

**Product: ShoreTel system****System version: ShoreTel 5 Release 2**

ShoreTel IP Phone System – PBX Interoperability: NEC 2000 IVS

This document describes the interoperability and configuration of an NEC 2000 IVS with the ShoreTel IP Phone System. It includes the following sections:

Tie line integration using PRI (Primary Rate Interface)

Overview

The purpose of this document is to provide a step by step guide on configuring a ShoreTel system to integrate with an NEC 2000 IVS PBX. This document also aims to provide an example of how to configure the legacy equipment to function in this environment; however this information is targeted to individuals who already have knowledge on configuring NEC systems. The examples provided are from tested, functioning systems but may vary from your environment.

Record of Change

This application note is subject to change as third party hardware and software changes. Updates and corrections are always welcome. Please submit any updates or corrections to ProServices@ShoreTel.com.

<u>Issue</u>	<u>Author</u>	<u>Reason For Change</u>	<u>Date</u>
1.0	R.Moses	Initial release	March. 26, 2006

1.0 Tie Line Integration Using PRI:

1.1 System Components:

PBX Model	NEC 2000 IVS
PBX Software Release	1800
PBX Interface card	24DTA + SC01 Card
Telephone Signaling	PRI
ShoreTel Software Release	ShoreTel5 Release 2
ShoreTel Hardware	ShoreGear-T1
Interconnect	RJ-48c crossover cable

1.2 System Requirements:

The following are required on the ShoreTel 6 system, and the legacy PBX to enable the integration of the two systems:

- ShoreTel 5 system

- ShoreGear-T1 Voice Switch - The ShoreGear-T1 voice switch supports both T1 and PRI connections and includes an integrated CSU.

- Legacy PBX

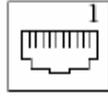
- T1 or PRI card for the PBX

- Available card slot and capacity for the added trunks

- Required software or licenses to support the desired trunk interface

1.3 Connectivity Diagrams:

RJ-48C T1/E1 and T1/E1 Monitor Connectors



Pin	Designation
1	RX Ring
2	RX Tip
3	—
4	TX Ring
5	TX Tip
6	—
7	—
8	—

NOTE When connecting the ShoreGear-T1 or ShoreGear-E1 to a legacy PBX, you must use a crossover cable between the two systems.

1.4 Setup Notes:

For extension-to-extension integration of two different systems you will need to determine which extension ranges are to exist on each PBX. You can not have overlapping extensions that exist on both systems, for example if extension 1234 is a valid extension on the legacy PBX, you should not create a ShoreTel user with extension 1234. There is an “off system” extension range that can be associated with the tie-line to allow these numbers to be dialed, which is covered in further detail below.

1.5 NEC 2000 PBX Configuration:

Example configuration of NEC 2000 PBX tie-line for extension-to-extension with tandem trunking:

The following example assumes that:

The NEAX 2000 is IVS (commands vary for IVS 2 and IPS).

Trunk routes 10 and 11 are not in use in NEC system.

Trunks 100 through 123 are not in use in NEC system.

LCR route pattern 00 and 10 and LCR toll restriction pattern 00 and 10 are not in use.

LCR digit addition pattern 00 is not in use.

The NEC system has its own voice mail system.

All trunking for outbound calls exists in ShoreTel.

The extension numbers in both the ShoreTel and the NEC systems are 4 digits.



The PRI in the ShoreTel is set to esf , b8zs ,PRI network ,and using NI2 protocol on “D” channel and off site extensions table is built.

When completed calls can be transferred between NEC and ShoreTel.
Calling number is displayed from ShoreTel to NEC but not from NEC to ShoreTel.

Basic programming functions

To access command mode
From a digital Keypad with display

1. Press Transfer
2. Press Conference
3. Press *
4. Press Transfer
5. Press Conference
6. Press #
7. Press Redial.

Steps 1 through 7 must be completed within 4 seconds.
If done correctly command will be displayed in LCD.

