



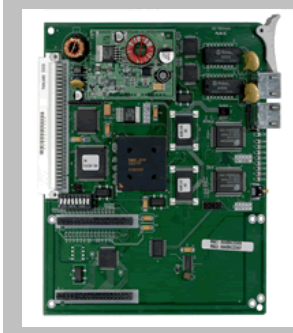
MEGACO IP Station Setup

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IPKII IP MEGACO Stations

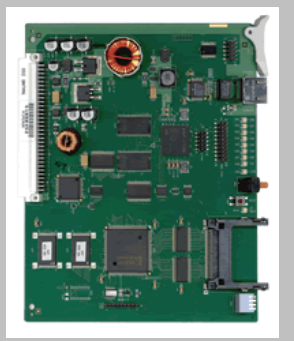
IP Stations off the IPKII utilize the MEGACO protocol. **MEGACO** stands for Media Gateway Control Protocol/Media Gateway Controller and is an IP telephony signaling protocol from the **IETF**. The **IETF** (Internet Engineering Task Force) is the body that defines standard Internet operating protocols such as TCP/IP. MEGACO is an international standard and is not written by NEC.

IP Stations are available via 2 cards on the IPKII. This document mentions the IAD but will focus on requirements, setup, and programming for the PVA card only.



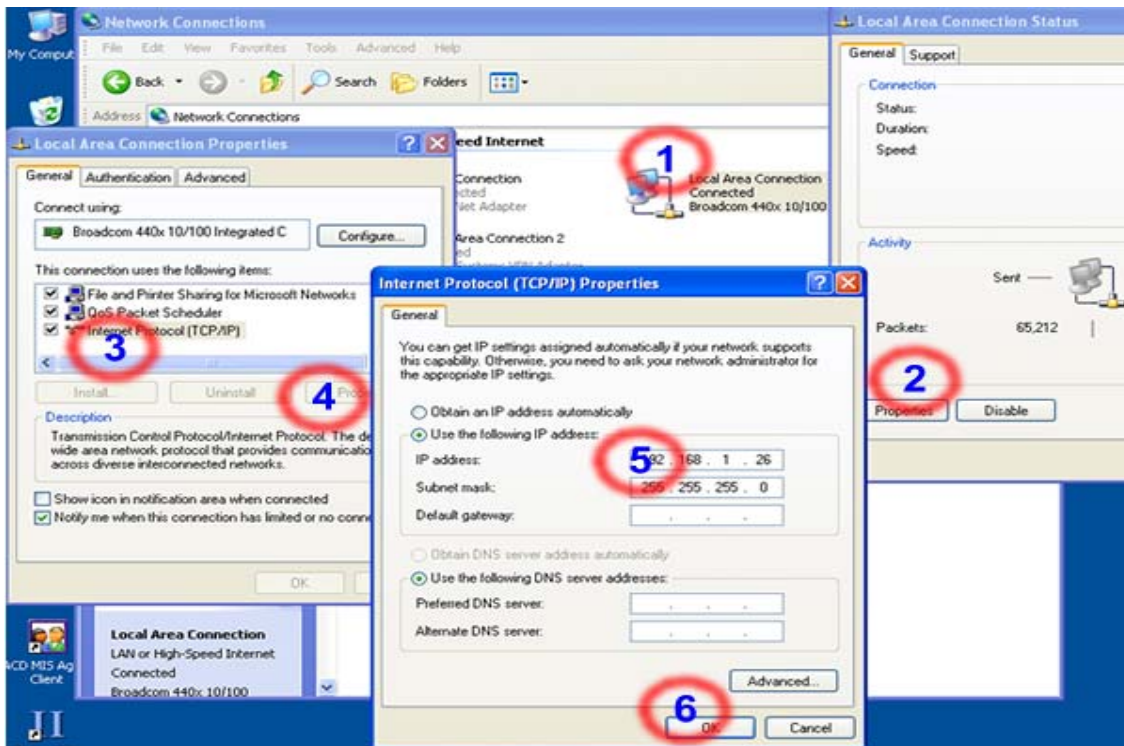
The IAD card will support up to 8 IP stations. It essentially is an ESI card that has the stations connecting via IP rather than regular station cabling. The IAD card has been discontinued by NEC but is still supported in the IPKII.

