



## iS3000 and SIP@Net

Hybrid and Server based communication platform

### *At a Glance*

- Unified Communication Engine
- Highly scalable hybrid and server based communication solution
- Facilitates step-by-step migration to a converged voice/data environment
- Support of open SIP standard by SIP@Net call processing software
- Open communication standards
- Modular architecture

The iS3000 communication platforms fulfil the modern communication needs of small to large organizations. The iS3000 and SIP@Net platforms are the IP communication solutions for your business.

The iS3000 can be configured fully modular to suit all sizes of businesses. It offers either a hybrid system or a server based system or a mix of both.

The iS3000 platform is the cornerstone of migration towards a converged network and the communications framework of next-generation platforms and applications. The platform's SIP@Net call processing software offers full SIP functionality across extensions, trunk lines and applications.

The SIP@Net Server platform provides a powerful native IP platform for IP communication services.

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### Key features

- Highly scalable hybrid and server based communication solution offering TDM and IP telephony
- Modular architecture for flexible and expandable system configuration
- Facilitates step-by-step migration to a converged voice/data environment
- Support of open SIP standard by SIP@Net call processing software
- SIP@Net IP call-processing software platform adds feature richness and enables the easy addition of future applications
- In-System IP gateway for IP trunks and IP extensions
- Open communication standards enable the integration of external applications
- Very high system availability
- Fast loading and restart times
- 19-inch housing
- Economical power consumption
- Suitable for high levels of communication traffic and multifunctional applications.

## General architecture

The iS3000 architecture provides a combination of IP telephony and traditional solutions by combining the best of hybrid and server based technology. Besides the iS3000 full hybrid PBX, a server version is part of the communication platform family. It supports the broad range of critical voice features and functions with which users are familiar, now in a converged network environment. The IP call-processing software platform - SIP@Net - forms the basis for both the hybrid and the server solution of migration to a converged network.

An In-System IP Gateway (ISG) incorporated within the hybrid iS3000 provides an embedded IP-switching module, which registers, interconnects and processes all IP end-points on the network, covering a wide range of SIP-based devices. The ISG also provides trunking between iS3000 systems, SIP@Net servers and SIP providers.

Uniform hardware architecture and a common software platform produce a scalable hybrid PBX that can be tailored to meet the needs of different organizations, through customization or the addition of applications and/or capacity.

This uniform hardware platform is based on distributed architecture that divides the iS3000 hybrid platform into functional modules:

- Central processor Module (CM): responsible for overall system operation, storage of user data and providing central access to external applications.
- IP-switching Module (In-System Gateway): registers, interconnects and processes IP end-points, such as SIP IP phones.
- Peripheral Module (PM): houses the plug-in boards that interface with end-user devices. A PM has access to up to 320 64 Kbits/s transmission paths and can accommodate up to 10 plug-in boards. Larger systems can be assembled by adding PMs as required (up to a maximum of 31).

This distributed architecture relieves the central module of critical and time-consuming tasks, such as end-user equipment administration, and by separating the system into modules, improves its overall reliability.

### Central processor Module

The characteristics of the hybrid iS3000 system depends on the choice of processor unit, which comes in two variants:

