objetivos y funciones, adelantará los procesos de contratación a que se refiere esta ley y velará por el debido cumplimiento y ejecución de los contratos celebrados.

Parágrafo. En la licitación y adjudicación de los contratos de concesión de licencias de PCS intervendrá transparencia internacional, directamente o a través de su filial transparencia Colombia, y/o un organismo no gubernamental de reconocido prestigio internacional, dedicado a la lucha contra la corrupción, con el objeto de salvaguardar los principios de igualdad de oportunidades, acceso democrático, transparencia, trato no discriminatorio y, en general, evitar cualquier forma de corrupción.

La organización tendrá acceso a los documentos, aún a los reservados, y podrá asistir a las diligencias de preparación de pliegos licitatorios, evaluación de ofertas y selección de adjudicatarios. No participará en la adopción de decisiones.

Luego de la adjudicación, la organización informará sobre la transparencia del proceso y la observancia de los principios enunciados.

Artículo 6°. *Plazo de la concesión.* El plazo de la concesión para los servicios PCS es de diez años. Se podrá prorrogar esta concesión por un período igual o menor, por solicitud del concesionario, en fecha que no será posterior al octavo año del período inicial de la concesión.

Artículo 7°. *Naturaleza de los concesionarios.* Los contratos de concesión para prestar servicios PCS sólo podrán celebrarse con personas jurídicas de derecho público o con sociedades privadas o mixtas constituidas en Colombia, de acuerdo con las leyes colombianas y con domicilio principal en este país, cuyo objeto social principal sea la prestación de servicios de telecomunicaciones.

Parágrafo 1°. Las sociedades de que trata este artículo deben ser sociedades anónimas y deben inscribir sus acciones en una de las bolsas de valores nacionales, en un plazo no mayor de tres (3) años contados a partir del perfeccionamiento del contrato de concesión, so pena de caducidad. La Superintendencia de Valores vigilará el cumplimiento de lo dispuesto en este parágrafo.

Parágrafo 2°. En las sociedades mixtas podrán participar directa o indirectamente, entidades descentralizadas de cualquier orden administrativo que tengan a su cargo la prestación de servicios de telecomunicaciones. Las entidades descentralizadas del orden nacional que presten servicios de telecomunicaciones, quedan autorizadas por la presente ley, para participar directa o indirectamente en estas sociedades.

Artículo 8°. *Modificación de la concesión.* Después de cinco años de otorgadas las concesiones, en aquellos municipios donde no se esté utilizando el espectro radioeléctrico asignado o no se tenga un plan de utilización para los cinco años siguientes, el operador en cuestión perderá el permiso para el

uso del espectro en esos municipios y el Ministerio de Comunicaciones podrá atribuir nuevamente y reasignar el espectro para la prestación de servicios de telecomunicaciones.

Lo anterior no exime al operador de PCS del obligatorio cumplimiento del plan mínimo de expansión de que trata el artículo 10.

Artículo 9°. De la contratación. El Ministerio de Comunicaciones seguirá las siguientes reglas generales, y en lo no previsto en ellas por la Ley 80 de 1993, para el procedimiento de selección de los contratistas y para el acto de adjudicación.

1. **Difusión del procedimiento.** El Ministerio de Comunicaciones, previo el inicio del procedimiento de contratación administrativa, informará en los medios de comunicación de amplia difusión y circulación el procedimiento para la concesión y la audiencia pública de adjudicación. Esta difusión se realizará de manera previa a la iniciación del procedimiento de selección objetiva de los concesionarios.
2. **Transparencia.** Toda la documentación relativa al proceso será pública, salvo en los casos en que haya expresa reserva legal. Los resultados parciales y finales se publicarán en medios de comunicación de amplia circulación y difusión. El Ministerio de Comunicaciones informará al público cuáles proponentes cumplieron con los pliegos de condiciones, por medio de comunicación de amplia circulación y difusión, antes de efectuarse el procedimiento de subasta. El Ministerio de Comunicaciones deberá informar al público por un medio de comunicación de amplia circulación y difusión el resultado de la adjudicación.
3. **Pliegos de Condiciones.** El Ministerio de Comunicaciones elaborará los pliegos de condiciones en los cuales deberá establecer las condiciones mínimas jurídicas, administrativas, técnicas, económicas y demás que estime convenientes, que obligatoriamente debe cumplir cada uno de los proponentes para poder participar en el procedimiento de subasta. El cumplimiento de dichas condiciones no otorgará derecho diferente al de poder presentar ofertas económicas.
4. **Audiencia pública previa al procedimiento de subasta:** De acuerdo con los términos del reglamento, el Ministerio de Comunicaciones realizará una audiencia pública para:
 - a) Explicar el contenido de la reglamentación y
 - b) Permitir que los interesados presenten sus observaciones.

Con base en esta audiencia, el Ministerio de Comunicaciones realizará los ajustes que estime pertinentes a la reglamentación.