The PVA card is similar in operation to the IP-PAD card in the NEAX PBX products. The card allows 16 channels of voice connection for the IP stations. One PVA card can support up to 256 IP stations but only 16 calls would be



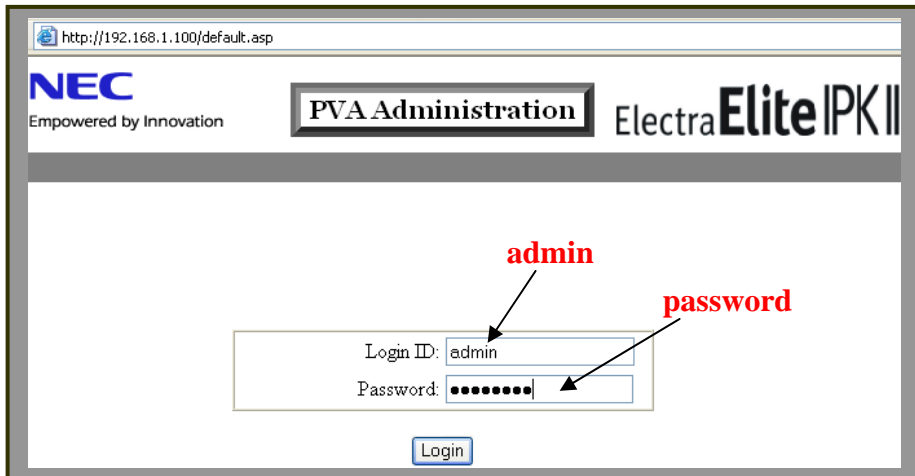
available at any one time. The PVA card also requires a license. There are 2 types of license for a PVA card. One license enables all ports (max 16 for MG and 24 for CCIS trunks) while the other enables a blocks of 4 port per license.

When the card taken from the box it must first be licensed to allow operation. The recommended way to connect to the PVA card is with a PC or Laptop directly connected via a cross over cable or a small switch/hub with no other devices connected. Make sure the PC/Laptop network connection is in the 192.168.1.0/24 subnet. See example below for setting this in Windows XP. Go to **Start, Control Panel** and then follow the steps below.....



License and Registration

Once your PC/Laptop are physically connected you can use an internet browser such as Internet Explorer to go to the address of <http://192.168.1.100>. A successful connection will show the following.....



Enter the Login ID and password then click Login.

The Welcome page will be shown awaiting registration. Write down the **Generated Key** displayed on **YOUR** Welcome page and then via the internet access <http://activate.necii.com>. Once at the web page enter the requested information including the **Generated Key** from **YOUR** PVA card, the Product Serial and Stock Number (provided on a separate piece of paper in an envelope with the PVA Resource CD). Once entered correctly the **ACTIVATE** button will give you the activation code. Enter this **Activation Code** back at the Welcome page of the PVA. Click Register to complete the process.



Loading Service Pack/Firmware

Both cards require a Service Pack and Firmware for the card to operate correctly. The Service Pack is similar to an operating system for the card while the firmware dictates the type of card it will perform as (MG, CCIS or Combo). The card should first be initialized followed by the loading of the Service Pack and then the Firmware. For Megaco Stations **MG16** or **Combo** firmware must be loaded. If using **Combo** firmware the CPU must be at 2.0 version software or higher.

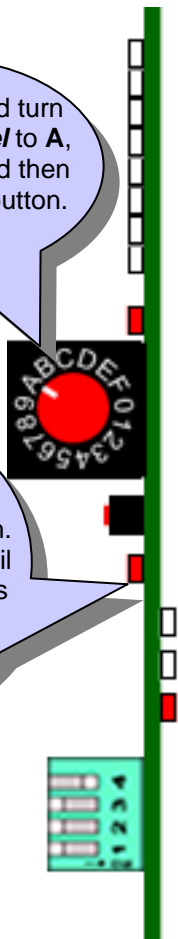
For the latest in Service Pack and Firmware software be sure to visit the Download section of the NTAC on line.

Step 1. Initialize the PVA Card

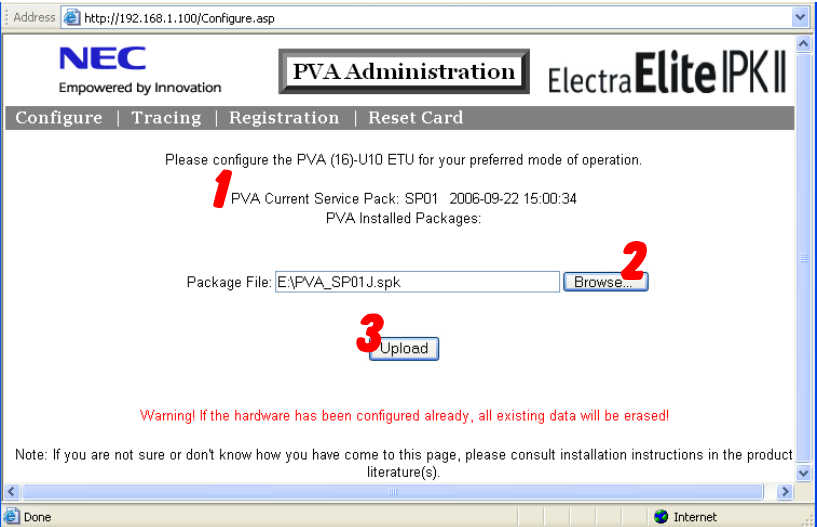
Step 2. Load the Service Pack

To initial the card turn the **Sense Wheel** to **A**, **SW1-4** to **ON** and then press the reset button.

