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# ***UNIVERGE<sup>®</sup> SV8100***

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## **SIP Trunking Service Configuration Guide for Bandwidth**



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Communications Technology Group



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# *Configuring NEC SV8100 with Bandwidth SIP Trunking Service*

## **SECTION 1      NEC SV8100 AND BANDWIDTH SETUP GUIDE**

### **1.1      This Guide and Related Documents**

This guide was created to assist knowledgeable vendors with configuring the NEC SV8100 Communication Server with Bandwidth's SIP Trunking service. It provides sample entries for the required fields. The actual data is provided by Bandwidth when service is activated. Questions about software and hardware installation or other PBX configuration issues should be directed to NEC's National Technical Assistance Center (NTAC).

For complete details on using SIP trunks with the SV8100, refer to the SV8100 Networking Manual.

For complete details on using DID features, refer to the DID feature in the SV8100 Features and Specifications Manual.

For details about related hardware, refer to the SV8100 System Hardware Manual.

These manuals can be downloaded from NEC's National Technical Assistance Center (NTAC) web site. You must have a valid dealer ID to access the documents.

### **1.2      Bandwidth Account**

Contact your Bandwidth representative.

### **1.3      SV8100 System Software**

The SV8100 requires system software 3.00 or higher to use Bandwidth's service.

## 1.4 Requirements

**With the SV8100, a VoIP gateway daughter board is required in addition to licensing for IP (SIP) trunks.**

A minimum of four IP (SIP) trunks are required due to the NEC Communications Server infrastructure setup.

The system software for the NEC Communications Server should be version 3.00 or higher.

NEC recommends that the requirements and programming are completed with as much information as possible before scheduling an activation appointment with Bandwidth.

## 1.5 Limitations

The following limitations apply:

- Some private IP network ranges conflict with SIP trunking service providers ranges. This can cause issues when connecting to the SIP trunking service provider. Private ranges reserved for the customer's LAN are:

10.x.x.x

192.168.0.x through 192.168.10.x

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## SECTION 2      **NEC PBX CONFIGURATION**

This section provides information to NEC's solution providers and NEC Associates for configuring an NEC UNIVERGE SV8100 to connect to a Bandwidth SIP Trunk service provider, utilizing a **DYNAMIC** and **STATIC** configuration.

### **2.1      Prerequisites**

Before you configure the UNIVERGE SV8100, you must have the following information available.

#### **2.1.1      SIP Trunking Information from Bandwidth**

- ☐ Primary SIP Proxy Server IP Address
- ☐ Number Plan, if applicable for the Point-to-Point Connection
- ☐ Trunking DID(s)  
The DID(s) are forwarded to the Public WAN IP address(s), DNS or DNS SRV records of the PBX.

#### **2.1.2      NEC UNIVERGE SV8100**

- ☐ SV8100 CPU firmware version 3.00 or higher
- ☐ IPLA-R UNIT (PZ-32IPLA, PZ-64IPLA or PZ-128IPLA)
- ☐ SIP Trunking License (minimum of four licenses)
- ☐ Digital, IP and TDM Telephones

#### **2.1.3      Installation Worksheet**

Use the worksheet to record the information needed for setting up the SIP Trunking service.

**Table 1 Installation Worksheet**

<b>WAN Side:</b>	
Internet Access Type and Speed:	
WAN IP Address:	
WAN Subnet Mask:	
WAN Gateway IP Address:	

<b>LAN Side:</b>	
LAN IP Address for SIParator or EdgeMarc:	
LAN Subnet Mask:	
LAN IP Address for SV8100:	
VLAN ID:	

<b>PBX Information:</b>	
Model:	
Firmware Version:	
Number of SIP Trunk Licenses:	
Add-on Software Applications:	
Number of Users:	
Number of Concurrent Calls:	

<b>Notes:</b>

## SECTION 3 SV8100 PROGRAMMING

When using Bandwidth as your SIP trunking service provider, the following programs must be changed for SIP trunking service.

When using PCPro or WebPro for programming, enabling an option may be a checkbox option rather than entering a '1' as in terminal programming.

