

**Corporate Network Solutions
Business Networks Systems Division**

**Technical
Information
Bulletin**

TITLE: Connecting an OAI application to a NEC PABX

SYSTEM APPLICATION:

SOFTWARE VERSION APPLICATION:

ATTACHMENTS:

Doc-Reg ID:

<http://www.kbase.cns.nec.com.au/>

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Overview

This TIB explains the process of connecting an OAI Application PC to a PABX in a network environment.

Introduction

The need for this TIB became apparent with the release of the NEAX 2000 IPS and IPX. With the introduction of integrated OAI on the Processor card and the release of Peer-to-peer IP Dterms and virtual IP Trunks, the sharing of the Ethernet port becomes a necessity. These devices must have connectivity to the port to function. Hence the historic way of connecting a crossover cable from the OAI Ethernet port to the OAI application PC may no longer be an option.

However connecting the OAI application PC and the PABX to the customer's network is not an appropriate solution. We still want to separate the customer traffic from the PABX/Voice traffic. This will ensure that the PABX/Voice traffic does not interfere with the customer's data traffic OR that the customer data traffic does not interfere with the PABX/Voice traffic. It also protects both networks from unnecessary traffic or broadcast storms.

Investigated in this TIB are 2 Scenarios:

1. A PABX network without IP connectivity.
2. A PABX network with IP connectivity.

OAI Application PC's can include and are not limited to the following applications:

- Q-Master_{EX}
- Q-Master UNIX
- Genesys
- PSL Voicemail

The MP card on the NEAX 2000 IPS and the NEAX 7400 IPX can perform the following functions:

- MAT (Maintenance Administrator Terminal)
- OAI (Open Application Interface)

In addition the Ethernet port on the NEAX 7400 IPX can also perform the following functions.

- MIS (Management Information System)
- PMS (Property Management System)
- NMS (Network Management System)
- SMDR (Station Message Detail Recording)
- MCI (Message Centre Interface)

Glossary Of Terms

VLAN or Virtual LAN

A virtual (or logical) LAN is a local area network with a definition that maps workstations or other IP Devices on some other basis than geographic location (for example, by department, type of user, or primary application). The virtual LAN controller can change or add workstations and manage load-balancing and bandwidth allocation more easily than with a physical picture of the LAN.

VLANs help meet performance needs by segmenting the network more effectively. Unlike standard switching, they restrict the dissemination of broadcast as well as node-to-node traffic, so the burden of extraneous traffic is reduced throughout the network. Security can also be improved. Since all packets travelling between VLANs may also pass through a router, standard router-based security measures can be implemented to restrict access as needed.

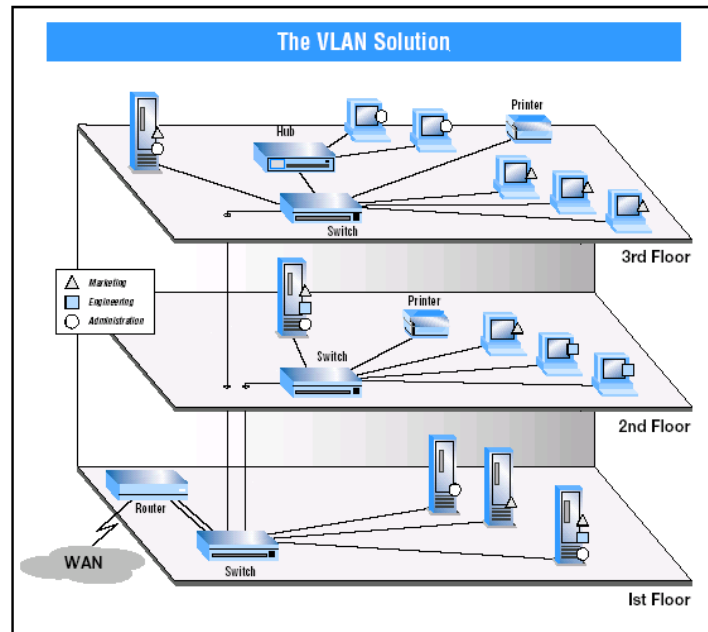


Figure 1: VLANs allow highly flexible, efficient network segmentation, enabling users and resources to be grouped logically, without regard to physical location.