5. ***Audiencia pública de subasta.*** De acuerdo con los términos del reglamento, el Ministerio de Comunicaciones realizará el procedimiento de subasta y de adjudicación de concesiones en audiencia pública, las cuales serán convocadas a través de medios de comunicación de amplia circulación y difusión, con una antelación no inferior a cinco (5) días hábiles. La audiencia será presidida por el Ministro de Comunicaciones.
6. ***Valor mínimo.*** El Ministerio de Comunicaciones fijará el valor mínimo para cada una de las concesiones.
7. ***Garantía de seriedad de las propuestas.*** Los proponentes deberán otorgar garantías de seriedad para sus propuestas y para tal efecto el Ministerio de Comunicaciones establecerá el valor base de las mismas. El Ministerio de Comunicaciones podrá ordenar ampliar el plazo o el valor de las garantías en cualquier momento dentro del procedimiento de subasta.
8. ***Contraprestaciones económicas.*** Los concesionarios de la prestación de servicios PCS deberán realizar un pago inicial y pagos periódicos.

El pago inicial corresponde al valor que el proponente ofreció en el procedimiento de subasta y por el cual se adjudicó la concesión.

En caso de prórroga del contrato de concesión, el Gobierno deberá cobrar un porcentaje del valor de la licencia inicial pagada por los operadores del PCS. El concesionario deberá pagar además las contraprestaciones periódicas establecidas en la presente ley.

Los pagos periódicos se calcularán como un porcentaje de los ingresos que reciban los operadores de sus usuarios por concepto de la prestación de estos servicios. El valor de estos pagos periódicos incluye la contraprestación por el uso del espectro radioeléctrico asignado para los servicios PCS. Este porcentaje será fijado por el Gobierno Nacional de conformidad con las normas que regulan la materia. Dicho porcentaje será igual al que se establece para TMC.

Artículo 10. Condiciones en que se deberán prestar los Servicios de Comunicación Personal, PCS. De conformidad con la Constitución y la ley, el Gobierno Nacional reglamentará las condiciones en que se deberán prestar los servicios de Comunicación Personal, PCS, teniendo en cuenta los siguientes criterios:

El servicio se prestará en todo el territorio nacional, tanto en las zonas urbanas y rurales, en condiciones para que la mayoría de los colombianos, puedan tener acceso a este servicio público.

Las concesiones para la prestación de Servicios de Comunicación Personal, PCS, se harán conforme a la atribución de bandas de frecuencias que realice el Ministerio de Comunicaciones.

Toda propuesta para que se asignen frecuencias para la operación de servicios PCS, incluirá un plan mínimo de expansión de obligatorio cumplimiento, en condiciones especiales a los municipios con mayores índices de necesidades básicas insatisfechas dentro de la respectiva área de la concesión. Dichos planes deberán realizarse en un término no mayor a cinco (5) años y su incumplimiento generará las sanciones a que haya lugar de acuerdo con lo previsto en la presente ley.

Para las concesiones iniciales, el plan mínimo de expansión en ningún caso será inferior al plan mínimo establecido para los operadores de TMC.

Parágrafo. Régimen de competencia. La Superintendencia de Industria y Comercio es la autoridad de inspección, vigilancia y control de los regímenes de libre y leal competencia en los servicios no domiciliarios de comunicaciones, así como de todos los demás sectores económicos. En tal calidad, la Superintendencia aplicará y velará por la observancia de las disposiciones contenidas en la Ley 155 de 1959, el Decreto 2153 de 1992 y la Ley 256 de 1996, contando para ello con sus facultades ordinarias y siguiendo para el efecto el procedimiento general aplicable, sin perjuicio de las atribuciones regulatorias de la Comisión de Regulación de Telecomunicaciones y la Comisión Nacional de Televisión.

Artículo 11. Concesiones iniciales. Inicialmente se otorgará una concesión para la prestación de los Servicios de Comunicación Personal, PCS, en cada una de las áreas Oriental, Occidental y Costa Atlántica, las cuales corresponden a las establecidas para la prestación de telefonía móvil celular en la Ley 37 de 1993 y sus reglamentos. De esta manera, la asignación de frecuencias se hará de forma que atienda esta división especial del territorio nacional.

En todo caso, se observarán las siguientes reglas:

a) Las concesiones se otorgarán dentro de los límites de esta ley, en los términos y oportunidades que para el efecto establezca el Gobierno Nacional;

b) Los concesionarios de telefonía móvil celular, TMC, los operadores nacionales de trunking, sus empresas filiales, matrices, subordinadas; los accionistas de los concesionarios de TMC, los accionistas de los operadores nacionales de trunking, que tengan una participación individual o conjuntamente de más del 30% y las empresas matrices, filiales o subordinadas de dichos accionistas no podrán:

- Participar en el proceso de licitación, ni obtener concesiones de PCS en ninguna de las áreas de prestación de PCS.
- Ser accionista de los concesionarios de servicios PCS, durante los primeros tres años de concesión para la prestación de los servicios PCS, contados a partir del perfeccionamiento del primer contrato;

c) Los concesionarios de servicios PCS, sus empresas filiales, matrices o subordinadas; los accionistas de los concesionarios de servicios PCS, las empresas matrices, filiales o subordinadas de dichos accionistas, no podrán adquirir más del treinta por ciento (30%) del capital social de un concesionario de TMC que preste servicios dentro de la misma área o de un operador nacional de trunking durante los primeros tres años de concesión para la prestación de los servicios de PCS.

