Power and productivity
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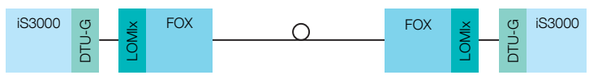
Voice System Overview
iS3000 SIP@net

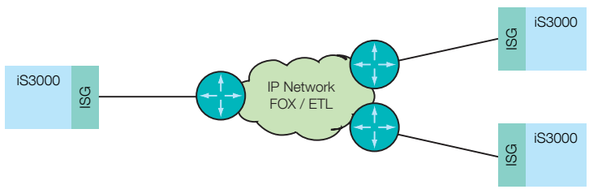
Board usage

	ALC	ATU	ATU-PA	DLX-L	DLX-U	DTU-G	DTU-VC	DTX-I	IAS
Subscriber equipment	X	X		X	X	X		X	
Operator consoles				X				X	
Trunk to public network		X				X		X	
Trunk to private network		X				X	X		
Special peri-pheral boards			X						X

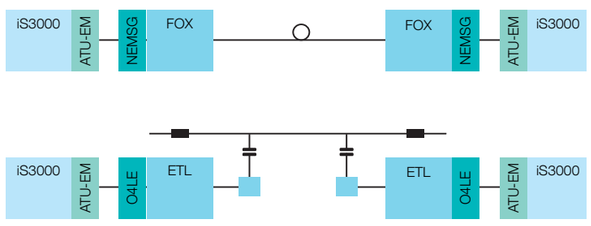
Digital trunks: E1, PRI, QSIG, DPNSS, CAS basic



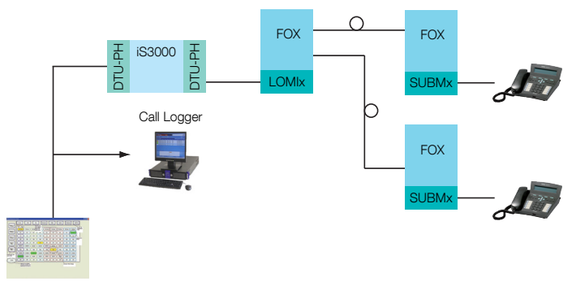
TCP/IP trunks



Analogue trunks (4w E&M)

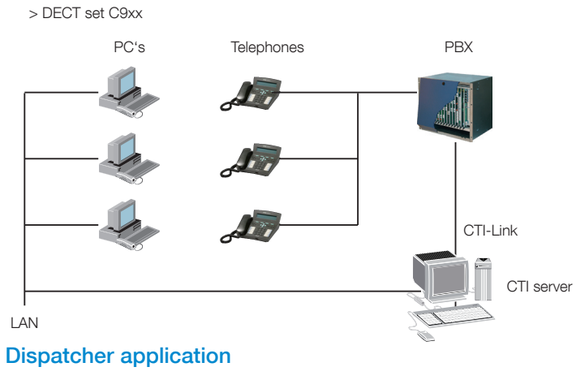


Call recording for important transactions

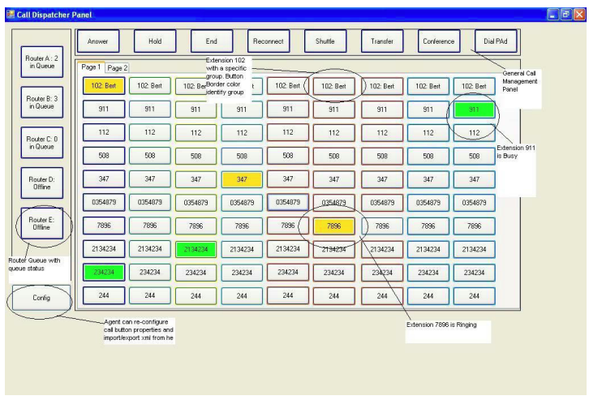


Computer Telephony Integration (CTI)

PC based operation of telephone services
– Call transfer, hold, consultation, conferences, call forward, call lags etc.
– Search and dial from directory
– Touch screen based dispatcher
– Integration of databases
– Ethernet for CTI on CPU
– CTI/TAPT interfaces for
  > Ergoline 325/330/340
  > DECT set C9xx