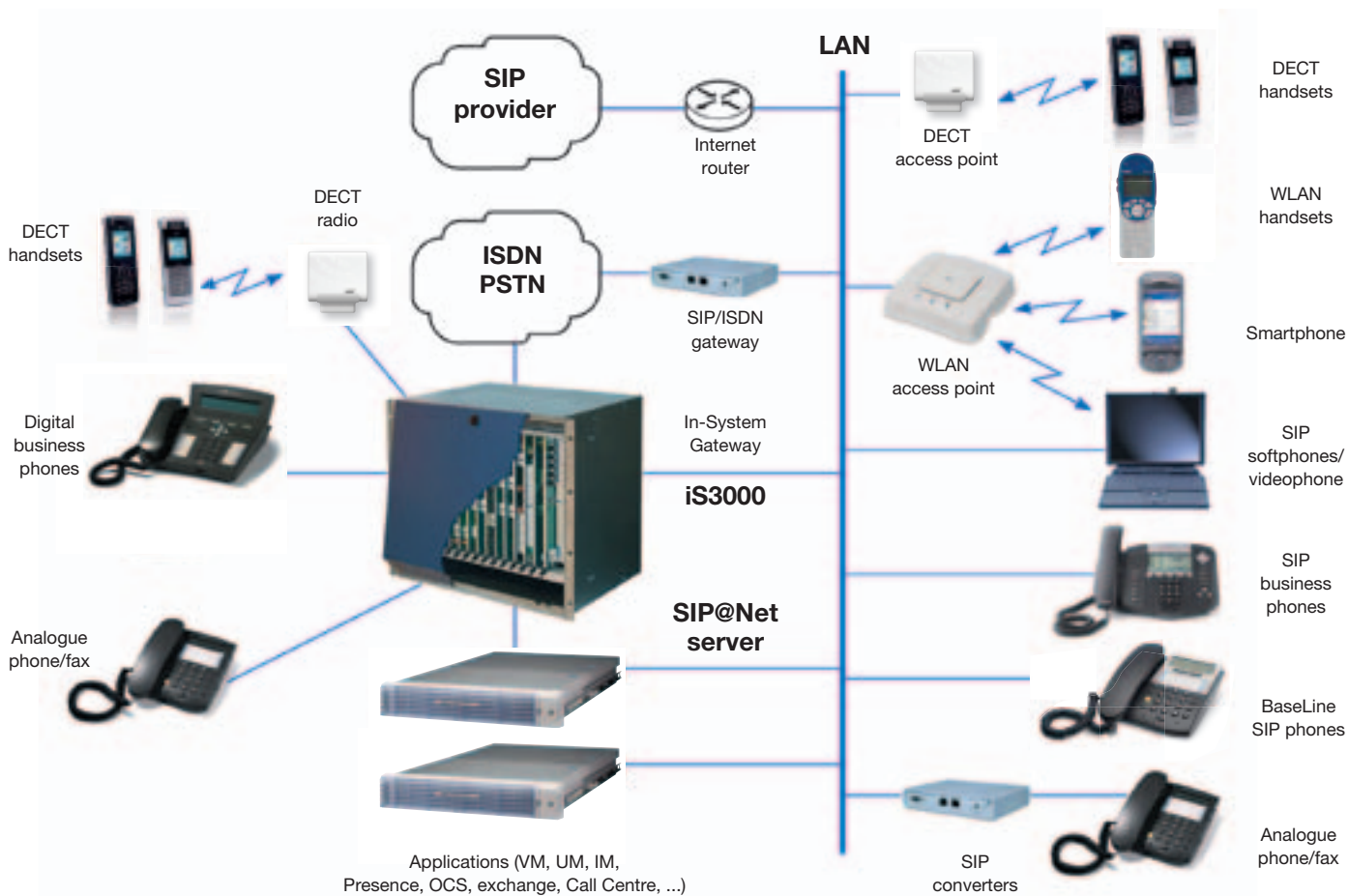
- Single-card Central processor Module; and
- Multi-card, fault-tolerant Central processor Module.

A single, common operating system provides a uniform software platform for call processing, operational maintenance, system assurance and the various end-user applications included in the SIP@Net system software. Freely configurable I/O ports enable the central connection of external applications, such as Microsoft Communicator, management systems, call logging devices, maintenance terminals, contact centre supervisors or remote service/management centres. The initial system configuration and subsequent software upgrades of an iS3000 are performed by downloading the system software and user data from an Operational Maintenance PC.

### Single-card Central processor Module

The heart of the Central processor Modules is the CPU4000 that consist of a combination of Server Interface Card (SIC) and In Skin Server (ISS). It offers a flexible, powerful, high performance Central Processor function for the iS3000 single processor communication platform. The In Skin Server is an industrial grade processor board running embedded WindowsXP operating system. It includes a 2 Gb flashdisc and at least a 0.5 Gb Ram for memory functions. The CPU4000 increases the iS3000 system's IP capabilities to their full extent. Up to 1216 ports (either full SIP or TDM or a mix) can be realized easily with this new industrial processor unit. The CPU4000 has 3 ethernet ports and 4 USB ports for management, control, dongle connection and future applications. An onboard battery powers the on board real time clock if wanted.

