

UNIVERGE® SV8500

General Description

For the
UNIVERGE® SV8500
(S2)



NEC

December 2009

This general description provides information with respect to the hardware, software and various configurations of packages and features offered on the UNIVERGE® SV8500 communications system. Some features and functionality discussed may be software version dependant. This document also looks at the equipment capacities for the various modular increments of hardware and explains a variety of IP options that are now available on this latest technology platform for the support of Enterprise voice solutions.

To understand some sections of this document will require a basic knowledge of VoIP Telephony

UNIVERGE® SV8500 Reference

It should be recognized that reference to “SV8500” in this document refers to the NEC UNIVERGE® SV8500

TABLE OF CONTENTS

1. INTRODUCTION	7
1.1 UNIVERGE® 360	7
1.2 WHAT IS UNIVERGE® SV8500?	7
1.3 UNIVERGE® SV8500 HERITAGE	8
1.4 OVERVIEW OF THE UNIVERGE® SV8500	8
2. ADVANTAGES	10
2.1 THE HEART OF A GREAT SOLUTION	10
2.2 SCALABILITY OF THE UNIVERGE® SV8500	10
2.3 SURVIVABILITY OF THE UNIVERGE® SV8500	10
2.4 LEVERAGING WITH THE UNIVERGE® SV8500	11
2.5 UNIVERGE® SV8500 SUPPORTED OPTIONS	11
2.6 UNIVERGE® SV8500 SYSTEM SOFTWARE UPGRADES	11
2.7 UNIVERGE® SV8500 INTEGRAL HANDSET SUPPORT	11
3. CAPABILITIES	12
3.1 UNIVERGE® SV8500 INTEROPERABILITY WITH PUBLIC NETWORKS	12
3.2 UNIVERGE® SV8500 ANALOGUE CONNECTIVITY	12
3.3 UNIVERGE® SV8500 SIP CAPABILITY	12
3.4 UNIVERGE® SV8500 TRAFFIC CAPABILITY	12
3.5 UNIVERGE® SV8500 TDM CAPABILITY	13
4. LICENSING	14
4.1 UNIVERGE® SV8500 GENERAL	14
4.2 UNIVERGE® SV8500 LICENCING DESCRIPTIONS	14
4.3 UNIVERGE® SV8500 LICENCING TABLE	15
5. HIGH DENSITY GATEWAYS	16
5.1 UNIVERGE® SV8500 HIGH DENSITY GATEWAYS	16
5.2 THE 8RU HIGH DENSITY GATEWAY	16
5.3 1RU POWER UNIT	17

6. IP MEDIA DEVICES **19**

6.1 OVERVIEW	19
6.2 ANALOGUE 8 PORT MC	19
6.3 ANALOGUE 4 PORT MC/2 PORT MG	19
6.4 ISDN PRI MG	20
6.5 CONFERENCE SERVER MG	20
6.6 SIP TRUNK MG	21
6.7 MULTI PURPOSE CHASSIS	21

7. APPLICATIONS **23**

7.1 GENERAL	23
7.2 OAI (OPEN APPLICATION INTERFACE)	23
7.3 MCI (MESSAGE CENTRE INTERFACE)	23
7.4 SMDR (STATION MESSAGE DETAIL RECORD)	24
7.5 CONTACT CENTRE SOLUTIONS	25
7.6 HOSPITALITY SOLUTIONS	26
7.7 Q-SIG SOLUTIONS	28
7.8 CCIS/FCCS OVERVIEW	29
7.9 CCIS TRUNKING	29
7.10 FCCS TRUNKING	31
7.11 UMS - UNIFIED MESSAGING SOLUTION	32
7.12 REMOTE NODE OVER IP SOLUTION (FOR NORTH AMERICA)	33
7.13 MIGRATION	33

8. TERMINALS **35**

8.1 OVERVIEW	35
8.2 DT & SP	35
8.3 UNIVERGE DESKTOP IP EXTENSIONS WITH COLOR LCD (DT750)	37
8.4 NEC SOFTPHONE	38
8.5 SP30	38
8.6 SOFT CLIENT SP350	38
8.7 UNIVERGE® WIRELESS	39

9. ATTENDANT CONSOLES **40**

9.1 IAC - PC BASED ATTENDANT CONSOLE	40
--------------------------------------	----

10. RELIABILITY & REDUNDANCY **42**

10.1 SYSTEM RELIABILITY	42
10.2 UNIVERGE® SV8500 REDUNDANCY	42
10.3 UNIVERGE® SV8500 MTBF	43

11. REMOTE SURVIVABILITY **44**

11.1 UNIVERGE® SV8500 REMOTE SURVIVABILITY	44
11.2 UNIVERGE® SV8500 SR-MGC (2U)	44
11.3 UNIVERGE® SV8500 SR-MGC (E)	45
11.4 EXAMPLE OF AN SV8500 MULTI-SITE DEPLOYMENT	45

12. SECURITY **46**

12.1 ENCRYPTION	46
12.2 SECURITY STANDARD 802.1X	46
12.3 PC PORT SHUTDOWN	47

13. MANAGEMENT **48**

13.1 INTRODUCTION	48
13.2 UNIVERGE® SV8500 DATABASE INFORMATION	48
13.3 MAINTENANCE ADMINISTRATION TERMINAL (PCPRO)	48
13.4 UNIVERGE® SV8500 ADVANCED DATABASE MANAGEMENT	49
13.5 UNIVERGE® SV8500 SYSTEM ADMINISTRATION	49
13.6 SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP)	50
13.7 VOICE QUALITY MANAGEMENT	51

14. SPECIFICATIONS **52**

14.1 BASIC SPECIFICATIONS OF THE SV8500	52
14.2 SYSTEM CAPACITIES	52
14.3 TOTAL NUMBER OF SYSTEM CAPACITY LICENSES TO BE CONSUMED	53
14.4 ACCOMMODATION LIMITATION OF STATIONS	54
14.5 ACCOMMODATION LIMITATION OF IP COMPONENTS	55
14.6 ENVIRONMENTAL REQUIREMENTS	56

15. IP-PAD **57**

15.1 PA-32IPDA (IP-PAD)	57
15.2 PA-32IPDB (IP-PAD)	57

GLOSSARY of TERMS

COT:	(Central Office Trunk)
LCR:	(Least Cost Routing)
MC:	(Media Converter)
MG:	(Media Gateway)
NCN:	(Network Control Node)
PFT:	(Power Failure Transfer)
PSTN:	(Public Switched Telephone Network)
PRI:	(Primary Rate Interface)
BRI:	(Basic Rate Interface)
MGC:	(Media Gateway Controller)
SR-MGC:	(Survivable Remote, Media Gateway Controller)
U-IPX:	(UNIVERGE® NEAX 2400 IPX)
O/S:	(Operating System)

1. INTRODUCTION

1.1 UNIVERGE® 360

Industry analyst research has revealed the top three issues on every executive's mind – maintaining a competitive advantage, attracting and retaining customers, and designing business strategies. Communications companies now have the opportunity to provide these executives with a way to address these issues. They must put people back in the center of business communications. They must learn how to take advantage of the convergence of IT and communications and see how to look forward to a software future which takes into consideration their investments in people and technology.

We discuss NEC's UNIVERGE®360, which is NEC's approach to unifying business communications. It provides a foundation for understanding the importance of putting people at the center of communications and reveals how your communications needs determine the Unified Infrastructure, Unified Communications and Communications Enabled-Business Processes necessary for a true Unified Business.

1.2 WHAT IS UNIVERGE® SV8500?

The SV8500 is a premier IP Communications server that supports voice, unified communications and mobility solutions for tens of thousands of users. Designed to easily and efficiently scale, the SV8500 meets the needs of the largest enterprises, supporting up to 192,000 ports in a networked environment.

The innovative design coupled with flexible Licensing controls allows a system to expand easily and grow smoothly. The versatile architecture accommodates the widest possible variety of services, and supports customization to suit your organizations unique needs.

Most importantly, the UNIVERGE® SV8500 offers customers a flexible, telephony platform from pure IP to converged hybrid for a solution deployment to support their whole organization.

The UNIVERGE® SV8500 solution consists of the following items:-

- The SV8500 as a 19" Rack mountable 3RU server. This hardware platform utilizes an industry standard Intel processor and is powered directly from AC100-240-volts or DC-48-volts. This server controls the features and licensing options for the system in addition to the Processor for managing communications between SIP devices, TDM devices and NEC's extended SIP terminals as IP Peer-to-Peer.
- In addition to the SV8500 servers, a range of distributed IP media converters and gateways is also available to cater for access to the traditional services at the host site or at remote locations.
- Optional is the 19" rack mounted expansion chassis or PIR (Port Interface Rack) The PIR is available as a high density TDM gateway, and allows for the support of traditional PBX packages such as for ISDN, Analogues and operator consoles.



Front view of an SV8500

1.3 UNIVERGE® SV8500 HERITAGE

The UNIVERGE® SV8500 system is the next step on the evolutionary path of the UNIVERGE® SV7000 and the NEAX2400 systems, and it can be incorporated into networks that contain either one or both of these products. Providing a totally set of around 800 features and offering the intricate NEAX networking capabilities of CCIS and FCCS, the UNIVERGE® SV8500 core software is based on the time proven and highly reliable software.

Although designed as a pure IP solution, the UNIVERGE® SV8500 may also be equipped to accommodate traditional TDM digital and analogue ports. This is made possible with the inclusion of high density TDM expansion chassis that supports many NEAX PBX packages.

This document provides a comprehensive overview of the SV8500 architecture including an introduction into the technical characteristics of the system.

1.4 OVERVIEW OF THE UNIVERGE® SV8500

An NEC SV8500 implementation is a 3RU SV8500 server, but may also include up to 16 UNIVERGE® SV8500 8RU PIR's.

The SV8500 server which is loaded with the main software, feature pack software and any system software options also holds all of the licenses. It is the Telephony Processor for the system handling all activities associated with IP Peer-to-Peer communications as well as the traditional TDM telephones.

In addition to controlling all of the "Protocol handling" functions of the IP terminals and trunks, it manages the communications between SIP devices/terminals and IP Peer-to-Peer or TDM devices.

The SV8500 functions on an "open standard" Linux Operating System (O/S) which allows IP based Telephony interconnection via a true client/server IP PBX design.

The SV8500 by using an "open standards" Linux platform leverages from the flexibility of operating in a redundancy option configuration, to provide a reliable connection for IP terminals, gateways and PC soft-phones.

NEC maintains an exceptionally high MTBF (Mean Time Between Failures) with this platform by incorporating flash memory cards as opposed to hard disks as used in traditional servers.

Telephony Server: UNIVERGE® SV8500

Chassis Bus Cable (Rear):-

- TDM Chassis Connector
- Daisy Chain to up to 16 Chassis

Flash Card:-

- Data Storage



EMA:-

For Hot Standby
Hot Swappable

SV8500

- 3RU 19" Rack mounted
- 100-240v AC or -48v DC powered
- Non moving part storage
- Linux OS

10Mbps/100Mbps/1Gbps LAN
Port:-

- Operation / Administration
 - SMDR
 - MCI
 - OAI
 - PCPro
 - SNMP
 - PMS
- etc

10Mbps/100Mbps/1Gbps LAN Port:-

- IP Call Control

2. ADVANTAGES

2.1 THE HEART OF A GREAT SOLUTION

The NEC UNIVERGE® SV8500 is a “pure” client/server IP-PBX offering that provides customers a full software generic feature package equal to those previously available only with traditional circuit switched PBX systems.

The NEC SV8500 solution also provides the key features that typically all customers are looking for;

- reliability,
- redundancy,
- survivability,
- terminal options
- an extensive range of telephony features

The SV8500 is a total communications system platform that consists of modular core and optional hardware/software components. At the heart of the system is an IP-PBX based on a true client/server design platform that does not require circuit switched common equipment hardware for support of any analogue stations or trunk circuit requirements.

2.2 SCALABILITY OF THE UNIVERGE® SV8500

The NEC SV8500 has primarily been designed for customers who require a significant percentage of their telephony equipment to be IP based for desktop and/or wireless.

The SV8500 is very easy to scale due to the simplicity of its build rules and licenses and offers a per port growth path for its IP connectivity, with a maximum capacity in a stand alone configuration of 6,144 ports. However, with the addition of the optional NEC Fusion software (FCCS) a solution can be expanded for up to 192,000 ports in a feature transparent cluster.

If required a high density TDM gateway chassis (PIR) supporting up to a maximum of 384 ports can be deployed. Requiring one system capacity license per PIR, a single SV8500 system can have connected just one, or up to 16 PIR's.

When utilizing a PIR, the relevant hardware interface packages will be required.

These packages are based on current interfaces being used in the NEC UNIVERGE® IPX system and range from a 4 port to 32 port capacity depending on the functionality required.

2.3 SURVIVABILITY OF THE UNIVERGE® SV8500

The NEC SV8500 offers multiple levels of solution survivability. At the very top level it offers hot standby host servers. The hot standby system mirrors the online host and provides a full service to the LAN attached UNIVERGE desktop IP terminals, other IP terminals, IP devices and high density TDM Gateways should the primary server fail.

The change over of online to standby server is virtually seamless with calls in progress normally not affected.

The next level of survivability offered is the implementation of an alternative registration server called an SR-MGC.

Typically deployed remotely from the host on a WAN, one or many SR-MGC servers can be installed. Their implementation location would be dependant on redundancy levels required and the overall network design.

IP Terminals and IP Gateways support multiple registration options and they can take advantage of one or many SR-MGC's should the network to the host be lost.

2.4 LEVERAGING WITH THE UNIVERGE® SV8500

NEC has a strong focus on supporting customers who have previously purchased their products and consequently offer various options for backward compatibility.

- Many packages from the large ICS, IMX and IPX NEAX models of PBX can still be used in the SV8500 high density TDM chassis (PIR).
- With regular software releases available for the NEC SV8500, it allows for customers to gain access to all of the latest software version features, by implementing a software upgrade.
- The SV8500 can support CCIS links to any other existing NEAX PBX systems that support CCIS Trunking. This provides a strong level of user functionality and feature transparency between the different models of NEC systems.

2.5 UNIVERGE® SV8500 SUPPORTED OPTIONS

The NEC UNIVERGE® SV8500 has a wide and varied range of integrated communications software options, features, terminals and devices that it supports. This provides customers with the capability to build extremely flexible and robust configurations and with the strength to scale it to suit their immediate and future business needs.

More details of the specific software options supported on the SV8500 such as ACD, OAI, CCIS, FCCS and Hospitality can be found further into this document.

The AES (128 bit) Encryption function is an additional security measure that is also an option available to customers if desired.

2.6 UNIVERGE® SV8500 SYSTEM SOFTWARE UPGRADES

Major software versions for the SV8500 are being released periodically. These software versions are not seen as a mandatory upgrade process for customers and are only required for users looking at utilizing the additional and more recently incorporated features. Customers can skip several software releases but are still able to upgrade to the very latest software level if they have the appropriate hardware platform.

