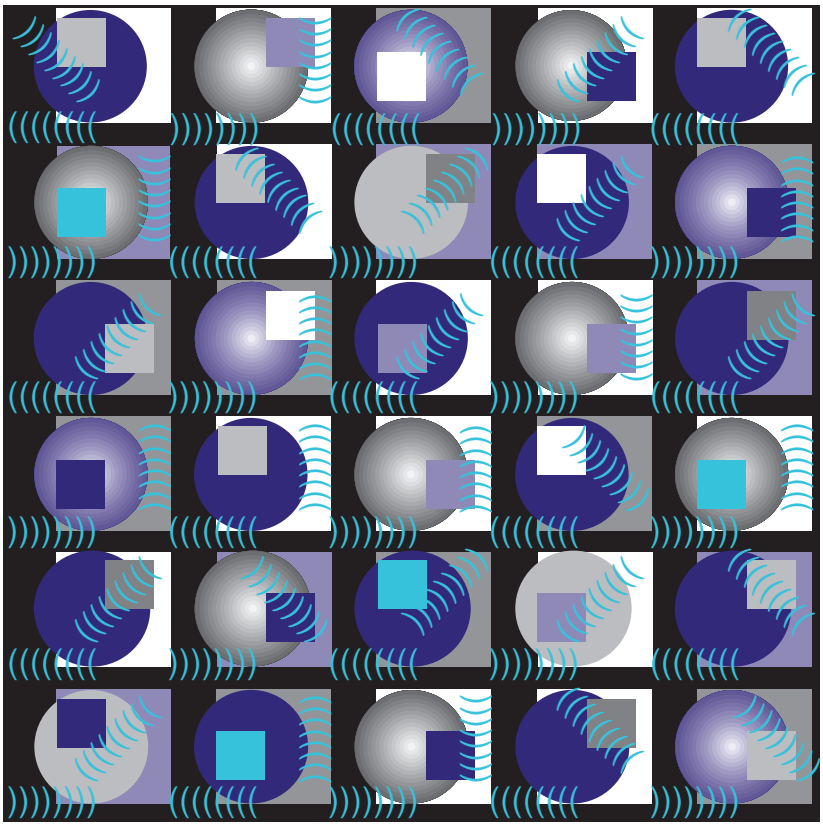
IBM Wireless LAN

Installing and Operating Your Network



IBM Wireless LAN

Installing and Operating Your Network

IBM

Note!

Before using this information and the product it supports, be sure to read the general information under Appendix E, “Notices” on page 255.

Second Edition (December 1995)

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About This Book

Who Should Use This Book

You should read this book, if you will use IBM Wireless LAN software to install and configure an IBM* wireless local area network (LAN).

Note: The information in this book assumes that before installing the IBM Wireless LAN, you have already installed NetWare** or OS/2* on the bases and servers by following the NetWare or OS/2 documentation.

How to Use This Book

This book is divided into three main parts:

Part 1, "Getting Started." gives you background information on the IBM Wireless LAN and shows you how to prepare your installation.

Part 2, "Software Installation and Set Up Processes" describes how to install and operate the IBM Wireless LAN. The IBM Wireless LAN can operate in a wide variety of networking situations. Inevitably there are a number of alternative installation and configuration procedures. This part of the book guides you through choosing and using the correct install and configure procedures for all choices of base and remote workstations.

Part 3, "Appendixes" for trouble shooting and problem determination.

Contents of Each Chapter

Part 1, "Getting Started." :

Chapter 1, "Overview" describes the benefits of the IBM Wireless LAN, network configurations, security features, and performance considerations.

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Chapter 2, “Radio Propagation” provides background information on the IBM Wireless LAN, such as radio wave propagation, cell area for different environments, placement of radio modules. It describes the principle and benefits of the mobility feature which allows a wireless workstation to roam seamlessly around the geographical area covered by the network.

Chapter 3, “Cell Planning” describes how to fill out the worksheets used to install IBM Wireless LAN base and workstations.

Chapter 4, “Installing The Adapter” describes how to install the IBM Wireless LAN adapter for different types of system bus.

Part 2, “Software Installation and Set Up Processes” .

Chapter 5, “Choosing a Setup Procedure” describes how to choose the installation and configuration procedures for base and workstations.

Chapter 6, “Installing NDIS Software Files” describes how to install software files for an NDIS base and workstations.