Parágrafo 1°. El Ministerio de Comunicaciones promoverá la participación de accionistas minoritarios en las sociedades anónimas que sean concesionarias del servicio de PCS.

En desarrollo de tal objetivo, se establecerán previsiones para asegurar que los concesionarios ofrezcan en venta a inversionistas minoritarios al menos el 15% de las acciones en bolsas de valores, a más tardar al cuarto año contado a partir del perfeccionamiento del respectivo contrato de concesión so pena de caducidad.

El Ministerio de Comunicaciones reglamentará la materia para que, antes del proceso de licitación, se fijen los mecanismos, las reglas y los procedimientos que se seguirán para dar cumplimiento al presente parágrafo.

Parágrafo 2°. El Gobierno Nacional contratará mediante licitación pública o concurso una asesoría que incluya un consultor en telecomunicaciones y una banca de inversión, ambos de reconocido prestigio nacional, para que entre otras funciones, recomiende la oportunidad para iniciar el proceso de licitación pública y asesore al Gobierno Nacional en el diseño de la subasta y en el establecimiento del valor mínimo de cada concesión, consultando las condiciones del mercado y de conformidad con lo previsto en esta ley.

Para preservar un ambiente de sana competencia al fijar el valor mínimo de cada concesión, el Ministerio de Comunicaciones atenderá el principio de equilibrio económico con los operadores de TMC.

Artículo 12. Nuevas concesiones. Se otorgarán nuevas concesiones adicionales a las previstas en el artículo 11, para la Prestación de Servicios PCS que se regulan en la presente ley, después de tres

años contados a partir de la promulgación de esta ley, El mecanismo para otorgar nuevas concesiones será la subasta.

En el proceso para la obtención de las nuevas concesiones podrán participar todas las personas jurídicas públicas, privadas o mixtas sin ningún tipo de restricción, siempre y cuando cumplan con las condiciones del proceso licitatorio que para el efecto adelante el Ministerio de Comunicaciones.

Artículo 13. *Inversión extranjera.* La inversión extranjera en la prestación de Servicios de Comunicación Personal, PCS se regirá por la Ley 9ª de 1991 y las normas que la modifiquen o complementen, y no tendrán más limitaciones que las señaladas en esas disposiciones.

Artículo 14. *Régimen de interconexión, acceso y uso.* Todos los operadores de telecomunicaciones deberán permitir la interconexión de sus redes y el acceso y uso a sus instalaciones esenciales a cualquier otro operador de telecomunicaciones que lo solicite, de acuerdo con los términos y condiciones establecidos por la Comisión de Regulación de Telecomunicaciones, para asegurar los siguientes objetivos:

- a) Trato no discriminatorio;
- b) Transparencia;
- c) Precios basados en costos más una utilidad razonable;
- d) Promoción de la libre y leal competencia.

Parágrafo. Las contravenciones a lo dispuesto en este artículo serán sancionadas por el Ministro de Comunicaciones, sin perjuicio de las competencias legales asignadas a otras autoridades.

Las sanciones consistirán en multas diarias hasta por 250 salarios mínimos legales mensuales, por cada día en que incurra en la infracción y por cada infracción, según la gravedad de la falta, el daño producido y la reincidencia en su comisión, sin perjuicio de las acciones judiciales que adelanten las partes.

Artículo 15. *Comisión de Regulación de Telecomunicaciones.* La CRT será el organismo competente para promover y regular la competencia entre los operadores de los Servicios de Comunicación Personal, PCS, entre sí y con otros operadores de servicios públicos de telecomunicaciones, fijar el régimen tarifario, regular el régimen de interconexión, ordenar servidumbres en los casos que sea necesario, expedir el régimen de protección al usuario y dirimir en vía administrativa los conflictos que se presenten entre los operadores de PCS, o entre estos y otros operadores de servicios de telecomunicaciones.

La CRT expedirá las normas que regulan la interconexión teniendo en cuenta los principios de neutralidad y acceso igual-cargo igual.

Artículo 16. *Recaudos.* El recaudo total de los pagos iniciales que efectúen los operadores de PCS por las concesiones de que trata el artículo 11 de la presente ley lo hará directamente la Dirección General del Tesoro Nacional. Tal valor se constituye en un ingreso corriente de la Nación y su monto será referencia para que la Nación a través del Ministerio de Hacienda y Crédito Público haga aportes, por el mismo valor, a los patrimonios que Telecom y Adpostal hayan constituido o a las entidades que hagan sus veces y al Fondo de Comunicaciones con el objeto de atender el pago de las obligaciones pensionales.