The NEC SV8500 system software can be loaded from a CD onto the system flash card. The new software version is then updated in the SV8500 system with a system reset which can be conducted at a time most convenient for the customer. A CPU reset for a typical system would normally take between 10 and 40 seconds before the system is back online. The reset time is still less than 2 minutes even for a very large system implementation.

2.7 UNIVERGE® SV8500 INTEGRAL HANDSET SUPPORT

The NEC SV8500 allows for the connection of UNIVERGE desktop IP terminals that use NEC's Extended SIP signaling. From a user perspective, the UNIVERGE desktop IP terminal will operate similarly to that of a traditional UNIVERGE desktop digital terminal. This can dramatically reduce implementation costs due to the limited requirement for staff training.

Hot-desking and individual operator security can be implemented simply by using the UNIVERGE desktop IP extension log-on, log-off capability.

Significant network infrastructure savings can also be achieved by utilizing the additional PC switch port connection available on the advanced UNIVERGE desktop IP extensions.

The NEC UNIVERGE desktop IP extension can be configured with up to four alternate server addresses in order to cover WAN failure or loss of internet connectivity. The UNIVERGE desktop IP extension will try each address in turn in an attempt to register to an active SV8500 or SR-MGC.

To support a mobile workforce, the SV8500 also supports Voice over WLAN handsets utilizing SIP protocols.

3. CAPABILITIES

3.1 UNIVERGE® SV8500 INTEROPERABILITY WITH PUBLIC NETWORKS

The NEC SV8500 provides interface gateways to ISDN Primary Rate, Basic Rate, SIP Trunks and to COT PSTN services. It provides for flexible managed least cost routing (LCR) of incoming and outgoing calls with support for calling line identification (CLI) on both ISDN and PSTN trunks with advice of charge (AOC) also available via ISDN.

The NEC SV8500 can also support a direct connection into a mobile carrier via either E1 link, ISDN PRA, PSTN, SIP trunks or QSIG links.

For SIP trunk connectivity between customer equipment and the Carriers, there may be a requirement for additional development depending on the SIP interoperability and functionality required by the customer and the carrier network.

3.2 UNIVERGE® SV8500 ANALOGUE CONNECTIVITY

The NEC SV8500 offers many options for analogue connectivity.

For a concentrated deployment of analogue stations at the host site, up to 16 high density chassis (PIR's) can be provided. This allows up to 384 ports for a 8RU rack mount configuration with the 8RU offering full common component redundancy. The appropriate 16 station or 24 station packages are then installed into the PIR as required.

Ethernet connected IP Media Converters are also available as either 4 ports or 8 ports. The flexible use of a variety of media converters can be implemented throughout a single SV8500 solution.

3.3 UNIVERGE® SV8500 SIP CAPABILITY

From a terminal perspective, the NEC SV8500 supports both standards based RFC SIP and also NEC Extended SIP. For a SIP terminal to operate on an SV8500 whether it is an NEC UNIVERGE desktop IP Extensions and Softphone, a dedicated license per terminal is required.

It should be noted that NEC standard SIP is based on the Version 2 IETF (*RFC3261*) SIP specification and has been in development and testing since June 2003. Additional IETF SIP draft and RFC documents are being created on a regular basis and NEC will be endeavoring to support specifications relevant to the internetworking and functionality of their systems well into the future.

NEC has also developed a range of SIP trunk Gateways. However SIP connectivity between customer equipment and the Carriers may require additional development depending on the SIP interoperability and functionality required by the customer and carrier network.

3.4 UNIVERGE® SV8500 TRAFFIC CAPABILITY

The SV8500 can provide a capability to handle approximately 1,000,000 Busy Hour Call Attempt (BHCA) in the FCCS configuration.

3.5 UNIVERGE® SV8500 TDM CAPABILITY

With the introduction of VoIP and “Peer to Peer” functionality into the telephony market, we now see changes in system relationships between hardware and terminals/trunks.

In a hybrid environment when deploying a PIR for traditional trunks or stations, there is normally the requirement to provide for voice communication paths between the traditional stations/services and the Pure IP stations/services. To allow this connectivity the SV8500 can support the installation into the PIR of a device called an IP-PAD.

The IP-PAD when installed in the PIR allows for the conversion of TDM to IP and also IP to TDM. Depending on your IP deployment requirements, there are different versions of IP-PAD available which can allow for varying options including support for such features as encryption and compression.

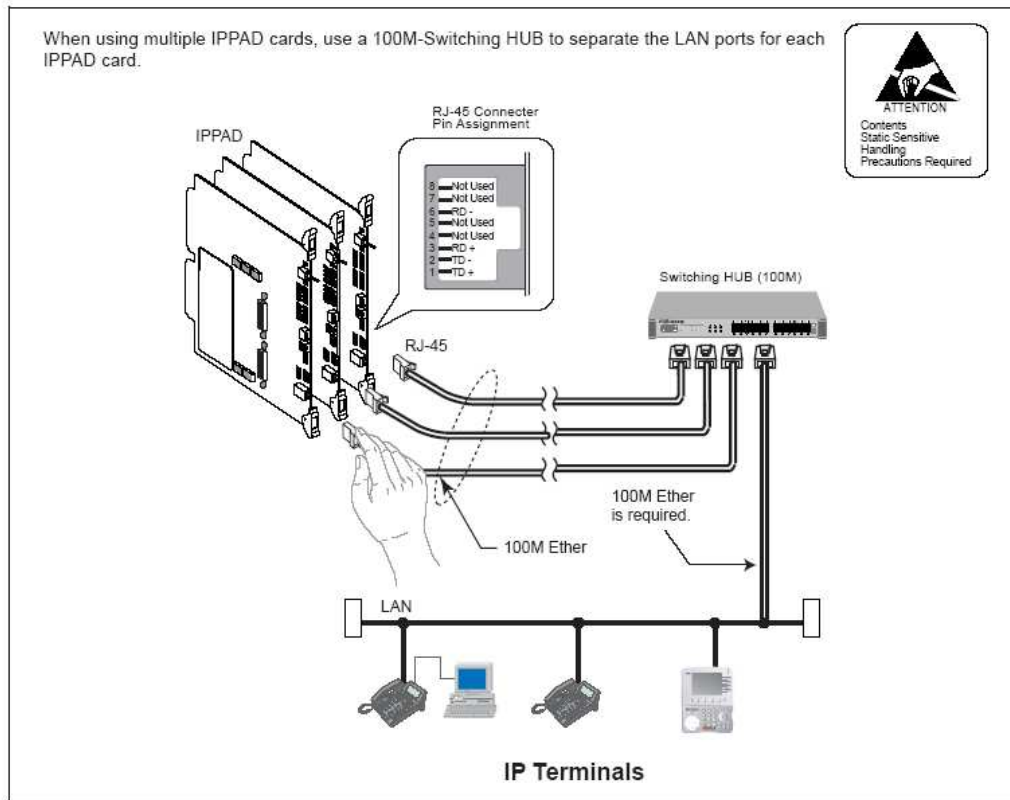
The number of IP-PAD circuits required in a system is based on traffic flow. Keeping this in mind, each IP-PAD package is capable of handling up to 32 simultaneous calls.

For IP-PAD specifications and more details on the IP-PAD packages available, please go to section 15 of this document.

External Interface

Referring to the figure below, connect the IPPAD cards and the switching HUB with 100 M Ether cables.

Cable Connections for IPPAD



Warning: Be sure to use a switching HUB when connecting IPPAD cards to the LAN.

4. LICENSING

4.1 UNIVERGE® SV8500 GENERAL

A basic SV8500 system hardware configuration would consist of Main server. Then for external connectivity, there is the option to add high density Gateways, IP Devices, IP Gateways and a range of terminals.

To control all of the options of terminals and devices required for normal operation, and to allow for system expansion, it is necessary to load into the SV8500 the required licenses.



SV8500 as basic system configuration

4.2 UNIVERGE® SV8500 LICENCING DESCRIPTIONS

The UNIVERGE® SV8500 system can be expanded simply by adding the necessary licenses and devices as required. An SV8500 can start from just a single port with growth available up to the maximum configuration currently supported for a single UNIVERGE® SV8500 system of 6,144 ports. This capacity could include up to a maximum of 6,144 high density (PIR) gateway ports.

An SV8500 solution, in addition to requiring System Capacity Licenses, also requires specific licenses to allow the connection of the relevant applications, terminals and devices.

These License details are as follows

System license (A):

It defines the version and the role. 1 License for 1 CPU is required. System License is divided into two groups;

Main-System: for each market and software version

Sub-System: for additional CPU such as, Remote Site CPU of PIM/PIR over IP and SR-MGC

Each System License has version information.

System Capacity license (B):

It defines the size (number of available ports including TDM ports and IP ports) of the system. This license is required per PIR (both Physical PIR and Virtual PIR).

System Option License (C):

This license is required to provide the additional optional applications on a per application basis such as ACD and OAI. This license is required per Node.

Client License (D):

It defines the number of client terminal registered. This license is required per IP device.

The Devices include UNIVERGE desktop IP extension, SIP terminal, SP30 Softphone, WLAN terminal, etc.

Client Option License (E):

These are two-in-one licenses that combine Option License and Client License.

This license is required per device/channel. This license is used as an Option License at FCCS Local-Node

The IP terminals and remote devices will only become accessible after the activation of their specific licenses which are controlled and supported directly from the SV8500.

The number of IP device licenses allowed is governed by the available system capacity.

Once a station or device is programmed into the SV8500, all communications with that station or device is classed as an operational heart beat only, which is via the SV8500 Ethernet port.

The station or IP device voice paths are however always peer-to-peer.

4.3 UNIVERGE® SV8500 LICENCING TABLE

System License (A)	
SB-xxxx NX-SYS Sxx-Sxx	: Defining the version and the role.
System Capacity License (B)	
SB-xxxx NX-CAP PIM-1	: Defining the size of the system.
System Option License (C)	
SB-xxxx NX-OP FCCS-NCN	: Activating the FCCS (NCN) feature.
SB-xxxx NX-OP FCCS-LN	: Activating the FCCS (LN) feature.
SB-xxxx NX-OP NW	: Activating the Network feature.
SB-xxxx NX-OP LD	: Activating the Location Diversity feature.
SB-xxxx NX-OP ENC	: Activating the Encryption feature.
SB-xxxx NX-OP HOTELUN	: Activating the Hotel feature.
SB-xxxx NX-OP OAIUN	: Activating the OAI feature.
SB-xxxx NX-OP NW-AOUN	: Activating the Network ACD feature.
Client License (D)	
SB-xxxx NX-CLI HD-A1	: For NEC Hard-phone
SB-xxxx NX-CLI SP-A1	: For NEC Soft-phone
SB-xxxx NX-CLI HD-SIP1	: For 3rd Party Hard-phone
SB-xxxx NX-CLI SP-SIP1	: For 3rd Party Soft-phone
Client Option License (E)	
SB-xxxx NX-CO PHSUN16	: For the PS (PHS)
SB-xxxx NX-CO VTRK32	: For P2P CCIS Virtual Trunk Channel
SB-xxxx NX-CO ACDUN1	: For ACD Agent

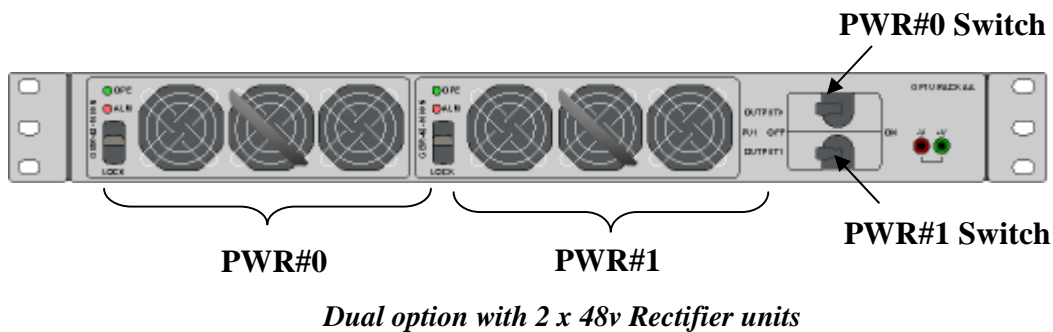
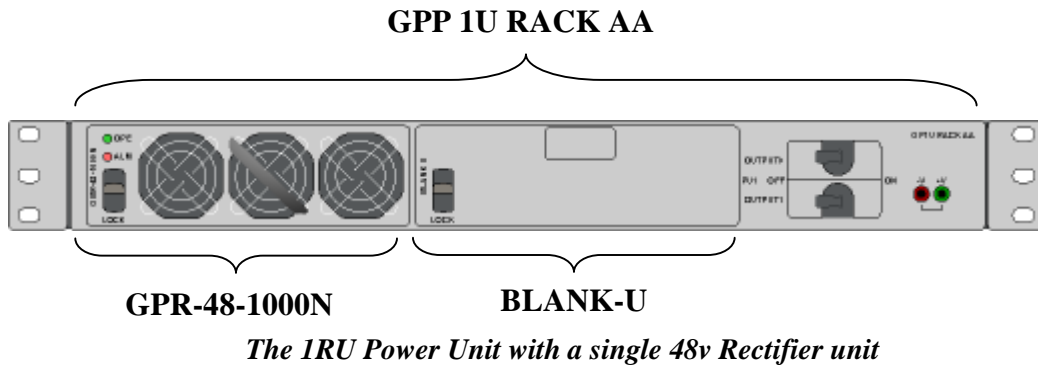
Please note that new licenses may be introduced in the future as additional functionality or system enhancements are added to the SV8500 system.

5.3 1RU POWER UNIT

To allow for maximum concentration of line and trunk packages and to alleviate any power limitations when using the 8RU PIR, it has been coupled to a 1RU 19” Rack mountable Power Unit that feeds 48 volts directly into the onboard DC power package.