Chapter 7, “Configuring OS/2 Bases” describes both basic and advanced procedures for configuring an OS/2 base.

Chapter 8, “Configuring NDIS Workstations” describes how to configure an NDIS workstation.

Chapter 9, “Setting Up Network Management on OS/2 Bases” describes how to set up the Network Management under OS/2.

Chapter 10, “Setting Up NetWare Bases” describes how to install and set up a NetWare Base.

Chapter 11, “Setting Up ODI Workstations” decribes how to install and set up ODI workstations.

Chapter 12, “Setting Up Network Management on NetWare Bases” describes how to set up the network management function in an IBM Wireless LAN running under NetWare.

Chapter 13, “Security” describes how to set up the network security functions for bases and workstations.

Chapter 14, “Access Control” describes how to set up the access control functions for wireless workstations on selected bases.

Chapter 15, “Using Remote Program Load” describes the RPL function for running in both OS/2 and NetWare environments.

Part 3, “Appendixes” consists of:

Appendix A, “Troubleshooting Wireless Network Problems,” which describes how to handle problems that may arise while installing and operating your IBM Wireless LAN.

Appendixes B through F contain complementary information, including:

- Examples of system files
- Alerts, Warnings and Messages displayed by the IBM Wireless LAN software.
- Code points for network management
- Various notices.

Related Publications

The following IBM Wireless LAN publication is also available:

Designing Your Network, GA33-0189

For assistance in obtaining IBM publications, contact your IBM representative or the authorized dealer serving your locality.

Part 1. Getting Started.

Part 1 introduces the IBM Wireless LAN and describes how to start your installation.

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Chapter 1. Overview

The IBM Wireless LAN allows personal systems and LAN workstations to access LANs, such as token ring, Ethernet, or IBM PC Network, via short-range wireless communication.

Cell Definition

Wireless communication in the IBM Wireless LAN is based on the propagation of radio waves in an indoor environment between a base wireless station and wireless workstations. The geographical area in which this wireless communication takes place is called a **cell**. A cell is considered as a circular space with the base wireless station in its center, and is the basic element of the IBM Wireless LAN. The base wireless station is referred to as **base** in the rest of this book.

Wireless communication in the IBM Wireless LAN is different from signal transmission using metallic cables or optical fibers in conventional LANs. The benefits of the IBM Wireless LAN are:

- Wiring cost savings
- Flexibility
- Quick installation and maintenance
- Enhanced end-user productivity
- Mobility within a site
- Easy extension of a wired LAN.

The IBM Wireless LAN provides an effective solution for communication in the following situations:

- Mobile applications.
- Buildings which are difficult to wire
- Temporary and leased offices
- Trade shows.

The following sections describe the configurations that you can set up with the IBM Wireless LAN.

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1.1 IBM Wireless LAN Configurations

The needs of your organization and its physical layout determine the topology of your wireless network. You can use two different configurations :

Stand-alone cell

Wired LAN cells bridged or routed to Token Ring, to Ethernet or other types of media.

Stand-alone Cell

A stand-alone cell is composed of a base, and up to 50 connected wireless workstations. The number of simultaneous users in a cell depends on the type of data traffic. Such a configuration is shown in Figure 1.

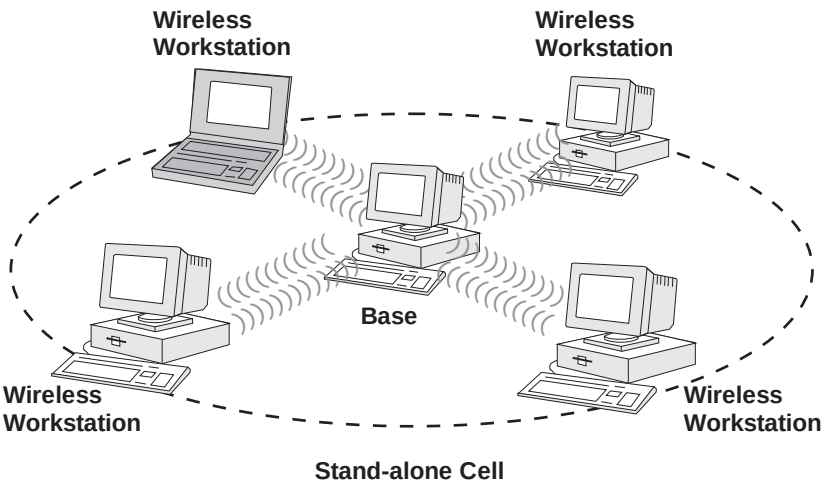


Figure 1. Typical Stand-alone Cell Configuration

In a stand-alone cell, the **base:**

- Is unique
- Manages the data traffic within the cell
- Contains the **Network Administration Program (NAP)**, which allows you to perform administration tasks such as access control.