Instead of using the In Skin Server, an external server can be applied to perform the system processor task. The external server offers flexibility in availability, interfaces, outline and future growth.



### **Multi-card, fault-tolerant Central processor Module**

The fault-tolerant Central processor Module ensures maximum system availability. Four identical Central Control Slices (CCS) operate in parallel, according to Philips' patented (4/2) concept. The four processors synchronously execute the same instructions and these are continuously verified by an automatic error recovery algorithm.

This algorithm is implemented in the hardware and ensures that a single- or double-bit fault, and even a fault that has affected an entire instruction, is detected and recovered without any loss of system continuity. This continuous process of hardware verification ensures that memory faults, processor faults or even the breakdown of an entire CCS are ruled out instantaneously, without the need for complex diagnostic software.

### *IP-switching Module (In-System Gateway)*

The IP-enabling functions for trunks and extensions are made available through In-System Gateways (ISG), of which up to 10 are available per system. The ISG is part of the IP concept, allowing the establishment of VoIP media channels between an iS3000 series system and IP terminals, the IP DECT infrastructure, or the SOPHO SIP server. It also allows the establishment of system-to-system media-channels (IP trunks). For an IP connection to non-iS3000/SIP@Net systems, the ISG offers SIP and H.323 based interfaces.

Each ISG requires one slot/unit group and the ISG offers 10 IP channels as standard. Up to 30 channels per ISG are possible and each ISG offers a 10/100baseT Ethernet interface. The ISG supports voice compression according to G.711 and G.729A, T38 fax support for iS3000 networks and has an on-board power supply. ISG supports secure communication by applying the SRTP and TLS standards.

### *Peripheral Module*

The Peripheral Module houses the plug-in boards that provide the interface with end-user equipment. One unit group shares 32 time-slots on the switching network, via a dedicated 2Mbits/s backplane bus. A few special positions have access to a full 2Mbits/s group. Different types of plug-in board can be freely mixed across the available positions. A plug-in board can be inserted in a free position without disconnecting the power or restarting the system.

### *Plug-in boards*

A wide variety of plug-in boards is available to interface an iS3000 system with all major types of analogue, digital or IP extensions, along with business phones, IP phones, public trunks, private tie-lines, IP trunks, cordless handsets, integrated announcers, operator consoles, voice processing systems, front-end office equipment and conference units.

Each plug-in board has been carefully designed to support a maximum number of circuits (between four and 32, depending on the interface type and the complexity of the wiring scheme). Multifunctional plug-in boards are provided to facilitate and optimize system configuration. This applies in particular to the 2B+D ISDN card, which can be set in different modes: extension, trunk or tie line.

The In-System IP Gateway card controls the IP interfacing for simultaneous IP extension, IP trunk, IP DECT or IP server use.

### *SIP@Net server*

To fulfill the demand for traditional voice services along with driving new growth in next-generation Voice over IP (VoIP) services, NEC's offer includes the SIP@Net server. This SIP@Net server provides a powerful server based platform for IP communication services. It also lays the base for Unified Communications such as integration of voice, IM, video, data and presence.

The server offers the iS3000 full SIP based interfaces for extensions, networking, trunking and application use. The SIP@Net server seamlessly connects to the hybrid iS3000 systems and so offers the full range of network interfaces for operation in present networks.

Existing iS3000 installations and customers will also benefit from easy migration and re-use of line equipment by adding a SIP@Net server to their network.

### *SIP@Net server principle*

One of the basic SIP characteristics, the so-called peer to peer communication, created the possibility of building a voice communication platform without the need of a physical switching function.

With SIP@Net software running on a server and Windows operating system, a SIP server is made available to execute all call processing functions required for SIP based endpoints (wired, IP DECT, VoWLAN, smart phones), SIP trunking and SIP based networking.