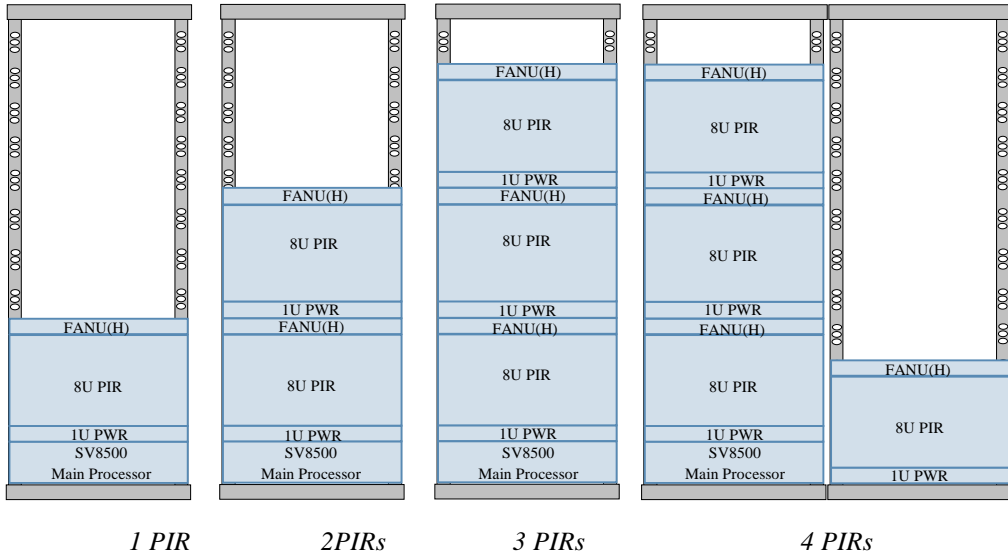
The power Units come with 2 slots that are designed to accommodate either 1, or for a redundancy option, 2 hot pluggable 48v Rectifier modules.

If the second Rectifier module is not fitted then the second slot of the Power Unit is fitted with a safety cover or “Blank” to block access to the slot.



Hardware Specifications of 8U-PIR (AC Powered Model)

Total Weight	Approx. 40 kg (maximum accommodation of 8U-PIR +1U-AC/DC Power Unit)
Input power for 8U-PIR	DC Terminal Unit accommodates Power Receiving Terminal (-48VR, -48V, and FG connection)
Input power for 1U-AC/DC Power	Two AC Inlets for dual AC power unit (#0 and #1)
	AC100V – AC240V (50/60Hz) +/- 10% Parallel two pole with grounding
Maximum electric power consumption	93 + * W (AC 240V) , *: Add the power consumption of PA-PKG which mounts in PIR.
Outside dimension	448x530x445mm, excluding the brackets 19-inch rack mount, 8U-box
Maximum module configuration	4 sets of 8U-PIR +4 sets of 1U-Power/SV8500
Number of universal slot	17 slots (maximum 384 ports)
Quake-proof strength	Horizontal accelerated-resistance to 0.5G



Typical installation displaying a redundant SV8500 utilizing 8RU AC Powered Model (1PIR-4PIRs)

6. IP MEDIA DEVICES

6.1 OVERVIEW

The SV8500 has the capability of supporting not just IP and SIP terminals but also a range of IP and SIP Devices. These devices in most cases are common between the U-IPX and the UNIVERGE® SV8500. This allows options for an IP deployment which can be on either a single site LAN or over a National WAN. These devices include analogue Media Converters (MC), PSTN and ISDN Media Gateways (MG) and voice conferencing servers (VS). Some are available in a standalone box and others can be provided as a blade that slots into a 1RU 19" rack mounted Multi Purpose Chassis (MPC).

6.2 ANALOGUE 8 PORT MC

The MC8 blade [SCA-8LCA] is an 8 port Media Converter (MC), providing media converting function between Internet Protocol (LAN-side) and conventional Voice Data (MC-connected conventional terminal side). By using this converter, up to 8 analogue telephones can serve as IP stations under the control of SV8500 system. Media Data (voice/ fax) is sent and received directly between IP terminals (MC-to-MC, MC-to-UNIVERGE desktop IP extensions, etc.) in Peer-to-Peer connection.

The 8MC Card comes with eight front accessible modular RJ45 jacks. Analogue telephones or fax machines can be connected to these ports. The MC- connected terminals communicate by directly sending conventional Media Data (voice/ fax) to the MC. The MC then embeds the media into IP packets, which are sent to the destination IP terminals over the LAN/WAN.

The 8MC blades can mount in either side or both sides of a 1RU Multi Purpose Chassis.

With a 2nd 8MC blade mounted into a single MPC, the offering becomes a single 19" rack mountable 1RU 16 port media converter.



6.3 ANALOGUE 4 PORT MC/2 PORT MG

The MCMG blade [SCA-4LC2COT] is an 4 port Media convertor (MC) and 2 port Media Gateway (MG).

The 4 port Media Converter (MC) is an interface providing media conversion between the Internet Protocol (LAN-side) and conventional Voice Data (the MC connected terminal).

The 2 port Media Gateway (MG) is the interface between the Internet Protocol (LAN-side) and the public carrier network (PSTN).

In an MC/MG device, the MC and MG functions can work together or independently.

This device, can in the case of power or Network failure, provide Power Failure Transfer (PFT) which is the connection of the PSTN lines and Analogue terminals directly.



6.4 ISDN PRI MG

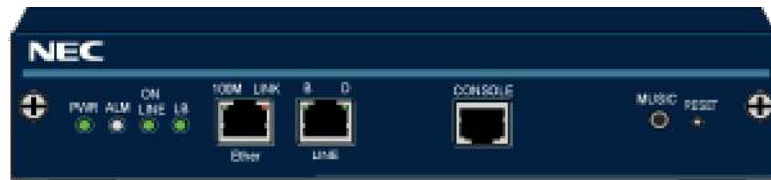
The ISDN Primary Rate Media Gateway (SCA-PRI) is an interface blade between the IP network and with the public ISDN, and provides an efficient connection for up to 30 trunks depending on the configuration of the SV8500.

A single SV8500 can support up to 32 MG-PRI Media Gateways.

Using an SV8500 solution programmed with LCR to control calls via SCA-PRI's configured in disbursed locations, short distance calls can be made over the WAN to the local ISDN service, offering a cost-effective alternative network for hop-on and hop-off calls.

The SCA-PRI Media Gateway under control of the SV8500 can also act as a QSIG E1 trunk interface into the IP network. In a similar process to setting up for ISDN, the QSIG trunks are fully configurable from within the SV8500.

Once the SV8500 has route and trunk data programmed and the MG has been connected to the IP network, it is then available as a QSIG E1 gateway.



6.5 CONFERENCE SERVER MG

The VS-32 Conference Server blade offers an Announcement feature, External Hold-Tone feature, and multi party Conference Feature. Its main function is however for providing multi party conference calls between IP stations and to IP devices for calls over the IP network.

The VS-32 also provides the three-way Conference connection when required for UMS call recording allowing the recording of the conversation between two parties.

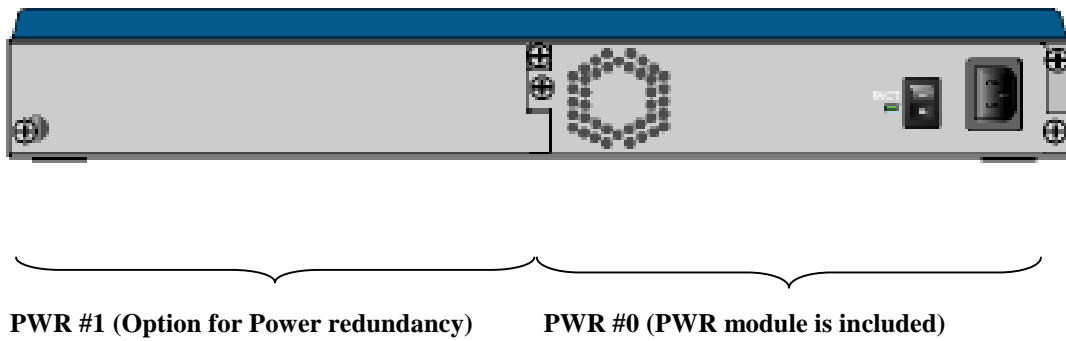
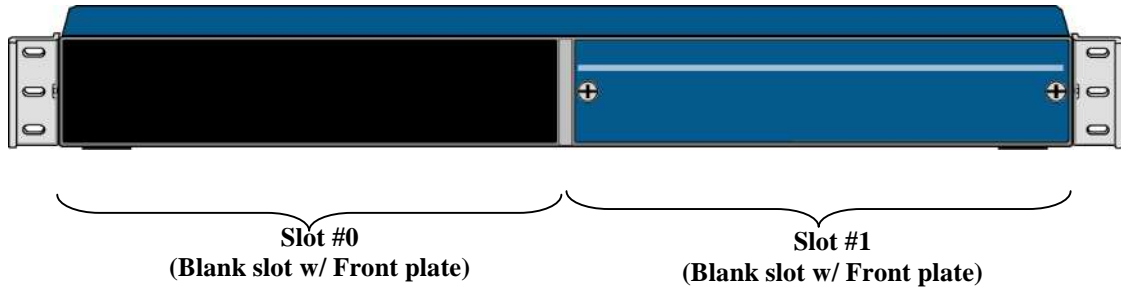
When using a local MOH device, the cable for the external hold tone source needs to be an all-purpose 3.5 monaural ear phone plug, which then fits directly into the music jack located on the front of the VS-32.

As a remote deployment when a network failure occurs, the VS-32 Conference Server continues to provide the Announcement feature, External Hold tone feature, and Conference feature in conjunction with the activated remote survivable server (SR-MGC).



The VS-32 Conference Server allows for a customer to allocate the VS-32 Conference Server features (Announcement / External Hold-Tone / Conference) within the guidelines as indicated in the following chart:

As indicated below in the front view of a 1RU Multi Purpose Cassis, we see that if a slot is not required then a blank front plate can be fitted. Dual power option is also available for the MPC.



Rear view of a 1RU Multi Purpose Chassis

7. APPLICATIONS

7.1 GENERAL

NEC offers a range of integrated application options all supported on the UNIVERGE® SV8500 such as SMDR (call billing details), ACD (Automatic Call Distribution), OAI (Open Application Interface), CCIS (Common Channel Interoffice Signaling), FCCS (Fusion Call Control Signaling), ISDN (Integrated Services Digital Network), QSIG, P2P IP Trunking, Hospitality and Healthcare Applications.

However NEC also understands that the strength of the SV8500 solution is significantly enhanced with the use of third party applications. Many third party applications that are supported from previous NEC PBX platforms can also function on to the SV8500. These applications suites include,

- A range of call accounting applications for managing call billing
- Many Unified messaging and voice mail products, scaling from several users to many thousands are also available to connect to the SV8500.

These are just a few of the many 3rd party developed application that provide real customer benefits when purchasing an NEC solution.

7.2 OAI (OPEN APPLICATION INTERFACE)

The Open Application Interface (OAI) opens a whole new world of computer and communication capabilities. The SV8500 and a general purpose computer are linked together to provide an interactive system of unprecedented functionality. OAI is NEC's evolutionary advancement that enables a built-in processor to control the operation of the SV8500.

NEC's OAI provides the tool to implement powerful integrated applications in which a computer and communications facility function as an Integrated Communications System in ways that have never before been possible. With the addition of the OAI software, control of the system features is extended by the internal resident processor.

OAI permits an internal resident processor as an applications processor, to send instructions to the SV8500 by allowing a two-way data exchange between the SV8500 CPU and the PC. This brings about new operating efficiency which allows business staff to use their DT terminals to communicate with the PC. The PC responds by updating the DT display in an interactive format, or by sending information to other terminals, PCs, or DTs as instructed by the application software. DT keypads can also be used to input data to the PC.

The control over integrated services and applications that OAI allows is surprisingly easy to obtain. An existing PC with its current operating system can be used. OAI employs a standard protocol conforming to the Open System Interconnection (OSI) model established by the International Standards Organization (ISO). Therefore, OAI is compatible with most computer systems, whether PC, micro, mini, or mainframe based.

OAI comes with a library of programs that translate standard programming instructions into recognizable commands to the SV8500 processor.

Customized application programs can be written on a general purpose PC without reference to the complex communication protocol proprietary to the SV8500 system.

7.3 MCI (MESSAGE CENTRE INTERFACE)

The key to successful business is the conveyance of accurate information and timely, responsive action to internal and external communications. The voice messaging service enables a business to operate in a precise manner, since accurate information is automatically relayed.

Messaging System integration generally delivers the following major features.

- **Call Forwarding to Personal Greeting**
This allows callers to leave messages for subscribers who are busy or away from their desks. Incoming calls routed to an unanswered or busy extension are automatically forwarded directory to a subscriber's voice mailbox.
- **Message Waiting Indication**
This will light a message-waiting lamp, activate a display, or provide a stutter dial tone on the subscriber's extension when new message have been received.
- **Easy Message Access**
This allows subscribers to retrieve new messages from their voice mailboxes without entering a personal ID number. A security code may be required before message playback to prevent unauthorized message access.

The SV8500 can provide voice messaging applications by integrating an external voice messaging system via a Message Centre Interface (MCI).

This application may also be centralized in a CCIS or FCCS Network.

The MCI is an Ethernet data link operating under a specific message protocol and format. The MCI can provide the following features.

- Sends incoming call information to an external voice messaging system, via the MCI, when the voice messaging system answers.
- Controls messaging waiting lamps for stations based on information sent from the voice messaging system.

7.4 SMDR (STATION MESSAGE DETAIL RECORD)

The Station Message Detail Record (SMDR) allows the UNIVERGE® SV8500 to record detailed call information for all terminals over the system connected trunks

The SMDR data provides the call information on a per call basis.

The information generated includes:

- Calling station number or
- Trunk route number,
- Dialed number,
- Time to answer
- Call start time,
- Date and
- Call duration

The SMDR information is all compiled within the SV8500 CPU and then under the SV8500 control, outputs the call information as a real time information data stream to the collection device via the Ethernet port.

During a LAN or WAN failure, or if the host SV8500 is offline and stations are operating off an SR-MGC, then the SR-MGC will store the appropriate SMDR records. Once the LAN, WAN or host SV8500 service is restored then the SR-MGC will down load the captured SMDR stored details to the SV8500.

7.5 CONTACT CENTRE SOLUTIONS

ACD (Automatic Call Distribution)

The ACD software option can be an important inclusion to add to an SV8500 solution.

Contact Centre's and telemarketers are able to take advantage of many new marketing strategies involving customer service calls and consumer telephone sales. ACD can do this by efficiently allocating calls to the available agents. It is not only important that a call be captured, but that it should not wait longer than necessary. The ACD provides queuing and levels of priority to ensure calls are handled in the order of arrival and importance.

The ACD evenly distributes customer calls by providing a queue for agents as well as for callers. The call control and agent functions, when combined with an effective Management Information System, are the tools to maximize profitability and efficiency.

There are many attributes that a true ACD must possess to provide cost effective handling of customer traffic. Two basic features that distinguish an ACD are its ability to queue callers when agents are not available and queue agents when callers are not available. This allows a smooth and even distribution of work load and incoming traffic flow.

When all agents are busy and a call arrives, the ACD can control the length of time the caller will hear ringing before the first announcement. The first announcement could be several minutes or as short as two seconds and can be followed by Music-on-Hold and/or a second announcement. During this time, a call may become eligible to be handled at an alternate answering point.

Eligibility for overflow is possible as early as four seconds after the call has been detected. When the call becomes eligible for overflow and the answering point is busy, the call will queue in two places, the original queue and the overflow queue.