### 3.1 Trunk Type / Slot Configuration

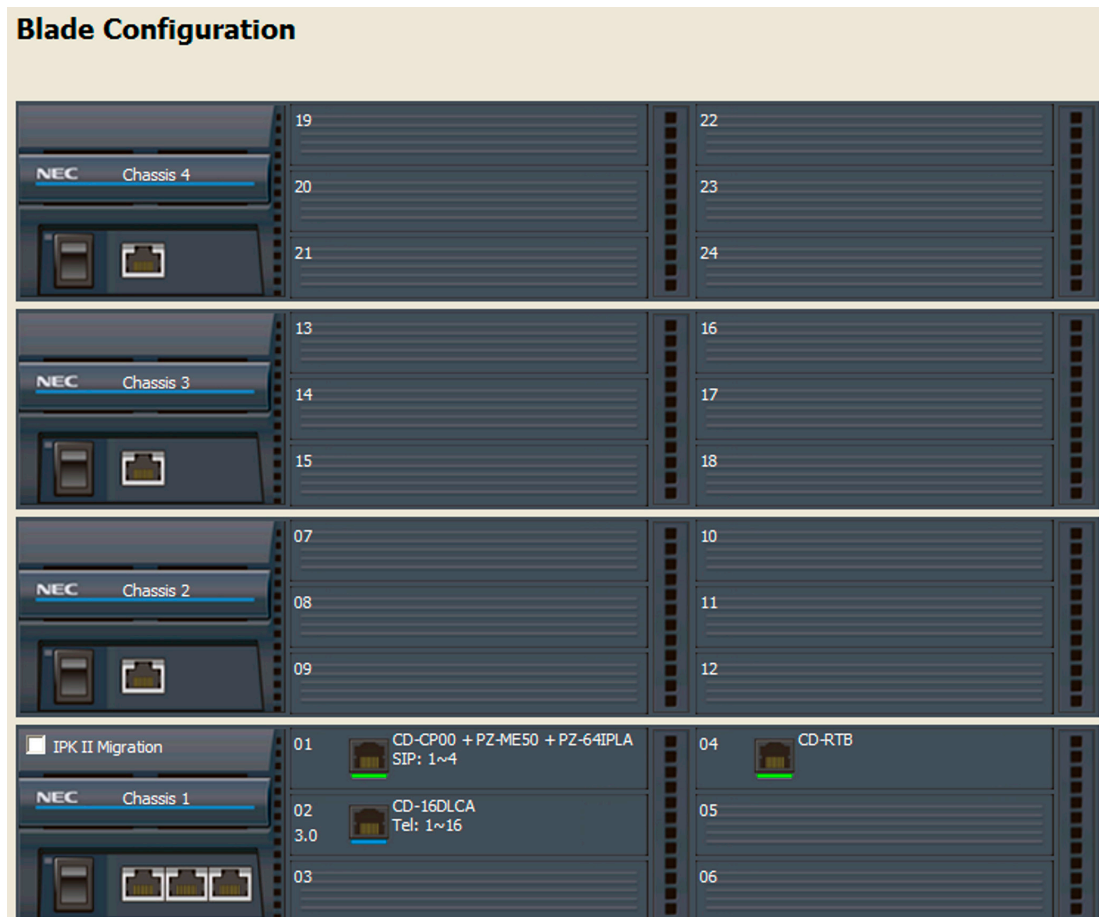


Figure 1 Blade Configuration

System Data

10-03: IPLA Configuration

SlotCD-CP00 + PZ-ME50 + PZ-64IPLA - Chassis 1 - Slot 01 (1)

Physical Port	Trunk Logical Port	Trunk Type	CCIS Trunk	Physical Port	Trunk Logical Port
001	25	SIP	Not CCIS	009	0
002	26	SIP	Not CCIS	010	0
003	27	SIP	Not CCIS	011	0
004	28	SIP	Not CCIS	012	0
005	0	H.323	Not CCIS	013	0
006	0	H.323	Not CCIS	014	0
007	0	H.323	Not CCIS	015	0
008	0	H.323	Not CCIS	016	0

Use Program 10-03: ETU Setup to setup and confirm the Basic Configuration data for each ETU. When changing a defined terminal type, first set the type to '0' and then plug the new device in to have to reset the ETU.

Figure 2 IPLA Configuration

10-03-02: Blade Setup, for IPLA (VoIPDB)  
Define the trunks to be used for SIP trunks as 1 (SIP).

10-19: IPLA DSP Resource Selection

SlotCD-CP00 + PZ-ME50 + PZ-64IPLA - Chassis 1 - Slot 01 (1)

DSP Resource (1~128)1

DSP Resource	DSP Resource	DSP Resource	
001	Used for IP trunks	009	Commonly used for both IP extensions and trunks
002	Used for IP trunks	010	Commonly used for both IP extensions and trunks
003	Used for IP trunks	011	Commonly used for both IP extensions and trunks
004	Used for IP trunks	012	Commonly used for both IP extensions and trunks
005	Commonly used for both IP extensions and trunks	013	Commonly used for both IP extensions and trunks
006	Commonly used for both IP extensions and trunks	014	Commonly used for both IP extensions and trunks
007	Commonly used for both IP extensions and trunks	015	Commonly used for both IP extensions and trunks
008	Commonly used for both IP extensions and trunks	016	Commonly used for both IP extensions and trunks

This program sets the IPLA DSP resource selection.

Figure 3 IPLA DSP Resource Selection

10-19-01 : VOIP DSP Resource Selection  
Specify the operating mode for the DSP resources (0=common use (extensions and trunks), 1=IP extensions only, 2=SIP trunks only, 3=CCIS, 4=NetLink, 5=Blocked, 6=Unicast, 7=Multicast, 8=Paging).



The screenshot shows a configuration window titled "System Data". In the top right corner, there are four icons: "Grid View", "Apply", "Cancel", and "Default". The main title of the window is "10-40: IP Trunk Availability". Below this title, on the right side, is a "Slot" dropdown menu showing "CD-CP00 + PZ-ME50 + PZ-64IPLA - Chassis 1 - Slot 01 (1)". The configuration area contains three settings: "01 - IP Trunk Availability" with a checked checkbox, "02 - IP Trunk Port Count" with a dropdown menu set to "4 ports", and "04 - CCISoIP Port Count" with a dropdown menu set to "None". At the bottom of the window, a note states: "This program sets the availability of SIP Trunks. A reset of the IPLA is required for changes to take effect."

**Figure 4 IP Trunk Availability**

**10-40-01 : IP Trunk Availability – IP Trunk Availability**

Turn this option "on".

**10-40-02 : IP Trunk Availability – IP Trunk Port Count**

Select the number of trunks being used.

## 3.2 CD-CP00 Network Setup

*Values shown are for example purposes only. Your actual IP values will be determined by your local LAN administrator.*

**System Data**

Grid View Apply Cancel \*

**10-12: CD-CP00 Network Setup**

01 - IP Address

02 - Subnet Mask

03 - Default Gateway

04 - Time Zone

05 - NIC Setting

06 - NAPT Router ☒

07 - NAPT Router IP Address

08 - ICMP Redirect ☐

09 - IPLA IP Address

10 - IPLA Subnet Mask

11 - IPLA NIC Setting

Use Program 10-12: CPUII Network Setup to setup the IP Address, Subnet-Mask and Default Gateway addresses.  
Caution: If any of the IP Address or NIC settings are changed, the system must be reset in order for the changes to take affect.