In a stand-alone cell, the **wireless workstations:**

- Are used as LAN workstations by end-users
- Are identified by the base
- Can communicate with the base and other wireless workstations.

The stand-alone cell is an easy and fast way to set up data communications between several workstations. This configuration does not require any cabling.

You may install several overlapping cells in the same physical area. Wireless workstations, however, can communicate only with other wireless workstations in the same cell.

Note: The maximum number of fully overlapping cells in the same physical area is 12. In case of partial overlapping cells, this number can be extended. This number may be lower in some countries due to local radio spectrum regulations. In Japan, for example, the maximum number of overlapping cells is 6.

Figure 2 shows an example of a stand-alone cell that is used to set up a wireless LAN in several offices of a single-floor building.

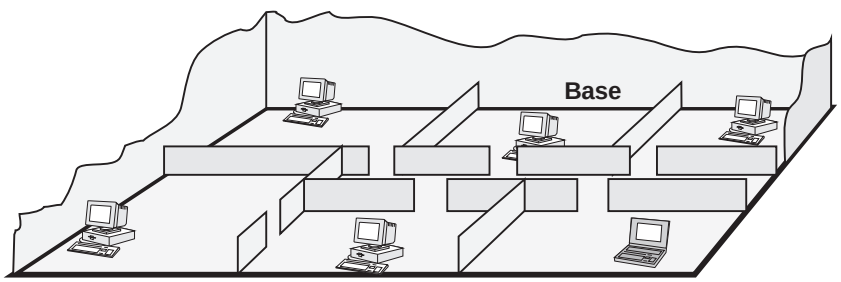


Figure 2. Example of a Stand-alone Cell

If you want wireless workstations in a stand-alone cell to communicate with remote servers over a network, you must connect the stand-alone cell to a wired LAN. If the wired LAN is managed by a network management station, you can have the stand-alone cell managed by the same station by connecting the cell to the wired LAN. The next section describes how to do this.

Wired LAN Cells

A wired LAN cell is a cell connected to a wired LAN. The wired LAN may already exist or can be installed to connect existing cells already installed in different buildings. Each cell is identical to a wired LAN segment.

In wired LAN cells, the **bases:**

- Are one per cell
- Are connected to the wired LAN
- Manage the data traffic within their cell.

One base contains the NAP, which allows you to perform administration tasks such as access control and base list definition.

Note: The NAP may also be installed on a station, connected to the wired LAN, that is not a base. In this case, you do not need to install an IBM Wireless LAN adapter in this station.

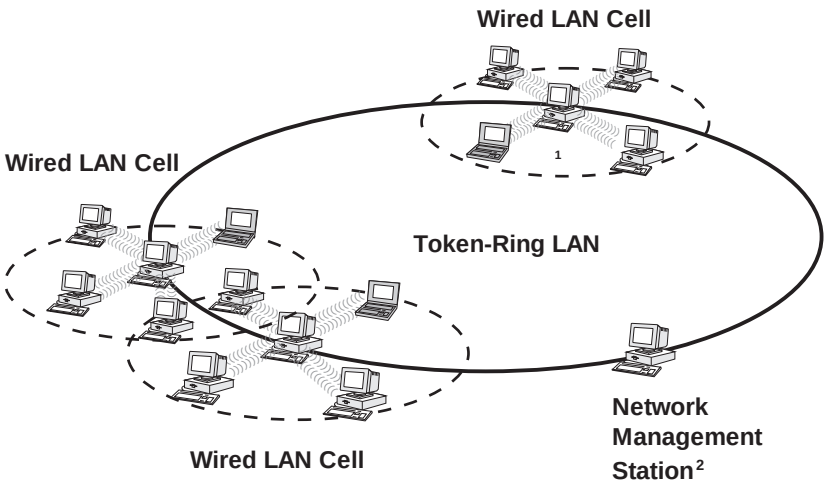
In wired LAN cells, the **wireless workstations:**

- Are used as LAN workstations by end-users
- Are identified by the bases
- Can communicate with any server or workstation connected to the wired LAN
- Can communicate with bases and wireless workstations in any cell.