Dispatcher application



PMC
Peripal Module Controller

Paging system		**ATU-PA** Paging systems acc. ESPA	**ALC-16/32** Analogue Line Circuit 16/32 ports → Analogue subscriber
PSTN, PABX	2-wire	**ATU-G3** Analogue Trunk Unit 8 ports To PSTN or PBX (tie line)	**DTX-I 7/15** 4w S0 2B+D Up to 8 terminals Max 600 m → S0 Subscriber
PSTN, PABX	ISDN BRA	**DTX-I** Digital Trunk eXtension ISDN S0 max 600 m 7 or 15 ports	**DLX-U15/31** Digital Line eXtension 15/31 2w Upn 1/2B+D Max 1000 m → Digital subscriber Ergoline D-320-2. D-325-2, D-330-2, D-340-2
PABX, PLC, FOX	4 W E&M	**ATU-EM01** Analogue Trunk Unit 4w E&M 4 ports	**DLX-L** Digital Line eXtension 15 x 2w Uko, 1/2 B+D Max 3500 m, 2B1Q line code → 2B1Q → **PNT-L** Private Networks
iS3000	xDSL	**LTU-C** Line Termination Unit 1 x copper 40 dB Trunk prolongation	
iS3000	2 Mbit/s optical	**LTU-F** Line Termination Unit 1 x fibre optics up to 48 km distance @ 0.5 dB/km	**DCC 8** DECT cluster controller 8 x RFP, G.703 max 2000 m → E1 (G.703) → **B712** Radio fixed part GAP & PAP 12 simultaneous calls; E1 (G.703) → **B706** Radio fixed part GAP & PAP 6 simultaneous calls
PABX, FOX	G.703	**DTU-G** Digital Trunk Unit 1 x ISDN, PRI, DPNSS	
PABX, FOX	G.703/G.704	**DTU-G** Digital Trunk Unit E1 PRI, ITU-T R2 MFC CAS or iS3000 interworking	**IAS** Int. Announcement Server 255 announcements (music on hold possible)
IP network		**ISG** In System Gateway	**MOH-I** Analogue line circuit 4 ports → Audio player