While calls are queuing, the agents can see the level of calls waiting as indicated by the call waiting lamp at the agent's position. The call waiting lamp has flexible thresh holds that can be set to indicate the call status:

- Off: there are no calls in queue
- Illuminated: calls are in queue
- Flashing: a pre-programmed threshold has been exceeded

As calls increase and decrease in the queue, the lamp status will change to inform the agents of the level of traffic at that moment.

When an agent becomes available at either answering point, the call is immediately routed to that agent. If only a limited number of calls are to be allowed to queue, the queue length can be adjusted. This feature provides an additional alternative for call handling based on traffic loading.

To support the ACD agent's efficiency, automatic answer and automatic release may be utilized.

In the case of difficult callers or threatening calls, an emergency key may be used to request assistance and simultaneously activate an emergency recorder.

If necessary, the supervisor, besides having all the same capabilities as an agent, also has the ability to assist agents with difficult calls by invoking a monitor and record function.

The DT300/700 Series terminals when used for an ACD Agent have been specifically designed for ACD operation and features, with the addition of strategically located ACD functions buttons. The intelligent design provides the increased efficiency needed in a fast paced call centre environment.

Headset and/or handset inbuilt modular jacks are incorporated into the DT300/700 Series terminals and allow ACD Agent to accept either connection as standard.

The DT300/700 Series for ACD Agent also features a four/five-line by a 16-character LCD display that can identify the type of call by name or LDN (Listed Directory Number).

Q-Master

Residing on the Microsoft Windows operating environment, the Q-master has been designed to take full advantage of the SV8500 OAI information, to combine the power and flexibility of a LAN based CTI architecture. Q-Master can allow customization of contact centre functionality to customer's specific requirements. Call Centre Managers are able to adjust call patterns, set skills based routing profiles and assign agents to multiple queues.

By utilizing incoming caller line identification (CLI), Q-Master determines where the call originated and searches for a match in customer database. Key customers can automatically be placed into priority queues, or directed to the agent who last dealt with that caller.

During periods of high traffic Q-Master greets callers with a series of announcements, reassuring them that they have reached the right place and advising them of their position-in-queue. This encourages callers to stay on the line longer, significantly reducing call abandonment rates.

Q-Master is fully modular in design, allowing contact centre managers to select the required components to best meet their operational and budgetary objectives and their customer needs.

7.6 HOSPITALITY SOLUTIONS

The SV8500 through application software allows customizing to address the needs of the hotel industry and has been the key to allow many hotels, rest homes, clinics, hospitals and other lodging-oriented businesses to function more efficiently. From the small hotel requiring basic services to the large hotel or hospital, the SV8500 offers sophisticated and enhanced features to appease the five star expectations. The entire industry spectrum, from as few as 100 guest rooms to thousands, can be efficiently managed by a single SV8500.

Installations requiring remote administrative functions in multiple locations can also be connected via NEC's CCIS/FCCS networking feature or by Distributed IP devices.

The needs of the hotel administrative and guest environments have been surveyed, studied and researched by NEC.

These needs have been specifically addressed by the unique and advanced hospitality-oriented software exclusive to the UNIVERGE® SV8500 and U-IPX Hotel option.

The vast assortment of enhanced business features inherent in the SV8500 sophisticated business software package have been incorporated and integrated into the Hotel system. With this powerful software and the commitment of NEC to communications excellence, the SV8500 can be a business passport to providing modern and efficient service to guests with transparent ease of operations to the administration staff.

The following are descriptive summaries of just a few of the time and cost saving features which are realized with the Hotel System software.

Language Services

The Language Service feature is a unique feature which provides personalized language services to guests. Via the visual display on the console and incoming console keys, hotel personnel are able to identify the guest's language and answer appropriately. Guest station calls may also be routed to a recorded announcement in the guest's own language. Multiple languages can be supported by a single system.

Guest Information Displays

Under PMS control, a guest's name is displayed while ringing at selected administration stations so that guests may receive a personal response when communicating with any special administration service station. This feature is also equipped at the Hotel Console and enhanced with a guest status display indicating such information as wake up time, message waiting, VIP status, DND (do not disturb) status and room class. If required, a terminal can be directed by the SV8500 to display enhanced guest information showing special administration stations or attendant consoles additional information such as: name of all guests in room, date of check-in/check-out, language, company/ division name and address.

Property Management System (PMS)

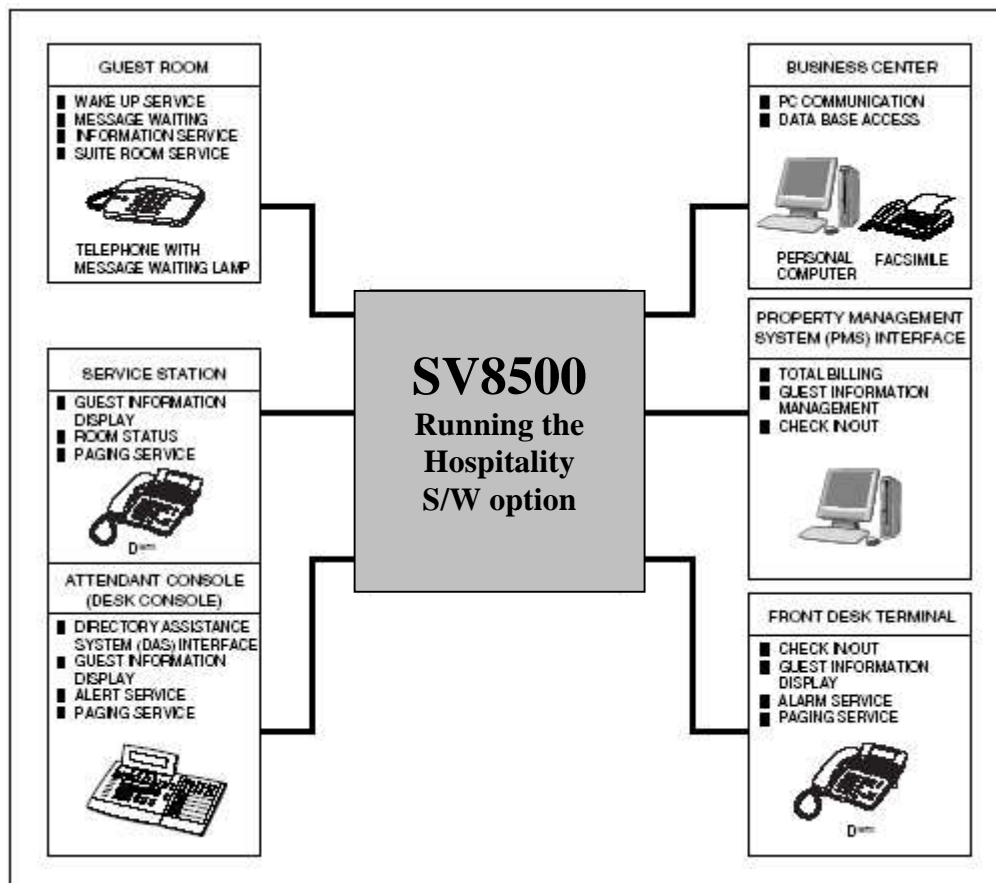
The SV8500 has been designed to accommodate the integration of an adjunct Property Management System (PMS). The PMS allows the support and control of many front and back office functions.

For example:

- Message Waiting Control
- Room/Housekeeping Status
- Room Change/Swap
- Check In/Out
- Connecting Room Service
- Directory Assistance Service (DAS)

Direct Data Entry

The SV8500 along with a Property Management System incorporates a Direct Data Entry feature. This feature allows custom applications to be developed. A special access code and up to 32 digits can be dialed from selected guest stations. These digits are sent to the PMS for inventory control, mini-bar usage, maintenance, etc.



Class of Service and Station Message Detail Record (SMDR)

The sophisticated services of the SV8500, allows for the hotel staff to provide varying calling privileges to staff members and guests. A guest's Class of Service can be assigned upon check-in, and the room automatically cut off from outbound calling upon check-out. Cost effective services such as Least Cost Routing and Look Ahead Routing can be employed to cut operating expenses. The Station Message Detail Record (SMDR) is provided as a real time information data stream passed from the SV8500 to an adjunct call accounting package to generate guest and staff call records and costs.

Emergency Call, Off Hook Alarm and Alert Services

These three features are included in the option software to provide hotel staff, guests and property with added security in the event of an emergency.

- Emergency calling allows a selected administration display station to maintain a connection even if the calling station hangs up; an event message can also be generated to the system printer.
- An Off Hook Alarm will connect an inadvertently off hook station to a preselected display telephone or Attendant Console so that appropriate action can be taken by security personnel.
- Alert Services can be activated by the Attendant Console or selected special administration stations, allowing the connection of all guest and special administration stations in the SV8500 to recorded announcement trunks for the relaying of emergency instructions.

7.7 Q-SIG SOLUTIONS

This feature enables the SV8500 to connect to other manufacturer systems as well as other NEC PBX's by using Layer 3 protocol as the Signaling for the support of circuit mode bearer services.

The physical interface is a 2 Mbps digital interface.

Q-SIG on the SV8500 can support the following inter-working with the other networks.

Advice of Charge at End of Call ETS 301 254/264*
 Calling Line Identification Presentation ETS 300 173*
 Calling Line Identification Restriction ETS 300 173*
 Calling Name Identification Presentation ETS 300 237/238*
 Calling Name Identification Restriction ETS 300 237/238*
 Call Associated Compliance to ISO 11582 ETS 300 239*
 Call Completion to busy subscriber CCBSETS 300 365/366*
 Call Completion on no reply CCNRETS 300 365/366*
 Call Completion to Busy Subscriber ETS 300 365/366*
 Call Completion on No Reply ETS 300 365/366*
 Call Transfer ETS 300 261*
 Call Diversion's All ETS 300 256/257*
 Call Diversion's NANS, ETS 300 256/257*
 Call Diversion's Busy ETS 300 256/257*
 Connected Line Identification Presentation ETS 300 173*
 Connected Line Identification Restriction ETS 300 173*
 Connected Name Identification Presentation ETS 300 237/238*
 Connected Name Identification Restriction ETS 300 237/238*
 FR I626 - National / International Number Type, Selected on a per Number dialled basis.*
 L2 and L3 QSIG- ISO11572*
 Non call associated, non bearer, connection oriented signalling ETS 300 239*
 Path Replacement*
 QSIG Basic Call ETS 300 170/171*
 QSIG Data Call ETS 300 171/172*
 QSIG Look Ahead Routing ETSI ETS 300-172*
 Recall on Busy ETS 301 257/258*
 Recall on No Reply ETS 301 257/258*
 Receipt and passing of facility information ETS 300 239*
 Support of notify message ETS 300 239*
 Support of QSIG facilities message ETS 300 239*

*** reflects the ETS feature code#**

7.8 CCIS/FCCS OVERVIEW

NEC offers two very powerful networking options as either TDM or IP Peer to Peer. The first is Common Channel Interoffice Signaling (CCIS) and the second is Fusion Call Control Signaling (FCCS).

FCCS and CCIS are fully compatible. When a network consists of multiple trunk connections to earlier generation systems, the connection will support the highest intelligence of feature transparency and administrative capabilities of the earlier generation system.

CCIS provides a customer with enhanced feature transparency over tie line trunks and is fully compatible with most other NEC NEAX systems. CCIS can be deployed between a mixture of systems types, large and small, and over a variety of different types of connections.

When deploying the FCCS functional and intelligent network capability, it allows multiple network nodes of U-IPX or UNIVERGE® SV8500 systems to be fully integrated creating one logical network. This Network integration provides a customer with enhanced feature transparency and strong centralized telecommunications functions.

FCCS also allows individual nodes dispersed within a network to operate as if each of them is part of a single integrated PBX providing significant feature transparency and number portability.

FCCS on the UNIVERGE® SV8500 is fully compatible with the U-IPX and may exist between a mixture of these systems as IP peer-to-peer, point to multi-point trunks.

7.9 CCIS TRUNKING

The modular architecture and wide range of voice and data features available from an SV8500 have been developed with emphasis on continued enhancement within a single SV8500. In order to meet the growing demand for further enhancement on a network level, NEC developed a networking system employing Common Channel Interoffice Signaling (CCIS).

The CCIS trunking links together individual SV8500 systems (nodes) to form a transparent voice and data network which acts as a single large SV8500, even though terminals within the network are in fact connected to different SV8500's. Common Channel Interoffice Signaling (CCIS) derives its name from the fact that a signaling channel (link), separate from voice and data channels, is provided between nodes for the sole purpose of signal exchange. This signaling link is used in common by all voice and data links for exchange of information relating to addressing (e.g. dialed digits, calling/called number); supervisory functions (e.g. call setup and termination); and network accounting and management (e.g. centralized billing and fault reporting.) This is unlike conventional tie line networks which exchange signaling information over the same links as used for the voice transmission (Associated Channel Interoffice Signaling).

Some advantages of the separate signaling link provided by CCIS over IP :

- **Network Transparency**
Because CCIS allows data relating to service features and station/trunk status to be exchanged between nodes at a high rate of speed (64 Kbps), service is provided to all users as though the CCIS network was a single SV8500.
- **Centralized Facilities**
Centralized Management: Fault messages from all nodes can be directed to one node.
Centralized Billing: Billing information for all nodes in the network can be processed at one central location.
Centralized Attendant Service: Attendant services can be provided to multiple nodes from one or more central location(s).

- Better Utilization of Trunking Facilities**
 Because network signaling is carried over separate signaling links, more efficient use can be made for network trunks (reduced call holding time, reduced connection time, etc.) so the number of trunk circuits required for a specified traffic capacity, may be reduced.
- Network Reliability**
 Alternate Routing provides the CCIS network with maximum reliability. If the signaling link between two nodes should fail, signaling is sent over an alternate route, via another node, without loss of service. Directly connected redundant links can also be provided to assure reliability.
- Reduction in Personnel**
 Because management, cost accounting, and services, such as Attendant operation, can be centralized, efficient use can be made of the people necessary to administer the network.
- Reduced Hardware**
 Signaling over a common channel; better utilization of trunking facilities; and centralized management and services all result in a vast reduction in hardware when a CCIS network, rather than a conventional Tie line network, is used.

CCIS networks can be divided into the following types, depending upon the numbering plan used: Main-Satellite Networks and Main-Remote/Campus Networks
 Both networks provide uniformity of services throughout the CCIS network, and because of numbering plan flexibility, station users are not conscious of the distance between nodes.

- Main/Satellite Network (Opened Numbering):**
 In this type of network, offices are connected by means of a numbering plan consisting of a three-digit office code, which denotes the location, and four-digit station numbers.
- Main-Remote/Campus Network (Closed Numbering):**
 In these types of networks, offices are connected by means of a numbering plan consisting of four or five digit station numbers. The first one or two digit(s) of these station numbers are used to denote the location. An advantage of this network is that it is less complex and requires far less infrastructure than would be necessary if traditional stations were connected to a single host system.

