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*The equipment described in this manual should only be installed and maintained by professional and qualified engineers in accordance with the procedures and instructions described in this manual.*

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NEC Infrontia, Inc.
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Irving, TX 75039-2402

Technology Development
GENERAL INFORMATION
The DECT access points described in this manual have no direct connection to the public telephone network. These access points are connected to the NEC Telephone System using an Ethernet based IP connection (Internet Protocol). The details are described in this manual.

Refer to the NEC Telephone System manuals for details about the connection of this telephone system to the public telephone network.

The equipment described in this manual should be installed and maintained only by professional and qualified engineers in accordance with the procedures and instructions described in this manual.

REGULATORY INFORMATION FOR WIRELESS PHONE - UNITED STATES
Modifications not expressly approved by NEC Unified Solutions, Inc. could void the user authority to operate the equipment. Privacy of communications may not be ensured when using this telephone.

EXPOSURE TO RADIO FREQUENCY (RF) SIGNALS
The access point is a radio transmitter and receiver. It is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission (FCC) of the U.S. Government. These limits are part of comprehensive guidelines and establish permitted levels of RF energy for the general population. The guidelines are based on the safety standards previously set by both U.S. and international standards bodies. These standards include a substantial safety margin designed to assure the safety of all persons, regardless of age and health.

This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter. The radiating element of the base station should be installed during operating at a separation distance greater than 20 cm between user and device. The device complies with the requirements for routine evaluation limits.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause
harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the equipment or antenna.
- Increase the separation between the equipment and receiver.
- Consult the dealer or an experienced radio/TV technician for help.

**SERVICE REQUIREMENTS**
If equipment malfunctions, all repairs must be performed by an authorized agent of NEC Unified Solutions, Inc. or by NEC Unified Solutions, Inc. The user requiring service is responsible for reporting the need for service to an NEC Unified Solutions, Inc. authorized agent or to NEC Unified Solutions, Inc.

**CSA SAFETY INFORMATION**
This equipment has been listed by CSA International under master contract number 233349 and found to comply with standard UL60950-1/CSA60950-1 for Information Technology Equipment.

**SERVICE REQUIREMENTS**
If equipment malfunctions, all repairs must be performed by an authorized agent of NEC Unified Solutions, Inc. or by NEC Unified Solutions, Inc. The user requiring service is responsible for reporting the need for service to an NEC Unified Solutions, Inc. authorized agent or to NEC Unified Solutions, Inc.
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What is DECT?

SECTION 1  OVERVIEW

Digital Enhanced Cordless Telecommunication (DECT) offers a standardized technique for wireless telephony. DECT can be applied in many applications. The NEC Telephone System can be equipped to support DECT, which means that you can use cordless handsets on the NEC Telephone System. Many call handling facilities of the NEC Telephone System are available on the cordless handset.

The DECT interface was developed by the European Telecommunication Standards Institute (ETSI).

The DECT system is based on radio transceivers and cordless telephones. The cordless/portable telephone is called a Portable Part (PP) according to the DECT standard. However, in this manual the portable telephone is also called a handset. A radio transceiver in the DECT system is called the Radio Fixed Part (RFP) according to the DECT Standard. The RFP is also called a base station. Figure 1-1 DECT System Parts (General) shows the basic DECT system setup or access point.

Figure 1-1  DECT System Parts (General)
SECTION 2  DECT SYSTEM CHARACTERISTICS

The DECT system has the following characteristics:

- Frequency range:
  - 1880 MHz ... 1900 MHz Europe
  - 1900 MHz ... 1920 MHz China
  - 1910 MHz ... 1930 MHz Latin America
  - 1920 MHz ... 1930 MHz North America (lower transmission power, –3 dB)

- Handset average transmitting power: 5mW, (peak power = 125 mW)

- Maximum number of calls per base station: 12

The radio area covered by a single access point is called a cell. The access points are located so that the cells overlap and the handset can remain in contact with the DECT system when moving from one cell to another. A group of cells belonging to one DECT system is called a cluster. (Refer to Figure 1-2 Example of a DECT Cluster.)

![Figure 1-2 Example of a DECT Cluster](image-url)
The number of access points needed to cover a certain area (in which the mobile telephone users can roam) depends on many factors such as:

- The size of the area.
- The nature of the area:
  - The number and the size of buildings in the area.
  - The radio propagation characteristics of the building(s).
  - Materials used for walls, floors, elevator shafts, reinforced glass, doors, or roofs.
  - Strong magnetic fields in the area (e.g. as result of welding equipment, or radar).
- The number of telephone users in an area, and how often they make or receive calls.

The speech signal through the air is encrypted, if the portable handset allows it, to ensure the privacy of the conversation. This encryption is fully automatic, without the intervention of a technician.

Before Handsets can be used, they must be subscribed (registered) to the system. That means that a relation must be defined between the DECT System and the Handset. Subscription is done with the DECT Service Console. The DECT Service Console is an application on a PC.
SECTION 1 OVERVIEW

The implementation of SIP DECT in a NEC Telephone System is a stand-alone DECT system that is connected to the NEC Telephone System via a TCP/IP connection using Session Initiation Protocol (SIP). This means that in the NEC Telephone System, the DECT extensions must be assigned as SIP extensions. From the NEC Telephone System perspective, there is no difference between a SIP extension and a SIP DECT extension.

Figure 2-1  SIP DECT System Configuration
Figure 2-1 SIP DECT System Configuration shows the SIP DECT System Configuration. All connections are IP connections over Ethernet. The following components are distinguished:

Handsets

- Handsets must be the NEC C124 DECT Handset.