During the PVA initial process the Busy Lamp will flash. Initial is not over until this light is out. This takes about 2 to 3 minutes

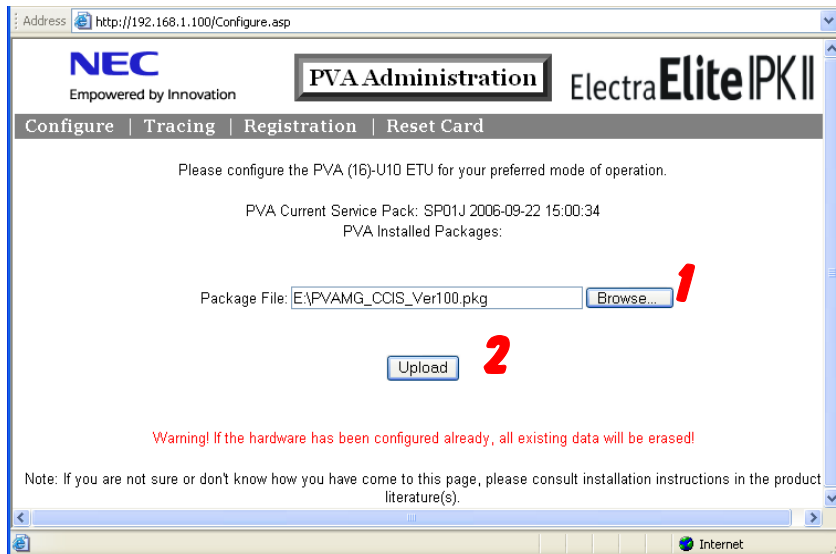


- a. First place the **Sense Wheel** back to **0** and **SW1-4** to the **OFF** position (to the left).
 - b. Then with an internet browser, again connect to the default address of 192.168.1.100 and login.
 - c. On the Configure page you should confirm the current Service Pack (**1 below**). If the card is not at the latest, right click on the **Browse...** button (**2 below**) and locate your copy of the latest .spk file for upload.
 - d. Then select the **Upload** button (**3 below**).
- The Service Pack load will take several minutes. **DO NOT** touch the card or attempt to connect to it during this procedure.

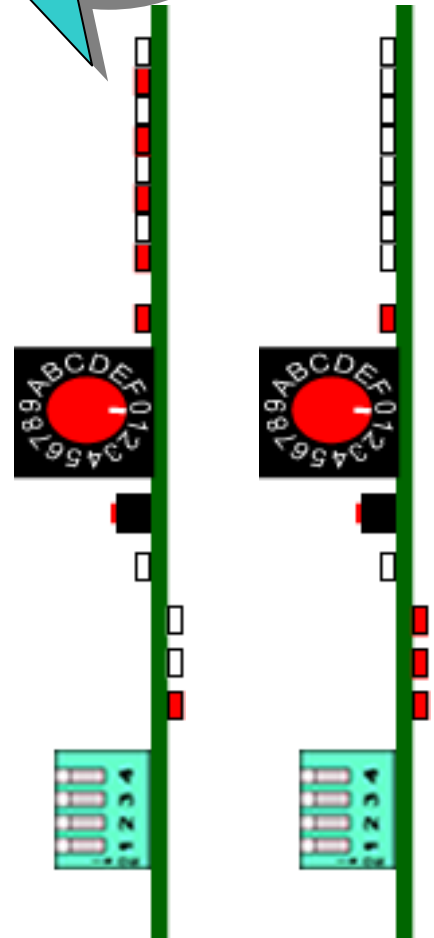


Step 3. Load the Firmware

- Confirm the Service Pack has completed loading (**LED 1** solid with the **BUSY** lamp out).
- With an internet browser access the card and login to see the **Configure** page.
- Select the **Browse...** button (**1 below**) and locate your copy of the latest .pkg file (MG16 or COMBO firmware).
- Click the **Upload** button (**2 below**). The firmware will take about 10 to 20 Seconds to load. **DO NOT** touch the card or attempt to connect to it during this procedure.
- Once the firmware is loaded CH LED's 1~8 will look like the image to the right.



PVA card with
firmware load
complete.



Step 4. Reset the PVA Card

Once the firmware has loaded the browser page will change informing you of the status and prompting for a reset of the card. Wait approximately 20 seconds and from the browser select the **Reset Card** option.

When the card comes back on line **LED 1~3** on the back side of the card should be lit solid. See image to the far right.