Este aporte será distribuido así: el sesenta y cinco por ciento (65%) para el patrimonio autónomo de Telecom, veinticinco por ciento (25%) para el de Adpostal o la entidad que haga sus veces con el objeto de atender el pago de sus obligaciones pensionales y el diez por ciento (10%) al Fondo de Comunicaciones para que recaude y gire dicho aporte a los patrimonios o entidades que haga sus veces para contribuir a cubrir las obligaciones pensionales de las empresas oficiales y mixtas en las cuales la participación pública sea igual o superior al setenta por ciento (70%) del capital social, que presten el servicio de telefonía pública básica conmutada local o local extendida, según criterios que establezca el Fondo de Comunicaciones.

Dicho aporte será efectuado en la fecha en que establezca su cuantía, mediante un documento de deuda cuya amortización a capital se comenzará a más tardar tres años después de su creación y en un plazo máximo de siete años a partir de su fecha de constitución. De cualquier forma, durante el plazo de la obligación se causarán intereses corrientes a una tasa de mercado determinada con base en el plazo y forma de autorización que sean establecidos.

Los pagos iniciales provenientes de las concesiones adicionales de que trata el artículo 12 de la presente ley, se destinarán al fomento de programas de inversión social en sector de las telecomunicaciones, al igual que los pagos periódicos de que trata la presente ley los cuales pertenecen al Fondo de Comunicaciones y se destinarán al mismo fin.

Artículo 17. *Régimen de protección al usuario.* La Comisión de Regulación de Telecomunicaciones fijará el régimen de derechos y obligaciones de los usuarios de los servicios de PCS y establecerá el reglamento de protección a los mismos, en el cual reconocerá a estos:

1. Derecho a la libre elección del operador.
2. Derecho a la medición.

3. Derecho a la protección.
4. Derecho a reclamar al operador.
5. Derecho de acudir a las autoridades.
6. Derecho a la información.
7. Derecho a la protección contra la publicidad indebida.
8. Derecho contra conductas restrictivas o abusivas.
9. Derecho a trato equitativo.
10. Derecho a la inviolabilidad y secreto de las comunicaciones.

Parágrafo 1°. La Comisión de Regulación de Telecomunicaciones reglamentará cláusulas de protección a los usuarios en los contratos para la prestación de servicios de telecomunicaciones móviles considerando entre otras, las siguientes reglas:

- a) Sólo se establecerán períodos de permanencia mínima, sanciones o multas por terminación anticipada, o prórroga automática, cuando el usuario en anexo independiente al contrato, acepte expresamente tal condición;
- b) Los operadores deberán presentar alternativas de suscripción al usuario que no le impongan un determinado período de permanencia;
- c) Los operadores no podrán fijar cláusulas que limiten o excluyan las responsabilidades que correspondan a los operadores.
- d) Los operadores no tendrán facultades para terminar los contratos por razones distintas al incumplimiento del usuario, a causas legales, fuerza mayor o caso fortuito.

Parágrafo 2°. Los operadores de todos los servicios móviles de telecomunicaciones sólo podrán almacenar y registrar datos que, según las normas o pautas que fije la Comisión de Regulación de Telecomunicaciones, y de conformidad con el artículo 15 de la Constitución, se consideren estrictamente relevantes para evaluar el perfil económico de sus titulares.

Los datos personales que recojan y sean objeto de tratamiento deben ser pertinentes, exactos y actualizados de modo que correspondan verazmente a la situación real de su titular.

Cualquier daño causado con violación de esta norma dará lugar a la indemnización de perjuicios según las reglas civiles de la responsabilidad, sin perjuicio de la procedencia de la acción de tutela para proteger el derecho fundamental a la intimidad personal.

Artículo 18. En el proceso de adjudicación el Gobierno tendrá dentro de los criterios de selección la maximización de la transferencia de tecnología, investigación y desarrollo al país, así como la

generación de valor agregado interno en distintas formas como la utilización del talento nacional, el aporte de conocimiento de los adjudicatarios a centros de investigación, la producción y ensamblaje de piezas, entre otras.

Artículo 19. Aplicación legislativa. En lo no previsto en esta ley se aplicará lo dispuesto en la Ley 80 de 1993, Ley 72 de 1989, Decreto 1130 de 1999, Decreto-ley 1900 de 1990 y la Ley 422 de 1998, y demás normas que la modifiquen, sustituyan o adicionan.

Artículo 20. Vigencia. La presente ley rige a partir de la fecha de su publicación y deroga las normas que le sean contrarias.

El Presidente del honorable Senado de la República,

Miguel Pinedo Vidal.

El Secretario General del honorable Senado de la República,

Manuel Enríquez Rosero.

El Presidente de la honorable Cámara de Representantes,

Armando Pomárico Ramos.

El Secretario General de la honorable Cámara de Representantes,

Gustavo Bustamante Moratto.

REPUBLICA DE COLOMBIA – GOBIERNO NACIONAL

Publíquese y ejecútese.

Dada en Santa Fe de Bogotá, D. C., a 2 de febrero de 2000.