DAPs

- A DECT Access Point (DAP) is the actual transceiver.
- There is one type of DAP available: AP200S.
- The AP200S supports up to 12 simultaneous calls and is for indoor applications. The AP200S is equipped with internal antennas, no external antennas are necessary.
- The AP200S gets its power via the Ethernet connection using a Power over Ethernet adapter or from an AC adapter.

IP Switch

- The IP Switch connects the Ethernet connection together. Only use an IP Switch that is supported for this DECT solution. The IP Switch must support IP Multicast and IGMP (snooping) must be disabled.

Laptop PC (or Desktop computer)

- The Laptop PC or Desktop computer is used for initial installation and configuration using the DAP Manager software. The Laptop (or any other type of PC) with the DAP Manager is only needed during installation of the system. Once the system is up and running, the PC is no longer needed. However, for subscription of a handset or adding a DAP, you must connect the PC (Laptop) temporarily.

SECTION 2  MAXIMUM CONFIGURATION (UX5000 ONLY)

SIP DECT Wireless application must use the VoIP daughter board mounted on the CD-CP00-US for a maximum 128 TDM talk paths. This total may be shared among SIP stations or SIP trunks. Registered SIP stations require licensing per handset.

The UX5000 CD-CP00-US contains a regular TCP/RTP/IP stack that can handle real-time media, support industry standard SIP (RFC 3261) communication on the WAN side, and interface with the VoIP daughter board mounted on the CD-CP00-US.
The SIP DECT C124 Handset, using the VoIP daughter board mounted on the CD-CP00-US, supports IP signaling for up to 128 SIP stations simultaneously. The maximum capacity of system stations is reduced in accordance with the number of registered SIP stations.

- The maximum number of handsets is limited by the availability of ports in the UX5000 configuration. The UX5000 supports a maximum of 512 phones including IP extensions. IP extensions are the sum of all IP extensions in the system and includes IP DECT handsets.

**Application Requirements**

SIP Clients
Licensed – VoIP daughter board mounted on the CD-CP00-US.

**References**

Refer to the associated system Installation and Programming manuals.
3.1 How it Works

The radio network structure supports seamless handover during a call; the handset moves from one cell to another, the second cell takes over the call without interruption or audible indication. The call may not be interrupted and the user may not hear a click or anything. Supporting handover requires synchronization of the radio signals in the air.

A DAP cell can be seen theoretically as a circle around the DAP. In Figure 2-2 Radio Synchronization you see two circles around the DAP: one, which has sufficient radio signal strength for good voice quality, and another wider circle with sufficient signal strength for synchronization. Due to the cellular structure of a DECT Radio Network, there must always be overlap in the cells with sufficient voice quality. The wider cell limit around the DAP must therefore have quite some overlap with the other cell, and must reach to the radio of the other cell. This means that the DAPs of the overlapping cells receive (weak) radio signals from each other. However these radio signals are still strong enough for synchronization.
3.2 Synchronization Hierarchy

When DAPs try to synchronize to each other, there is a hierarchy structure. The system arranges itself and under normal conditions the installer does not need to do anything. However, in some cases manual intervention may be needed.

When a DAP is started up, it tries to synchronize to a DAP in the environment. Each DAP has its own unique identifier, called the RPN (Radio Part Number). The RPN is a hexadecimal two digit number. A DAP always tries to synchronize to a DAP that has a lower RPN.

In Figure 2-3 Synchronization Structure you see an example of a simple DAP structure. When the system starts up, the DAPs try to synchronize to the DAP with the lowest RPN. For DAP 10, this rule means that it becomes the synchronization source. The DAPs with RPNs 11, 13 and 14 synchronize to RPN 10. However, RPN 12 synchronizes to RPN 13 although RPN 13 is a higher number. Finding a synchronization source is not limited to one level deep only. DAP 12 knows that DAP 13 is synchronized to a DAP 10 that has a lower number than itself. Therefore DAP 12 synchronizes to DAP 13, because it is aware that DAP 13 gets its source from a DAP with a lower number.

If a DAP "sees" more than one other DAP, it synchronizes to the DAP that has the shortest path to the synchronization master. If the path to the master is the same number of hops for more DAPs, the DAP synchronizes to the DAP with the lowest RPN.
When two or more DAP clusters are outside each others synchronization range, they become separate synchronization islands. There can be more than one synchronization island in the system. In that case, each synchronization island has its own synchronization master. The synchronization algorithm is applicable for each individual island. Seamless handover is not possible between the two islands.

If you want to make a DAP a synchronization master, or give a DAP a higher position in the synchronization structure, you can assign a lower RPN number to a DAP manually. RPNs can be assigned manually via the DECT Manager WEB interface.
SECTION 1  HARDWARE INSTALLATION

To install the hardware:

1. Determine the number of DAPs that need to be installed and where they should be located. Use Section 2 DAP Planning as a guideline.

2. Read the Section 3 DAP Cabling on page 3-4 and Section 4 DAP Power Provision on page 3-4 carefully and determine how the DAPs should be powered and how the cable must be run.

3. Make sure that you have an IP Switch available to which you are going to connect the IP DECT equipment. Power up the IP Switch.

4. Setup and connect the power provision for the DAPs. The LEDs on the DAPs should show some activity.

5. Connect the DAP cables to the IP Switch.

   Do not connect the Ethernet cables or the IP Switch to the local IP network. The DECT configuration should be installed in a closed network.

6. Make sure that you have a computer available that can be used for management. Connect this PC to the IP Switch using an ethernet cable. Check that the lamp on the IP Switch indicates that the connection is established.

7. (For UX5000 only) Connect a network cable between the VoIP daughter board mounted on the CD-CP00-US and the IP Switch.