**Figure 5 CD-CP00 Network Setup**

### 10-12-01 : CD-CP00 Network Setup – IP Address

Set the LAN IP address for the system ethernet port to 0.0.0.0

### 10-12-02 : CD-CP00 Network Setup – Subnet Mask

Set the subnet mask for the system ethernet port to be different than the subnet for the IPLA blade.

### 10-12-03 : CD-CP00 Network Setup – Default Gateway

Set the default gateway for the IPLA blade.

**If a router or firewall is placed between the SIP Trunk Provider and SV8100,**  
you must also set the following programs:

### 10-12-06 : CD-CP00 Network Setup – NAPT Router


Turn this program on if the SV8100 resides behind a NAT router.

### 10-12-07 : CD-CP00 Network Setup – NAPT Router IP Address

Set the WAN IP address of the NAT router behind the SV8100.

**10-12-09 : CD-CP00 Network Setup – IP Address**

Select the IP address for the VoIP connection (default: 172.16.0.10). A static IP address is required.

 *IP address is required by the CD-CP00. Some private IP network ranges (ex: 192.168.0.0/16, 172.16.0.0/12) conflict with SIP Service Provider's Network ranges which may cause issues when connecting SIP connect service. Private ranges reserved for the customer's LAN are 10.x.x.x and 192.168.0.x through 192.168.10.x.*

**The SV8100 must be reset in order for the change to take effect.**

**10-12-10 : CD-CP00 Network Setup – Subnet Mask**

Select the Subnet Mask to be used by the VoIP server (default: 255.255.0.0).

**3.3 IPLA DSP Basic Setup**

*Values shown are for example purposes only. Your actual IP values will be determined by your local LAN administrator.*

**System Data**

84-26: IPLA DSP Basic Setup

Slot: CD-CP00 + PZ-ME50 + PZ-64IPLA - Chassis 1 - Slot 01 (1)

VoIP Gateway	IP Address	RTP Port	RTCP Port
1	10.10.3.20	10020	10021
2	10.10.3.21	10052	10053
3	10.10.3.22	10084	10085
4	10.10.3.23	10116	10117
5	0.0.0.0	10148	10149
6	0.0.0.0	10180	10181
7	0.0.0.0	10212	10213
8	0.0.0.0	10244	10245

**Figure 6 IPLA DSP Basic Setup**

**Port Forwarding:**

The Router will require port forwarding rules to be configured.

**Port 5060 must be forwarded to the address entered in Program 10-12-09.**

Port 5060 is not used for remote terminals - ports 5070 and 5080 are used instead. Port 5060 is only used for trunking so there are no issues with the possible fraudulent usage of unauthorized remote attempts to register remote terminals.

**The ports used in Programs 84-26-02 and 84-26-03 must be forwarded to the IP address entered in Program 84-26-01.**

The RTP/RTCP ports are forwarded to avoid possible one-way conversation which might occur on inbound calls. When forwarding the ports, the range for each gateway must be set. The number of gateways to forward will depend on the size of the IPLA.

- Gateway 1 will require ports 10020-10051 forwarded.
- Gateway 2 will require ports 10052-10083 forwarded.
- Gateway 3 will require ports 10084-100115 forwarded.
- Gateway 4 will require ports 10116-10147 forwarded.
- Gateway 5 will require ports 10148-10179 forwarded.
- Gateway 6 will require ports 10180-10211 forwarded.
- Gateway 7 will require ports 10212-10243 forwarded.
- Gateway 8 will require ports 10244-10275 forwarded.

**Table 2 Port Table**

Ports	UDP	TCP
5060	Yes	No
10020	Yes	No
10021	Yes	No
10052	Yes	No
10053	Yes	No
10084	Yes	No
10085	Yes	No
10116	Yes	No
10117	Yes	No

Table 3 Router Forwarding (Gateway Table)

IPLA Size	Gateway	IP Address	RTP Port	RTCP Port	UDP
	1				
IPLA32	2				
	3				
IPLA64	4				
	5				
	6				
	7				
IPLA128	8				

**Example: Router configuration shown from the NEC InRouter/4300T Router**

```

udp;143.101.120.218/255.255.255.0-10020>10.10.3.20-10020
udp;143.101.120.218/255.255.255.0-10021>10.10.3.20-10021
udp;143.101.120.218/255.255.255.0-10052>10.10.3.21-10052
udp;143.101.120.218/255.255.255.0-10053>10.10.3.21-10053
udp;143.101.120.218/255.255.255.0-10084>10.10.3.22-10084
udp;143.101.120.218/255.255.255.0-10085>10.10.3.22-10085
udp;143.101.120.218/255.255.255.0-10116>10.10.3.23-10116
udp;143.101.120.218/255.255.255.0-10117>10.10.3.23-10117
udp;143.101.120.218/255.255.255.0-5060>10.10.3.10-5060

```

### 3.4 SIP System Information Setup (Static and Dynamic Configuration)

*Values shown are for example purposes only. Your actual values will be determined by your implementation team.*

**System Data**

10-28: SIP System Information Setup

01 - Domain Name

02 - Host Name

03 - Transport Protocol

04 - User ID

05 - Domain Assignment

06 - IP Trunk Port Binding ☐

This program sets basic system information used in SIP Trunk

**Figure 7 SIP System Information Setup**

#### 10-28-01 : SIP System Information Setup – Domain Name

Define the Domain name up to 64 characters. This information is specific to your market and is provided by your SIP Trunking Service Provider.

*When configuring Domain name the SIP service provide will supply the Proxy/Domain in the following manner - "Host Name" . "Domain Name" . The characters are normally separated by "." The characters after "." will be in the Domain Name.*

#### 10-28-02 : SIP System Information Setup – Host Name

Define the Host name, up to 48 characters.