Using SIP@Net on a server, all IP based iSNet networking options are available to network to a hybrid iS3000 system for expansion or migration scenarios. The application ideally suited in combination with the SIP@Net server is Business ConneCT, offering a full integrated solution for Operator, Call Agent or Employee functionality. The SIP@Net server runs on Windows server operating system, and installed on an industry server it offers maximum flexibility on the processor, power, performance and availability.

## Interfaces hybrid series

The following is an overview of the wide variety of interface types supported by the different plug-in boards for the iS3000 hybrid series.

### Analogue extensions:

- Tone/pulse dialling
- Earth, flash, dial one recall

### Digital extensions:

- B+D Uko (2-wire, 2B1Q)
- 2B+D Upn (2-wire, Philips)
- 2B+D S0 (4-wire, ISDN TBR3)

### IP extensions

- 10/100 Mbit/s Ethernet
- TCP/IP
- G.711 A-law, G.729A,AB
- QoS (802.1Q/p,ToS)
- SIP (RFC 3261)
- TLS, SRTP

### Cordless extensions:

- DECT (GAP standard)
- WLAN (SIP standard)

### Analogue trunks:

- Subscriber signalling
- DDI/DDO via pulse, MFC, DTMF
- Polarity detection
- Metering (50Hz, 12/16 kHz)
- Power failure switch (ESU)

### Digital trunks:

- Euro ISDN:
  - ISDN Basic rate TBR3 (2B+D)
  - SDN Primary rate TBR4 (30B+D)
- Channel Associated (CAS –2Mb/s):
  - MFC

### IP trunks:

- 10/100 Mbit/s Ethernet
- TCP/IP, H.323,T.38
- G.711 A-law,  $\mu$ -law, G.729A, AB
- ECMA 333
- QoS (802.1Q/p,ToS)
- SIP (RFC 3261)
- SRTP, TLS

### Analogue tie-lines:

- CEPT-L1
- E&M (2/4 wire)
- Loop disconnect
- Local battery

### Digital tie-lines:

- 2B+D or 30B+D with:
  - BT DPNSS
  - ETSI QSIG

### CSTA interface:

10Mb Ethernet TCP/IP connection (ECMA-179 Services CSTA phase 1).

### Interfaces SIP@Net server

The following interface types are supported by the SIP@Net server:

### IP extensions/trunk/network/application

- Ethernet based
- TCP/IP
- G.711 A-law, G.729A,AB
- QoS (802.1Q/p,ToS)
- SIP (RFC 3261)

### CSTA interface

Ethernet based TCP/IP connection (ECMA-179 Services CSTA phase 1).



## Technical data

### Power supply

The 19-inch based iS3000 single processor and the iS3000 redundant processor can be powered directly from the mains. An optional battery back-up system or Uninterrupted Power Supply (UPS) can be installed to ensure continuous operation in the event of a power failure.

### Mains:

- 230 Volt AC (+10%, -15%), 40-60 Hz
- Safety class 1 (IEC) 60950-1
- Battery: 42 - 60V DC

### Power consumption

3 Volt CMOS technology keeps power consumption at an extremely low level. Typical power consumption figures are:

- 70 W for each 19-inch PM shelf
- 0.7 W for each analogue extension
- 180 W for iS3000 fault tolerant 19-inch shelf

For digital extensions, these figures depend on the terminals connected. Each digital port supplies power to one or more ISDN terminals, in accordance with the ETS300012 standard (max. 4 W).

### Performance

- iS3000 single:
  - 50,000 Busy Hour Call Attempts
- iS3000 fault-tolerant version:
  - 50,000 Busy Hour Call Attempts
- SIP@Net server:
  - 100.000 busy Hour Call Attempts

Performance figures depend on the system configuration and software release.

### Traffic

- iS3000 single: 600 Erlang
- iS3000 fault tolerant: 3,000 Erlang
- SIP@Net server: 3,000 Erlang

### Transmission

Pulse Code Mode (PCM) coding in accordance with A-Law CCITT G711/712.

### Switching

Non-blocking Time Division Multiplex (TDM) switching matrix, using 64 Kbits/s time-slots.