Benefits of VLANs

Flexible network segmentation

Users and resources that communicate most frequently with each other can be grouped into common VLANs, regardless of physical location. Each group's traffic is largely contained within the VLAN, reducing extraneous traffic and improving the efficiency of the whole network.

Simple management

The addition of nodes, as well as moves and other changes, can be dealt with quickly and conveniently from the management console rather than the wiring closet.

Increased performance

VLANs free up bandwidth by limiting node-to-node and broadcast traffic throughout the network.

Better use of server resources

With a VLAN-enabled adapter, a server can be a member of multiple VLANs. This reduces the need to route traffic to and from the server.

Enhanced network security

VLANs create virtual boundaries that can only be crossed through a router. So standard, router-based security measures can be used to restrict access to each VLAN as required.

More Information On VLANs

For more information on Virtual LAN's please go to the following Http address:

http://www.intel.com/network/connectivity/resources/doc_library/tech_brief/virtual_lans.htm

Or Go to www.google.com and search for "The need for VLANs"

System Set-Up

Scenario 1 (Non-VOIP Solution)

Figure 2 below shows the cabling diagram for an OAI Application PC in a PABX and LAN environment.

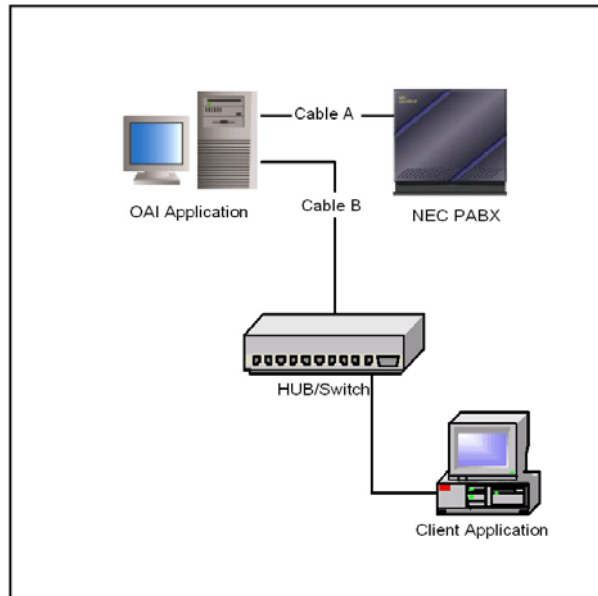


Figure 2. Connecting an OAI Application to a NEC PABX without IP.

Cable A: Is a network crossover cable that connects from the first Network Interface Card located in the OAI Application PC directly to the Ethernet (OAI) port of the PABX.

Cable B: Is a network cable that connects from the second Network Interface Card located in the OAI Application PC directly to the customers LAN via a HUB/Switch.

PABX's that are applicable for this scenario are as follows:

- ICS 110/120/140/160/180
- IMX 240/260/280
- IVS 2000
- IPS/IPX (No IP Dterms, Virtual IP Trunks or other IP devices that need connectivity to Ethernet port on MP card.)

For applications that need to access the MP port such as MatWorx, IP forwarding can be enabled in the OAI application PC ^{Note 1}. This can be achieved in both Windows NT and Windows 2000 (See Appendix A).

Special configuration is required on the Clients workstation. See Appendix B for instructions.

Note 1: In the case that the OAI Application PC fails due to power failure or other unforeseen circumstance then access to the MP Port will not be possible.

Scenario 2 (VOIP Solution)

RESPONSIBILITY: A person with sufficient data knowledge will be able to follow the technical details in this scenario.

WARNING: In this scenario, if the switch loses power due to Upgrade/Maintenance/Power Outage then the connection between the OAI Application PC and the PABX will also be lost. If this OAI Application PC is performing mission critical functions (ie Q-Master_{EX}) then it is recommended that the switch be on an UPS.

Figure 3 below shows the cabling diagram for an OAI Application PC in a PABX and LAN environment with the addition of Voice over IP.

The Switched HUB must be capable of having the following options:

1. Traffic Classification
2. Prioritisation
3. 802.1Q VLAN Tagging

In this scenario two VLANs are mandatory. This will separate all the PABX traffic from the customer data traffic. As we have a switched HUB all voice over IP will not interfere with the OAI traffic due to peer-to-peer connectivity.

A router may be included if there is a need to route between VLAN's. ie If there are PC's on the LAN that need to access the MP Port for functions such as MAT, SMDR etc.