iS3000-19L
Non-redundant system
Single CPU
Up to 4 PM shelves

Small / medium PBX
Up to 1216 ports

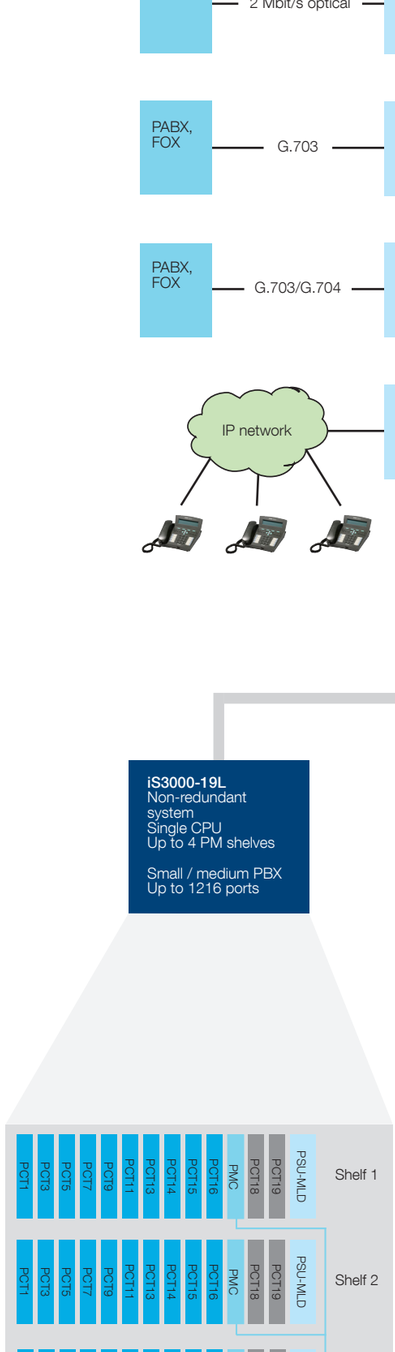
iS3000-19H
Redundant system

Multiple CPU
Up to 31 PM shelves

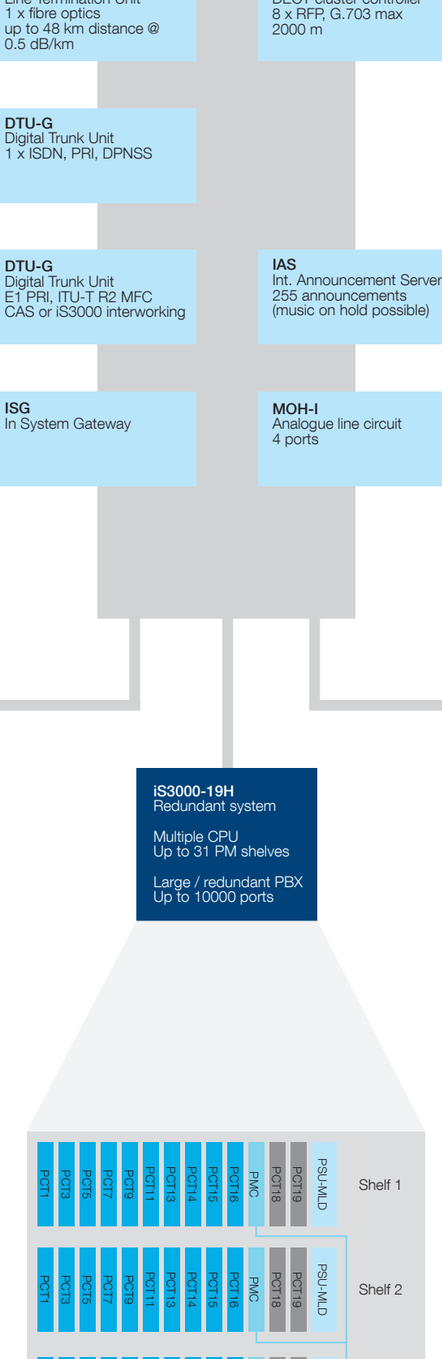
Large / redundant PBX
Up to 10000 ports

iS3000-19E
Redundant or non-redundant system
Off shelf server
Up to 24 PM shelves

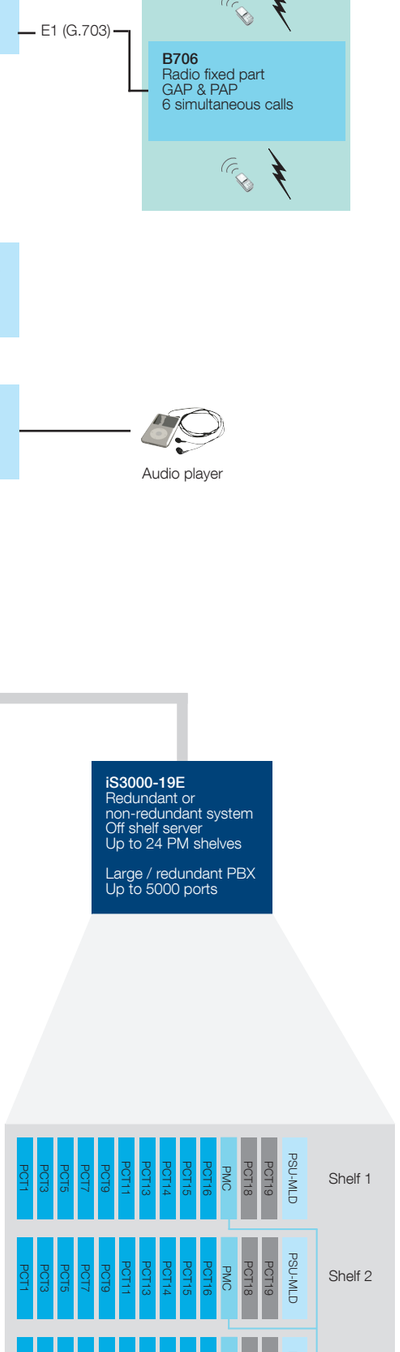
Large / redundant PBX
Up to 5000 ports



Low range example (19L)
1...4 shelves are possible



High range example (19H)
1...31 shelves are possible

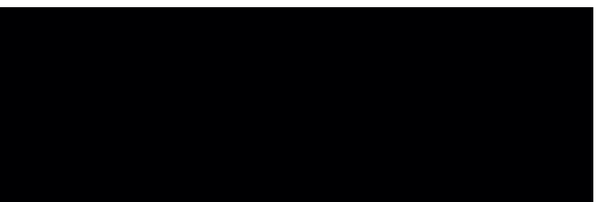


External server example (19E)
1...24 shelves are possible in combination with 1/2 servers for redundancy

Remote subscribers

PCM30 CAS over fibre optics

2/4w over fibre optics



Power line 2w remote subscriber

Complementing communication solutions

Multiservice platform for utilities
The FOX-family of equipment forms an important part of ABB's comprehensive range of Utility Communications. As a turnkey provider, ABB has answers to all kind of communication requirements. The following list summarizes the portfolio, which complements the FOX-family in a perfect way.