## System capacity

	Single processor	SIP@Net server	Fault tolerant processor
Max. no. of 19-inch shelves	4	n.a.	31
Max. no. of Remote Peripheral Modules	4	n.a.	15
Max. no. of ports <sup>1)</sup>	1216	n.a.	10000
Max. no. of cordless DECT handsets (0.2 Erlang) <sup>1)</sup>	1216	2560	2560
Max. no. of IP ports (0.2 Erlang)	1216	5000	1000
Max. no. of trunks and/or tie-lines	600	n.a.	2500
Max. no. of IP trunks	300	600	300
Max. no. of operators	8	12	31
<i>1) the actual number of (usable) ports/subscriptions is determined by the installed software license.</i>			

## System availability

State-of-the-art technology is used in order to reduce to an absolute minimum the number of system cards that can cause a failure. The fault-tolerant architecture has the capability of tolerating a card and/or link failure without any loss of system continuity.

- iS3000 fault tolerant: >99.999%
- iS3000 single: >99.97%
- SIP@Net server: server dependent

## System capacity

### Mean Time Between (Fatal) Failure:

- iS3000 fault tolerant: > 250 years
- iS3000 single: > 7.5 years
- SIP@Net server: server dependent

The above figures assume a mean time to repair of two days.

### Interface compliance

The iS3000 Series complies with European Directives:

- 2006/95/EC (Safety);
- 2004/108/EC (EMC);
- 1999/5/EC (R&TTE);
- and the Council Recommendation 1999/519/EC (EMF).

### Telecommunication Interfaces in compliance with:

- ISDN Basic Rate: TBR3
- ISDN Primary Rate: TBR4
- DECT: EN 301 406 (TBR6), TBR10, TBR22
- PSPDN X25: TBR2
- 64 kbit/s digital unrestricted leased lines: TBR14

## System Housing

The iS3000 19-inch housing is available for the Single Processor, the Fault-tolerant Processor and server based platforms. The iS3000 is available as an AC- or DC-powered system. iS3000 is a modular communication platform that fulfils the modern communication needs of small to large organizations.

The CSM and PM are industry-standard 19-inch units. 19-inch style patch panels are available for easy installation of the complete system into a single 19-inch cabinet.

The universal design of the CSM and PM allows stacking in a floor-standing configuration of up to four modules. Side panels are available as an option.

### Application area

Powered by SIP@Net, a iS3000 Single Processor system as well as the iS3000 Fault-tolerant system can be deployed in virtually any VoIP, digital or analogue telephony network. The large variety of interface boards available in the iS3000 product range and supported by the iS3000 19-inch systems ensures a high level of investment protection.

The system allows expansion into the IP-connected world. Full SIP functionality is offered across extensions, trunk lines and applications. The industry-standard 19-inch form factor allows seamless integration into today's IT environment.

Having the choice of AC or DC powering, enables customers to select the powering option that suits their needs; the ease of use and universal availability of AC power, versus a battery-backed up DC power solution for high availability.

## Components

### Control and Switching Module

The Control and Switching Module (CSM) contains the Fault-tolerant Processor and central switching matrix.



Control and Switching Module

### Peripheral Module

The Peripheral Module contains system boards, which provide extension and trunk interfaces to end-user and carrier equipment. One of the Peripheral Modules in the Single Processor system also contains the processor board or Server Interface Card.

The CSM, the PM, DDU and patch panel are designed for installation in an industry-standard 19-inch cabinet according to IEC 60297-2. The CSM and PM may also be fitted into 19-inch cabinets conforming to IEC 60917-2 or ETS 300 119-3. The DDU and the patch panel do not fit in these cabinets, so these configurations should be AC-powered.



Peripheral Module

Up to four Peripheral Modules may be stacked on top of each other in a self-supporting floor-standing configuration. In this case the DC Distribution Unit with adjustable feet acts as floor-stand too.

A single Peripheral Module can be fixed to a wall by way of a Wall Mount Bracket 19-inch.