8. The next step is setting up your IP Addressing structure. Refer to Chapter 4 IP Addressing.

SECTION 2  DAP PLANNING

The number of DAPs required to guarantee proper function of the handsets varies with installation: for example, an office environment requires a different DAP deployment than a factory floor. Many factors can affect the coverage area. Some factors are area size, materials used in walls, floors, doors, or strong magnetic fields in the area. The following tables are only estimates and are not a standard for every installation.
Table 3-1 Radio Coverage - Indoor Office Environment shows radio coverage for a typical office environment (indoor).

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</table>

The distance between two radios should not exceed 108 feet in a **normal office** environment.
The AP200S should not be installed outdoors. When installed outdoors, however, a dedicated Outdoor Box must be used. The Outdoor Box should be mounted on a wall and under an appropriate shelter. The AP200S ethernet cable should never be exposed to an outdoor environment. The cable should enter the Outdoor Box from inside the wall mount if at all possible. If ethernet cabling is outdoors it is exposed to EMC from lightning, which can cause serious damage to equipment and people.

The environmental temperature range of the DAPs is 41°F (5°C) to 104°F (40°C). If the temperature in the environment is outside this temperature range, you must apply an outdoor box. The environmental temperature range for a DAP in an Outdoor Box is -4°F (-20°C) to 122°F (50°C).

Table 3-2 Radio Coverage - Indoor/Outdoor Open Space Office Environment shows radio coverage for an open space environment (in/outdoor).

<table>
<thead>
<tr>
<th>Dim. (Ft.)</th>
<th>54</th>
<th>108</th>
<th>162</th>
<th>216</th>
<th>270</th>
<th>324</th>
<th>378</th>
<th>432</th>
<th>486</th>
<th>540</th>
<th>594</th>
<th>648</th>
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<th>756</th>
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<tbody>
<tr>
<td>54</td>
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SECTION 3  DAP CABLING

All connections in the system configuration are based on standard ethernet cabling.

The requirements for the cabling is as follows:

- Maximum cable length between IP Switch and DAP: 300 feet
- Cable type: Cat 5 or better.

The DAPs can get their power via a dedicated AC power adapter, or by using Power over Ethernet. If using a non-PoE-capable switch and PoE is desired, a power injector must be used for the DAP switch ports.

*The maximum cable length between the IP Switch and the DAP remains limited to 300 feet.*

SECTION 4  DAP POWER PROVISION

4.1 General

The DAPs can be powered locally via an RJ11 connector. They also support Power over Ethernet over *spare wires* (refer to the IEEE802.3af specification).

To ensure redundancy, both types of power provisioning may be used simultaneously on the same DAP. The power provision that provides the highest voltage is active. If one of the power inputs fails, the other smoothly takes over.

4.2 Local Power Provision

Local Power Provision is done via an AC adapter. The connection between the AC adapter and the DAP uses an RJ11 plug.
In Figure 3-1 DAP AC Power Connector for Local Power Supply, the RJ11 layout is depicted.

In Figure 3-1 DAP AC Power Connector for Local Power Supply, the RJ11 layout is depicted.

Legend;

1 = AC2 (or DC2)
2 = AC1 (or DC1)
3 = AC1 (or DC1)
4 = AC2 (or DC2)

Figure 3-1 DAP AC Power Connector for Local Power Supply

The AC voltage must be 40V (+/− 10%). Use an AC adapter that can provide at least 10 Watts. Use the special AC adapter that can be delivered from your supplier for this purpose.

Using the AC adapter requires a standard power socket near the location of the DAP. This socket must be permanently available for the power provision of the DAP. If someone disconnects the AC adapter it reduces the availability of your communication infrastructure and communication functionality.

4.3 Power over Ethernet (PoE)

The DAPs supports PoE (refer to IEEE802.3af specification).

○ The following overview gives the specifications of the PoE.

○ Voltage at the DAP: minimum 36 volts, maximum 60 volts.

○ Connector: Standard RJ45 connector, using the spare wires pins (wires). Refer to Figure 3-2 Pin Layout Ethernet Connector RJ45 on the DAP.

○ Maximum cable length: 300 feet

Legend;

1 = 10/100 Base-T TX+
2 = 10/100 Base-T TX-
3 = 10/100 Base-T RX+
4 = + 48 Volt power
5 = + 48 Volt power
6 = 10/100 Base-T RX-
7 = RTN (0 Volt) power
8 = RTN (0 Volt) power

Figure 3-2 Pin Layout Ethernet Connector RJ45 on the DAP
The PoE injector (as shown in Figure 3-3 Power over Ethernet Using a Power Injector) is typically located near the IP Switch instead of near the DAP.
SECTION 1  GENERAL

The IP DECT system on a NEC Telephone System uses Session Initiation Protocol (SIP) over an IP network. Typically, this is a closed network with its own addressing structure. The following table shows the default IP addresses.

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>IP Addresses</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD-CP00-US</td>
<td>192.168.0.10</td>
</tr>
<tr>
<td>VoIP daughter board mounted on the CD-CP00-US</td>
<td>172.16.0.10</td>
</tr>
<tr>
<td>Computer for Management</td>
<td>172.16.0.1</td>
</tr>
<tr>
<td>DAPs</td>
<td>172.16.0.100–172.16.0.150 Addresses are automatically assigned using DHCP server.</td>
</tr>
</tbody>
</table>

The default settings for subnet mask and default gateway are as follows:

- Default subnet mask: 255.255.0.0
- Default Gateway: 172.16.255.254

This chapter is based on the Default IP Settings for the NEC Telephone System IP DECT Plug & Play configuration.