Once in command mode the keys function as follows

1. Feature = Step backwards
2. Reall = DE (Data Entry)
3. Conf = EXE (Execute)
4. Redial = ST (Command entry Start)
5. Speaker = S(Step forward)
6. Answer =CE (Clear entry)
7. Transfer = ,
8. Hold = Back space
9. Line keys 1-6 = A-F respectively

To Assign Data for PRI

Assign T-1 Card to system

command =05 DE
enter wheel setting of t – 1 Card DE (04-15 Make sure no two cards are set the same)

Set to 09 EXE

Assign SC01 Card to system

Command = 05 DE
Enter wheel setting of SC01 card DE (04-15 Make sure no two cards are set the same)

Set to 12 EXE

Assign SC01 card as “D” channel handler card number 0

Command = 0608 DE enter wheel setting of SC01 DE set to 0 EXE



Assign trunks to each channel on T-1 card
(xx = Wheel setting of T-1 Card)

Command = 0701 DE
xx00 DE Set to D100 EXE S
xx01 Set to D101 EXE S
xx02 Set to D102 EXE S
xx03 Set to D103 EXE S
xx04 Set to D104 EXE S
xx05 Set to D105 EXE S
xx06 Set to D106 EXE S
xx07 Set to D107 EXE S
xx08 Set to D108 EXE S
xx09 Set to D109 EXE S
xx10 Set to D110 EXE S
xx11 Set to D111 EXE S
xx12 Set to D112 EXE S
xx13 Set to D113 EXE S
xx14 Set to D114 EXE S
xx15 Set to D115 EXE S
xx16 Set to D116 EXE S
xx17 Set to D117 EXE S
xx18 Set to D118 EXE S
xx19 Set to D119 EXE S
xx20 Set to D120 EXE S
xx21 Set to D121 EXE S
xx22 Set to D122 EXE S
xx23 Set to D123 EXE S

This will assign trunks 100 through 123 to T-1 Card.

RESET SYSTEM BEFORE PROCEEDING.

Assign Trunks 100 through 122 to trunk route 10 and trunk 123 to route 11

Command = 3000 DE
100 DE Set to 10 EXE S
101 Set to 10 EXE S
102 Set to 10 EXE S
103 Set to 10 EXE S
104 Set to 10 EXE S
105 Set to 10 EXE S
106 Set to 10 EXE S
107 Set to 10 EXE S
108 Set to 10 EXE S
109 Set to 10 EXE S
110 Set to 10 EXE S
111 Set to 10 EXE S
112 Set to 10 EXE S
113 Set to 10 EXE S



114 Set to 10 EXE S
115 Set to 10 EXE S
116 Set to 10 EXE S
117 Set to 10 EXE S
118 Set to 10 EXE S
119 Set to 10 EXE S
120 Set to 10 EXE S
121 Set to 10 EXE S
122 Set to 10 EXE S
123 Set to 11 EXE S

Assign Trunks 100 Through 122 as isdn indial for day mode

Command = 3002 DE

100 DE 18 EXE S
101 18 EXE S
102 18 EXE S
103 18 EXE S
104 18 EXE S
105 18 EXE S
106 18 EXE S
107 18 EXE S
108 18 EXE S
109 18 EXE S
110 18 EXE S
111 18 EXE S
112 18 EXE S
113 18 EXE S
114 18 EXE S
115 18 EXE S
116 18 EXE S
117 18 EXE S
118 18 EXE S
119 18 EXE S
120 18 EXE S
121 18 EXE S
122 18 EXE S

Assign Trunks 100 Through 122 as isdn indial for night mode

Command = 3003 DE

100 DE 18 EXE S
101 18 EXE S
102 18 EXE S
103 18 EXE S
104 18 EXE S
105 18 EXE S
106 18 EXE S
107 18 EXE S
108 18 EXE S



109 18 EXE S
110 18 EXE S
111 18 EXE S
112 18 EXE S
113 18 EXE S
114 18 EXE S
115 18 EXE S
116 18 EXE S
117 18 EXE S
118 18 EXE S
119 18 EXE S
120 18 EXE S
121 18 EXE S
122 18 EXE S

Assign circuit identification codes for trunks 100 through 122

Command = 3007 DE
100 DE set to 000 EXE S
101 001 EXE S
102 002 EXE S
103 003 EXE S
104 004 EXE S
105 005 EXE S
106 006 EXE S
107 007 EXE S
108 008 EXE S
109 009 EXE S
110 010 EXE S
111 011 EXE S
112 012 EXE S
113 013 EXE S
114 014 EXE S
115 015 EXE S
116 016 EXE S
117 017 EXE S
118 018 EXE S
119 019 EXE S
120 020 EXE S
121 021 EXE S
122 022 EXE S