*When configuring Host name the SIP service provide will supply the Proxy/Domain in the following manner - "Host Name" . "Domain Name" . The characters are normally separated by "." The characters before "." will be in the Domain Name.*

#### 10-28-03 : SIP System Information Setup – Transport Protocol

Define the Transport type. This option is always set to 0 (UDP).

#### 10-28-04 : SIP System Information Setup – User ID

This information is provided by your SIP Trunking Service Provider.

Entries: 32 characters maximum (Default=No Entry).

*If Program 10-23-04 is set for system interconnection, this entry must be numeric as 10-23-04 does not allow text entry - only numeric.*

#### 10-28-05 : SIP System Information Setup – Domain Assignment

Determine the type of Domain Assignment. Set this entry to 1 (Domain name).

#### 10-28-06 : SIP System Information Setup – IP Trunk Port Binding

Set this entry to 0 (Disable) to allow an incoming call to use the lowest port.

### 3.5 SIP Server Information Setup (Dynamic Configuration)

**Values shown are for example purposes only. Your actual values will be determined by your implementation team.**

**System Data**

10-29: SIP Server Information Setup

01 - Outbound Default Proxy ☐

02 - Inbound Default Proxy ☐

03 - Default Proxy IP Address

04 - Default Proxy Port

05 - Register Mode

06 - Registrar IP Address

07 - Registrar Port

08 - DNS Mode ☐

09 - DNS IP Address

10 - DNS Port

11 - Registrar Domain Name

12 - Proxy Domain Name

13 - Proxy Host Name

14 - SIP Carrier Choice

15 - Registration Expiry Time

16 - Register Sub Mode ☐

17 - DNS Source Port

This program sets the information of SIP Server this system uses

**Figure 8 SIP Server Information Setup**

#### 10-29-01 : SIP Server Information Setup – Outbound Default Proxy

Enable (1) the SIP Outbound Proxy.

If entries are made in Program 10-29-xx for a SIP Server and the SIP Server is then removed or not used, the entries in Program 10-29-xx must be set back to their default settings. Even if 10-29-01 is set to .0. (off), the SV8100 will check the settings in the remaining 10-29 programs.

#### 10-29-03 : SIP Server Information Setup – Default Proxy IP Address

Define the SIP Trunk Service Provider Proxy IP Address (e.g., 47.234.106.137). You may resolve the IP address of the Outbound Proxy by pinging the URL.

#### 10-29-05 : SIP Server Information Setup – Registrar Mode

Set the Registrar Mode to 1(manual) with SIP trunking.

#### 10-29-06 : SIP Server Information Setup – Registrar IP Address

Input the IP address of the SIP registrar (if given).

**10-29-07 : SIP Server Information Setup – Registrar Port**

Input the Registrar Port address (5060) at default.

**10-29-08 : SIP Server Information Setup – SIP Proxy Setup – DNS Mode**

Set the DNS Mode to 1, when the SIP carrier provides a domain name.

**10-29-09 : SIP Server Information Setup – SIP Proxy Setup – DNS IP Address**

This information should be provided by your SIP service provider.


 *The DNS IP Address should be any valid Domain Name Server either SIP provided or within your network.*

**10-29-11 : SIP Server Information Setup – SIP Proxy Setup – Registrar Domain Name**

Define the Registrar Domain Name. This information should be provided by your SIP service provider (128 characters maximum).


**10-29-12 : SIP Server Information Setup – Proxy Domain Name**

Enter the Domain name.

 *When configuring the Domain name, the SIP service provider will supply the Proxy/Domain in the following manner - "Host Name". "Domain Name". The characters are normally separated by "." The characters **after** "." will be in the Domain Name.*


**10-29-13 : SIP Server Information Setup – Proxy Host Name**

Enter the Host name.

 *When configuring Domain name the SIP service provide will supply the Proxy/Domain in the following manner - "Host Name". "Domain Name". The characters are normally separated by "." The characters **before** "." will be in the Host Name.*

**10-29-14 : SIP Server Information Setup – SIP Carrier Choice**

Set the SIP Carrier Choice to Default.

 *Changing this program automatically changes program 10-29-16 to "on". 10-29-16 must be turned off in order for incoming calls to route correctly.*

**10-29-15 : SIP Server Information Setup – Registration Expiry Time**

It is **important** to leave this automatic re-registration time to be 3600 seconds so that the Bandwidth network does not get flooded.

**10-29-16 : SIP Server Information Setup – Register Sub Mode**

Unchecking the Register Sub Mode (setting it to "off") will allow all trunk calls to be routed based on routing policies.



### 3.6 IP System Interconnection Setup (Static Configuration)

**System Data**

10-23: IP System Interconnection Setup

Sys No. (1~1000)

Sys No.	System Interconnection	IP Address	Call Control Port	Dial Number
0001	<input checked="" type="checkbox"/>	<input type="text" value="216.82.224.202"/>	<input type="text" value="1720"/>	<input type="text" value="0"/>
0002	<input checked="" type="checkbox"/>	<input type="text" value="216.82.224.202"/>	<input type="text" value="1720"/>	<input type="text" value="1"/>
0003	<input checked="" type="checkbox"/>	<input type="text" value="216.82.224.202"/>	<input type="text" value="1720"/>	<input type="text" value="2"/>
0004	<input checked="" type="checkbox"/>	<input type="text" value="216.82.224.202"/>	<input type="text" value="1720"/>	<input type="text" value="3"/>
0005	<input checked="" type="checkbox"/>	<input type="text" value="216.82.224.202"/>	<input type="text" value="1720"/>	<input type="text" value="4"/>
0006	<input checked="" type="checkbox"/>	<input type="text" value="216.82.224.202"/>	<input type="text" value="1720"/>	<input type="text" value="5"/>
0007	<input checked="" type="checkbox"/>	<input type="text" value="216.82.224.202"/>	<input type="text" value="1720"/>	<input type="text" value="6"/>
0008	<input checked="" type="checkbox"/>	<input type="text" value="216.82.224.202"/>	<input type="text" value="1720"/>	<input type="text" value="7"/>
0009	<input checked="" type="checkbox"/>	<input type="text" value="216.82.224.202"/>	<input type="text" value="1720"/>	<input type="text" value="8"/>
0010	<input checked="" type="checkbox"/>	<input type="text" value="216.82.224.202"/>	<input type="text" value="1720"/>	<input type="text" value="9"/>

This program sets the IP system interconnection .