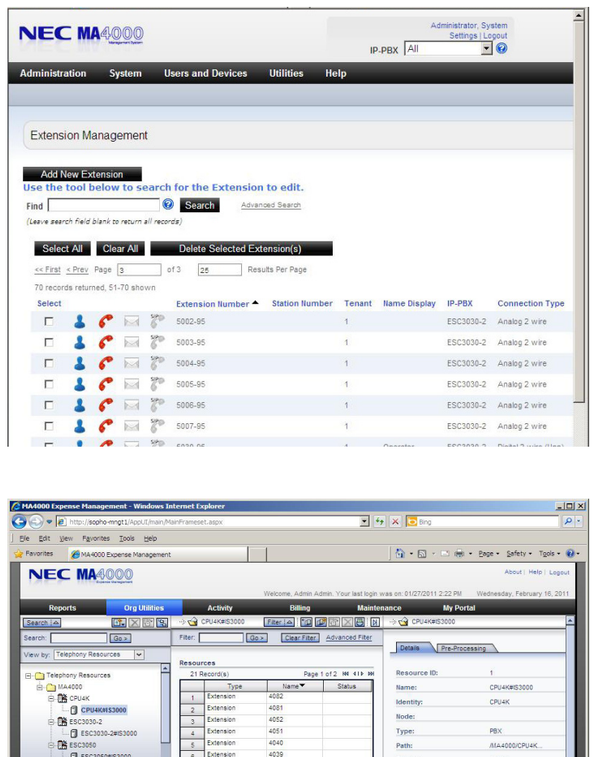
Power line carrier
ABB's combined analogue/digital power line carrier solutions are based on the ETL500/600 product family. ETL600 reaches so far unseen transmission rates and self-adapting speed- & multiplexing features to obtain optimized transmission capacities.

Teleprotection systems
ABB's NSD-family has a long tradition of stand-alone teleprotection devices. The latest generation of NSD570 provides highly reliable protection signaling over a wide choice of medias (dedicated fiber analogue/digital interfaces).

Wireless solutions
Where no fibers can be installed due to missing rights of way or topographic reasons, ABB can provide microwave, VHF/UHF radio, cellular and satellite solutions, tailored to the local situation and available frequencies.

In-plant communications
In-plant communications refer to the applications and technologies used internally in a substation or a power plant. It includes video, public addressing systems, local radio, access control, intruders detection and similar services. The FOX platform enables not only the integration between them but also the connection to the out-plant systems and allows the remote access, a key functionality in the modern utility.

Management system



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iS3000 SIP@net technical data

Main Features

System
Up to 14 PBXs with 65‘000 extensions
Fully integrated high density DECT system
Flexible management
Free operator location
Call centre & CTI solutions
Automatic call distribution
Voice mail system
Automatic announcements, music on hold

Maintenance
Windows based maintenance tool SMPC/telnet
System configuration without operation interruption
File management/backup on flash memory or hard disk
Unique system software/maintenance software
Flexible licence mechanism
Test calls

Networking
Free numbering scheme for small and large systems
Various networking capabilities (DPNSS, QSIG)
High inter-site traffic
Networking on demand
DECT roaming within the entire network

User features
Digital phone sets Ergoline
Standard features (hold, forward speed dialling, etc.)
Priority calls, break-In, forced release
DECT twinning fixed lines
CTI & TAPI applications

Upgrade iS3000 Systems:

DCS255 (SW300) ⇨ iS3000
– replace CPU-ME/MT with CPU4000 (SIC + ISS)
– deliver SSW810
– check firmware/PROM on boards
– define required licenses
– new service & maintenance tool
– new documentation
– training for new system
– replace PMC board (SW200/SW205)

CPU4000 (SIP@net4.3 onward for iS3000-19L)
CPU4000 contains Server Interface Card (SIC) or PMC combined SIC card (PMC-SIC) and In-Skin-Server (ISS).
– 3 x LAN interfaces
– 4 x USB interfaces
– VGA monitor interface
– Real time clock with back-up battery
– 4 GB flash disk, 1 GB RAM
– Windows embedded
– iS3000 SIP@net system software is installed in ISS.
– Dongle based licenses