Assign trunk route data for route 10

Command = 3500 DE 10 DE set to 00 EXE
Command = 3504 DE 10 DE set to 2 EXE
Command = 3509 DE 10 DE set to 08 EXE
Command = 3516 DE 10 DE set to 0 EXE
Command = 3518 DE 10 DE set to 0 EXE
Command = 3528 DE 10 DE set to 0 EXE



Command = 3590 DE 10 DE set to 3 EXE
Command = 3593 DE 10 DE set to 00 EXE (sets route 11 to use “D” channel 0)

Assign trunk route data for route 11

Command = 3500 DE 11 DE set to 3

Set trunk 123 as “D” channel

Command = A900 DE 0 DE set to 123 EXE

Assign misc parameters for T-1 card

Command = AA00 DE wheel setting of T-1 card DE set to 0 EXE
Command = AA01 DE wheel setting of T-1 card DE set to 1 EXE
Command = AA02 DE wheel setting of T-1 card DE set to 1 EXE
Command = AA03 DE wheel setting of T-1 card DE set to 7 EXE
Command = AA06 DE wheel setting of T-1 card DE set to 63 EXE

Assign misc parameters for SC01 card

Command = AA00 DE wheel setting of SC01 card DE set to 1 EXE
Command = AA01 DE wheel setting of SC01 card DE set to 1 EXE
Command = AA02 DE wheel setting of SC01 card DE set to 1 EXE
Command = AA03 DE wheel setting of SC01 card DE set to 7 EXE
Command = AA06 DE wheel setting of SC01 card DE set to 28 EXE

At this point the link should be live with ShoreTel.

Set up LCR to allow dialing between systems.

Command = 200 DE (leading digit of ShoreTel extensions) DE set to A29 EXE
Command = 8A407 DE (leading digit of ShoreTel extensions) DE set to 010 EXE
Command = 8A010 DE 1DE set to 01010 EXE
Command = 857 DE (leading digit of ShoreTel extensions) DE set to 04 EXE
Command = 36 DE 1010 DE 0 EXE

At this point Dialing between systems should be possible.

Set up LCR to dial out through ShoreTel.

Command = 200 DE 9 DE A26 EXE
Command = 8A405 DE 0 DE 000 EXE S
8A405 1 000 EXE S
8A405 2 000 EXE S
8A405 3 000 EXE S
8A405 4 000 EXE S
8A405 5 000 EXE S
8A405 6 000 EXE S
8A405 7 000 EXE S



8A405 8 000 EXE S
8A405 9 000 EXE S
Command = 8A000 DE 1 DE set to 00010 EXE
Command = 8A500 DE 100 DE set to 00 EXE
Command = 8A900 DE 0 DE set to 9 EXE

1.5 ShoreWare Director Configuration

1.5.1 Configure Trunk Group

1. Log into ShoreWare Director.
2. Navigate to **Trunks** and select **Trunk Groups**.
3. Select the site you wish to add the Trunk Group to (Note: Must be the same site selected when adding the SG-T1 switch).
4. Select trunk group type **PRI** and click **Go**.
5. Assign a name for the trunk group (example: **Nortel Tie**).
6. Set **Number of Digits from CO** to 4.
7. Select the **extension** check box.
8. Select **Tandem Trunking** if applicable.
9. Select the **Outbound Services** you wish to allow between systems (if any).
10. Add the range of **off system extensions** that will be accessible on the NEC 2000 IVR PBX.
11. Click **Save** at the top of the page.

1.5.2 Configure ShoreGear-T1

1. Navigate to the **Switches** page.
2. Select the site you wish to add the ShoreGear-T1 to.
3. Select switch type **ShoreGear-T1** and click **Go**.
4. Enter the appropriate parameters for the switch **Name, Description, IP Address and Ethernet Address**.
5. Select **T1 PRI User** for switch type.
6. Select **ESF** framing format.
7. Select **B8ZS** line coding.
8. Select **NI-2** for CO type (or select a setting compatible with the PBX).
9. Select **Master** clock source.
10. In **Channel 1**, select the trunk group created in section 1.5.1, and click the **Fill Down** button.
11. Click **Save** at the top of the page.