**Figure 9 IP System Interconnection Setup**

#### 10-23 : IP System Interconnection Setup

Sys No. 0001– 0012 Check System Interconnection and assign the SIP Trunking Service Provider Proxy IP Address and Dial Number 0-9 and also (\*) and (#).

***This field applies for those SIP service providers supporting Static Configuration.***

### 3.7 SIP Authentication Information Setup

***Values shown are for example purposes only. Your actual values will be determined by your implementation team.***

**System Data**

Grid View Apply Cancel Default

10-30: SIP Authentication Information Setup

02 - User Name

03 - Password

04 - Authentication Trial Count

This program sets Authentication information used in SIP Trunk

**Figure 10 SIP Authentication Information Setup**

#### **10-30-02 : SIP Authentication Information Setup – User Name**

Define the authentication User Name provided by Bandwidth as defined in Program 10-28-04. This information is provided by your SIP Service Provider.

Entries: 48 characters maximum.

*✎ NEC recommends using "nec8100" if this information is not supplied by your service provider.*

#### **10-30-03 : SIP Authentication Information Setup – Password**

Enter the Bandwidth authentication password. This information is provided by your SIP Service Provider.

Entries: 48 characters maximum.

### 3.8 SIP Trunk Registration

*Values shown are for example purposes only. Your actual values will be determined by your implementation team.*

**System Data**

10-36: SIP Trunk Registration Information

Registration ID (1~31)

Registration ID	Registration	User ID	Authentication User ID	Authentication Password
01	<input checked="" type="checkbox"/>	<input type="text" value="12144840672"/>	<input type="text" value="nec8100"/>	<input type="text" value="k72yg49r"/>
02	<input checked="" type="checkbox"/>	<input type="text" value="12144840673"/>	<input type="text" value="nec8100"/>	<input type="text" value="k72yg49r"/>
03	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
04	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
05	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
06	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
07	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
08	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Figure 11 SIP Trunk Registration Information

### 3.9 Calling Party Information (Trunk)

**Caller ID** - In the Invite message there are two fields that can have caller ID. One field is the “SIP From Address” and the other field is “SIP Display Info”. If both of these fields are left blank the call will not complete.

Below is an example of a SIP Invite Message with outbound CID.

From “2142622000”<sip:test@172.16.0.100>

#### 14-12-01 : SIP Register ID Setup for IP Trunks

On a per trunk basis, you can choose a SIP register ID of 0~31. If the ID is left to 0, the “SIP from Address” would not be assigned on a per trunk basis. If set to 1~31, it then looks at command 10-36-02 to populate the “SIP from Address” field.

#### 14-12-02 : SIP Register ID Setup for IP Trunks

This is for SIP trunks to the provider for inbound purposes. If 10-28-06 (Trunk port Binding) is enabled, inbound calls map to the trunk. If you want to create a hunt group when trunk port binding is enabled, set multiple trunks to the same pilot and then define that number in 10-36.

#### 10-36-02 : SIP Trunk Registration Information

Per registration ID 1~31 you can assign what will be populated in the “SIP from Address” field.

**15-16-01 : SIP Register ID Setup for Extensions**

Per station you can choose a SIP register ID of 1~31. If left blank the “SIP from Address” would not be assigned on a per station basis. If assigned, it will look at Program 10-36-02 to populate the “SIP from Address” field. This takes priority over command 14-12-01.

**10-28-04 : SIP System Information Setup – User ID**

This is the default “Display Info” and “From Address” if either of these fields is blank what is assigned in this command will be inserted. This setting has the lowest priority and if any of the next commands are set they will be sent out instead of this command.

**3.10 Class of Service Options (Outgoing Call Service)**

*Values shown are for example purposes only. Your actual values will be determined by your implementation team.*

**System Data**

20-08: Class of Service Options (Outgoing Call Service)

Class of Service (1~15)

01 - Intercom Call	<input checked="" type="checkbox"/>
02 - Outgoing Trunks	<input checked="" type="checkbox"/>
03 - Common Speed Dials	<input checked="" type="checkbox"/>
04 - Group Speed Dials	<input checked="" type="checkbox"/>
05 - Dial Number Preview	<input checked="" type="checkbox"/>
06 - Toll Restriction Override	<input type="checkbox"/>
07 - Repeat Redial	<input checked="" type="checkbox"/>
08 - Toll Restriction Dial Blocking	<input type="checkbox"/>
09 - Hotline for Handpiece	<input type="checkbox"/>
10 - Handsfree Answerback/Forced Intercom Ringing Switching	<input checked="" type="checkbox"/>
11 - Call Mode Switching Protection from Caller (Internal Call)	<input type="checkbox"/>
12 - Department Group Step Calling	<input checked="" type="checkbox"/>
13 - ISDN Clip	<input type="checkbox"/>
14 - Set Calling Sub Address	<input type="checkbox"/>
15 - Block Outgoing Caller ID	<input type="checkbox"/>
16 - E911 Dialed Extension Name and Number Display	<input type="checkbox"/>
17 - ARS Override of Trunk Access Map	<input type="checkbox"/>
19 - Hotline for Speaker	<input type="checkbox"/>
20 - Hot Key Pad	<input type="checkbox"/>
21 - Automatic Trunk Seizing by Pressing SPK Key	<input type="checkbox"/>

Use Program 20-08: Class of Service Options (Outgoing Call Service) to define the outgoing call feature availability for each extension's Class of Service (CoS).