TYPE OF NETWORK:	MAIN-SATELLITE NETWORK (Opened Numbering)	MAIN-REMOTE/CAMPUS NETWORK (Closed Numbering)
NUMBERING PLAN:	Office Code: Three digits Sta. No.: Four digits	Office Code: First one or two digits of Station Number. Sta. No.: Max. five digits
ACCESS METHOD	$\begin{array}{c} \underline{8-XXX-XXXX} \\ \begin{array}{l} \\ \\ \\ \end{array} \begin{array}{l} \text{Sta. No.} \\ \text{Office Code} \\ \text{Access Code} \end{array} \end{array}$	$\begin{array}{c} \underline{XXXXX} \\ \begin{array}{l} \\ \\ \end{array} \begin{array}{l} \text{Sta. No.} \\ \text{Office Code} \end{array} \end{array}$
NETWORK SIZE:	Large (Nationwide)	Small (Premises)/ Medium (Local Area)

7.10 FCCS TRUNKING

The main advantage of using the Fusion Call Control Signaling (FCCS) system is improved Inter-Office service feature functionality. The FCCS system eliminates the constraints normally associated with network services that are offered using Common Channel Inter-Office Signaling (CCIS) or Channel Associated Signaling (CAS).

The SV8500 supports FCCS to other SV8500 systems or to UNI-IPX systems with the following benefits

- **FCCS Networking via IP**
This feature allows the system to exchange both Speech and FCCS Signals over an Intranet. The Speech data between the IP Stations can be sent and received in a Peer-to-Peer connection, while the control signals are handled by the System. The control signals are all managed internally.
- **FCCS Alternate Routing - Backup**
This feature automatically routes a FCCS over IP call over Alternate Routes when the first-choice link is down due to the LAN failure, etc.
- **FCCS Location Diversity**
This feature guarantees the reliability of the enterprise network connected by FCCS. When a fault has occurred to a specific node within the FCCS network, IP terminals accommodated in this faulty node automatically re-register to other nodes according to the pre-assigned data. By receiving this request, other nodes within the FCCS network back-up the call processing of DTs that were previously accommodated in the faulty node, to avoid them being isolated from the network.

The Location Diversity feature is available for UNIVERGE desktop IP extensions and Dterm SP30.

The number of primary stations + visitor stations should not exceed the total system capacity licenses within each node. Additional System capacity licenses and Terminal licenses would normally be required within each back-up node to allow for the terminals being recovered.

A system operating with FCCS allows the user to have telephone numbers in addition to existing station numbers (Physical Station Numbers). The FCCS service features are activated when a Telephone Number is dialed. The telephone number, which can be assigned on a station basis, is a unique number within the FCCS network. If required, numbering plan data, which is identical to that of an existing station number, can be used to maintain consistency of the numbering plan. When this plan is adopted, you can use the same numbering plan data after introducing the FCCS system.

An FCCS network has one Network Control Node (NCN) and the rest are Local Nodes (LN). Multiple nodes cannot be assigned as a Network Control Node. The Network Control Node of an FCCS network manages all of the other nodes on the network.

All nodes other than the Network Control Node are called Local Nodes. Fault information generated at a Local Node is sent to the Network Control Node via an FCCS link, allowing the Network Control Node to collect the fault information.

The PCPro is connected to the NCN. The PCPro manages the information from all nodes on the network and has Network Data Memory that stores all of the data related to the network level.

The telephone numbers are changed using the PCPro at the NCN and the PCPro also allows the user to manage network-level office data.

An FCCS solution can have a maximum of 64 nodes and providing a total FCCS network capability of 192,000 ports.

7.11 UMS - UNIFIED MESSAGING SOLUTION

The UM8500 UMS combines voicemail, automated attendant and audio text functionality into a completely integrated business solution to help you communicate more effectively with your customers and colleagues. Built on the Windows operating system, UM8500 offers organizations investment protection and a solid growth path.

With the Visual Messaging Solutions modules, as well as a video mail application the UM8500 unifies your communications platforms. Visual Messaging Solutions applications integrate UM8500 with your Local Area Network (LAN) to give you control over your incoming and outgoing calls. It also provides visual message management all from your desktop PC.

The key features of the UM8500 are

- Web browser system administration console
- Unified messaging
- Speed keys for single button access to functions
- Date and time stamp
- Single digit dialing
- Subscriber self enrolment tutorial
- Special delivery options (future, urgent, return receipt)
- Mailbox Manager

An integrated Mailbox Manager allows all users to modify their own mailbox settings quickly and easily via an intuitive graphical user interface. This includes selecting active profiles, changing their voicemail greetings, creation of caller groups for customized treatment of key customers and also setting notifications.

UM8500 general system specifications;

- Subscriber mailboxes - 65,000 maximum
- Voice ports (IP only): 2 to 48 (upgrades available) Max IP cluster 132 ports
- Voice ports TDM 4 – 72 Max Cluster in excess of 500 ports
- Operating system: Windows Server
- Storage: approximately 3600 hours (hard drive dependant)
- CPU: platform dependant minimum (Intel Celeron 2.0 or 2.4GHz)
- RAM: 512MB
- Modem: Optional external USB 56Kbps
- Network interface: On-board Ethernet, 10/100 base T, auto negotiation, RJ-45
- Security key: USB
-

7.12 REMOTE NODE OVER IP SOLUTION (FOR NORTH AMERICA)

Building of an IP network has been spreading within the enterprise communication environment in recent years. The IP Centrex model and the hot-desking model that were built on this IP network have spread widely, too. These are the configurations which install a control system in a main site, establish only an endpoint of an IP base at a remote site and control the whole action from a main site.

However, since an endpoint's own cost isn't economical, continuing use of a TDM based endpoint has been requested.

This means that mounting of analogue telephones and digital telephones may be requested at the remote site.

If we receive such a situation, we can offer the feature which is called “Remote node over IP.”

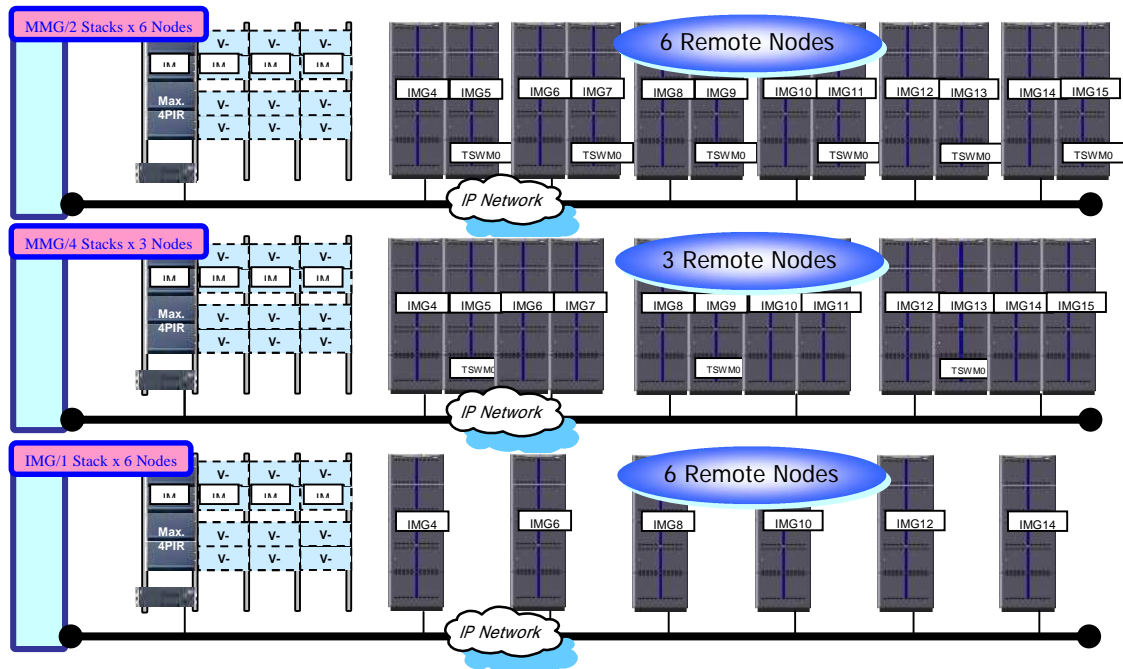


Image of Remote Node over IP Configuration (Three Configurations Image)

7.13 MIGRATION

We are offering a proposal that builds the latest communication environment by utilizing some part of the existing infrastructure. We are calling this the “Migration Proposal”. Our migration proposal makes it possible to utilize the UNIVERGE SV8500 within your existing environment by utilizing parts of your existing communication property. By doing this, the initial investment in the new technology will be partially suppressed.

Also, the amount of equipment which becomes unnecessary is minimized because components of it can be reused. This restrains the effect of disposal of trash, which will have a positive effect on our ecology activities.

The processing of waste from the Enterprise area has added to the environmental pollution in recent years.

We are considering the global environmental deterioration by offering the “migration proposal”.

We have options when offering the migration method. Network solutions such as FCCS and CCIS is one way.

A proposal of adding a new CPU to your system is another method. This method is known as “Cable Migration”.

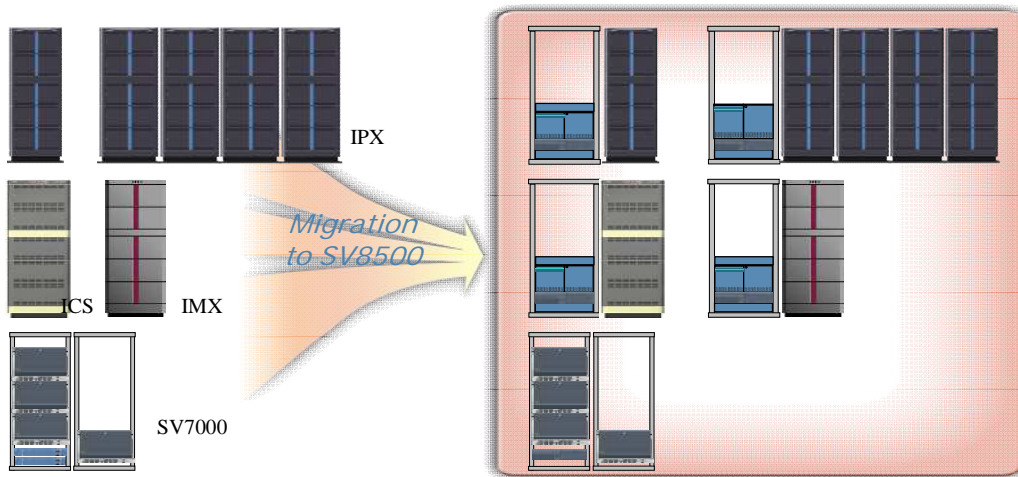


Image of Migration

8. TERMINALS

8.1 OVERVIEW

The NEC SV8500 supports an extensive range of handsets.

There are 3 levels of NEC analogues starting with a basic model, executive model and up to a highly featured CLI model.

For advanced features and functionality there are the NEC desktop terminals which are available as TDM or NEC Extended SIP varieties.

Desktop TDM are available as 2 Button, 6 Button, 12 Button, 24 Button and 32 Button terminals.

Desktop IP also have same lineup. There are also high functionality user interactive option terminals, first is the DT750 multi-function handset and then the SP30 / SP350 Softphone.

The SV8500 also allows for the connection of RFC SIP phones although for confirmed access to features and proven functionality the recommendation is to use the NEC preferred RFC SIP terminals.

8.2 DT & SP

The UNIVERGE® SV8500 supports an extensive range of features via terminal equipment which includes the IP integral terminals (UNIVERGE desktop IP extensions), digital integral terminals (UNIVERGE desktop digital extensions) and SP30 / SP350 Softphone.

DT700 Series: UNIVERGE desktop IP extensions

DT300 Series: UNIVERGE desktop digital extensions

SP30 / SP350 : Softphone

NEC provides a broad range of terminal products including analogue, TDM, IP and Softphone that are not discussed within this product description. Each of those terminals has different feature sets and price points depending upon customer needs.

NEC has developed a SIP-based Dterm capable of using the SIP protocol to deliver similar Dterm based features and functionality that customers have been used to as a TDM or IP terminal. This DT supports the SIP protocol with NEC extensions to the SIP protocol.

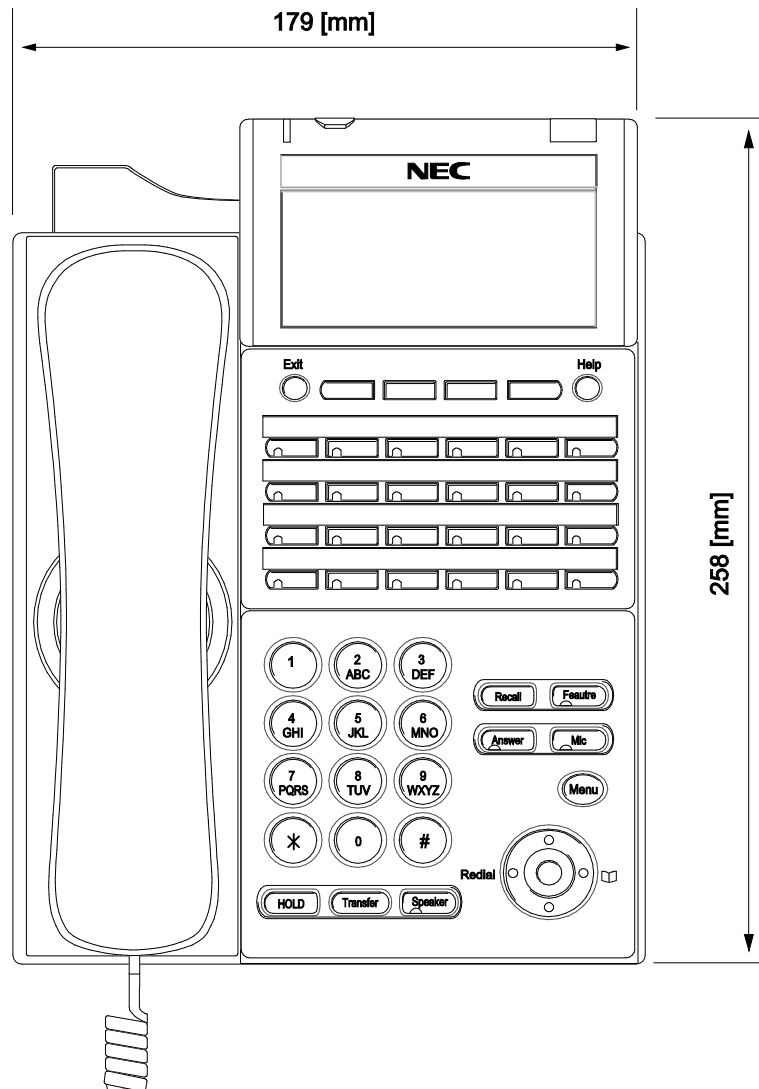
See the Figure below for a general overview illustration of a DT face layout.