ANDRES PASTRANA ARANGO

El Ministro de Hacienda y Crédito Público

Juan Camilo Restrepo Salazar.

La Ministra de Comunicaciones

Claudia De Francisco Zambrano

Para mayor información, lea los archivos adjuntos (CD):

- Aportes de ACIEM al Proceso PCS.doc
- Pliego de Condiciones.pdf
- RESOLUCION 1512.pdf.

ANEXO C. ACRONIMOS

A

A. Interfaz entre el MSC y el BSC para GSM e interfaz entre el MSC y la BS para TDMA/IS-136

AAA. Authentication, Authorization and Accounting – Autenticación, Autorización y Facturación

Abis. Interfaz entre el BSC y la BTS en GSM

ACCH. Associated Control Channel – Canal de Control Asociado

ACH. Access Channel – Canal de Acceso

AMPS. Advanced Mobile Phone System – Sistema Telefónico Móvil Avanzado

AMR. Adaptative Multi-Rate – Multivelocidad Adaptativa

ANSI. American National Standards Institute – Instituto de estándares Nacionales Americanos

APD. Average Power Decrease – Disminución de Potencia Media

ARCH. Access Response Channel – Canal de Respuesta de Acceso

ARIB. Association of Radio Industries and Broadcasting – Asociación de Industrias de Radio y Radiodifusión

ARPU. Average Revenue Per User – Ganancia Media Por Usuario

ARQ. Automatic Repeat Request – Petición Automática de Repetición

AUC. Authentication Center – Centro de Autenticación

B

BCCH. Broadcast Control Channel – Canal de Control de Radiodifusión

BER. Bit Error Rate – Tasa de Error de Bit

BG. Billing Gateway – Pasarela de Facturación

BS. Base Station – Estación Base para TDMA/IS-136

BSC. Base Station Controller – Controlador de Estación Base

BSS. Base Station System – Sistema de Estación Base

BTS. Base Transceiver Station – Estación Transceptora Base

C

C/I. Carrier to Interference Ratio – Relación de Portadora a Interferencia

CAPEX. Capital Expenses – Gastos de Capital

CCCH. Common Control Channel – Canal de Control Común

CDG. CDMA Development Group – Grupo de Desarrollo CDMA

CDMA. Code Division Multiple Access – Acceso Múltiple por División de Código

CDMA/IS-95. Digital Cellular Standard IS-95 – Estándar Celular Digital IS-95

cdmaOne. Marca comercial para IS-95 que integra la interfaz de aire CDMA/IS-95 y el protocolo de red ANSI-41.

CDMA2000 1x EV-DO. CDMA2000 1x Evolution Data Only – CDMA2000 1x Evolución Solo Datos

CDMA2000 1x EV-DV. CDMA2000 1x Evolution Data and Voice – CDMA2000 1x Evolución Datos y Voz

CDPD. Cellular Digital Packet Data – Servicio Celular Digital de Paquetes de Datos

CDR. Call Detail Records – Registros detallados de Llamadas

CHTML. Compact HTML – HTML Compacto

CITEL. Comisión Interamericana de Telecomunicaciones

CN. Core Network – Núcleo de Red

CPAGCH. Compact Packet Access Grant Channel – Canal de Concesión de Acceso por Paquetes Compact

CPBCH. Compact Packet BCCH – Canal de Control de Radiodifusión por Paquetes Compact

CPPCH. Compact Packet PCH – Canal de Búsqueda por Paquetes Compact

CPRACH. Compact Packet RACH – Canal de Acceso Aleatorio por Paquetes Compact

CS. Code Scheme – Esquema de Codificación

CSD. Circuit Switched Data – Datos por Conmutación de Circuitos

CSCF. Función Control de Sesión de Llamada

D

D-AMPS. Digital AMPS – AMPS Digital

DCCH. Digital Control Channel – Canal de Control Digital para TDMA/IS-136

DCCH. Dedicated Control Channel – Canal de Control Dedicado para GSM y UMTS

DECT. Digital Enhanced Cordless Telecommunications – Telecomunicaciones Inalámbricas Digitales Mejoradas

DN. Directory Number – Número de Directorio

DNS. Domain Name Server – Servidor de Nombres de Dominio

Downlink. Enlace descendente o hacia delante, entre la estación base y la estación móvil

DPCH. Dedicated Physical Channel – Canal Físico Dedicado

DQPSK. Differential Quadrature Phase Shift Keying – Modulación por Desplazamiento de Fase de Cuadratura Diferencial

DS. Direct Sequence – Secuencia Directa

DS. Despread Spectrum – Desexpansión del Espectro

DS-CDMA. Direct Sequence CDMA – CDMA de Secuencia Directa

DSCH. Downlink Shared Channel – Canal Compartido para el enlace Downlink

DTCH. Dedicated Traffic Channel – Canal de Tráfico Dedicado

DTX. Discontinuous Transmission – Transmisión Discontinua

E

E-BCCH. Extended BCCH – Canal de Control de Radiodifusión Extendido

ECSD. Enhanced Circuit Switched Data – Datos Mejorados por Conmutación de Circuitos