SECTION 2  DHCP SERVER AND TFTP SERVER

This section provides information about the built-in DHCP and TFTP server in the DAP Controller/Manager software. These servers are automatically setup and configured with a default configuration during installation of the DAP Controller/Manager. These servers are started using the DAP Configurator tool.

The DAPs get their IP address from the DHCP server. After receiving the IP address, the address is stored in the DAP and a DHCP is no longer necessary.
When the DHCP server issues an IP address to a DAP, it also issues a next boot server IP address to the DAPs. This is the address of the TFTP server where the DAP gets its firmware and configuration files from. This is typically the IP address of your DAP Controller/Manager PC.

The TFTP server is automatically installed on the DAP Controller/Manager computer. When started, it runs as a service under MS Windows®. The TFTP server is automatically setup and configured. Manual intervention is not needed.

Note that the DHCP and TFTP server are necessary only during system installation or when you add, remove or replace a DAP. The IP settings and configuration settings are stored in the DAPs. Therefore, the DHCP server and TFTP server are not needed after installation.

The built-in DHCP and TFTP servers are not required if other DHCP and TFTP servers are available. When using another DHCP server, it must support DHCP Option 66 and Option 67. Option 66 tells the DAP the address of the TFTP server that provides the firmware and configuration. Option 67 tells the DAP the firmware file name on the TFTP server.

SECTION 3  AUTOMATIC NETWORK ADAPTER CONFIGURATION

You can select to let the DAP Configurator change the IP settings of your network card automatically in multi-system mode to the required values for IP DECT on a NEC Telephone System. This can be useful for a technician who manages different IP DECT systems. When arriving at the new site and opening the site configuration, the DAP configurator changes the IP address of the technician PC to one needed for the current configuration. Refer to Section 5 Setting up the Configuration on page 5-12.

SECTION 4  SETTING UP YOUR NETWORK ADAPTER FOR IP DECT

In advance of the installation of the DAP controller/Manager software, you must set up the IP configuration on the network card of your computer. The following task procedure explains how to set up the IP configuration on the network card.

* Each time you use the computer for IP DECT maintenance, make sure that the IP settings are correct. If you are not sure, execute this procedure.*
To set up the IP Configuration on your network card:

1. On the computer where you plan to install the DAP Controller/Manager, select **Start**, **Control Panel**.

   The Control Panel window open as shown in **Figure 4-1 Control Panel**.

   ![Control Panel](image)

   **Figure 4-1 Control Panel**

2. Double click **Network Connections**.

3. Right Mouse click **Local Area Connection**. In the pop-up window, click **Properties**.
4. Select **Internet Protocol** and then click **Properties**.
5. When the Internet Protocol (TCP/IP) Properties window (or one similar to it) opens, your settings may be different. Write down the settings in the window exactly as they are displayed on your computer.

![Internet Protocol (TCP/IP) Properties](image)

Figure 4-4 Internet Protocol (TCP/IP) Properties

6. After you write down the settings, change the settings in this window to the settings needed for the configuration you are using. Figure 4-5 Internet Protocol (TCP/IP) Properties indicates the settings needed for a default NEC Telephone System configuration.
7. Click **OK**, and in the window that is displayed, click **Close**.

8. Close the window **Network Connections**.

9. Continue with Chapter 5 **DAP Manager Installation**.
SECTION 1 GENERAL

The DAP Manager is necessary for initial system configuration and for configuration and maintenance tasks.

The DAP Manager runs on a Desktop computer or Laptop. Once the system is up and running and no maintenance tasks are needed, the DAP Manager can be disconnected.

SECTION 2 DAP MANAGER PC REQUIREMENTS

The computer that you use for the DAP Manager must comply with the following minimum requirements:

☐ CPU speed: 2.4 GHz or higher
☐ 256 MB RAM or more
☐ CD-ROM drive
☐ 1GB harddisk space free

* IIS (Internet Information Services) must be installed using Windows. IIS is the Windows Microsoft WEB server. Refer to Section 3 Internet Information Services.

SECTION 3 INTERNET INFORMATION SERVICES

The DAP Manager requires Internet Information Services to be installed on your computer.

* The procedures in this section are applicable for Windows XP Professional.

Use the following procedure to check if IIS is installed and running properly on your computer.
3.1 Checking IIS

3.1.1 Check to determine if IIS is Installed and Running

1. Open Internet Explorer on the computer where you want to install the DAP Manager.

2. Enter the following URL: http://localhost/localstart.asp.

3. Check that the following window, shown in Figure 5-1 Windows XP Welcome Screen is displayed.

   If this page is displayed correctly, IIS is installed and running. Close the window and continue with Section 4 Installing the DAP Manager 5-4.

   If the page is not displayed, proceed to 3.1.2 Installing IIS under Windows XP Professional 5-3 to install IIS on your computer.

![Figure 5-1 Windows XP Welcome Screen](image-url)
3.1.2 Installing IIS under Windows XP Professional

* The Microsoft Windows XP Installation CD is required to install IIs.

1. Select **Start** and **Control Panel**.

2. Double click **Add/Remove Programs** to open it.

3. Click on the **Add/Remove Windows Components**.

4. Select **Internet Information Services**.
   * Do not check the checkbox!

5. Click the **Details** button.

6. In the details window, check the box **World Wide Web Service**.

7. Click **OK**.

8. Click **Next**.

9. Insert the **Windows XP Professional CD** when the system prompts for it and click **OK**.
   
   If the Welcome to Microsoft Windows XP window pops up, it is a result of auto run on the CD. Click **Exit** in the bottom left corner of the window.