Features most commonly used in daily operation and functions required by the user are provided by the following dedicated buttons/lamps.

- **HOLD** - Press this key to place an internal or external call on hold.
- **TRANSFER** - Allows the station user to transfer established calls to another station or to the operator without attendant assistance.
- **ANSWER** - When LED is on it indicates a call is waiting, press the key to answer the waiting call.
- **SPEAKER** - Controls the built-in speaker used for Hands Free /Monitoring and Voice Call.
- **REDIAL** - Press this key to activate the redial feature which displays last number dialed, press redial again to scroll back through numbers that have been dialed. When desired number is displayed, press the # key to activate dialing.
(*This button is for the terminal w/o LCD.*)

- **CONF** - Press this key when appropriate to establish a three-way conversation. *(This button is for the terminal w/o LCD.)*
- **RECALL** - Press key to terminate established call and return to internal dial tone.
- **FEATURE** - Used to activate terminal setup functions and to program One-Touch Speed Dial/Feature Keys.
- **MIC** - Press the “MIC” key to respond using hands free. LED comes on during speakerphone operation.

This ergonomically designed terminal provides; larger keypad buttons for dialing convenience, an expanded four line by 28-digit LCD display, tilt-able legs with non-skid feet, and a highly visible call/message indicator lamp. All models have built-in hands-free unit as standard.



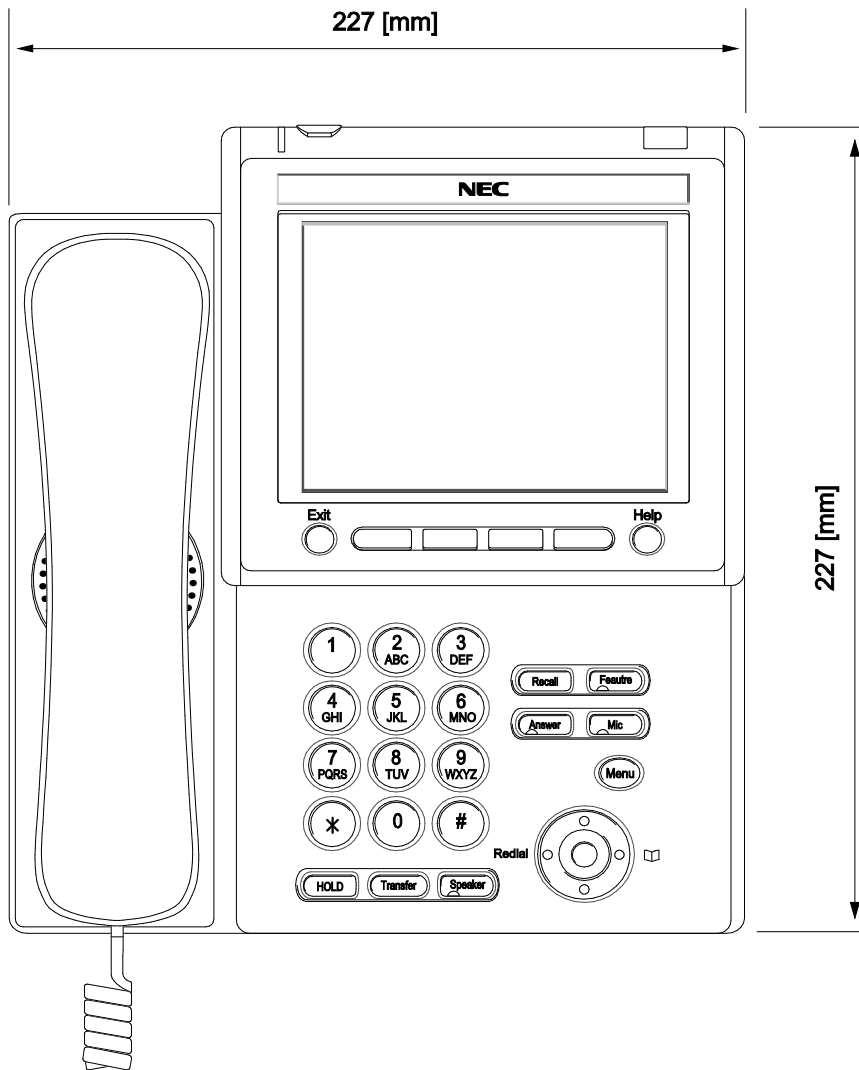
8.3 UNIVERGE DESKTOP IP EXTENIONS WITH COLOR LCD (DT750)

UNIVERGE desktop IP extension DT750 has a large size color LCD screen and supports all functions of traditional Dterm series terminals. XML application is also supported. Customized application can be developed with the API, providing the best suited operation environment for personalized requirements.

The DT750 terminal uses full duplex hands free for speaker phone and has a 5.7 inch TFT color screen w/ Touch Panel.

The Audio/Codec's supported are G.711, G.729a and G722.

It is PoE IEEE802.3af compliant.



8.4 NEC SOFTPHONE

8.5 SP30

The SP30 is an NEC developed Softphone application that turns your laptop or desktop PC into an advanced telephony interface. Take advantage of your multimedia IP network in the office or on the road with the Dterm SP30 Softphone. The converged mobility tool lets you share real-time information and ideas from your PC/Laptop with an impressive array of high quality video, audio, text and application features. When linked together across an IP network, Dterm SP30 is the ideal voice and data tool. It's equipped to deliver full-featured telephony to the desktop with the full complement of call handling and convergence capabilities you would expect from an NEC phone including video conferencing and real time collaboration.

Some of SP30's highlights include

- Implements IP telephone on personal computer

The Dterm SP30 provides voice communications using the IP on a personal computer.

It enables the user to continue to use the functions of the main software of the SV8500 over the IP network.

- Powerful user interface by GUI

The Dterm SP30 provides a powerful GUI (Graphical User Interface) enabling it to provide normal telephone operation. The Main Window displays a view of the Dterm SP30.

- Displays call records in a quick reference list accessible from the Call Log function

All calls are recorded in the call log. You can view at a glance previous calls. The Dterm SP30 also offers the Call Memo function whereby you can record the key points of a call in the form of a memo so that you can visually identify the individual records.

- Saves the whole of a call by the Recording function

You can use your personal computer to record a call in a sound file and can readily reproduce the saved contents of a call anytime from the Call Log window, etc.

You can switch between the automatic and manual recording modes.

8.6 SOFT CLIENT SP350

UNIVERGE Soft Client SP350 has evolved from a softphone into a total office communication tool.

From a business communication tool perspective, it is now becoming more popular to provide various types of features such as video conference and file sharing, and the ability to integrate with other application such as e-mail. The features and capabilities of these business communication tools also need to be simple and easy to use from the user's point of view.

UNIVERGE Soft Client SP350 has been designed to meet the demanding requirements of business communication. It offers a diverse range of communication capabilities that will allow users to choose the communication means to best match their job role or situation, and assist businesses in improving productivity and reducing total cost of ownership.

Some of SP350's highlights include

- Simple and easy to use interface

Flexible skin displays allow users to choose a skin that best suits them, and features such as providing the contact list in a tree structure, and allowing launch icons to be linked to frequent use applications allow SP350 users to saving time and improving productivity.

- Data Meeting

Providing up to 8-party video conference, data sharing, white-boarding, file transfer, chat etc... without the need of dedicated data servers.

- Simple search of "Phone book", "Contacts", "Call history", etc...

By entering a key word and clicking the search button, user can search for information against "Contact", and "Outgoing/Incoming Call History". The search results can be used to refer to related information, place a call, or send an IM easily.



UNIVERGE Soft Client SP350

8.7 UNIVERGE® WIRELESS

The SV8500 also supports integrated wireless/cordless handsets that communicate over a WLAN and provides many of the features of the DT Series terminals with a wireless advantage. WLAN can be offered as an integral part of the SV8500 solution or as a standalone wireless system supporting wireless data.

NEC's Wireless LAN (WLAN) technology offers high system capacity, proven system reliability, high voice quality, network integration, investment protection and extensive user mobility. NEC's WLAN product series has been integrated into the UNIVERGE® architecture to provide customer requested features.

The UNIVERGE® WL series delivers WLAN capabilities to any UNIVERGE® network and is based upon the IEEE 802.11 WLAN standards.

NEC's SIP based WLAN terminals communicate via air interface while the access points communicate with the controller via the exiting wired Ethernet network.

9. ATTENDANT CONSOLES

NEC PC based consoles empower your operators with superior call handling abilities so that they can recognize incoming calls, monitor extensions and manage every call professionally.

9.1 IAC - PC BASED ATTENDANT CONSOLE

The Integrated Attendant Console (IAC) is a PC based, high traffic handling operator's console for use with NEC UNIVERGE® NEAX systems that is also supported on the UNIVERGE® SV8500.

The SV8500 uses the same ATI package as the UNIVERGE® NEAX 2400 IPX systems. The ATI card is installed into a PIR and provides connectivity for one or two IAC consoles per card for business or when used for Hospitality. Up to 2 IAC consoles can be connected to one 8RU PIR.

The IAC is a Windows based operator console that provides the capability to operate as an Attendant Console and a powerful Directory System. By monitoring the MCI information from the SV8500 the IAC can also integrate with most Voice Mail systems.

The IAC can be implemented as a standalone console or it can be linked via a network to other IAC's. Sharing common directory enhanced functionality is available through LAN connections to corporate E-mail, Voice Mail and Data Base Management system.

Features

- True system integrated Console Operation
- Directory Database (SQL)
- Staff Details Status
- Greeting Banners
- Single Mouse Click Transfer to Mobile
- Open System-ODBC, SMTP, TCP/IP
- Email Integration
- Voice Mail Integration
- Directory Integration, including LDAP

Options

- Advanced Reporting option, including browser-based Real-Time Monitor (like wallboard)
- Call Recording option

Call Log Table:

Loop	Status	Source	Dest	Status	Route/Trunk	Time
1	Hold	9134 Russell, Mary	9101 Smith, John			00:00:26
2	Attend	9101 Smith, John	9101 Smith, John			00:00:25
3	Recall	9154 NA, NA	9101 Smith, John			
4						
5						
6						

Contact Details:

Last Name: Cruise | First Name: Tom | Manager: Nicole | Mgr Phone: 9135
 Extension: 9166 | Dept: CTI | Job Status: Shooting
 Location: Hollywood | Staff Group: Movies | Email: tom@ctipl.com.au
 Job Title: Movie Star | Cost Centre: http://www.movies.com
 Phone: 99009118 | Home: 93459876 | Cost Centre: 547 | Contact ID: PR200
 Mobile: 0411777444 | Fax: 99009191 | Pager: [blank]

Search Matches Table:

Surname	Firstname	Ext	Title	Dept
Main	Number	9100		CTI
Buisman	Paul	9103		CTI
Bellamy	Mike	9104		CTI
Doell	Jane	9104		CTI
Burke	John	9105		CTI
Hefner	Hugh	9107		CTI
Czerniecki	John	9110		CTI
Fejes	Tom	9112		CTI
NA	NA	9113		CTI
NA	NA	9114		CTI
NA	NA	9115		CTI

The IAC PC Based Attendant Console

10. RELIABILITY & REDUNDANCY

10.1 SYSTEM RELIABILITY

System reliability is an established NEC hallmark, and the UNIVERGE® SV8500 continues to offer the highest degree of secure system operation. A unique combination of flash upgrade or EPROM for line, trunk, and common control circuit cards, plus Flash for generic system software, provides customers with the traditional high level of reliability and security

Flash system memory provides:

- **Easy program updates and upgrades.**
Software upgrades are implemented by loading directly from flash cards
- **Integrated Software Capabilities.**
Unbundling of software allows organizations to choose Specific software capabilities to suit their operational needs

10.2 UNIVERGE® SV8500 REDUNDANCY

The basic design philosophy of NEC is to provide redundant configurations (Dual), as a customer selection option. The SV8500 system redundancy option comes in the form of a hot standby capability.

The SV8500 system also extends its redundancy options to the 8RU PIR, which offers dual packages for all critical circuitry such as TSW, MUX, Register package and AC/DC power.

The SV8500 System is able to employ non-redundant and redundant systems for processors, memory, switching, bus, and power. In addition, it offers a wide selection of redundancy options, which allows each system to be tailored to meet each customer's specific requirement.

The options available are:

- Single system with No redundancy
- Dual PIR TSW and Power packages
- Dual PIR Power unit rectifiers
- Duplicated Gateways and Media Converters

NEC is able to offer this highly reliable system with some of the most comprehensive redundancy options available with not only hardware support but also for the IP deployment.



SV8500's showing connection points for hot Standby mode

Now with the primary support function of an SV8500 solution focusing on integrated IP services, network failure redundancy is also a high priority and many options are available for managing the range of IP devices hosted by an SV8500, but located remotely over a WAN.

This support service is provided by an SR-MGC (Server Remote Media Gateway Controller) which offers IP WAN failure backup to the remotely installed IP stations and devices.

More details on the SR-MGC are available under "Remote survivability" in this documents.

10.3 UNIVERGE® SV8500 MTBF

The SV8500 “Mean Time Between Failure” (MTBF) figures reflect the true strength of NEC’s product reliability with component failures expressed typically in terms of years.

The MTBF represents the minimum time frame in which a failure of any common equipment such as processors, memory, switching, etc. may cause a partial system outage.

This is not to be confused with the Mean Time Between Catastrophic Failures (MTBCF), where the system design provides for a minimum period of 20 years when implemented with full redundancy.

The UNIVERGE® SV8500 has been tested to determine power requirements and the Mean Time Between Failure (MTBF) for the various components.

Below is a list summarizing the power and MTBF figures for the SV8500 core components.

Description	PWR	MTBF
		Years
UNIVERGE® SV8500 (for AC, single w/IOC)	DC12V 8.13A	4
	AC100V 130.08W	
	AC240V 126.7W	
FLASH-2G		20
VS-32 (V)	AC100V 0.21A(rated)	6
	AC120V 0.19A(rated)	
	AC230-240V 0.15A(rated)	
	(AC 50/60Hz)	
SR-MGC(2U)	AC100V 1.5A	8
	AC120V 1.2A	
	AC240V 0.63A	
SR-MGC (E)	AC100V 1.3A	8
	AC120V 1.1A	
	AC230-240V 0.7A	
SCA-30PRIA	708mA 12VDC(8.5W)	9
SCA-8LCA	AC100V 1.4A	7
	AC120V 1.2A	
	AC230-240V 0.8A	

11. REMOTE SURVIVABILITY

11.1 UNIVERGE® SV8500 REMOTE SURVIVABILITY

With the SV8500 capability of supporting WAN deployed IP stations and a range of IP Devices, it now becomes extremely important to provide survivability options to remote locations in the event of a WAN failure. To provide this option, the SV8500 supports the implementation of a device called an SR-MGC (Survivable Remote Media Gateway Controller)

The SR-MGC requires a license in the host SV8500 which is based on the capacity needs of IP stations to be offered survivability. The SR-MGC models are available for a 50, 200, 500, 1000 and 2000 IP stations capacity. Specific quantities of IP deployed devices can also be supported within the IP station capacity license.