Floor-standing and wall-mounted Peripheral Modules can be provided with decorative side panels. Two sizes are available: the Side Panel Set 9U 19-inch which covers a single PM (top right) and the Side Panel Set 12U 19-inch which covers a combination of a PM and a DC Distribution Unit (bottom right).



Left to right: 19-inch rack, floorstanding cabinets with and without side panels

For stack mount each of the modules is fixed to the lower module both at the front and at each side.



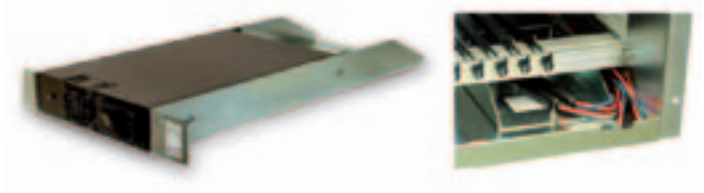
Fixation front inside



Fixation at the side

### AC Power Unit 19-inch

The AC Power Unit integrates fully with the Peripheral Module transforming it from a DC-powered into an AC-powered PM.



AC Power Unit 19-inch separate (left) and built-in (right)

This high-quality power supply accepts AC mains voltage in the range of 100 to 240V and generates 48V DC. The MTBF is specified at 100,000 hours at 30°C (MIL-HBK-217F). The Fault-tolerant CSM module is equipped with two AC Power Units. Whatever the power source (AC or DC), power supply operation is continuously monitored during normal operation. Malfunction is detected and reported as an alarm via the Alarm Cable CSM 19-inch supplied with each CSM.



Backside of CSM shelf with two AC Power Units

### RJ45 2/4W patch panel 19-inch

This versatile 1U high patch panel is mounted in a 19-inch cabinet and provides three groups of eight interfaces.



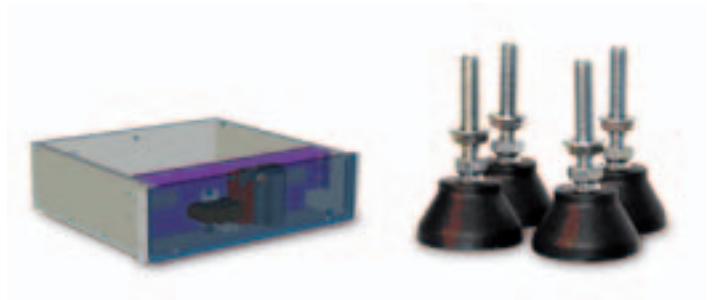
RJ45 2/4W patch panel 19-inch

Each group can be used as either 2-wire or 4-wire interfaces, to which industry-standard RJ45 jacks can be connected. Connection with the PM is by way of well-known F122-based cables. In case external alarm signals are to be mixed with Power alarm and Fan alarm, a dedicated RJ45 2/4W Patch Panel 19-inch is required to select alarm input assignments. One cable F122 from the backplane and two cables to the CIE board are then required.



### *Sofycom bracket 19-inch*

This bracket accommodates up to 48 traditional '10DA' Sofycom-style modules, arranged in two columns of 24 modules. The bracket has the same height as the Peripheral Module and can be installed in a 19-inch cabinet. It can also be fixed to a wall.



*Left: DC Distribution Unit, right: adjustable feet 19-inch*



*Left: Sofycom bracket 19-inch, right: wall-mount bracket 19-inch*

### *DC Distribution Unit 19-inch*

This 3U high module safely and reliably distributes DC power from an external DC power supply to up to four Peripheral Modules.

The DC Distribution Unit also serves as a floor-stand for a stacked configuration of PMs, in which adjustable feet 19-inch are required to level the system.

### *Fan unit 19-inch*

Adequate cooling of the Peripheral Module under all operating conditions is provided by an integrated fan unit, which can be hot-swapped and thus allows uninterrupted telephony service.



*19-inch fan unit*

Each PM and each CSM comes equipped with a fan unit. MTBF of the individual fans is specified at 80,000 hours at 40°C.

Fan operation is continuously monitored during normal operation. Malfunction is detected and reported as an alarm via the Alarm Cable CSM 19-inch supplied with each CSM.