CPU4000 features:
– Support TDM/IP 1‘216 ports
– Simple alarming (iS3000 proprietary) and SNMP agent
– DHCP/TFTP/SNTP server for IP phones
– Remote desktop
– Telnet PBX configuration

Main characteristics

Recommendations	
ITU-T	G.703, G.704, G.706, G.707, G.711, G.712-G.715, T I.430, I.431, ITU-T Q.93x, Q.95x, K.20
European approved interfaces	
Conform to the European directive	– 91/263/EEC: – iCTR3 ISDN basis rate – iCTR4 ISDN primary rate – iCTR2/14 digital leased lines – CTR6/10 DECT
Maximum system capacity	
iS3000-19L	1‘216 ports
iS3000-19E	5‘000 ports
iS3000-19H	10‘000 ports
iS3000 network (distributed ISPBX)	65‘000 ports
Ambient conditions	
Environmental conditions	ETSI ETS-300019: Stationary use class 3.1, Storage class 1.2, Transport class 2.3
Operation	-5...45 °C / 10 %...85 % humidity / non-condensing
Storage	-25...55 °C / 10 %...85 % humidity / non-condensing
Transport	-40...70 °C / 10 %...80 % humidity / non-condensing
Mechanical dimensions / weights	
19“ shelf	400x483x409 (9U)/15 kg
Typetests	
KEMA typetest	yes
Electromechanical compatibility	
Conform to the European directive	89/336/EEC: – EN55022 Class B – EN50082-1 – EN61000-3-2 – EN61000-3-3
Safety	
Conform to the European directive	73/23/EEC: – EN60950 – EN41003 (Chapter 6)
Power supply	
Voltage	-42...-60 VDC
Safety class 2	IEC 60950
Ground resistance	max. 8 Ω
Power consumption	
For each shelf	70 W (fixed)
Per analogue extension	0.7 W
Per CM/SM of iS3000-19H	180 W for CM/SM of iS3000-19H
Quality	
Quality	Standard ISO 9001 including TickIT software certification
System mean time between (fatal) failures	
iS3000-19L	MTBFF > 7.5 years
iS3000-19H	MTBFF > 250 years
System availability	
iS3000-19L	99.97 %
iS3000-19H	99.999 %
iS3000-19L	
Peripheral module	1...4
Interface boards	max. 70
Non-blocking capacity	max. 1216 ports
Power consumption per shelf	100...300 W
Power consumption per system	max. 1‘200 W
iS3000-19H	
Number of cabinets	1...9
Shelves per cabinet	max. 8
CCS capacity	100‘000 BHCA (Busy Hour Call Attemp)
Number of CCS	4
Number of SNS	up to 6
Peripheral module	max. 31
Interface boards	max. 527
Non-blocking capacity	10‘000
System backup	BIM BackupInterfaceModule
Network Size	up to 14
Power consumption per shelf	100...300 W
Power consumption per system	max. 10‘000 W

Basic modules

CPU-4000 (Central Processor Unit for iS3000-19L)

Traffic capacity	45‘000 BHCA (Busy Hour Call Attemp)
Interfaces	LAN, USB

PSU-MLD (Power Supply Unit)

Input voltage	42...60 VDC

PMC (Peripheral Module Controller)

CSN-BC (Central Switching Network for iS3000-19L more than two shelves)

Capacity	1‘536 x 1‘536 speech channels

CCS (Central Control Slice for iS3000-19H)

Modes	4/2, dual or stand-alone (single)

SNS (Switching Network Slice for iS3000-19H)

Switch matrix	6‘144 x 6‘144 channels

CIE (Communication Interface External)

Interfaces	Ethernet (connects to BIM)

IAS

Integrated announcement server	System announcements Personal announcements Music on hold

MOH-I (Music On Hold-Interface)

Number of interfaces	4
Interface type	analogue (CD/MP3 player)

Digital subscriber interfaces

DTX-I7 or DTX-I15 (Digital Trunk eXtension ISDN)

Number of interfaces	7/15
Interface type	2B+D BRI (S0) 4w
Modes	– S0 Subscriber for Terminal Euro ISDN, 1TR6 – Tie-Line Trunk for PABX Networking – PSTN Trunk
Max. line length	600 m (0.5 mm cable)
Euro ISDN	ITU-T I.430
Operator consoles	SV25, SV35, PC-based SV60E

DLX-U15/31 (Digital Line eXtension)