EDGE. Enhanced Data Rates for Global Evolution – Velocidades de Datos Mejoradas para la Evolución Global

EFR. Enhanced Full Rate – Velocidad Plena Mejorada

EGPRS. Enhanced GPRS – GPRS Mejorado

EIR. Equipment Identity Register – Registro de Identificación de Equipos

ESN. Electronic Serial Number – Número Serial Electrónico

ETSI. European Telecommunications Standards Institute – Instituto Europeo de Estándares de Telecomunicaciones

F

FACCH. Fast Associated Control Channel – Canal Rápido de Control Asociado

FACH. Forward Link Access Channel – Canales de Acceso de UMTS para el enlace Downlink

F-APICH. Forward Auxiliary PICH – Canal Piloto Auxiliar para el enlace Downlink

F-ATDPICH. Forward Auxiliary Transmit Diversity PICH – Canal Piloto Auxiliar de Diversidad de Transmisión para el enlace Downlink

F-BCCH. Fast BCCH – Canal Rápido de Control de Radiodifusión

F-BCH. Forward BCH – Canal de Radiodifusión para el enlace Downlink

F-CACH. Forward Common Assignment Channel – Canal de Asignación Común para el enlace Downlink

FCC. Federal Communications Commission – Comisión Federal de Comunicaciones

F-CCCH. Forward CCCH – Canal de Control Común para el enlace Downlink

FCCH. Frequency Correction Channel – Canal de Corrección de Frecuencia

F-CPCCH. Forward Common Power Control Channel – Canal de Control de Potencia Común para el enlace Downlink

F-DCCH. Forward DCCH – Canal de Control Digital para el enlace Downlink

FDD. Frequency Division Duplex – Duplexación por División de Tiempo

FDTC. Forward Digital Traffic Channel – Canal de Tráfico Digital para el enlace Downlink

F-PCH. Forward PCH – Canal de Búsqueda para el enlace Downlink

F-PICH. Forward PICH – Canal Piloto para el enlace Downlink

F-QPCH. Forward Quick PCH – Canal de Búsqueda Rápido para el enlace Downlink

FR. Full Rate – Velocidad Plena

F-SYNCH. Forward Sync Channel – Canal de Sincronización para el enlace Downlink

F-TDPICH. Forward Transmit Diversity PICH – Canal Piloto de Diversidad de Transmisión para el enlace Downlink

G

GAIT. GSM ANSI-41 Interoperability Team – Equipo de Interoperabilidad GSM ANSI-41

Gb. Interfaz GPRS entre el BSS y la red principal por conmutación de paquetes 2G

GERAN. GSM/EDGE Radio Access Network – Red de Acceso por Radio GSM/EDGE

GGSN. Gateway GPRS Support Node – Nodo de Soporte de Pasarela GPRS

GIWU. GSM Interworking Unit – Unidad de Interfuncionamiento GSM

GMM. GPRS Mobility Management – Gestión de Movilidad GPRS

GMSC. Gateway MSC – Pasarela del Centro de Conmutación Móvil

GMSK. Gaussian Minimum Shift Keying – Modulación por desplazamiento mínimo Gausiano

GPRS. General Packet Radio Service – Servicio General de Paquetes por Radio

GPS. Global Positioning System – Sistema de Posicionamiento Global

GSM. Global System for Mobile Communication – Sistema Global para Comunicación Móvil

GTP. GPRS Tunnelling Protocol – Protocolo de Entunelamiento GPRS

H

HA. Home Agent – Agente Residente

Hand Off. Transferencia de Llamadas Intercelular

HDML. Handheld Device Markup Language – Servidor de Lenguaje del Dispositivo para Marcación

HLR. Home Location Register – Registro de Localización de Residentes

HR. Half Rate – Velocidad Media

HSCSD. High Speed Circuit Switched Data – Datos de Alta Velocidad por Conmutación de Circuitos

HSDPA. High Speed Downlink Packet Data Access – Acceso de Alta Velocidad para Paquetes de Datos del Enlace Downlink

HS-DSCH. High Speed DSCH – Canal Compartido de Alta Velocidad para el enlace Downlink

HSS. Servidor de Abonado Residencial

I

IMEI. International Mobile Equipment Identity – Identificación Internacional de Equipo Móvil

IMSI. International Mobile Station Identity – Número Internacional de Identificación de MS

IMT 2000. International Mobile Telecommunications 2000 – Telecomunicaciones Móviles Internacionales 2000

IMT DS. IMT Direct Sequence – Telecomunicaciones Móviles Internacionales de Secuencia Directa

IMT FT. IMT Frequency Time – Telecomunicaciones Móviles Internacionales de Frecuencia por Tiempo

IMT MC. IMT Multiple Carrier – Telecomunicaciones Móviles Internacionales de Portadora Múltiple

IMT SC. IMT Single Carrier – Telecomunicaciones Móviles Internacionales de Portadora Única