**Figure 12 Class of Service Options**

**20-08-13 : Class of Service Options (Outgoing Call Service) – ISDN Clip**

This needs to be turned ON per COS, if you are trying to send any information on a per station basis. If turned OFF, it will still send the trunk information if set.

**20-09-02: Class of Service Options (Incoming Call Service) Caller ID Display**

This needs to be turned ON per COS, if you want to receive caller ID.

### 3.11 IP Trunk Calling Party Number Setup

The screenshot shows a configuration window titled "System Data" with a subtitle "21-17: IP Trunk (H.323/SIP) Calling Party Number Setup for Trunks". The window has a toolbar with "Grid View", "Apply", "Cancel", and "Default" buttons. A "Trunk" dropdown menu is set to "001: SIP - Chassis 1 - Slot 01 (1)". Below this, there is a table with four rows for trunks 01, 02, 03, and 04. Each row has a "Calling Party Number" field. The field for trunk 01 contains "<Customer TN>", while the others are empty. At the bottom, a note reads: "Use Program 21-17: IP (H.323/SIP) Trunk Calling Party Number Setup for Trunks to allow for the Calling Party Number to be displayed for IP trunks when the VoIP feature is used."

Trunk	Calling Party Number
01	<Customer TN>
02	
03	
04	

**Figure 13 IP Trunk (H.323/SIP) Calling Party Number Setup for Trunks**

**21-17-01: Calling Party Number Setup for Trunks**

On a per trunk basis this populates the "SIP Display Info" field. If a station has a setting in 21-19-01, it will override this field.

3.12 IP Trunk (SIP) Calling Party Number Setup for Extensions

Values shown are for example purposes only. Your actual values will be determined by your implementation team.

System Data

Grid View

Apply

Cancel

Default

21-19: IP Trunk (SIP) Calling Party Number Setup for Extensions

ICM Extension

117: IP\* - STA 117 - 0.0.0.0 - Port 017

ICM Extension	Calling Party Number	ICM Extension	Calling Party Number
117	<Customer TN>	206	
118		207	
119		208	
201		209	
202		210	
203		211	
204		212	
205		213	

Use Program 21-19: IP (SIP) Trunk Calling Party Number Setup for Extensions to allow for the Calling Party Number to be displayed for IP extensions when the VoIP feature is used.

Figure 14 IP Trunk (SIP) Calling Party Number Setup for Extensions

21-19-01 : IP Trunk (SIP) Calling Party Number Setup for Extensions

On a per station basis this populates the “SIP Display Info” field.

This setting has the highest priority. This program is used to assign the Calling Party Number for each extension (Entries: 1~0, \*, #). The assigned number is sent to the SIP Trunking Service Provider when the caller places an outgoing call. If the Calling Party Number is assigned by both Program 21-17 and 21-18/21-19, then the system uses the data in Program 21-18/21-19. Do not use Program 21-13 for SIP. This entry must be a 10-digit DID associated with the SIP Trunking Service Provider Account. DID numbers are provided by your SIP Trunking Service Provider Coordinator.

3.13 DID (TN to ext map)

*Values shown are for example purposes only. Your actual values will be determined by your implementation team.*

System Data

Grid View

Apply

Cancel

Default

22-02: Incoming Call Trunk Setup

Trunk

001: SIP - Chassis 1 - Slot 01 (1)

Night Mode

01 - Mode 1

Night Mode

Trunk	Mode 1	Mode 2	Mode 3	Mode 4
01	DID	DID	DID	DID
02	DID	DID	DID	DID
03	DID	DID	DID	DID
04	DID	DID	DID	DID

Use Program 22-02: Incoming Call Trunk Setup to assign the incoming trunk type for each trunk. There is one item for each Night Service Mode.

Figure 15 Incoming Call Trunk Setup

22-02-01 : Incoming Call Trunk Setup

Define the SIP trunks as type 3 (DID). In addition to the SIP trunk programming, refer to the DID feature in the SV8100 Features and Specifications Manual for additional DID programming (e.g., 14-05, 22-04, 22-09, 22-10, 22-11, 22-12, 22-13, 22-17, 34-01).

### 3.14 DTMF Configuration

*Values shown are for example purposes only. Your actual values will be determined by your implementation team.*

84-13: SIP Trunk Codec Setup

21 - Signal Limiter

Mode 5

22 - Echo Canceller Non-linear Processing Mode

2 wire only

26 - TX Gain

-20.0dBm

0.0dBm (20)

20.0dBm

27 - RX Gain

-20.0dBm

0.0dBm (20)

20.0dBm

28 - Audio Capability Priority

G.711\_PT

31 - DTMF Payload Number

110

32 - DTMF Relay Mode

RFC2833

33 - G.722 Maximum Audio Frame Size

30ms

34 - G.722 Voice Activity Detection

☐

35 - G.722 Minimum Jitter Buffer Size

30

36 - G.722 Average Jitter Buffer Size

60

37 - G.722 Maximum Jitter Buffer Size

120

38 - G.726 Maximum Audio Frame Size

30ms

39 - G.726 Voice Activity Detection

☐

40 - G.726 Minimum Jitter Buffer Size

30

41 - G.726 Average Jitter Buffer Size

60

42 - G.726 Maximum Jitter Buffer Size

120

43 - iLBC Maximum Audio Frame Size

30ms

Figure 16 SIP Trunk Codec Setup

**84-13-32 : SIP Trunk CODEC Information Basic Setup – DTMF Relay Mode**  
Set the DTMF setup to 1 (RFC2833).



### 3.15 ToS Setup

*Values shown are for example purposes only. Your actual values will be determined by your implementation team.*