Number of interfaces	15/31
Interface type	Upn 2w
Modes	1B, 1 x 64 kBit/s channel 2B, 2 x 64 kBit/s channel
Max. line length	1 km (0.5 mm cable)

DLX-L15 (Digital Line eXtension Long line)

Number of interfaces	15
Interface type	Uk0 (2w) with 2B1Q to PNT-L
Max. line length	5.5 km (0.5 mm cable)

PNT-L (Private Network Terminator)

Number of interfaces	1 x S0, 1 x Uk0
Interface type	S0 to terminals, Uk0 with 2B1Q to DLX-L15

Analogue subscriber interface

ALC-16/32 (Analogue Line Circuit general protected)

Number of interfaces	16/32
Interface type	2 wire subscriber
Impedance	600 Ω
ITU-T coding	A-law acc. G.711
Distance of subscriber line	6 km (0.5 mm cable)
Max. line current	35 mA
Power supplies	+5 VDC, -5 VDC, -48 VDC, 75 VAC/25 Hz
Overvoltage protection	ITU-T K.20
EMC	EN 50082-1, EN55022
Safety	EN 60950
Environment	EN 300 019
Channel bandwidth	300..3‘400 Hz
MTBF	> 12 years

Digital trunk interface

DTU-G/DPNSS (Digital Trunk Unit with DPNSS Protocol)

Number of interfaces	1 with 30 channels
Interface type	DPNSS; E1 G.704

DTU-G/ETSI (Digital Trunk Unit with ISDN or QSIG protocol)

Number of interfaces	1 with 30 channels
Interface type	ISDN or QSIG E1 ITU-T G.704
QSIG	ITU-T Q.93x, Q.95x (Q reference SIGnalling)
Euro ISDN	ITU-T I431

DTU-G/CAS (Digital Trunk Unit Primary rate Universal)

Number of interfaces	1 with 30 channels
Interface type	E1 ITU-T G.704

DTU-VC (Voice Compression)

Number of interfaces	3/9 (3x3 voice channels to compressed into 1x3, 64 kbits)
Interface type	G.703 or V.35

LTU-F (Line Termination Unit Fibre optic)

Number of interfaces	1 DTU-xx
Interface type	optical

LTU-C (Line Termination Unit Copper)

Number of interfaces	1 DTU-xx
Interface type	dsl

DTX-I (Digital Trunk eXtension ISDN)

Number of interfaces	7/15
Interface type	2B+D BRI (S0)
Modes	– S0 subscriber – Trunk/tie-line for PABX networking – Trunk/tie-line to PSTN using 1TR6/ISDN
Max. line length	600 m (0.5 mm cable)
Euro ISDN	ITU-T I.430

Analogue trunk interface

ATU-EM (Analogue Trunk Unit E&M signalling)

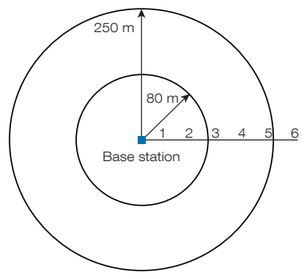
Number of interfaces	4
Interface type	2- or 4w with E&M signalling
Channel bandwidth	300...3‘400 Hz
Modes (per interface configurable)	E&M type 1...5 Continue signalling Wink signalling

ATU-G3 (Line Trunk Unit analogue)

Number of interfaces	8
Interfaces type	2w loop-start signalling
Channel bandwidth	300...3‘400 Hz
Modes (per interface configurable)	Emergency switch units Metering Polarity detection

DECT

Coverage and speech quality in open environment
1 = Excellent (ISDN telephone quality)
2 = good (Occasionally a click)
3 = Satisfactory (clicks, occasionally a mute)
4 = Poor (clicks, mutes, just intelligible speech)
5 = Very poor (unintelligible)
6 = No speech at all



DECT terminology

DECT (Digital Enhanced Cordless Telephony)

FP	Fixed Part
PP	Portable Part
PWT	Personal Wireless Telephony (North America)
WRS	Wireless Relay Station

DECT Air Interface

CAP	CTM Access Profile
GAP	Generic Access Profile
GIP	GSM/DECT Interworking Profile
IAP	ISDN Access Profile
MC	Multi Carrier
PAP	Public Access Profile
RAP	Radio Local Loop Access Profile
TDD	Time Division Duplex
TDMA	Time Division Multiple Access

iS3000 Implementation

Frequency range	1‘880 - 1‘900 Mhz
Transmission power	10 mW average
Simultaneous calls per RFP	12
Seamless hand over	
Encryption of voice data	
Data transfer rate	< 552 kb/s
Radio standard	GAP