In the event of a WAN failure, the SR-MGC allows for IP stations and IP devices that would normally be connected over the WAN to the host SV8500 system, to register to it to maintain call processing. The SR-MGC provides the IP stations with similar operational functionality to that when hosted off the main system. If the IP stations normally access centralized hosted services over the WAN, then this service may be affected until the WAN is restored.

When an SR-MGC is installed, it registers with the SV8500 server and requests a copy of all relevant user information. Once all the information or office data has been downloaded from the SV8500, it is then stored within the SR-MGC in non-volatile memory.

The customer data changes programmed at the SV8500 are then automatically transferred to the SR-MGC on a daily basis. If required, changes to programming can also be uploaded to the SR-MGC's using a forced update command.

11.2 UNIVERGE® SV8500 SR-MGC (2U)

The 2RU SR-MGC has Licensing options available to backup either 200, 500, 1000 or 2000 stations. The 2RU SR-MGC provides survivability for SIP supported stations and devices as well as the standard IP stations and devices



2RU SR-MGC

The number of SR-MGC's that should be deployed in a network depends upon customer needs and expectations. The different models of SR-MGC as described, can be licensed to a single SV8500 host and the models can be selected to suite the necessary site requirements. The SR-MGC's could be deployed in various scenarios, for example one for an entire network, one for every large office, one for each main building or one for every LAN within a total WAN. This level of survivability is totally dependant upon the degree of concern that a customer places on the redundancy option and what they feel comfortable with.

11.3 UNIVERGE® SV8500 SR-MGC (E)

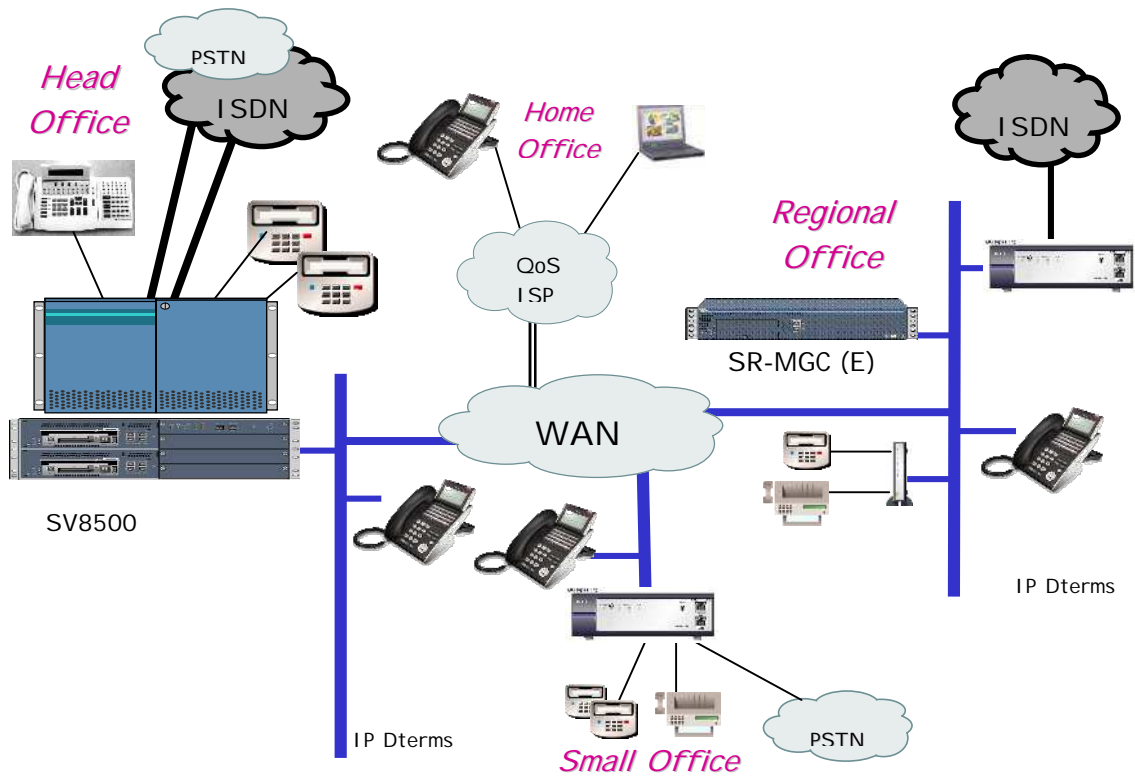
The SR-MGC (E) is a new component in the lineup of SR-MGC models. This SR-MGC (SR-MGC (E)) has downsized the chassis from 2U to 1.5U although it has kept the same processing capability as the UNIVERGE SV8500. We have achieved cutting the power consumption by approx. 50% compare to the 2U model. Also, we have accomplished high speed file transfer between UNIVERGE SV8500 and the SR-MGC (E) so we have reduced the amount of time for copying the office data compared to the 2U model.

The SR-MGC (E) also has Licensing options available to backup either 200, 500, 1000 or 2000 stations. And we have added 50 and 100 stations backup as well. The SR-MGC (E) provides survivability for SIP supported stations and devices as well as the standard IP stations and devices



SR-MGC (E)

11.4 EXAMPLE OF AN SV8500 MULTI-SITE DEPLOYMENT



12. SECURITY

12.1 ENCRYPTION

The Authentication and Encryption feature allows customers to provide a highly secure network for their users. This is accomplished by Terminal Authentication, SIP Call Control Signal Encryption, and RTP (Voice) Encryption of both SIP and UNIVERGE desktop IP extensions.

The advantages of NEC VoIP Encryption are as follows:

- No need for digital certificates
Digital Certificates are not required for the Authentication.
- Easy Installation
Installation procedure requires a one-time password (used temporarily) registration to the terminal and the system.
- High Authentication Level by Mutual Authentication
Terminal Authentication for preventing terminal spoofing and High Mutual Authentication for preventing server spoofing.
- Adopting UDP for signal encryption to reduce the server load
TLS uses TCP, so 10 times more processing capability is required for the server to control the same traffic.
This feature encrypts RTP packets and control signals (including passwords, login accounts, and encryption keys) over IP networks. To use this feature, the terminal will login with a one-time password to enable the security protocols. After Login, 128-bit AES encryption keys are applied to secure user information.

The RTP voice packets are only encrypted on the IP network. The connections to the PSTN are left un-encrypted to comply with Federal regulations. RTP passing through a media gateway or IP PAD will be unencrypted as it leaves the VoIP network. If one of the two terminals used in a call does not support this feature, then the voice packet will not be encrypted. If an encrypted call is transferred and the forwarding extensions support the encryption, then the forwarded call is encrypted. When a forwarding extension does not support the encryption, the forwarded call is left unencrypted.

When the three-way call feature is used, which includes phone recording and conference calls, encrypted capability for the telephone call depends upon whether or not the station setting up the conference supports encryption.

12.2 SECURITY STANDARD 802.1X

A more recent trend in enterprise network security, dictates that every IP device when connecting to an Ethernet network will need to authenticate to the network before any access is granted.

A LAN security standard, IEEE 802.1X Port-Based Network Access Control is increasingly being adopted by enterprises worldwide to protect the data network. With the advent of VoIP, it is anticipated that IP phones which connect to the Ethernet LAN, should be able to operate under the 802.1X regime to maintain enterprise LAN security.

Therefore it is increasingly important for IP phones to be able to either authenticate itself via 802.1X or other mechanism to gain network access. The longer term view is to build 802.1X Supplicant support directly onto the NEC UNIVERGE desktop IP extensions.

Currently however, the NEC IP Dterms have firmware onboard that allows 802.1X EAPOL packet pass through. The “802.1X EAPOL” (Extensible Authentication Protocol over LAN) pass-through is the basic method for an IP phone to operate in an 802.1X environment. In this scenario, the IP phone itself actually does not authenticate to the switch, it simply passes the EAPOL packets (the 802.1X authentication packets) from the connected PC to the Ethernet switch.

The 802.1X supplicant is also supported but is dependant on the terminal firmware version.

12.3 PC PORT SHUTDOWN

A feature available on the NEC DT700 series is to allow control and management of the PC port at the base of the DT700 series. The configuration in the system is done at 2 levels, at the Administration Terminal and locally on the menu of the UNIVERGE desktop IP extensions.

In the case of a device that is connected via the PC port and it is infected with a virus, this feature can disconnect the infected device from the Network.

The PC port shutdown feature is also supported on the NEC UNIVERGE desktop IP extensions when loaded with SIP firmware and operating in a SIP environment.

13. MANAGEMENT

13.1 INTRODUCTION

The UNIVERGE® SV8500 employs the following advanced technologies to enhance installation and maintenance functions

- Flash card Memory. The Flash system facilitates a one person operation of software upgrades
- Viewing of card switch settings allowing cards with switch settings to be viewed from the PC maintenance terminal
- Supports individual packages with a display of their port and alarm status
- Provides SNMP alarm output management options

13.2 UNIVERGE® SV8500 DATABASE INFORMATION

The NEC SV8500 uses internal proprietary program files to store customer configuration information. This method allows for a simple and fast access for changes and backups.

These files can be readily accessed and changed via external management systems such as the MA4000. The MA4000 keeps a synchronized SQL database of the SV8500 configuration at all times and can be used to make changes to this SV8500 data. For additional efficiency and automation, changes via the MA4000 can leverage additional interface such as CSV file.

Maintenance personnel can also interface with the system using the Maintenance Administration Terminal (PCPro) from on-site or from a remote location to determine the overall system status or to conduct system changes. System commands allow for the programming and diagnostics of both traditional or IP terminals, trunks and devices.

13.3 MAINTENANCE ADMINISTRATION TERMINAL (PCPRO)

The management interface to the SV8500 can be performed by special software loaded onto a PC known as the Maintenance Administration Terminal (PCPro). The PCPro run on a selected Windows based PC and supports the following functions:

- System office data management (moves and changes)
- System office data downloads / backups to flash card
- Traffic data display
- System Message display

The PCPro also provides access to a variety of traffic management reports to be used for overall analysis of system performance. It is used to request and display the type of report, measurement time period and time increments of reports. Traffic reports can be produced by assignment which will provide such information as:

- Terminal Traffic
- Route Traffic
- Station Peg Counts
- Attendant Console Peg Counts
- Route Peg Counts
- Service Feature Peg Counts
- UCD Route Peg Counts
- UCD Group Peg Counts
- UCD Station Peg Counts

The SV8500 diagnostics software constantly monitors the operating system and automatically generates supervision and control fault information on the overall system performance. The information is then passed of to the PCPro or to remote monitoring equipment. This alarm information can also be processed as SNMP.

The UNIVERGE® SV8500 can also be connected in a network of UNI-IPX systems running FCCS (Fusion Call Control Signaling). A centralized Maintenance Terminal is connected to the master control node (NCN) for management of all of the systems within the network.

13.4 UNIVERGE® SV8500 ADVANCED DATABASE MANAGEMENT

The NEC SV8500 has several options and change levels available for the system administration. The high level management interface is controlled via an IP connected Terminal. It offers multiple levels of access via passwords and is generally used for the detailed technical configuration of a solution.

The NEC SV8500 can also be managed with the MA4000 web based maintenance tool, allowing an end user to configure and manage multiple PBX's via a simple-to-use web based tool. The tool is built with the IT manager in mind, facilitating:

- Web based deployment, meaning no additional software is required on the client machine, can be accessed from anywhere on the corporate LAN / WAN.
- Fully configurable security allowing user access to be controlled down to the smallest feature.
- Complete auditing, with every change logged, time stamped and recorded against a user.
- Scheduled backup can be performed allowing for complete networks of PBX's to be centrally maintained.
- Date and time synchronization done automatically.

13.5 UNIVERGE® SV8500 SYSTEM ADMINISTRATION

The NEC SV8500 administration terminal (PCPro), although the primary tool for implementing detailed system moves and changes, also has the capability to record and display alarms, display CPU performance, track call trace information, record traffic information and trunk utilization.

Alternatively the MA4000 can be used. The MA4000 is a web based maintenance tool allowing an end user to access multiple systems via a simple to use web based interface.

This tool has many useful functions, including:

- Web based deployment.
- Fully configurable security.
- Complete auditing.
- Any change (or batch of changes) can be executed at once or scheduled to be performed at any time, with a complete roll back in case of errors. With changes as complex as for every extension who's users name contains an 'e', set line key 3 to 'log-out' and update the name display.
- Scheduled backup and restoration can be performed allowing for complete networks of PBX's to be centrally maintained.
- Date and time synchronization done automatically.

13.6 SIMPLE NETWORK MANAGEMENT PROTOCOL (SNMP)

SNMP one of the network management protocols defined by IETF, transfers and controls information on the TCP/IP basis between the SNMP manager and the SNMP agent.

Generally, SNMP management software such as HP Open View needs to be installed in the SNMP manager, and operated to monitor the agents. On the other side, the SNMP agent collects network information and stores it as Management Information Base (MIB), which the SNMP manager can control.

This system supports MIB-II based on RFC1158 and RFC1213.

This setting provides the following functions:

- SNMP manager gets/sets MIB information of SNMP agent.
- SNMP manager monitors/clears the alarms for SNMP agent.
- SNMP agent sends trap (fault information) to SNMP manager.

Other than standard MIB-II, the system supports NEC-specific MIB.

Supports MIB information (GET) listed below.

- Alarm Lamp Status
- MAJOR Lamp Status
- MINOR Lamp Status
- Supervisory Status
- CPU Usage
- Basic System Setting

- Ready status Flag of Readout of Traffic
- Status of data setting for the Traffic Measurement
- Terminal Traffic
- Route Traffic
- Peg Count (Station)
- Peg Count (Att.)
- Peg Count (Route)
- Peg Count (Service)
- Peg Count (IP Service)
- Peg Count (Connection Route)
- Peg Count (UCD Route)
- Peg Count (UCD Group)
- Peg Count (UCD Station)
- Peg Count (Att. Answering)
- Peg Count (CS)
- Connection Route Traffic (Connection Route)
- IP Service Traffic (IP Service)

- Status of Circuit Card
- Status of Port

- Number of License
 - *System Line Capacity*
 - *IP Line Capacity*
 - *Number of Softphone License*
 - *Number of Associate License*

- Registration Information
 - *LENS*
 - *Circuit Card Type*

- *Maximum number of registration*
- *Number of registered terminal*
- *Number of terminal logged-in.*
- *Specified number of control stations*
- *MPH LENS*
- *MPH ID*

13.7 VOICE QUALITY MANAGEMENT

The SV8500 incorporates various features to provide high voice quality as well as to monitor voice quality in the system. The items below illustrate some of the features that can be utilized by a customer.