10. In the Windows Components wizard, click **Finish**.

11. Close the **Add/Remove Programs** and the **Control Panel** windows.

12. If present, remove CD/DVD and/or floppy from your system. Close all windows and restart your computer.

13. After the computer is restarted, check that IIS is running. If not, consult the Microsoft web site.
   
   To determine if IIS is running, refer to 3.1.1 Check to determine if IIS is Installed and Running 5-2.
SECTION 4  INSTALLING THE DAP MANAGER

The software is available on CD. To execute the installation, follow the steps in the following procedure.

- You only need to execute this procedure once because the installation can be used for as many system configurations as necessary. You can modify the settings later.

4.1 Software Installation

Before starting this procedure, make sure that you have properly set up the IP addressing on the network adapter. Refer to Chapter 4 IP Addressing.

1. Insert the CD-ROM in the CD drive and run setup.exe. Depending on the directory structure on the CD-ROM, the setup.exe file may be found in a directory: Disk1.

   The InstalledShield Wizard is displayed. This window remains visible during the installation of the DAP Controller components and gives you information about the installation progress.

2. If the Microsoft .NET Framework 1.1 software is already installed, the Welcome to the InstallShield Wizard for DAP Controller window is displayed. Continue to Step 8. on page 5-7.

   If the Microsoft .NET Framework 1.1 software is not yet installed, the Figure 5-2 DAP Controller Installation Window is displayed.

![Figure 5-2 DAP Controller Installation Window](image)

   DAP Controller optionally uses the Microsoft (R) .NET 1.1 Framework. Would you like to install it now?

   Yes  No

   Figure 5-2 DAP Controller Installation Window
3. Click **Yes** and wait until **Figure 5-3 Microsoft .NET Framework Setup License Agreement Screen** is displayed.

4. On the Microsoft .NET Framework Setup screen, click **I agree** and then **Install**.

5. When Microsoft .NET Framework 1.1 is successfully installed, **Figure 5-4 Microsoft .NET Framework Setup Complete Message Screen** is displayed.
6. On the Microsoft .NET Framework Setup Complete Message Screen, click **OK**.

   The installation and configuration of the Net Framework is not finished, even though you clicked **OK**. When the configuration process is on-going, the DAP Controller - InstallShield Wizard window shows activity in the progress bar. This can take several minutes.

7. When the process is finished, you are asked to restart the PC. Click **Restart** to reboot the PC.

   After the PC is restarted, it automatically continues with the DAP Controller installation.

![Figure 5-5 Microsoft .NET Framework Setup Restart Prompt](image-url)
8. The window DAP Controller - InstallShield Wizard is displayed with the Welcome screen. Click **Next**.

![Figure 5-6 DAP Controller - InstallShield Wizard Screen](image)

9. The Figure 5-7 DAP Controller - InstallShield Wizard System Type Selection Screen 5-8 is displayed. Select the **Multiple System** type and click **Next**.
Figure 5-7  DAP Controller - InstallShield Wizard System Type Selection Screen
10. The Figure 5-8 DAP Controller - InstallShield Wizard Setup Type Selection Screen is displayed. Select **Standard** as the system type and and click **Next**.

![Figure 5-8 DAP Controller - InstallShield Wizard Setup Type Selection Screen](image-url)
11. When the Figure 5-9 DAP Controller - InstallShield Wizard Ready to Install Screen is displayed, click **Install** to start the software installation.

![Figure 5-9 DAP Controller - InstallShield Wizard Ready to Install Screen](image)

**Figure 5-9** DAP Controller - InstallShield Wizard Ready to Install Screen
12. When the Figure 5-10 DAP Controller - InstallShield Wizard Completed Screen is displayed, click **Finish**.

The DAP Configurator automatically starts. This allows you to configure your IP DECT system.

![Figure 5-10 DAP Controller - InstallShield Wizard Completed Screen](image)
SECTION 5  SETTING UP THE CONFIGURATION

This section is based on Plug & Play configuration for NEC Telephone System. To use settings other than Plug & Play, refer to the NEC Business Mobility IP DECT SIP Wireless Administrator Guide which is available on the Installation CD-ROM.

5.1 Configuration Setup

1. Make sure that the installation of the DAP Manager is successfully executed.

   If you selected to start the DAP Configurator automatically after the installation, the DAP Configurator window should be displayed. Skip to step 3 in this procedure.

   If you did not select to start the DAP Configurator automatically, continue with Step 2.

2. Start the DAP configurator tool by clicking Start, All Programs, DAP Controller, DAP Applications, DAP Configurator.

   Figure 5-11  Selecting DAP Configurator
3. If you did not assign a fixed IP address to your network card, you see the error message indicated in Figure 5-12 Network Card Not Properly Installed Error Message. Refer to Section 4 Setting up your Network Adapter for IP DECT 4-2 and follow the steps for assigning an IP address to the network card.

If the ERROR message is not displayed, proceed to Step 4.

![Network Card Not Properly Installed Error Message](image)

**Figure 5-12** Network Card Not Properly Installed Error Message

4. Start the DAP Configurator.

If this is the first time that configurator is started, Figure 5-13 IP-DECT Configurator Screen is displayed.

If starting the DAP Configurator after the system is configured, Figure 5-14 IP-DECT Configurator - Network Card Settings Screen 5-15 is displayed with additional buttons available.
5. If you are creating a new system, click **New System**. If you are working with an existing system, click **Modify System** and select the system you want to configure.
6. Click the button that is applicable, normally it is **New System**. Refer to Figure 5-15 IP-DECT Configurator - DAP Configuration, DAP Controller Configuration, PBX IP Configuration.

7. Click the **General** button and enter the **System Name**. Enter the firmware file name (e.g., 4910b404.dwl) for the access points in the AP200 package field.