In the example below we have used VLAN ID's 10 and 20. VLAN 10 will carry all PABX related traffic, which includes VOIP and OAI and VLAN 20, which will carry all the customer related data.

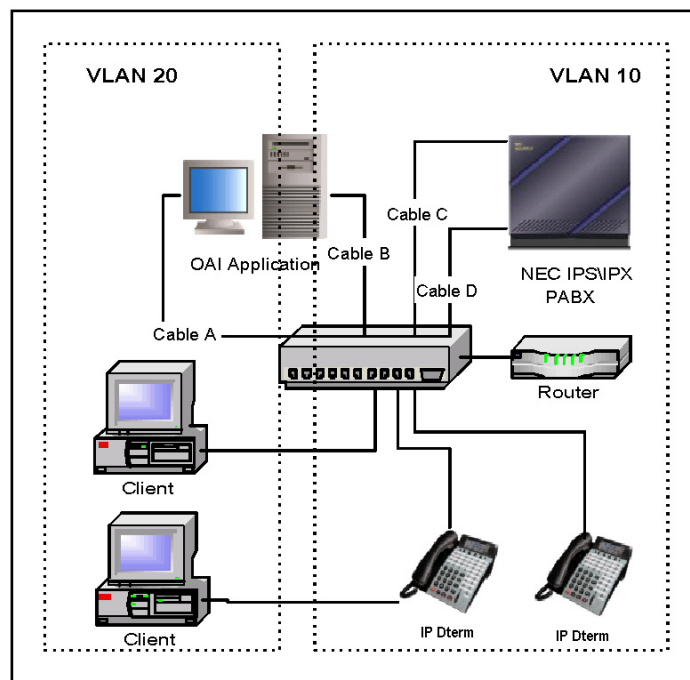


Figure 3. Connecting an OAI Application to a NEC PABX with IP.

Cable A: Is a network cable that connects from the second Network Interface Card located in the OAI Application PC directly to the switched HUB. The cable carries all the client information used for the OAI Application. (Such as broadcasts). This uses VLAN ID 20

Cable B: Is a network cable that connects from the first Network Interface Card located in the OAI Application PC directly to the switched HUB. This cable carries the OAI TCP traffic and hence must be allocated VLAN ID 10.

Cable C: Is a network cable that connects from the Ethernet port on the MP card directly to the switched HUB. This cable carries the OAI TCP traffic as well as control signal for the IP Dterms and virtual IP Trunks. This uses VLAN ID 10.

Cable D: Is a network cable that connects from the Ethernet Port on the IP-PAD card directly to the switched HUB. This cable carries the VOIP TCP traffic for the IP Dterms. This uses VLAN ID 10.

PABX that are applicable for this scenario are as follows:

- IPS\IPX (With IP Dterms, Virtual IP Trunks or other IP devices that need connectivity to Ethernet port on MP card.)

For applications that need to access the MP port such as MatWorx, this can be done in two ways.

1. IP forwarding can be enabled in the OAI application PC Note 1. This can be achieved in both Windows NT and Windows 2000 (See Appendix A).
Special configuration is required on the Clients workstation. See Appendix B for instructions.
2. Using a router.

Appendix A

How to Enable IP Forwarding on Windows 2000 Server

1. Press Start → Run
2. Type in “Regedit” and press Enter
3. Locate The following Registry Key
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters
4. Locate and Double Click on the following registry value: “IPEnableRouter”
5. Change Value data to 1.
6. Press OK
7. Exit Registry Editor
8. Reboot PC