IMT TC. IMT Time Code – Telecomunicaciones Móviles Internacionales de Código por Tiempo

IN. Intelligent Network – Red Inteligente

IOS. Interoperability Standard – Norma de Interoperabilidad

IP. Internet Protocol – Protocolo de Internet

IR. Incremental Redundancy – Redundancia Incremental

ISDN. Integrated Services Digital Network – Red Digital de Servicios Integrados

ISP. Internet Service Providers – Proveedores de Servicio Internet

ITU. International Telecommunication Union – Unión Internacional de Telecomunicaciones

Iu. Interfaz entre UTRAN y la red principal GSM/UMTS

Iub. Interfaz entre el Nodo B y el RNC

Iu-cs. Interfaz Iu para conmutación de circuitos de la red principal GSM/UMTS

Iu-ps. Interfaz Iu para conmutación de paquetes de la red principal GSM/UMTS

Iur. Interfaz entre RNC y RNC

Iur-g. Interfaz entre UTRAN y BSS

IWF. Interworking Function – Función de Interoperabilidad

L

LA. Link Adaptation – Adaptación de Enlace

LA. Location Area – Area de Localización

LQC. Link Quality Control – Control de Calidad de Enlace

M

MAC. Medium Access Control – Control de Acceso al Medio

MAP. Mobile Application Part – Parte de Aplicación Móvil

MCS. Modulation and Coding Scheme – Esquema de modulación y codificación

ME. Mobile Equipment – Equipo Móvil

MGCF. Función de Control de la Pasarela de Medios

MGW. Pasarela de Medios

MIN. Mobile Identification Number – Número de Identificación Móvil

MoU. Memorandum of Understanding

MOU. Minutes Of Use – Minutos de Uso

MRF. Función de Recursos Multimedia

MRP. Multiple Reuse Patterns – Patrones de Reutilización Múltiple

MS. Mobile Station – Estación Móvil

MSC. Mobile Switching Center – Centro de Conmutación Móvil

MSN. Mobile Service Node – Nodo de Servicio Móvil

MVNO. Mobile Virtual Network Operators – Operadores Móviles de Redes Virtuales

MXE. Message Center – Centro de Mensajería

N

NMT. Nordic Mobile Telephone – Telefonía Móvil Nórdica

NGN. Next Generation Network – Red de Próxima Generación

NMS. Network Management System – Sistema de Gestión de Red

O

O&M. Operation and Maintenance – Operación y Mantenimiento

OA&M. Operation, Administration and Maintenance – Operación, Administración y Mantenimiento

OHG. Operators Harmonization Group – Grupo de Operadores para la Armonización

OMC. Operation and Maintenance Center – Centro de Operación y Mantenimiento
 OPEX. Operational Expenses – Gastos Operacionales
 OQPSK. Orthogonal Quadrature Phase Shift Keying – Modulación por Desplazamiento de Fase de Cuadratura Ortogonal
 OSS. Operation and Support System – Sistema de Operación y Soporte

P

PARC. Acuerdo Panamericano de Roaming
 PCH. Paging Channel – Canal de Búsqueda
 PCN. Packet Core Network – Núcleo de Red de Paquetes
 PCS. Personal Communication System – Sistema de Comunicación Personal
 PCU. Packet Control Unit – Unidad de Control de Paquete
 PDC. Personal Digital Communication – Comunicación Personal Digital
 PDCH. Packet Data Channel – Canal de Paquetes de Datos
 PDGN. Packet Data Gateway Node – Nodo Pasarela de Paquetes de Datos
 PDN. Public Data Network – Red Pública de Paquetes de Datos
 PDP. Packet Data Protocol – Protocolo de Paquetes de Datos
 PDSN. Packet Data Serving Node – Nodo Servidor de Paquetes de Datos
 PDTCH. Packet DTCH – Canales de Tráfico de Paquetes de Datos
 PDU. Protocol Data Unit – Unidad de Protocolo de Datos
 PICH. Pilot Channel – Canal Piloto
 PLMN. Public Land Mobile Network – Red Terrestre Móvil Pública
 PN. Pseudo Noise – Pseudo Ruido
 PPP. Point to Point Protocol – Protocolo Punto a Punto
 PSTN. Public Switched Telephone Network – Red Telefónica Pública Conmutada
 PTCCH. Packet Timing Advance Control Channel – Canal de Control Avanzado de Temporización de Paquetes
 PTM. Point To Multipoint – Punto A Multipunto
 PTP. Point To Point – Punto A Punto