8. When the screen is complete, click **Apply**.
9. Click the **IP Settings** button. In the DC IP address field, enter the **IP Address** of the PC the IP Dect configurator is running on or click **This PC IP** button to automatically fill it in.

10. In the CPU IP address field, enter the **IP Address** of the NEC Telephone System VoIPDB. All other default settings should be all right to leave at default.

11. Click **Apply**.

12. Click the **Network Settings** button. When asked for a password, enter **NEC-DECT**. (Refer to Figure 5-16 IP-DECT Configurator - Network Settings 5-17.)

13. In the Select Network card connected to the IP DECT system field, choose the **Network Interface Card** the configurator uses to communicate with the DAPs. Verify that the address automatically populates.

![Figure 5-15 IP-DECT Configurator - DAP Configuration, DAP Controller Configuration, PBX IP Configuration](image-url)
14. If the TFTP server is to run on this machine, check the Run TFTP server on this PC box. If needed, define the TFTP folder.

15. If the DHCP server is to run on this machine, check the Run DHCP server on this PC box. Define the DAP IP range, Subnet Mask, and Default gateway the DAPs should use.

16. Click Apply.

17. Click the SIP Settings button, and define the Local Time Zone. (Refer to Figure 5-17 IP-DECT Configurator - SIP Settings 5-18.)

18. Click the More button at the bottom of the screen. In the Configuration items section, located on the right side of the screen, check the mwi_support=item and choose yes in the confirmation window.

19. Click Apply.
20. Click the **DECT Settings** button. (Refer to Figure 5-18 IP-DECT Configurator - DECT Settings 5-19.)

21. Enter the **PARI** and **Country Code**.

22. Click the **More** button at the bottom of the page.

23. In the Advanced DECT Settings section, click **0, 1, 2, 3, 4** in the **Use carriers** field until they each have a box.

24. Click **Apply**.
25. Click the **Customer Information** button and define any information that must be saved with the site configuration. (Refer to Figure 5-19 IP-DECT Configurator - Customer Information 5-20.)

26. Click **Apply**.
27. Click the **Save System** button, located on the left side of the screen. The screen shows all the configuration files to update. (Refer to Figure 5-20 IP-DECT Configurator - Save Configuration Files 5-21.)
28. Copy the firmware file into the following directory:

```
C:Documents and Settings\All Users\Application Data\NEC\DAP Controller\<system name>\Application Data
```

- Where `<system name>` is the name you defined on the General page in Step 7. on page 5-15.
- Application Data is a hidden folder and may not be displayed. If this is the case, from the tools menu, select Folder Options/View tab/Show Hidden Files and Folders radio button.

29. Click the Activate/Deactivate/System Status button on the left side of the screen.

30. Click Activate All.
Two warnings may be displayed on this screen (Figure 5-21 IP-DECT Configurator - Warnings).

The first warning indicates that the DHCP Server in the NEC Telephone System should be inactive. DAPs should get their IP configuration from the DHCP Server that is running on your DAP Controller/Manager PC.

The second warning indicates that there is no firmware file in the TFTP directory. If you get this firmware file warning, confirm that the firmware file (`4910b404.dwl`) is in the following directory:

```
C:\Documents and Settings\All Users\Application Data\NEC\DAP Controller\<system name>\`
```

Where `<system name>` is the name you defined on the General page in Step 7. on page 5-15. Application Data is a hidden folder, and may not be displayed. If this is the case, from the tools menu, select Folder Options/View tab/Show Hidden Files and Folders radio button.
The file name of the firmware should match the file name that is specified in Step 7. on page 5-15 in this procedure.

- When the system is activated, an Internet Explorer window is automatically started, showing the DECT Manager interface. Refer to the DECT Manager Interface in Chapter 6 Making the DECT System Operational.

You can close this window now. This window is displayed again in Chapter 6 Making the DECT System Operational. The system is activated and all relevant services are started. Click Exit to finish the configuration procedure.

32. Reboot all AP200S, power down and power up.
Making the DECT System Operational  CHAPTER 6

SECTION 1  DAP LED STATUS

This section explains how to check the DAP LED status.

1. Check each individual DAP LED status. In this installation stage, the LED should already be on. If not, check Chapter 7 Maintenance.

2. When all DAP LEDs are on, proceed to Section 2 Starting the DECT Manager.

SECTION 2  STARTING THE DECT MANAGER

The DAP Manager should already be on. If not, to start DAP Manager:

1. Double click Internet Explorer to open a WEB session.
   - Internet Explorer is the only supported WEB browser.

2. In the address field, enter the following URL: http://localhost/cds, and press Enter.

3. Click on Access Points in the main menu. Verify that the DAPs you connected are listed. If some DAPs are missing, try restarting the DAPs by powering down and powering up. Refer to Figure 6-1 DECT Manager - Web Session.
Section 3 Entering Extension Numbers

To enter extension numbers:

1. Make sure that the DECT Manager window is open.

2. Click the Add Number Range menu option.

3. Enter the number range, which is applicable for your system. The number range should match the extension numbers that you defined in your NEC Telephone System. If you want to enter more than one number range, click the menu Add Number Range again after entering a number range.

4. Now your system is ready to subscribe handsets. Refer to Section 4 Handset Subscription.
The last step before handsets are ready to use is to activate the subscription. The subscription procedure requires you to enable the numbers using the DECT Manager.

### 4.1 Selecting Handsets for Subscription

1. If the DECT Manager Interface is not already open, open it now (if necessary, refer to Section 2 Starting the DECT Manager on page 6-1).

2. Select the extension number(s) for which you want to activate subscriptions.

   You can select up to 10 extension numbers at one time for subscriptions by selecting the first extension number in the row, holding the <Shift> key and then selecting the last extension number in the row.