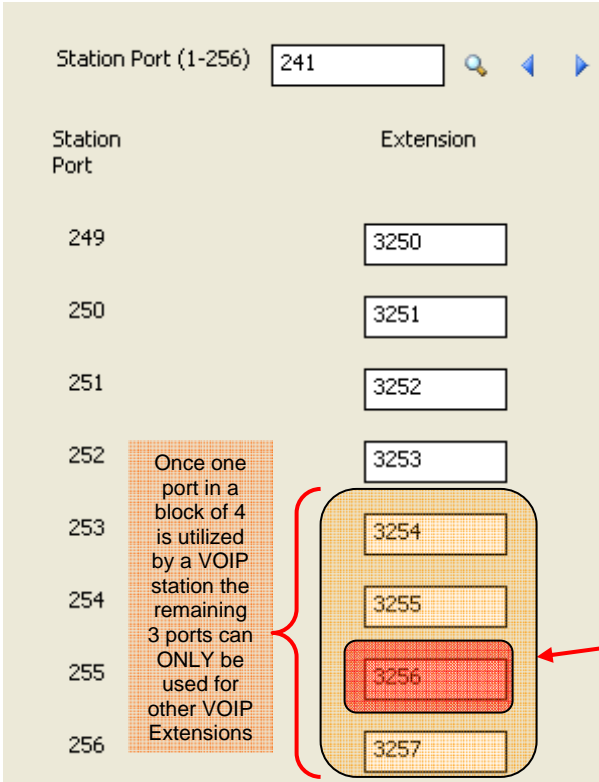
Note: Once the firmware is loaded successfully the card will assume the IP Address assigned in CM 84-05-01. There are default IP Addresses assigned to all slots in the IPKII cabinets (Slot 1~7 = 172.16.0.20~27, Slot 9~16 = 172.16.0.28~35, Slot 17~24 = 172.16.0.36~43). After changing the this address (or anything in CM 84) the PVA card must be reset.

PVA card
online after a
reset.

IPKII Megaco Station Assignments

1. First confirm the number of client licenses loaded to the CPU is equal to or more than the number of Megaco stations you expect to be connected to the system. Each licensed PVA card adds 16 Clients to the CPU. The PVA card must be licensed and online to see these client licenses. Additional licenses can be purchased in blocks of four and added to the CPU.

Feature Status	
Active	Feature Name
Yes (56)	VoIP Clients (MEGACO)
No (0)	VoIP Clients (SIP)
Yes	ACD
Yes	HOTEL
Yes	CTI
Yes	In-Mail
Yes	SMDR
Yes	Firmware Update
Yes	CCISoIP

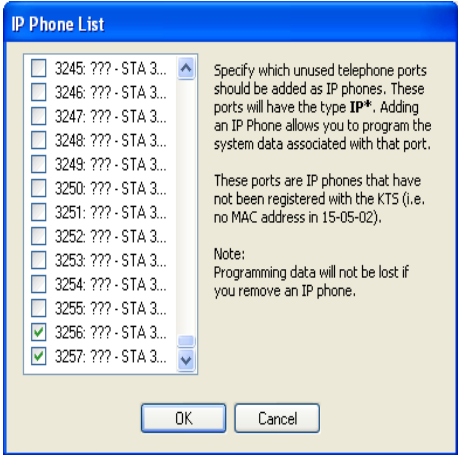
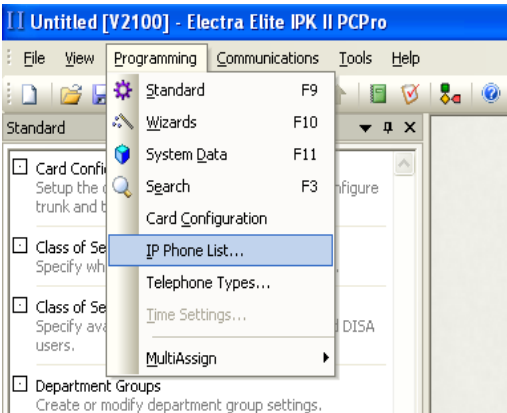


2. Megaco IP Stations are assigned to non-equipped hardware ports.

Physical Station ports are assigned automatically from lowest number up as cards are added to the system. Because of this it is recommended to assign Megaco Stations starting with the highest port numbers and then in descending order.

By default all Station Ports are assigned numbers in the IPKII. These are easily changed in **CM 11-02** to the number required as long as the leading digit/digits are assigned in **CM 11-01** as **Extension**.

NOTE: Ports are dedicated to VOIP stations in groups of 4. E.g. In the image to the left if port 255 (Extension 3256) is used for a Megaco Station that group of 4 ports (Ports 253, 254, and 256) can then **ONLY** be used for other VOIP stations



3. To enable Key data and other station feature programming (before IP Phone is brought online) the extensions must be identified as IP Phones. Once checked in the **IP Phone List** in PC-Pro (see images to the left) the extensions will be available for selection in CM 15.