**System Data**

Grid View Apply Cancel Default

**84-10: ToS Setup**

Protocol Type	ToS Mode	IP Precedence Priority	IP Precedence Delay	IP Precedence Throughput	IP Precedence Reliability	IP Precedence Cost	Priority (Diffserve)
DRS	Disabled	0	Normal	Normal	Normal	Normal	0
Protims	Disabled	0	Normal	Normal	Normal	Normal	0
Voice Control	Disabled	0	Normal	Normal	Normal	Normal	0
H.323	Disabled	0	Normal	Normal	Normal	Normal	0
RTP/RTCP	Diffserve	0	Normal	Normal	Normal	Normal	40
SIP	Disabled	0	Normal	Normal	Normal	Normal	0
CCIS	Disabled	0	Normal	Normal	Normal	Normal	0
DT700	Disabled	0	Normal	Normal	Normal	Normal	0
SIP Trunk	Diffserve	0	Normal	Normal	Normal	Normal	46
NetLink	Disabled	0	Normal	Normal	Normal	Normal	0

This program sets the ToS Data.

**Figure 17 ToS Setup**

#### 84-10-01 : ToS Setup – ToS Mode

For the RTP/RTCP (Protocol type 5) and SIP Trunk (Protocol type 9), set the ToS Mode to “2” (Diffserv).

**The SV8100 must be reset in order for the change to take effect.**

#### 84-10-07 : ToS Setup – Priority (Diffserv)

For each of the following protocol types, set the following priorities:

RTP/RTCP (Protocol type 5): **Priority 40**.

SIP Trunk (Protocol type 9): **Priority 46**.

**The SV8100 must be reset in order for the change to take effect.**

### 3.16 SIP Trunk Basic Setup

*Values shown are for example purposes only. Your actual values will be determined by your implementation team.*

System Data

Grid View

Apply

Cancel

Default

84-14: SIP Trunk Basic Setup

01 - Invite ReTx Count

7

02 - Request ReTx Count

11

03 - Response ReTx Count

7

04 - Request ReTx Start Time

5

05 - Request Max ReTx Interval

40

06 - SIP Trunk Port

5060

07 - Session Timer Value

0

08 - Minimum Session Timer Value

1800

09 - Called Party Info

Request URI

10 - URL Type

SIP-URL

11 - URL/TO Header Information

SIP UA Domain

Use Program 84-14: SIP Trunk Basic Information Setup to define the basic setup for SIP trunks.

Figure 18 SIP Trunk Basic Setup

**84-14-11 : SIP Trunk Basic Setup – URL/To Header Setting Information**  
Set this program to SIP UA Domain.


**Changes within this program require the SV8100 be reset in order for the change to take effect.**

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## SECTION 4      INITIAL TESTING AND TROUBLESHOOTING

To confirm that the system is correctly set, perform the following tests:

 *If you run into an issue with any of these tests, refer to [Table 4 Troubleshooting Guide](#).  
Test an outgoing call to a local number. Check for ringback, 2-way audio and quality.*

1. Test an outgoing call to a long distance number. Check for ringback, 2-way audio and quality.
2. Test an outgoing call to an international number. Check for ringback, 2-way audio and quality.
3. Test a outgoing call lasting more than 15 minutes.
4. Test multiple call concurrences on outgoing calls. Setup multiple calls to PSTN.
5. Test an outgoing call to an Operator '0'.
6. Test an outgoing call to directory assistance '411'.
7. Test a 911 call.



***Identify to the operator that this is a TEST!***

8. Test an incoming call to an internal DID. Check for ringback, 2-way audio and quality.
9. Test an incoming call to an auto-attendant. Check DTMF and audio quality.
10. Test transferring calls off-site.
11. Test an outgoing call to an auto-attendant and verify DTMF.

Table 4 Troubleshooting Guide

Issue	Cause	Remedy
No Calls IN/Out	○ Router Configuration	○ Check Router Configuration
	○ NEC Configuration	○ Check NEC Configuration
	○ Unqualified IP Address	○ Note WAN IP Address and Contact Provider
No Calls Out	○ NEC Configuration	○ Check NEC Configuration
	○ Unqualified IP Address	○ Note WAN IP Address and Contact Provider
No Calls In	○ NEC Configuration	○ Check NEC Configuration
	○ Unqualified IP Address	○ Note WAN IP Address and Contact Provider
One-Way Audio	○ NEC Configuration	○ Check NEC Configuration
Echo	○ Excessive Delay	○ Check LAN and WAN for high latency
	○ Echo Cancellation Issue	○ Check Echo settings and/or consult Bandwidth
Call Dropping	○ Internet Access Issues	○ Call Internet Access Provider
	○ Extreme Latency on LAN	○ Check Latency on LAN
	○ SIP issue	○ Contact Provider
Static or HUM on Phones	○ Power issue	○ Check power if using AC, should not be issue in PoE
Missing Parts of Words	○ Packet Loss or Latency on LAN	○ Check LAN
	○ Packet Loss or Latency on WAN	○ Check with Internet Access Provider
	○ Jitter Buffer Configuration	○ Check with NEC

---

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## SECTION 5      **NEC INROUTER CONFIGURATION SOFTWARE VERSION 9.1.0**

The following are screen shots taken from an active NEC InRouter while interfaced with BandTel SIP service. They are provided as a guide; your situation could be different from what is shown. The IP Address shown will of course not apply as you will need the IP Address assigned to your unique situation.