   *The subscription data of the first 25 extensions, which are subscribed in sequence, are put on one DAP and share the same (DAP) IP address. These extension numbers must be in the same IP Duplication Group (PRG 15-05-18). The second set of 25 extensions are put on another DAP and should be put in another IP Duplication Group (PRG 15-05-18).*
3. Click **Enable**, located in the lower left of the Figure 6-3 DECT Manager – Enable Subscriptions screen.

The subscription procedure for the selected extension is now active and a pin code is displayed. This screen shows an example of an extension number that is enabled for subscription.

*The PIN code is active for 15 minutes. The subscription procedure must be executed from the handset that you want to subscribe during this time. If not executed during this time frame, the subscription procedure is terminated and the PIN code is removed.*

![Figure 6-3 DECT Manager – Enable Subscriptions](Image)

### 4.2 Subscribing at the Handset

Use the following procedure to complete the subscription from the NEC C124 Dect handset.

1. Press the **OK** button on the handset.
2. Arrow down to the **Reg. Menu**, and press **OK**.
3. Arrow to subscribe, and press **OK**.
4. The Screen displays:

Subscribe

AC Code _ _ _ _

Enter the PIN for the extension you want to assign to the handset from the subscription screen in the DAP Manager, and press OK.

5. The (subscription) status in the DECT Manager should change from Enabled to Subscribed, indicating that the handset is subscribed.

The handset cannot be used until it is established in the NEC Telephone System.

6. Repeat the subscription procedure for all handsets being used on the system.

7. It is important that you export the system to a safe and reliable medium. Refer to Chapter 8 Backup/Restore (Export/Import).

Remember, if your PC crashes, you lose all subscription and system data!

8. When the system is exported, it is removed from the PC. To restore it to the PC, use the import option.

9. This completes the IP DECT system setup procedure.
-- NOTES --
SECTION 1  DAP LED INDICATIONS

The DAP has one LED, which can provide six different status indications for DAP. Refer to Table 7-1 DAP LED Status Indications.

<table>
<thead>
<tr>
<th>LED Status</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No power.</td>
</tr>
<tr>
<td>0.5 seconds On - 0.5 seconds Off</td>
<td>Loading software/firmware.</td>
</tr>
<tr>
<td>Short flash every 0.25 seconds</td>
<td>IP Network error (not connected, no DHCP/TFTP server, no DAP Controller).</td>
</tr>
<tr>
<td>Fast blink</td>
<td>DAP operational, but trying to synchronize to another DAP.</td>
</tr>
<tr>
<td>Continuous fast blink</td>
<td>Hardware error.</td>
</tr>
<tr>
<td>Steady On</td>
<td>DAP operational (and synchronized to other DAP or is the synchronization master).</td>
</tr>
</tbody>
</table>

SECTION 2  VISIBILITY CHECKING

After the installation is finished and the DAPs are running, perform a visibility check. The visibility check is necessary, to determine if the DAPs can “see” each other.

Use the following procedure to execute the visibility check.
2.1 Checking the Visibility of DAPs

1. Start the Performance Manager in an Internet Explorer window. To do this, enter the following URL: http://localhost/cds/perform.aspx. Or, go to Start/Programs/DAP Controller/DAP Applications/IP DECT Performance Manager.

Figure 7-1 Performance Management should be displayed.

2. Click the **Save Visibility** button, and save the text file in a location of your choice.

3. Start the DAP Sync Analyzer tool by selecting: Start, All Programs, DAP Controller, DAP Applications, DAP Sync Analyzer.
4. After the tool is started, the Main window is displayed.
5. On the Main window, go to the **File, Open**.

6. Open the file that you have saved in Step 2 on page 7-2. The synchronization structure of the DAP is displayed. Figure 7-4 Accessing DAP Sync Analyzer – Synchronization Structure is an example.

![Figure 7-4 Accessing DAP Sync Analyzer – Synchronization Structure](image)

7. Check the displayed synchronization structure. If an exclamation mark is in front of a DAP RPN (Radio Part Number), it indicates a possible problem. Normally it indicates that a DAP "sees" only one DAP that is higher in the hierarchy.

If you click on an RPN, the visibility information of the DAP is displayed in the bottom left pane.
In the visibility, RSSI values are displayed as hexadecimal in the range: 0...e., where 0 is no signal. The minimum level for stable synchronization between DAPs is the boundary between value 3 and 4 (approximately). When the value is 3, synchronization is still possible but it may not be stable.

Generally, the Phase difference must be ffffffff with a maximum deviation of 7 (higher or lower).

8. The tool can calculate the best master, which means that the synchronization structure is as flat as possible. Go to **View, Best Master**. The best master is now highlighted. Using the DECT Manager window, you can change the RPN number of that DAP to a value lower than the lowest RPN number in the system. The DAP with the new RPN number becomes the synchronization master.

9. If necessary, create a new visibility file and analyze the structure again.
SECTION 1  GENERAL

Backup is made using the Export System option. Refer to Section 2 Export System. The Export System function exports all relevant data of your system. After an Export is done all relevant system data is removed from your DECT Management environment and stored in a file. Store this file in a safe place!

If you want to continue using your DECT Management PC for the IP DECT system that you have (e.g., to use the computer for management of your local DECT system only), Import the data that you exported.

You can restore a system configuration by executing an Import. Refer to Section 3 Import System.

After a successful installation, ALWAYS execute the Export and Import function. Remember, if your PC crashes, you lose ALL Subscription and System data and you must start from scratch.

SECTION 2  EXPORT SYSTEM

To export a system configuration:

1. Start the DAP Configurator tool by selecting: Start, All Programs, DAP Controller, DAP Configurator.
2. Select modify system and select the system you want to export.