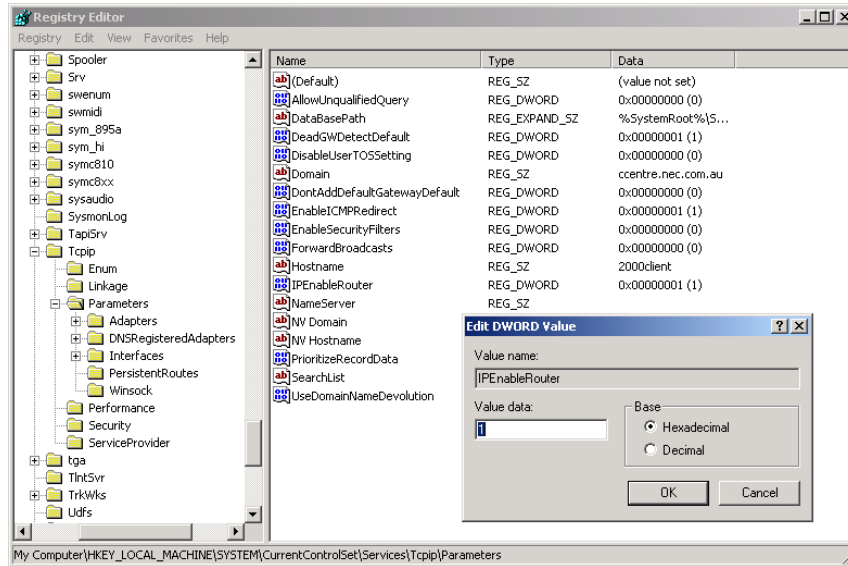


Figure 4. Registry Editor for Windows 2000 Server.

How to Enable IP Forwarding on Windows NT Server

1. Right Click on Network Neighborhood and click Properties.
2. Select Protocols Tab. (See Figure 5.)
3. Select TCP/IP Protocol. (See Figure 5.)
4. Click Properties. (See Figure 5.)
5. Select Routing Tab.
6. Click on the checkbox “Enable IP Forwarding”
7. Press OK
8. Reboot PC

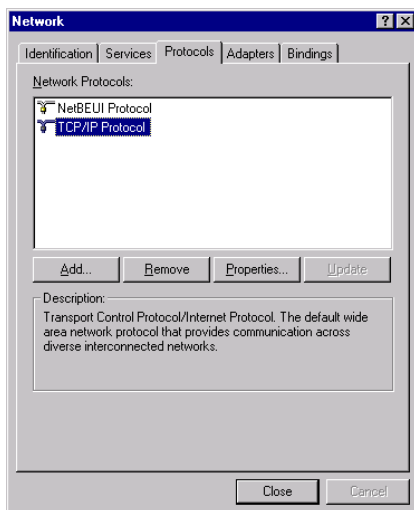


Figure 5. Protocol Tab in Windows NT Server

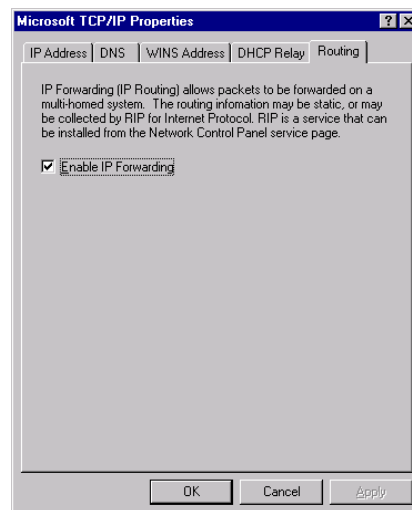


Figure 6. Enabling IP Forwarding in Routing for Windows NT Server.

Appendix B

How to Setup a Client Workstation to access the PABX network

For a workstation on the customers LAN to access the PABX, a persistent route needs to be added to the workstation. Below are 2 examples of a customers network and shows how to add a persistent route.

		Example 1	Example 2
Customer Network Address Range		147.76.26.xxx	147.76.xxx.xxx
Customer's Subnet mask		255.255.255.0	255.255.0.0
Customers PABX Network		192.100.x.x	192.100.100.x
Customers PABX IP Address		192.100.100.101	192.100.100.101
Customers PABX Subnet Mask		255.255.0.0	255.255.255.0
OAI Application PC IP Address	NIC 1 (Gateway)	147.76.26.170	147.76.26.170
	NIC 2	192.100.100.100	192.100.100.100

1. Open a "Command prompt"
2. Type in the following command (See examples below.):
C:\>route -p add [PABX Network] mask [Subnet Mask] [Gateway]

Example 1

```
Route -p add 192.100.0.0 mask 255.255.0.0 147.76.26.170
```

Example 2

```
Route -p add 192.100.100.0 mask 255.255.255.0 147.76.26.170
```

LEGEND:

-p	Persistent Route
[PABX Network]	PABX IP Range
[Subnet Mask]	Subnet Mask of PABX Network
[Gateway]	IP Address of OAI Application PC

3. Press Enter.
4. Test by Pinging the PABX. Ie
C:\>ping 192.100.100.101
5. Confirm that the PABX returns a ping.

Warning: A persistent route is NOT supported under Windows 95.