Feature R-58 (RTP Information Output) collects information related to low voice quality or an abnormal status of IP devices and then outputs that information to a log file. The information can then be used by a network administrator to debug devices and/or the network. The log can be output by using SNMP manager and PCPro.

This feature provides the following capability:

- **Communication Log Collection:** A history (includes speech time, opponent, IP Address, MAC Address and Voice Quality) per speech is collected and output.
- **Failure Log Collection:** Reset factor and Time of occurrence are output. Sending/receiving times and Retransmission times are collected.

When a system administrator receives voice quality complaints from an end user, the related data can be extracted from the communication log and fault logs to determine the cause of that voice quality.

With the Terminal Claim Handling for IP terminals feature (T-65), individual users (stations) can send notices about real or perceived voice quality problems to the system administrator. The system administrator uses the call quality information and feature R-58 to review the case and determine if the problem is related to the network, a portion of the network, a particular IP device, or the user themselves.

This operation is also available on UNIVERGE desktop IP extensions (DT700 series). During the call, the users will need to push the info button on their terminal where they can select several call attributes about the current call. The information is then captured in an SNMP TRAP message.

The feature is available on the following terminals:

- IP enabled Dterm / Dterm Series E / Dterm Series i with LCD
- UNIVERGE desktop IP extensions (DT700 Series) with LCD
- Dterm Softphone (using the Function key)

The following attributes can be selected about the voice call quality. These answers are sent to the system administrator:

- No sound (Yes/No)
- Echo (Yes/No)
- Broken sound (Yes/No)
- Noise (Yes/No)
- Delay (Yes/No)
- Low/High volume (Yes/No)
- One-way communication (Yes/No)
- Distortion (Yes/No)

14. SPECIFICATIONS

14.1 BASIC SPECIFICATIONS OF THE SV8500

Power	AC-Powered Model	AC100V (50/60 Hz)±10%×2
		AC120V (50/60 Hz)±10%×2
		AC230V (50/60 Hz)±10%×2
		AC240V (50/60 Hz)±10%×2
	DC-Powered Model	DC48V ± 5V × 2

14.2 SYSTEM CAPACITIES

The following capacity limits apply to a single, typical system. The system capacity ultimately depends upon the customer's network design and infrastructure. Therefore, actual capacities of each component will vary depending upon the system configurations.

- SV8500 servers is supporting up to a total of 6,144 system ports
- Up to 255 SR-MGC servers off one SV8500, however each SR-MGC must be requested with a license for the number of terminals to be supported and currently must be of the same type.
- Up to 16 PIR's –for a total of 6,144 ports per system.

14.3 TOTAL NUMBER OF SYSTEM CAPACITY LICENSES TO BE CONSUMED

Description	Consumption of System Capacity												Consumption of System Capacity License for Internal PHx	Consumption of System Capacity License for Internal MPH	
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	
Minimum Unit Note3	32	8	8	8	8	8	8	32	8	32	32	32			
SR-MGC	-	-	-	-	-	-	-	-	-	-	-	-	0	0	
SCA-VS32VA (NEC Proprietary)	32	-	-	-	-	-	-	-	-	-	-	-	for PHE single: 8 dual: 8	0	
Analog MC	-	2	-	-	-	-	-	-	-	-	-	-			
WLAN Handset (MH Series) 3rd party SIP	-	-	-	Note1	-	-	-	-	-	-	-	-			
SCA-4LC2COTA (MC part)	-	4	-	-	-	-	-	-	-	-	-	-			
DtermIP (SIP/Protims)	-	-	-	-	1	-	-	-	-	-	-	-			
DT700 Series	-	-	-	-	1	-	-	-	-	-	-	-	for SP-PHD single: 8 dual: 16	for MPH single: 8 dual: 16	
DtermSP30 (SIP/Protims)	-	-	-	-	1	-	-	-	-	-	-	-			
SOFT CLIENT SP350 (SIP)	-	-	-	-	1	-	-	-	-	-	-	-			
SCA-2BRIA	-	-	-	-	-	4	-	-	-	-	-	-			
SCA-8LCA/8LCA-EMEA	-	-	8	-	-	-	-	-	-	-	-	-			
SCA-6COTA/B/C (SIP/NEC Proprietary)	-	-	-	-	-	-	8	-	-	-	-	-	for SP-PHI single: 8 dual: 16		
SCA-24PRIA (SIP)	-	-	-	-	-	-	-	32	-	-	-	-			
SCA-30PRIA (SIP)	-	-	-	-	-	-	-	32	-	-	-	-			
SCA-4LC2COTA (MG part)	-	-	-	-	-	-	-	-	2	-	-	-			
SCA-VS32VA (SIP)	32	-	-	-	-	-	-	-	-	-	-	-			
SCA-24DTIA	-	-	-	-	-	-	-	-	-	32	-	-	0 for PHI (TCP)	0	
SCA-24PRIA (NEC Proprietary) Note2	-	-	-	-	-	-	-	32	-	-	-	-			
SCA-30PRIA (NEC Proprietary) Note2	-	-	-	-	-	-	-	32	-	-	-	-			
SCA-16SIPMGA	-	-	-	-	-	-	-	-	-	-	32	-			16 for PHI (UDP)
FCCS (30ch)	-	-	-	-	-	-	-	-	-	-	-	-			0 for PHF
CCIS (30ch)	-	-	-	-	-	-	-	-	-	-	-	32	8 for PHC		

Total amount of System Capacity = a + b + c + d + e + f + g + i + j + k + l + m + n

e.g. SCA-4LC2COT/1, DT700/340

Total amount of System Capacity = b(4) + e(340) + i(2) + m+ n

=> 8(minimum unit: 8) + 344(minimum unit: 8) + 8(minimum unit: 8) + m + n

=> 360 (ports) + m + n (“m + n” is depends on single/dual)

Note 1:	<p>Each group of 3 terminals, an extra port is needed (i.e. it is necessary to reserve ports for WLAN Handset and 3rd party SIP terminals in blocks of 4 ports). So in the example above this would mean: - For 1 x WLAN Handset and 1 x 3rd Party SIP terminal: 4 ports - For 2 x WLAN Handset and 3 x 3rd Party SIP terminals: 8 ports One Virtual IP-BS can handle the mix of WLAN Handset and 3rd Party SIP terminal. You need twice the port for the dual system.</p>
Note 2:	Maximum accommodating number of MG-PRI (SCA-30PRIA) in the system is 32.
Note 3:	Each component belongs group of “a” to “l”. Each group (“a” to “l”) has “Minimum Unit” of consumption.

14.4 ACCOMMODATION LIMITATION OF STATIONS

	Maximum Number of Accommodation		Condition of Combination with PHS
	w/o encryption	w/ encryption	
DtermIP, DtermSP30 (NEC Proprietary) (X sets)	4000 In total	4000 (1)	-
DtermIP, DT700 Series, DtermSP30, Soft Client SP350 (SIP) (Y sets)		2000 (1) Note 1	
WLAN terminal (MH Series) 3rd Party SIP Phone (Z sets)		4000 (1)	

Note 1:	For DT700 Series, encryption feature is supported from firmware issue 2.0.
----------------	--

The conditions of combining the terminals are as follows.

$$(1) \quad X/4000 + Y/2000 + Z/4000 \leq 1$$

The condition of the terminal encryption is as follows:

Description	Business	OAI	ACD
Dterm IP(Protims) (w/o encryption)	×	×	×
Dterm IP(Protims) (w/ encryption for voice)	×	N	N
Dterm IP(Protims) (w/ encryption for voice and control signal)	-	-	-
Dterm IP(SIP) (w/o encryption)	×	×	×
Dterm IP(SIP) (w/ encryption for voice)	-	-	-
Dterm IP(SIP) (w/ encryption for voice and control signal)	×	N	N
DT700(Protims) (w/o encryption)	-	-	-
DT700(Protims) (w/ encryption for voice)	-	-	-
DT700(Protims) (w/ encryption for voice and control signal)	-	-	-
DT700(SIP) (w/o encryption)	×	×	×
DT700(SIP) (w/ encryption for voice)	-	-	-
DT700(SIP) (w/ encryption for voice and control signal)	×	N	N

X: available, N: not available, -: not applicable

Note 1: Silent Monitor is not supported.

14.5 ACCOMMODATION LIMITATION OF IP COMPONENTS

The table below shows the details on the accommodation limitations for circuit cards mounted in Universal Slots of 1U-MPC.

Circuit Card	Registration Destination PH	Capacity of IP Components	Maximum Number of Simultaneous Connections	Maximum Number of Speech Channels			
SCA -VS32VA (NEC Proprietary)	PHE	191 sets	-	6136ch			
SN8029 MC2A-B		3068 sets	-	6136ch			
SCA -4LC2COTA (MC part)		1534 sets	-	6136ch			
SCA-24DTIA	SP-PHI	144 sets	1840ch (460ch/LP*1)	3456ch			
SCA -2BRIA (SIP)		1000 sets		4095ch*2			
SCA -4LC2COTA (MG part)		2047 sets		4095ch*2			
SCA-6COTC/SCA-6COTB(NEC Proprietary)		250 sets		1500ch			
SCA-6COTC/SCA-6COTB (SIP)		250 sets		1840ch (460ch/LP*1)	4095ch*2		
SCA -24PRIA (SIP)						127 sets	4095ch*2
SCA -30PRIA (SIP)						127 sets	4095ch*2
SCA-VS32VA (SIP)						127 sets	4095ch*2
SCA-8LCA/ SCA-8LCA-EMEA (SIP)						511 sets	4095ch*2
SCA -24PRIA (NEC Proprietary)		PHI (TCP)		32 sets	768ch		
SCA -30PRIA (NEC Proprietary)				32 sets	1024ch		
SCA -4LC2COTA (MG part)	PHI (UDP)	3052 sets	6136ch				
SCA -16SIPMGA		175 sets	6136ch				

*1: LP - Local Partition (refers to a logical processor number that theoretically assigned for each IMG.

*2: For dual CPU System, up to 6144 channels (system capacity) are supported.

Note 1:	“ 460 channels per LP” is shared among ISDN, Legacy/P2P CCIS and PHS/PCS (Including virtual IP-BS) channels.
Note 2:	A maximum number of components which can be accommodated in a system depends on the number of channels to be assigned per component.
Note 3:	The LENS of even-numbered MG, Unit=0, Group=0 cannot be used for MG-PRI, MG-BRI, MG-COT and MG-SIP.
Note 4:	MG-SIP 16 is needed to have interconnectivity test with certain SIP-carrier before releasing to customer.

14.6 ENVIRONMENTAL REQUIREMENTS

The SV8500 is sensitive to increases in temperature and humidity, as is a computer. Air conditioning may be required. The following details address the environmental conditions for operating temperature and humidity.

The table below shows the environmental conditions that are required in the equipment room. If the system is operated in an environment that does not meet these specifications, the reliability of the equipment may be impaired. Improper operating conditions can cause circuit boards, etc. to deteriorate. Therefore, to enable the equipment to operate to the full extent of its expected lifetime, give careful consideration to the location of the equipment and to proper ventilation and air conditioning. If the temperature or humidity fluctuates repeatedly, the system's electronic parts can be adversely affected. Such conditions will promote the corrosion of metal parts and the deterioration of insulation, thereby lowering the overall reliability of the system.

Environmental Requirements

- Temperature: 0°C~40°C (32°F~104°F)
- Humidity: 20%~85% (not condensing)
- Main Source Power: AC100/120/230/240V ±10% 50/60 Hz

Do not install an SV8500 in inappropriate locations as it could cause operational failures or electrical shock. Locations such as on an unstable floor, in areas that may be subjected to dust, water, oil or chemicals, in direct sunlight, in locations that receive strong electric waves from other equipment or areas receiving possible vibration.

The installation location of the SV8500 servers and devices is important and also must be considered so as to not interfere with heat liberation and ventilation.

The UNIVERGE® SV8500 Servers and Remote Devices operate from a commercial power, however it is recommended to use a UPS for the Servers as well as the Gateways and Media Converters for a more reliable operation.

In the case of an implementation utilizing 8RU PIR's then their primary operating supply of 48v is provided by 1RU rectifiers which itself connects into a commercial power. In this instance it is also recommended to use some form of back power or UPS for the rectifiers.

15. IP-PAD

15.1 PA-32IPDA (IP-PAD)

The PA-32IPDA (IPPAD) card provides the interface function between terminals/devices on LAN and conventional networks such as PSTN, ISDN, and private network. A maximum of 32 lines of terminals/devices in private network (intranet) can be connected

This circuit card comes with compression support onboard and dependant on the system s/w version, it can also support Encryption

This circuit card provides the following functions:

- Voice Encoding/Decoding: G.711(64 kbps), G.729a(8 kbps), G723.1 (5.3 k/6.3 kbps) **Note 1**
- Encryption: AES **Note 2**
- Echo Cancellor: G.168 (64 milliseconds)
- IP Network Interface: 10/100 Mbps Ethernet Interface
- Payload: 10-40 milliseconds (10 millisecond step)
- Jitter Buffer: 10-300 milliseconds (10 millisecond step)
- PAD: 0-16 dB **Note 3**

Note 1: For the G723.1 Payload Size, only 30 milliseconds can be assigned.

Note 2: For assigning encryption data, please refer to [V-27] VoIP Encryption.

Note 3: For assigning PAD data, please refer to “IP Service PAD/Echo Cancellor Data” in the Feature Programming manual.

15.2 PA-32IPDB (IP-PAD)

The PA-32IPDB (IPPAD) card provides interface function between terminals/devices on LAN and conventional networks such as PSTN, ISDN, and private network. Maximum 32 lines of terminals/devices in private network (intranet) can be connected via a switching HUB.

Please note that this circuit card does not support compression or Encryption.

This circuit card provides the following functions:

- Voice Encoding/Decoding: G.711 (64 kbps)
- Echo Cancellor: G.168 (64 milliseconds)
- IP Network Interface: 10/100 Mbps Ethernet Interface
- Payload: 20-40 milliseconds (10 millisecond step)
- Jitter Buffer: 10-300 milliseconds (10 millisecond step)
- PAD: 0-16 dB **Note**

Note: For assigning PAD data, please refer to “IP Service PAD/Echo Cancellor Data” in the Feature Programming manual.

Liability Disclaimer

NEC reserves the right to change the specifications, functions, or features, at any time, without notice.

NEC has prepared this document for the exclusive use of its employees and customers. The information contained herein is the property of NEC and shall not be reproduced without prior written approval from NEC

NEC, the NEC logo, UNIVERGE® and the UNIVERGE logo are trademarks of NEC Corporation in Japan, and other countries, or both.

Copyright December 2009