3. The basic CPU and PVA card assignments can be set in CM 10-12 and 84-05 respectively. **NOTE:** If a change is made to CM 10-12 a CPU reset is required.

System Data

Apply Cancel *

10-12: IPK II Network Setup

01 - IP Address: 172.16.0.10

02 - Subnet Mask: 255.255.0.0

03 - Default Gateway: 0.0.0.0

04 - Time Zone: (GMT -05:00) Eastern Time (US and Canada)

05 - NIC Setting: 100Mbps - Full Duplex

06 - NAPT Router:

07 - NAPT Router IP Address: 0.0.0.0

08 - ICMP Redirect:

CPU and PVA card must be assigned to the same subnet

System Data

Apply Cancel *

84-05: VoIP IP Address Setup

Slot: MG(16) - Cab 1 - Slot 08 (8)

01 - IP Address: 172.16.0.27

02 - LAN Setting: 100Mbps - Full Duplex

03 - Master/Slave: Master

04 - Subnet Mask: 255.255.0.0

05 - Default Gateway: 0.0.0.0

This program sets the IP address of VoIPU PKG.

When connected to an Ethernet switch that allows changing of the interface settings, it is recommended to set the IPKII, and associated switch port, to 100Mbps-Full Duplex.

4. Finally the Megaco Station requires assignments to be made in the phone itself. Enter the Program Mode in the station using the steps to the right.
Note: The station does not require an Ethernet connection to enter the program mode. Only power is required. For Basic bench testing only the following assignments are required.



1. Network Settings

- 1. DHCP
- 2. IP Address
- 3. Subnet Mask
- 4. Router IP Address

1. DHCP Disable then Set.

**Enter the IP Address for the station then Set.
 Enter the Subnet Mask for the station then Set.
 Enter the Default Gateway Address then Set then Prev. If you are testing without a router/gateway this must be left at the default 0.0.0.0**

2. MGC IP Address

Enter the IP Address of the PVA card then Set

3. Extension Number

Enter the Extension Number for the IP station then Set then Save

Basic Trouble Shooting

With the previous steps completed a basic bench test station should be on line. If the Station does not come on line there are several items that should be checked.

- Confirm that all devices (CPU, PVA, and station) can communicate on the same LAN. Test this with a simple ping test. Confirm there is no duplicate by pinging each device, while it is unplugged, and confirm no response. A ping can also be performed from the station itself. In the phone programming go to **9 (Advanced Settings)**, **8 (Diagnostic Utility)**, and then **1 (Ping)**. Enter the IP Address of the CPU and then the PVA card. The Utility will attempt 4 ping requests. Each ping should return with a **o**. If the request returns with an **x** it was unsuccessful.
- If there is no physical router/gateway (bench testing) connected make sure this address in the phone, CM 10-12, and CM 84-05 is set to **0.0.0.0**. Once the IP-Phone is online it will fill this entry, in the phone, with its own IP Address. This is normal operation.
- Confirm the station number assigned in the phone is assigned on an un-equipped port in CM 11-02 on the CPU.
- To clear all settings on the station (clearing any previous VLAN or DRS settings) a factory default can be performed by going into the IP Station and selecting **9 (Advanced Settings)**, **7 (Default Value Set)**, followed by **Set**, **Prev**, and finally **Save**. The station will re-boot back to the default value. When coming back up go into programming and set **ONLY** the required assignments as detailed on the previous page.
- Confirm CM 15-05-02 for the IP Station number is set to 00-00-00-00-00-00. Do not attempt to enter the MAC Address of the physical station. This field can only be filled by the CPU when the IP Station registers.
- Check PVA, CPU, and IP-Station Revisions. Confirm that the latest versions are loaded. Latest versions can be obtained by going to www.necntac.com and visiting the Downloads section.
- If you are using DHCP mode and getting your addressing through a server/router, go into the IP Phone programming and select option **8** then the up and down arrow soft keys to verify the phone received a valid IP Address, Subnet Mask, and Gateway Router address.

Advanced Settings

QOS (Quality Of Service) *If you understand QOS you may skip the rest of this page.*

When voice and data exist on the same network the voice and voice setup packets **MUST** be given priority over data wherever there maybe a possible bottle neck in the network. This would typically be at the router where one LAN is connected to another LAN via some sort of connection (WAN).

An analogy for QOS with a router could be presented as the baseball/football stadium before a major game. There are only 16 or so gates (router) into the stadium. Hours before the game (off peak times) the spectators (data packets) and players (voice packets) can all pass through the gates with no delay as there are enough gates for the number of people trying to pass.

Ten minutes before game time (peak traffic time) there are hundreds of fans (data packets) trying to get through the limited number of gates into the stadium (router) so they all start lining up. If a player (voice packet) shows up he is immediately rushed to the front of the line giving him priority (QOS) over the spectators as it is imperative he get through for the game to start on time. If several players don't get through the gates with priority they will have to line and as a result his team will be short and not able to play correctly (choppy voice, cut off call).