Wireless Network Definition

A wireless network consists of up to 60 wired LAN cells managed by a NAP. A wireless network is identified by the network name defined in the NAP.

Figure 3 and Figure 4 on page 9 show two examples of wireless networks.

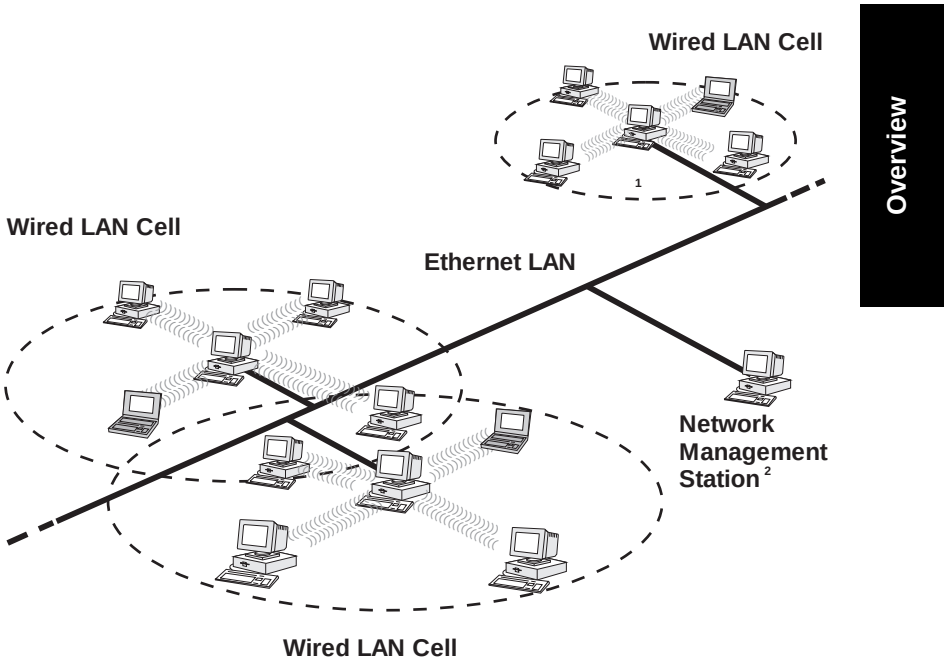


Legend

Contains the NAP.

Refer to “Network Management” on page 11.

Figure 3. Example of Wireless Network Using a Token-Ring LAN



Legend

Contains the NAP.

Refer to “Network Management” on page 11.

Figure 4. Example of Wireless Network Using an Ethernet LAN

Figure 5 shows how wired LAN cells can be used to set up a wireless LAN in a three-floor building.

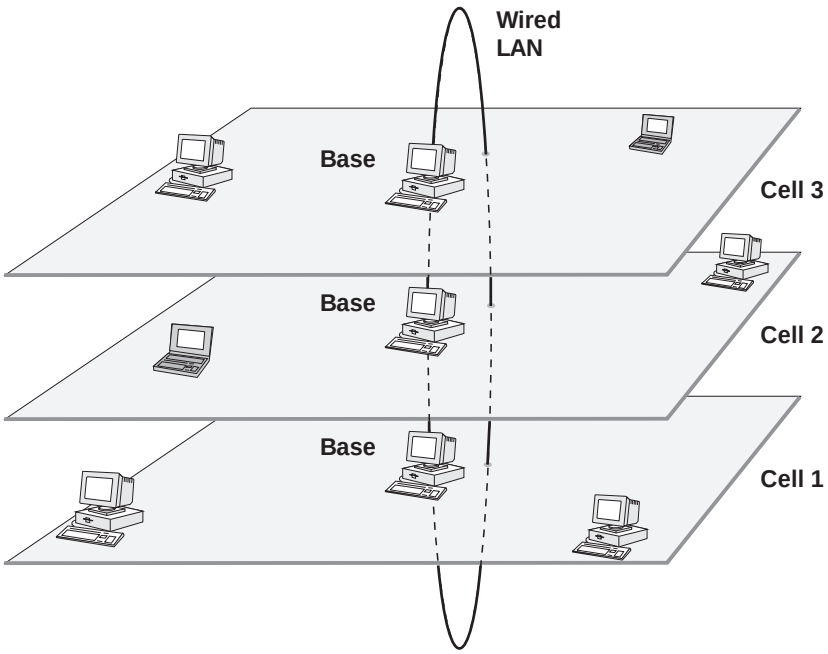


Figure 5. Example of Wired LAN Cells in a Three-Floor Building

LAN Connectivity

The wired LAN can include bridges or routers. This allows you to organize groups of users into different cells in different wireless networks. All users share the same resources, regardless of their geographical proximity.