Q

QoS. Quality of Service – Calidad de Servicio

R

R&D. Research and Development – Investigación y Desarrollo
 RA. Routing Area – Area de Enrutamiento
 RAB. Radio Access Bearers – Portadores de Acceso por Radio
 RACH. Random ACH – Canal de Acceso Aleatorio
 R-ACH. Reverse ACH – Canal de Acceso para el enlace Uplink
 RAN. Radio Access Network – Red de Acceso por Radio
 R-CCCH. Reverse CCCH – Canal de Control Común para el enlace Uplink
 RDCCH. Reverse DCCH – Canal de Control Digital para el enlace Uplink
 RDTC. Reverse Digital Traffic Channel – Canal de Tráfico Digital para el enlace Uplink
 R-EACH. Reverse Enhanced ACH – Canal de Acceso Mejorado para el enlace Uplink
 RF. Radio Frecuencia
 RLC. Radio Link Control – Control de Enlace de Radio
 RNC. Radio Network Controller – Controlador Red de Radio
 R-PICH. Reverse PICH – Canal Piloto para el enlace Uplink
 RRC. Radio Resources Control – Control de Recursos de Radio
 RTT. Radio Transmission Technology – Tecnología de Transmisión de Radio

S

SACCH. Slow Associated Control Channel – Canal Lento de Control Asociado
 S-BCCH. Service BCCH – Canal de Control de Servicio de Radiodifusión
 SCF. Shared Channel Feedback – Canal de Retroalimentación Compartido
 SCH. Synchronization Channel – Canal de Sincronización
 SDCCCH. Stand-alone Dedicated Control Channel – Canal de Control Dedicado Autónomo
 SDU. Service Data Unit – Unidad de Datos de Servicio
 SGSN. Serving GPRS Support Node – Nodo Servidor de Soporte GPRS
 SIM. Subscriber Identity Module – Módulo de Identificación del Subscriptor
 SIP. Protocolo de Inicio de Sesión
 SMG. Special Mobile Group – Grupo Móvil Especial
 SMS. Short Message Service – Servicio de Mensajería Corta
 SMSCH. SMS Channel – Canal SMS
 SPACH. SMS, Paging and Access Channel – Canal de Acceso, Búsqueda y SMS
 Spread Spectrum – Espectro Extendido para CDMA/IS-95
 SS. Switching System – Sistema de Conmutación para GSM

T

TACS. Total Access Communications System – Sistema de Comunicaciones de Acceso Total

TCH. Traffic Channel – Canal de Tráfico

TCP. Transmission Control Protocol – Protocolo de Control de Transmisión

TDD. Time Division Duplex – Duplexación por División de Tiempo

TDMA. Time Division Multiple Access – Acceso Múltiple por División de Tiempo

TDMA/IS-136. Digital Cellular Standard IS-136 – Estándar Celular Digital IS-136

TDMA/IS-136HS. TDMA/IS-136 High Speed – TDMA/IS-136 de Alta Velocidad

TFI. Temporary Flow Identifier – Identificador Temporal de Flujo

TIA. Telecommunications Industry Association – Asociación de Industrias de Telecomunicaciones

TS. Time Slot – Intervalo de Tiempo

TSG GERAN. Technical Specification Group GERAN – Grupo de Especificación Técnica GERAN

T-SGW. Función de Pasarela para Señalización de Transporte

TTI. Transmission Time Interval – Intervalo de Tiempo de Transmisión

U

UE. User Equipment – Equipo de Usuario

Um. Interfaz entre el terminal móvil y la estación transceptora base

UMTS. Universal Mobile Telecommunications System – Sistema Universal de Telecomunicaciones Móviles

UPCH. User Packet Data Channel – Canal de Paquetes de Datos de Usuario

Uplink. Enlace ascendente entre la Estación Móvil y la Estación Base

USIM. UMTS Subscriber Identity Module – Módulo de Identificación del Subscriptor UMTS

UTRA. UMTS Terrestrial Radio Access – Acceso por Radio Terrestre UMTS

UTRAN. UMTS Terrestrial Radio Access Network – Red Terrestre de Acceso por Radio UMTS

Uu. Interfaz entre el Nodo B y UE

UWC-136. Universal Wireless Communications 136

UWCC. Universal Wireless Communications Consortium – Consorcio Universal de Comunicaciones Inalámbricas

V

VLR. Visitor Location Register – Registro de localización de Visitantes

VoIP. Voz sobre IP

VPN. Virtual Private Network – Red Privada Virtual

W

WAP. Wireless Application Protocol – Protocolo de Aplicación Inalámbrico

WARC. World Administrative Radio Conference – Conferencia Mundial Administrativa de Radiocomunicaciones

WCDMA. Wideband Code Division Multiple Access – Acceso Múltiple por División de Código en Banda Ancha

WLAN. Wireless Local Area Network – Red de Area Local Inalámbrica

WRC. World Radio Conference – Conferencia Mundial de Radiocomunicaciones

WSN. WLAN Service Node – Nodo Servidor WLAN

WWW. World Wide Web

OTROS

136MM. IS-136 Mobility Management – Gestión de Movilidad IS-136

1G. First Generation – Primera Generación

2G. Second Generation – Segunda Generación

3G. Third Generation – Tercera Generación

3GPP. Third Generation Partnership Project – Proyecto de Colaboración de 3G

3GPP2. Third Generation Partnership Project 2 – Proyecto de Colaboración 2 de 3G

8PSK. Eight Phase Shift Keying – Modulación por Desplazamiento de Fase de Ocho Símbolos