There are several ways to accomplish QOS. The IPKII requires programming for two methods. IP Precedence and Differential Services (Diffserv).

Setting QOS For the PVA(MG16/Combo)

84-10: ToS Setup

01 - ToS Mode: Protocol Type: 03 - Megaco

02 - IP Precedence Priority: 5

03 - IP Precedence Delay: Normal

04 - IP Precedence Throughput: Normal

05 - IP Precedence Reliability: Normal

06 - IP Precedence Cost: Normal

07 - Priority (Diffserve): 0

Note: The IP Precedence dropdown menu is open, showing options: 01 - CPU, 02 - MG16, 03 - Megaco, 05 - RTP/RTCP, 06 - SIP, 07 - CCIS. The 05 - RTP/RTCP option is highlighted.

For IP Phones two protocol types must have ToS (Type of service) assigned. Megaco (Setup messages from PVA to IP phone) and RTP/RTCP (Voice packets from PVA to IP Phone). The PVA(MG16) and CPU are typically on the same LAN so a setting is rarely required.

ToS mode can be set to either IP Precedence or Diffserve. The person in charge of the router configuration will advise you of which method they are looking for and the appropriate setting. See list on the next page for QOS settings.

These settings are rarely ever used with IP Precedence and should be left at default.

The network administrator will advise you of which method of TOS he is using for the VOIP. The only time the IPKII will require an assignment is if he wishes to use IP Precedence or Diffserv. Below is a table showing all the possible settings for these 2 types of TOS. In CM 84-10 you enter the decimal value from the **Type and Setting column.**

Type and Setting	Name	Decimal Value (Entry in IP Phone)
IP Precedence 0	Routine	0
IP Precedence 1	Priority	32
IP Precedence 2	Immediate	64
IP Precedence 3	Flash	96
IP Precedence 4	Flash Override	128
IP Precedence 5	Critical	160
IP Precedence 6	Inter-network Control	192
IP Precedence 7	Network Control	224
Differentiated Services Code Point 0	Best Effort	0
Differentiated Services Code Point 8	Class Selector 1	32
Differentiated Services Code Point 10	Assured Forwarding 11	40
Differentiated Services Code Point 12	Assured Forwarding 12	48
Differentiated Services Code Point 14	Assured Forwarding 13	56
Differentiated Services Code Point 16	Class Selector 2	64
Differentiated Services Code Point 18	Assured Forwarding 21	72
Differentiated Services Code Point 20	Assured Forwarding 22	80
Differentiated Services Code Point 22	Assured Forwarding 23	88
Differentiated Services Code Point 24	Class Selector 3	96
Differentiated Services Code Point 26	Assured Forwarding 31	104
Differentiated Services Code Point 28	Assured Forwarding 32	112
Differentiated Services Code Point 30	Assured Forwarding 33	120
Differentiated Services Code Point 32	Class Selector 4	128
Differentiated Services Code Point 34	Assured Forwarding 41	136
Differentiated Services Code Point 36	Assured Forwarding 42	144
Differentiated Services Code Point 38	Assured Forwarding 43	152
Differentiated Services Code Point 46	Expedited Forwarding	184
Differentiated Services Code Point 48	Class Selector 6	192
Differentiated Services Code Point 56	Class Selector 7	224

Setting QOS for the IP Phone

Go into the IP Phone programming

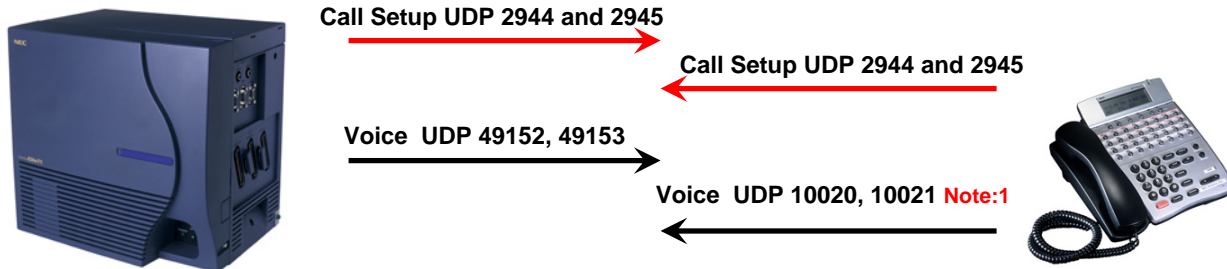


Select **9** (Advanced Settings), **5** (Type Of Service) and you will have to select **1** for RTP (Voice Packets) and then **2** for Megaco (Control messages).

From the table on the previous page select the type of TOS you are using and enter the number from the **Decimal Value** column into the IP Phone.