Table 1 shows the possible types of connection to use depending on your environment and the type of the wired LAN you are using.

Table 1. LAN Connectivity

Environment	Wired LAN Type	Connectivity To Be Used
OS/2*	Token-Ring	Bridge function provided with the IBM Wireless LAN software
OS/2	Ethernet	Bridge function provided with the IBM Wireless LAN software
OS/2	Token-Ring, Ethernet, or any media type supported by TCP/IP for OS/2	IP routing provided with TCP/IP for OS/2
OS/2	Token-Ring, Ethernet, or any media type supported by IBM Communication Manager/2	SNA Gateway provided by Communication Manager/2
NetWare**	Token-Ring, Ethernet, or any media type supported by NetWare	Routing IPX or IP provided with NetWare

Network Management

If you have several cells connected to a wired LAN, we recommend that you manage your wired LAN cells and other resources of your network from a single point. A network management station can be connected to the wired LAN to:

Efficiently manage your wireless network by displaying alerts and messages received from bases.
Act as a service point.

The network management station must use the simple network management protocol (SNMP). Stations such as IBM NetView/6000 or Novell** NMS can be used.

The SNMP protocol defines Traps as a method to send unsolicited notifications from a base to the network management station. Traps reporting problem conditions include additional information allowing NetView/6000 to convert a Trap into a generic alert to be sent to NetView* (running on a mainframe). A NetView/6000 operator or automation program can also issue SNMP requests which are sent to the bases.

Note: Although a network management station is optional, you are strongly recommended to install one in your wireless LAN.

1.2 End User Considerations

From the point of view of a wireless workstation user, the IBM Wireless LAN functions like a wired LAN. Each wireless workstation automatically establishes a connection to the base from which it receives the clearest radio signals. This is transparent to the user. Therefore, all wired LAN resources are available to each wireless workstation, regardless of the base it is connected to.

A remote program load (RPL) function is provided by the IBM Wireless LAN software. This function makes it possible for you to load application programs from an RPL server into a wireless workstation even though this wireless workstation may not have a disk or diskette drive.

A wireless workstation user may monitor the level of the radio signal received through the received signal strength indicator (RSSI) application available on the wireless workstation screen.

1.3 Wireless Network Security

Because there is no physical connection between a wireless workstation and the wireless network, the following features are provided:

- Each wireless workstation is registered and authenticated at the wireless network through system-generated security codes.
- Data can be encrypted before transmission over the radio link.
- Each attempt to access the wireless network from a wireless workstation is checked by the NAP.

These features can be enabled at installation or later.

1.4 Performance Considerations

Data is exchanged over the wireless network as compressed data. The compression factor depends on the data type. The media speed of the IBM Wireless LAN is 1Mbps through air. Actual data throughput within a cell depends on the traffic type, the compression factor, and protocols' overhead.

Note: To improve network performance, use the compression option. The compression option can be enabled independently for each wireless workstation at installation or later.

1.5 Radio Frequency Management

The IBM Wireless LAN Adapter selects the radio frequencies used and the radio power emitted according to your local telecommunication standards, and automatically manages interference.

1.6 Power Saving

In order to save battery power, the IBM Wireless LAN allows you to reduce the current consumption on portable computers. Whenever the IBM Wireless LAN uses this technique for battery saving (about 30%), it is working in the **Power Saving** mode. Power saving mode is the normal and default operating mode.

Chapter 2. Radio Propagation

This chapter presents technical information to help you plan the number of cells in your IBM Wireless LAN, according to your site characteristics.

Reminder: A cell is considered as a circular space with a base in its center.

The area of the cell depends on:

- The type of building in which your wireless network is installed
- The floor plan of the building
- The construction materials of the walls, the floors, the furniture, and other objects in the cell.

2.1 Radio Wave Propagation

The IBM Wireless LAN operates in the 2.4GHz frequency band. Radio waves in this spectrum can pass through nonmetallic obstacles such as walls and furniture. The obstacles, however, absorb and reflect part of the radio signal.