3. Select **Activate/Deactivate/System Status**.

4. Click **Deactivate**. Note that this does not bring the system down, the DAPs remain fully operational.

![Figure 8-2 IP DECT Configurator – Deactivate System](image)

5. Click **Export System**. (Refer to Figure 8-3 IP DECT Configurator – Export System on page 8-3.)
6. A window is opened, which allows you to store the file in a location of your choice. (Refer to Figure 8-4 IP DECT Configurator – Browse for Folder on page 8-4.)
SECTION 3 IMPORT SYSTEM

3.1 Import a System Configuration

To import a system configuration:

1. Start the DAP configurator tool, via Start, All Programs, DAP Controller, DAP Applications, DAP Configurator. (Refer to Figure 8-5 Accessing DAP Configurator to Export on page 8-5.)
2. When the DAP Configurator is displayed, click **Import System**.
3. Browse to the file folder that contains the system you want to import. Import all individual files from the zipped file. Import of a single zip file is not possible.

   Press **Ctrl-A** to select all the files at once, then click **Open**.
SECTION 1  GENERAL

When a DAP is broken, it must be replaced. However, replacing a DAP can cause problems:

- Synchronization structure might change if the new DAP has a different RPN (Radio Part Number) than the replaced DAP.
- Due to the Distributed mode operation, subscription records are not automatically moved from the broken DAP to other DAPs or to the newly installed DAP.

To avoid problems in replacing a DAP you must use the replacement procedure in this chapter.

If a DAP is broken, the handsets that have their subscription records in the broken DAP are not usable. This means that immediate intervention is needed.

SECTION 2  REPLACING DAP

This procedure requires that you have a new replacement DAP available.

To make sure that the newly installed DAP behaves in the same way as the replaced DAP, execute the following procedure:

To replace a DAP:

1. Verify the DAP Manager is running.
2. Verify that the DHCP server and the TFTP server are running on your DAP Manager PC (use the DAP Configurator tool to start the DHCP/TFTP Servers.
3. Open the DECT Manager WEB interface.
4. Click Access Points. Note the RPN of the DAP that must be replaced.
5. Disconnect the DAP that must be replaced! Do not continue this procedure until the DECT Manager indicates that the DAP is not working.
6. Connect the new DAP. Wait until you see that the new DAP is running (in the DECT Manager interface).

7. Click the **Edit** button for the new DAP.

8. Change the RPN of this DAP to the RPN of the replaced DAP and click **OK**.

9. The new DAP reboots. When the DAP is running again, it should have the RPN of the replaced DAP.

10. The subscriptions that were active in the replaced DAP are automatically installed in the new DAP. This can take a few minutes. Check that the subscriptions of the replaced DAP are on the new DAP.

   After the subscription records are placed in the new DAP, switch the handsets associated with these records, off and on, to make them operational again.

11. Verify that you can make phone calls using the new DAP.
Replacing a Handset

SECTION 1  GENERAL

When a handset must be replaced, the old handset must be unsubscribed and the new handset must be subscribed.

SECTION 2  UNSUBSCRIBE A HANDSET

1. Check that the DAP Manager/Controller PC is connected to the IP DECT Network. If not, connect the DAP Manager/controller PC to the network and, if necessary, adapt the network settings as described in Section 4 Setting up your Network Adapter for IP DECT on page 4-2.

2. Open the DECT Manager interface (refer to Section 2 Starting the DECT Manager on page 6-1). If a configuration of the DECT system is still in your DECT Manager, check that this configuration is still up to date for the IP DECT system that you want to manage. If you are not sure, restore a saved backup of the system. (Refer to Section 3 Import System on page 8-4.)

3. Make sure that the handset is switched on and within reach of a DECT radio. If the handset is lost or broken, proceed to Section 3 Terminating a Subscription.

4. In the DECT Manager window, click the extension number of the handset that you want to replace and click Disable.

5. Now the subscription data is removed from the IP DECT system and from the handset. You should see that the handset does not show the system information. Also you should see that the status of the extension in the DECT Manager window goes from Subscribed to Blacklisted to Free. If the IP DECT system cannot reach the handset, the Disable procedure is not executed! In that case proceed to Section 3 Terminating a Subscription.
SECTION 3  TERMINATING A SUBSCRIPTION

Execute this procedure only if the previous procedure (Unsubscribe a handset) failed because the handset could not be reached or is broken. Using this procedure does not remove subscription data from the handset. The subscription data in the handset becomes unusable and therefore must be removed from the handset manually (if the handset supports manual removal of subscription data).

To terminate a subscription:

1. Check that the DAP Manager/Controller PC is connected to the IP DECT Network. If not, connect the DAP Manager/controller PC to the network and, if necessary, adapt the network settings as described in Section 4 Setting up your Network Adapter for IP DECT on page 4-2.

2. Open the DECT Manager interface (refer to Section 2 Starting the DECT Manager on page 6-1). If a configuration of the DECT system is still in your DECT Manager, check that this configuration is still up to date for the IP DECT system that you want to manage. If you are not sure, restore a saved backup of the system (refer to Section 3 Import System on page 8-4).

3. In the DECT Manager window, click the extension number of the handset that you want to replace and click Terminate.

4. Now the subscription data is removed from the IP DECT system and NOT from the handset. The status of the extension in the DECT Manager window goes from Subscribed to Free.

SECTION 4  SUBSCRIBING HANDSET

After the old handset is removed, the new handset can be subscribed. For the procedure, refer to 4.2 Subscribing at the Handset on page 6-4. Check that the handset is on the same RPN (Radio Part Number) as the one you have replaced.