TOS with Port Priority

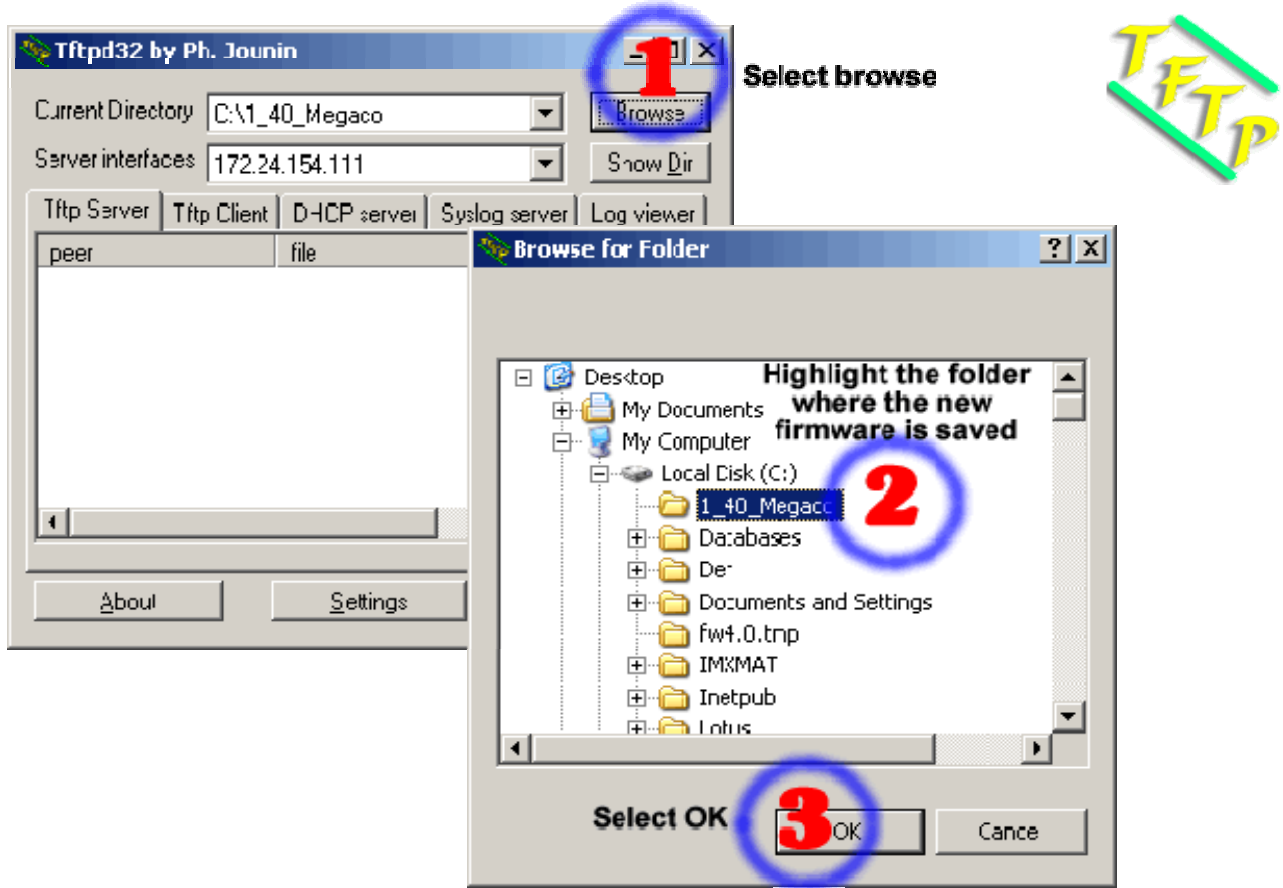
In some cases the LAN Administrator may want to do TOS in the routers based on the IP address of the VOIP devices or on the IP Port numbers they use. Below is a list of the ports utilized by the IP Phones and PVA card. The LAN Administrator will then create a policy map in the router prioritizing these ports over all others in the router.



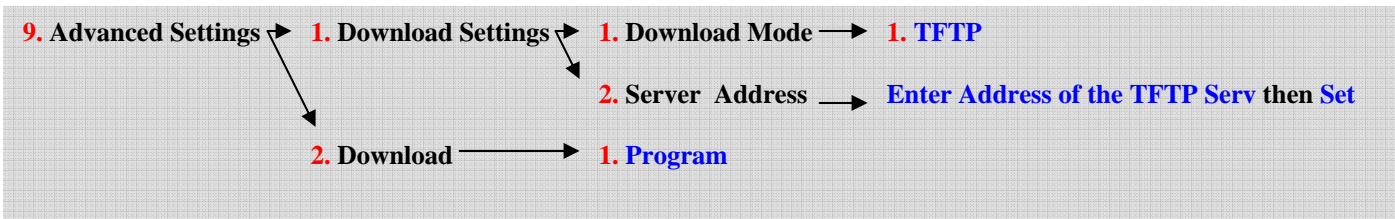
Note: 1 The first call between the Megaco phone and PVA card will negotiate with ports **10020** and **10021**. Additional calls will also attempt to utilize these same ports but the PVA will re-negotiate forcing the call up to the next available pair of ports. **E.g.** 1st Megaco VOIP call uses **10020** and **10021** and while in progress a 2nd call made uses ports **10022** and **10023**. A third call (with the first 2 calls still in progress) ports **10024** and **10025** etc.