### 5.1      **Network**

Networking configuration information for public and private networks.

#### **LAN Interface Settings:**

IP Address:

Subnet Mask:

Enable VLAN support ☐

---

#### **WAN Interface Settings:**

☐ ADSL-PPPoE

☐ DHCP

☒ Static IP Address

☐ EVDO

☐ T1/E1

IP Address:

Subnet Mask:

---

#### **Network Settings:**

Default Gateway:

---

Note: In case of dynamic links, this DNS server address will override the DNS server address obtained from the Servers. Default value for dynamic links is obtained from the server, if left blank.

Primary DNS Server:

Secondary DNS Server:

**Figure 19 Network Configuration Example**

## 5.2 Firewall

Enable Firewall for WAN:

### Basic WAN Firewall Settings:

These setting apply to services that are running on the System.

Allow HTTP access through firewall: ☒

Allow HTTPS access through firewall: ☒

Allow TELNET access through firewall: ☐

Allow SSH access through firewall: ☐

Allow SNMP access through firewall: ☐

Allow TCP Port:

Allow UDP Port:

### Trusted Management Addresses:

Apply basic settings configuration only to the following addresses:

Address can be host IP or network/mask, e.g. 10.10.10.1 or 10.10.10.0/24. To delete an entry, highlight and delete it.

### Forwarding WAN Firewall Settings:

These settings apply to packets being forwarded to systems running behind the firewall.

Enable Firewall Logging: ☐

Enable PPTP Server Pass-through: ☐

PPTP Server IP Address:

Figure 20 Firewall Settings Example

## 5.3 NAT

NAT dynamic and static settings:

### Dynamic NAT

Dynamic NAT allows a system with a private address to be mapped to a public address, allowing the system to access the public network.

Enable LAN NAT:



### Static NAT

Static NAT is a special form of NAT that allows the system to map public IP address and port pairs to a specific IP address and port running on the LAN. The public IP address can be either the system's WAN address or another IP address in the same subnet. For Static NAT to function, WAN NAT must be enabled.

#### Add a Static NAT Rule:

Protocol:

TCP ▾

Src IP:

Src Netmask:

Src Port:

Dest IP:

Dest Port:

Figure 21 NAT Configuration Example

## 5.4 SIP Settings

SIP Protocol settings.

The SIP Server settings specify the address and port that all client traffic shall be forwarded to.

SIP Server Address:	<input type="text" value="216.82.224.202"/>
SIP Server Port:	<input type="text" value="5060"/>
Use Custom Domain:	<input type="checkbox"/>
SIP Server Domain:	<input type="text" value="bandwidth.com"/>
List of SIP Servers:	<input type="button" value="Create"/>
Enable Multi-homed Outbound Proxy Mode:	<input type="checkbox"/>
Enable Transparent Proxy Mode:	<input type="checkbox"/>
Limit Outbound to listed Proxies / SIP Servers:	<input type="checkbox"/>
Limit Inbound to listed Proxies / SIP Servers:	<input type="checkbox"/>

### Stale Timer

The stale timer, if set, is used to automatically delete SIP clients that have not registered within the given time period.

Stale client time (m):	<input type="text" value="1440"/>
------------------------	-----------------------------------

Registration Rate-Pacing parameters are available on the [Survivability page](#).

<input type="button" value="Submit"/>	<input type="button" value="Reset"/>
---------------------------------------	--------------------------------------

Figure 22 SIP Settings Example



## 5.5 SIP Trunking

Configuration of SIP trunking devices.

### ***SIP Trunking devices***

A SIP trunking device can be a PSTN gateway, or similar device, that does not issue REGISTER messages. Calls will be forwarded to the device based on the dial-plan rules below.

If VLANs are enabled, the SIP trunking device needs to be in the same VLAN as defined in the VoIP ALG page.

SIP Trunking Devices		
Select: <a href="#">All</a> <a href="#">None</a>		Action: <a href="#">Delete</a>
Address	Port	Name
<input type="checkbox"/> 10.10.3.10	5060	8100

**Add a trunking device**  
Action: Add new trunking device ▼  
Name:   
Address:   
Port:   
Commit Reset

Figure 23 SIP Trunking Example

## 5.6 Rules

Rules are used to forward and/or modify incoming and outgoing calls. There are three types of rules:

- Inbound – from server to trunking device
- Outbound – from trunking device to server
- Redirect – from local telephone to trunking device (w/o routing to server)

Outbound rules can match against and/or modify either the calling or called number. Inbound and redirect rules operate on the called number only. Stripped and added digits always apply to the left-most digits of the DID.

Dial Rules							
Select: <u>All</u> <u>None</u>						Action:	Delete
	Type	Party	PRI/O	Pattern - match	Strip	Add	Trunking device
<input type="checkbox"/>	Inbound			Default Rule			8100 (10.10.3.10:5060)

Figure 24 Dial Rules Example

**Add a rule**

Action: Add new rule ▼

Type: Inbound ▼

Call Party: Called ▼

Default rule: ☐

Priority (inbound & redirect only): ☐

Pattern-match (if not default):

Strip digits:

Add string:

Use SIP proxy as secondary target: ☐

Trunking device: 8100 (10.10.3.10:5060) ▼

Commit Reset

Figure 25 Add A Rule Example

---

## 5.7 Header Transformation

These header transformation rules are applied to all SIP trunking devices. They define how specified SIP headers should be transformed when forwarding to the SIP Server.

**From Header**  
Select the domain to use in From header when sending requests to the SIP Server:  
☒ SIP Server Address (default)  
☐ System WAN IP

Figure 26 From Header Example

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