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The degree of absorption and reflection depends on the material the obstacles are made of:

Objects such as wood, glass, brick, or plastic let a large part of the radio signal through.
Water and objects that contain a large amount of moisture absorb a significant part of the radio signal.
Metallic objects are highly reflective and do not let radio signals through.

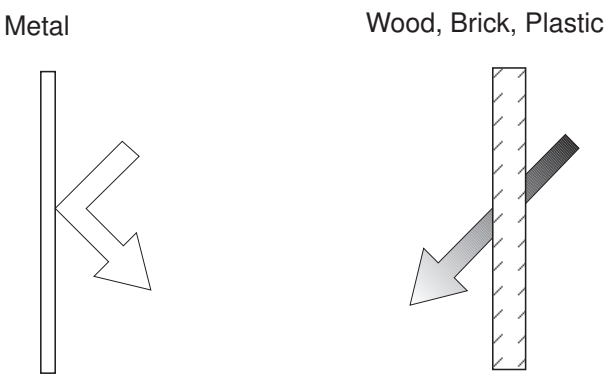


Figure 6. Example of Reflective and Absorbent Materials

2.2 Radio Frequency Allocations

The IBM Wireless LAN operates on the 2.4GHz Industrial, Scientific, and Medical (ISM) band.

The following parameters differ according to country or group of countries:

The number of radio channels allowed on that band.
The Effective Radiated Power (**ERP**).
The Equivalent Isotropically Radiated Power (**EIRP**).

These values are fixed by law within each country and cannot be changed. You may need this information later during installation of the IBM Wireless LAN software.

Table 2 on page 17 shows the radio frequency allocation by country. If your country is not listed in the table, use the values in the **all others** line.

Table 2. Radio frequency allocation by country

Countries	Country type	Min Freq (KHz)	Max Freq (KHz)	Spare Freq	ERP (mW)	EIRP (mW)
USA, Canada, Israel, all others	1	2401	2482	3	100	500
ETSI countries plus Singapore	2	2401	2482	3	20	100
Japan	3	2472	2496	2	50	230
New Zealand	4	2401	2479	6	100	500
Mexico	5	2401	2482	3	20	100
France	6	2448	2482	4	20	100
Hong-Kong	7	2426	2474	6	20	100
Australia	8	2401	2449	6	100	500
Korea	12	2401	2426	3	50	230

Note: European Telecommunications Standards Institute (ETSI) countries are:

Austria	Belgium	Bulgaria
Czechoslovakia	Denmark	Finland
Germany	Hungary	Ireland
Italy	Luxemburg	Netherlands
Norway	Portugal	Spain
Sweden	Switzerland	United Kingdom

Number of Radio Channels and Transmission Robustness

Radio waves emitted by base and workstations are non-directional. To allow overlapping cells, the IBM Wireless LAN transmitter hops from one frequency to another within a permitted range. The duration of transmission on a frequency is fixed, but the value of the next frequency is decided at pseudo-random by the base station.

2.3 Cell Area for Different Environments

The number of required bases is obtained by determining how many cells are needed to provide radio coverage of the desired area.

Three types of environment are considered:

A closed space such as a collection of rooms, a floor with individual offices, or a house.

A semi-closed space such as a large room with cubicles, a store, a warehouse, an exhibit hall, or a factory floor; or a large space containing various objects such as dividing panels, shelves, goods or machines. The radio coverage depends on the location, size, and material of the various objects.

An open space such as a corridor in which there are no obstacles between the base and wireless workstation.

Table 3, Table 4 and Table 5 on page 19 show the average maximum distance between a base and a wireless workstation, in different environments depending on ERP and EIRP parameters.

Table 3. Cell Area in Different Environments for ERP=100mW and EIRP=500mW

Environment	Distance	Cell Area
Closed Space	25 m (82 ft.)	1250 m (13 500 sq. ft.)
Semi-Closed Space	Up to 85 m (278 ft.)	Up to 15 000 m (155 000 sq. ft.)
Open Space	180 m (590 ft.)	65 000 m (700 000 sq. ft.)