Upgrading Megaco Firmware

There are two ways to upgrade the firmware in the Megaco Station sets. Manually at each station or Automatically after a station reset. Both methods require a TFTP server to be on the network the Megaco stations are connected to. There are many free TFTP servers that are available for download on the internet. This example will show the use of **TFTD32** which can be found with a simple search from a web browser. Once installed locate a copy of the latest Megaco firmware from the NTAC Downloads web page and save it to a folder off the root directory of your pc. Then configure the TFTP app to access this folder. See below.



Manual Upgrade now requires you to go into the IP Programming Mode with each of the Megaco sets to be upgraded and assign/confirm the settings in **BLUE** shown below.



Once Program is selected the display on the Megaco Station will show "Downloading Now" and activity can be observed in the window of the TFTP application. When the download is completed the station will reboot and come back on line with the updated version of firmware. This can be confirmed from **System Information** (Option 8) in the **IP Programming Mode** in the Megaco Station.

Automatic Upgrade requires some additional assignments to the IPKII database so that when the phone boots it will check for an available version of firmware before downloading it to the Megaco Station.

System Data [Apply] [Cancel] [Default]

84-07: Firmware Download Setup

01 - Server Mode:

02 - File Server IP Address:

03 - Login Name:

04 - Password:

Use Program 84-07: Firmware Download Setup to specify the file server details for downloading data for IP phones.

Enter the IP Address of the TFTP server.

Enter the Hardware and Firmware version you want the Megaco Stations to download. The Hardware will always be a 04 for the IP Bundled set and 02 for a regular Dterm with IP Megaco Adapter. Upon boot the IP Megaco Station will check this version and if it is different to the one it is currently running (higher or lower) it will locate the TFTP server and download the firmware.

System Data [Apply] [Cancel] [Default] [Copy]

90-22: Terminal Version Information

Terminal Type	Hardware Version	Firmware Version
IP Terminal	<input type="text" value="04"/>	<input type="text" value="01.40"/>
IP Adaptor	<input type="text" value="02"/>	<input type="text" value="01.40"/>

Use Program 90-22: Terminal Version information to define the hardware and firmware version of the terminal.

System Data [Apply] [Cancel] [Default] [Copy]

84-08: Firmware Name Setup

Terminal Type	Firmware Directory	Firmware File Name
IP Terminal	<input type="text" value="C:\1_40_Megaco"/>	<input type="text" value="apph248.out"/>
IP Adaptor	<input type="text" value="C:\1_40_Megaco"/>	<input type="text" value="apph248.hex"/>

Use Program 84-08 : Firmware Name Setup to setup the firmware name of the IP phone for download.

The exact location, on the TFTP server, for the firmware files must be entered in CM 84-08 along with the actual file name. Note the file name is the same and can be identified by the extension. The .hex file is for the IP Adaptor and the .out file is for the Bundled IP phone.

7. PC Port Settings	1. PC Port VLAN Mode	1. Port VLAN Disable		
		2. Port VLAN Enable		
	2. PC Port VLAN ID	Port VLAN ID?		
	3. PC Port VLAN Priority	Port VLAN Priority		
8. System Information	Summary of all settings made to IP Station.			
9. Advanced Settings	1. Download Settings	1. Download Mode	1. TFTP	
			2. FTP	
		2. Server Address	Srv IP?	
	2. Download	1. Program		
		2. Configuration		
		3. Boot&Program		
	3. DRS Settings	1. DRS Mode	1. DRS Disable	
			2. DRS Enable	
		2.Primary DRS Address	Pri IP?	
		3. Secondary DRS Address	Sec IP?	
		4. DRS Mate Port	Mate Port?	
	4. CDP Mode	5. DRS Self Port	Self Port?	
		1. CDP Disable		
	5. Type of Service	2. CDP Enable		
		1. RTP	TOS(RTP)?	
		2. Megaco	TOS(Megaco)?	
	6. SoftReset	3. DRS	TOS (DRS)?	
		SoftReset Execute?		
	7. Default Value	Default Value Set?		
	8. Diagnostic Utility	1. Ping	PingAdr?	
1. MGC Mate Port		MGC Mate Port?		
9. Port Settings	2. MGC Self Port	MGC Self Port?		
	3. RTP Port1	RTP Port1?		
	4. RTP Port2	RTP Port2?		