DECT mobile interfaces

General

Integration level	Full integrated into iS3000
Max. number of base stations	256
Max. number of simultaneous calls	960
Multi-site mobility	With PARI/SARI (Primary/secondary access rights identifier)

DCC 8 (Dect Cluster Controller)

Number of base station interfaces	8
Interface type	E1/G.703 to Radio Fixed Part
Number of speech channels	30
Number of assigned phone numbers	Up to 512 (concentration mode)
Remote powering line length	Up to 2'000 m

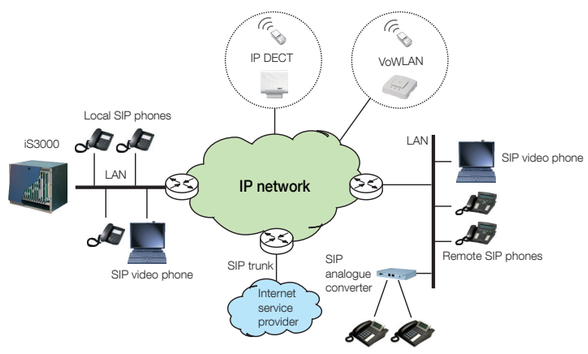
B706 / 712

Number of radio channels	6/12 channels
Interface type	Radio: GAP (General Access Profile) Cable: E1 G.703 Power: 5 VDC
Typical radio coverage radius	Confined offices: 20 - 50 m Open area: up to 300 m
Options	– Outdoor housing – Directional antenna – Local power supply

VoIP solution

– Hybrid TDM/IP PBX or VoIP call server
– Futureproof, open standards-based solutions
– SIP extension+ (Standard SIP + iS3000 features)
– SIP peer to peer connection
– Video phone (H.264)
– SIP trunk
– Common Channel Interoffice Signaling (CCIS) IP trunking inter iS3000 PBX
– IP DECT
– VoWLAN
– VoIP CODEC (G.711, G.729)
– Bandwidth usage control
– Fax over IP (T.38)
– Survivability (IP endpoint multiple registry)

VoIP solution



Auxiliary modules

ATU-PA (Analogue Trunk Unit - Private Attachment (for paging equipment))

Number of interfaces	2
Interface type	Paging (radio searching system)
Signalling standard	ESPA (European Selective Paging Association)

IAS (Integrated Announcement Server)

Number of connections	14/30
Number of voice messages	255
Message types	– for incoming trunks – for ACD – music on hold
Total message time	31...1591 seconds

IAS-A (Integrated Announcement Server - Autonomous)

Number of connections	14/30
Number of voice messages	255
Message types	– personal announcement – music on hold
Total message time	31...1591 seconds

Element manager

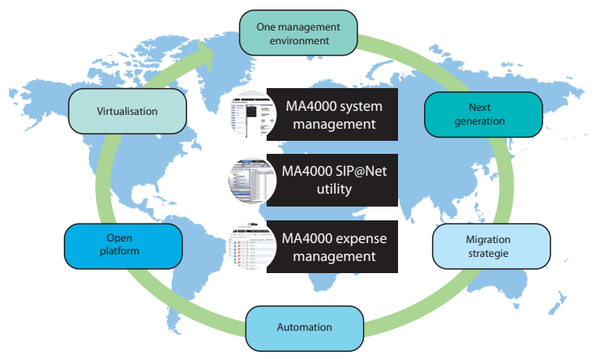
Management system MA4000
– Server - client web based IT structure
– Windows/MS SQL platform
– One single license mechanism (LMS)
– Centralized authentication

System management
– Simple-to-use, wizard-based web interface for extension feature configurations
– Range programming
– SIP terminal management
– Scheduled PBX synchronization and backup
– Alarm notification client (screen pop-up or e-mail)
– Management for up to 150‘000 extensions
– Organization hierarchy

Expense management
– Database synchronization from MA4000 system management
– Budget management
– Regular calendar and fiscal year support
– User defined costing plan and pricing plan rules
– Extensive report facility

SIP@Net Utility
– Traditional maintenance tools
  – Announcement Manager (AMM)
  – Operational Management (OMM)
  – DECT manager
  – iSPBX file manager
– Web access based MS terminal server
– Access PBX via IP or V.24

MA4000 management system



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