# Technical specification

## Capacity iS3000 Single Processor system

The SOPHO iS3000 Single Processor system is available in one to four Peripheral Modules. System capacity scales accordingly up to a maximum of 1216 ports. System capacity in terms of traditional analogue or digital extensions is as follows:

Number of PMs	Analogue ext.	Digital ext.
1	256	270
2	512	570
3	768	840
4	1024	1140

Each Peripheral Module accommodates one non-blocking Peripheral Module Controller (PMC) and up to 12 Peripheral Circuit (PCT) Boards, spread over 10 Unit Groups (0-9).

U G 0	U G 1	U G 2	U G 3	U G 4	U G 5	UG6		UG7		U G 8	U G 9		
P C T 1	P C T 3	P C T 5	P C T 7	P C T 9	P C T 11	P C T 13	P C T 14	P C T 15	P C T 16	P M C - G C I	P C T - C I	P S U - M L D	
01	03	05	07	09	11	13	14	15	16	17	18	19	20

## Capacity iS3000 Fault-tolerant Processor system

The iS3000 Fault-tolerant Processor system is available in one Control and Switching Module plus 1 to 24 Peripheral Modules. System capacity scales accordingly at about 300 digital endpoints per PM:

Number of PMs	Analogue ext.	Digital ext.
1	256	300
2	512	600
3	768	900
Etc.		

Up to 10,000 ports are supported by a single node with the maximum number of 24 PMs. Expansion to up to 65,000 ports is supported in a distributed arrangement of 14 nodes.

The Control and Switching Module accommodates four processor slices arranged in a (4,2) fault-tolerant configuration and two to six redundant switching network slices. The switching network is non-blocking when equipped with six network slices.

C C S 0	C C S 1	C C S 2	C C S 3	S N S 0	S N S 1	S N S 2	S N S 3	S N S 4	S N S 5	C I E / I N C	C I E / I N C	C I E / I N C	C I E / I N C
01	02	03	04	05	06	07	08	09	10	11	12	13	14



### Compatibility

Existing iS3000 systems can be upgraded to CSM/PM 19-inch modules. The PM 19-inch module can also be used as Remote Peripheral Module. Existing iS3000 cards can be placed in the CSM or PM 19-inch modules.

### Physical characteristics

- Dimensions CSM and PM 19-inch
  - Width 483 mm (19-inch)
  - Height 400 mm (9 U)
  - Depth 408 mm; 468 mm including front cover
- Weight: 15 kg excluding system boards and AC Power Unit
- Colour: Front cover (NEC) purple

### Power

The basic CSM and PM 19-inch are DC-powered. They can be AC-powered by insertion of one or two AC Power Units 19-inch (two units in CSM only).

- Operating voltage range:
  - AC: 100 to 240V, 47 to 63 Hz
  - DC: 42 to 60V, positive ground
  - Safety class (IEC) 60950-1

### Compliance

- European Directives
  - Safety: 2006/95/EC
  - EMC: 2004/108/EC
  - R&TTE: 1999/5/EC
  - EU RoHs: 2002/95/EC
  - WEEE: 2002/96/EC
- Council Recommendation
  - EMF 1999/519/EC
- European Standards
  - EN55022
  - EN55024
  - EN61000-3-2
  - EN61000-3-3
  - EN60950-1
  - EN50371



### MTBF

- AC PSU: 100,000 hrs (MIL-HBK-217F) at 30°C
- Fan: 80,000 hrs at 40°C

### Environmental conditions

- ETS 300 019
  - storage class 1.2
  - transportation class 2.3
  - stationary use class 3.1
- Temperature: -5° to +45°C
- Humidity: 10 to 85%

### Expert Services

The iS3000 and SIP@Net is fully supported by our Expert Services. This extensive portfolio of services provides the insight and support needed to get the most out of equipment and applications. The services offered comprise advice, design, customization, integration, training, maintenance, continuous optimisation and Business Partner services.

UNIVERGE®360 is NEC's approach to unifying business communications. It places people at the center of communications and delivers on an organization's needs by uniting infrastructure, communications and business.



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