Table 4. Cell Area in Different Environments for ERP=50mW and EIRP=230mW

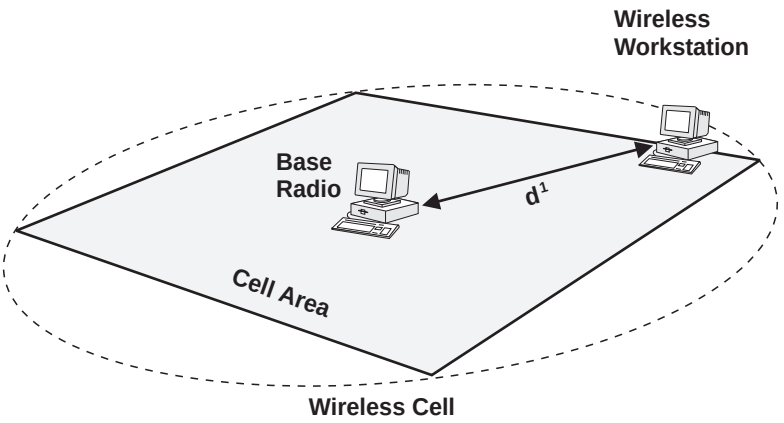
Environment	Distance	Cell Area
Closed Space	20 m (66 ft.)	800 m (8 600 sq. ft.)
Semi-Closed Space	Up to 65 m (214 ft.)	Up to 8600 m (95 000 sq. ft.)
Open Space	130 m (427 ft.)	34 000 m (370 000 sq. ft.)

Table 5. Cell Area in Different Environments for ERP=20mW and EIRP=100mW

Environment	Distance	Cell Area
Closed Space	16 m (53 ft.)	500 m (5 400 sq. ft.)
Semi-Closed Space	Up to 45 m (148 ft.)	Up to 4100 m (44 100 sq. ft.)
Open Space	90 m (296 ft.)	16500 m (178 000 sq. ft.)

A building is usually a square or a rectangle. A cell, however, is a circle. The radius of this circle is the distance between the base radio and the wireless workstation that is farthest away from the base.

Figure 7 on page 20 shows that the cell area, specified in the tables above, includes only that portion of the square or rectangular building that lies within the radius of the cell.



Legend

Distance given in Table 3, Table 4 and Table 5.

Figure 7. Cell Area Versus Wireless Cell

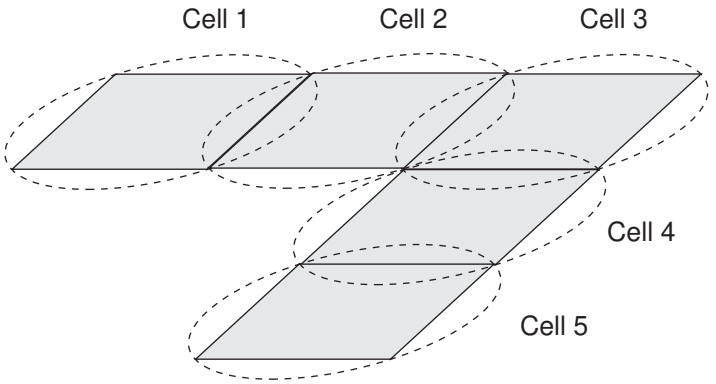


Figure 8. Example of Building Coverage

In some situations, the distance given for reliable wireless communications can exceed the data given in the tables above.

Wireless communication between adjacent floors is possible if the floor material is not highly absorbent or reflective. We recommend, however, that all workstations of a cell be on the same floor.

2.4 Placement of Radio Modules

The IBM Wireless LAN adapter consists of an external unit and a adapter card or a PCMCIA Credit Card. The external unit is called a **radio module**.

This radio module contains the antenna. It is connected by cable to the adapter card or the PCMCIA Credit Card.

Considering that each base must be located at the center of the cell it controls, cells should be arranged in a manner to cover the site. The following guidelines for radio module placement ensure reliable operation of the wireless network.

Place all radio modules:

- So that they are not hidden by metallic objects
- Far from moving objects such as fans or metallic doors
- Away from radiation sources that emit in the 2.4GHz frequency band, such as microwave ovens.

In addition, place the base radio modules:

- Above the average furniture height, at least 1.5 m above the floor
- Above dividing panels, shelves, and so on
- At the center of the ceiling of a large room or corridor, or at the intersection of two corridors.

Modern buildings having metallic partitions are very common. We suggest that you install the base radio modules in the ceiling of corridors. Radio waves used by the IBM Wireless LAN are reflected along these partitions, and enter into offices through the doors or glass parts.

Extension Cable

You can purchase a 4 meter cable (approx 13 feet), to place the radio module further from the base. Its part number is 54G2016.

Custom Cable Kit

It is not always convenient to have the base station in the optimum position. For example, you might have a machine room that contains all your network servers and facilities, and want to put your base station there too. This might not be the center of the cell. In a case like this you can purchase the Custom Cable Kit:

Length up to 170 meters (approx 550 feet)
Part number 80G4320

This will allow you to place the radio module in the center of the cell, but have the base station secure in a machine room up to 170 meters away.

2.5 Received Signal Strength Indicator

The IBM Wireless LAN is supplied with software that shows the user of a wireless workstation the strength of the radio signal received from the base station. This provides an indicator on the screen which consists of a row of five squares each colored green or red according to the strength of the radio signal:

Green shows the level of the signal.

Red provides a visual warning if the strength is not sufficient.

The green is supplemented with a plus sign, the red with a minus sign, so the levels are readable on monochrome screens. The program that provides this information is included on the diskettes that contain the IBM Wireless LAN software, and is called the Received Signal Strength Indicator (RSSI).

Using radio waves instead of cables to connect workstations to the base allows for movement within the same cell. Users are no longer limited to one location. They can move the workstation to follow their work patterns as long as there is adequate reception of radio signals.

2.6 Workstation Mobility

The IBM Wireless LAN also allows workstations to move from one cell to an ***adjacent*** cell without the user having to inform network administration, nor without having to reconfigure the workstation. The transition from one cell to another is seamless. This facility is called **mobility.**

You might want mobility from one cell to another where a wireless workstation is moving around a large environment, such as a warehouse, hospital, or office complex, or an organization physically spread out over a large site. The workstation can roam the site at will as long as it stays within radio range of the base stations.

When the mobile workstation leaves a cell and enters another one, it may experience a small delay of a few seconds, but will not have to log off and on again to reach its applications.

The IBM Wireless LAN provides mobility for cells bridged to either Ethernet or Token Ring. All bases providing for mobility must be bridged to the same type of network, must have the same network name and must be controlled by only one NAP. The bases must either be on the same segment or on two different segments if there is a bridged path between those segments. A workstation cannot move between cells if there is a router on the network between the cells' base stations.

Each workstation can be:

Not mobile, when the mobility function is not supported by its base (see Table 7 on page 28, and Table 8 on page 29 for further information).

Mobile, with either:

- **Low Sensitivity** if you want to emphasize the cell coverage (maximum range) rather than the overall data throughput (maximum performance).
- **High sensitivity**, otherwise.

Chapter 3. Cell Planning

There are numerous possibilities when considering the type of wireless LAN required to serve an organization's needs. You must consider:

- The connection of the IBM Wireless LAN to a backbone.
- What kind of workstations exist already, or are required.
- The kind of base stations required to serve the workstations and connect them through to the wider network, if one exists.
- The networking applications that exist or are required on each workstation.
- Mobility requirements.

All these possibilities are shown in this chapter, with guidelines on how to choose those most suitable for each situation.

3.1 The Planning Process

The steps below represent the planning process for any wireless LAN network, from first deciding to build one to full operation:

1. For each cell you need to know:

   The networking and prerequisite software needed on each workstation, see 3.7, “Filling out the Workstation Planning Worksheet” on page 37.

   The type of connection to any backbone, see 3.2, “Cell Connectivity” on page 26.

   Base station characteristics, see 3.3, “Choosing the Base Station” on page 26.

   Workstation characteristics, see 3.7, “Filling out the Workstation Planning Worksheet” on page 37.

   The location of the station with the Network Administration Program, see 3.4, “Network Administration Program” on page 30.

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2 Complete the worksheets for each base and each workstation.

3 Order the required software and hardware.

This chapter contains worksheets so you can record the requirements for each base and workstation.

3.2 Cell Connectivity

The IBM Wireless LAN provides four kinds of connectivity:

Cell is bridged to a Token Ring network, see Figure 3 on page 8.

Cell is bridged to an Ethernet network, see Figure 4 on page 9.

Cell performs its own routing to an external network, and is 'not bridged'. The base must have networking software that can perform the routing functions, such as NetWare or TCP/IP. This base station of such a cell is also known as a 'router'.

A stand-alone cell, not connected to any external network, see Figure 1 on page 4. By definition a stand-alone cell is also 'not bridged'. It is possible to upgrade a stand-alone cell by connecting it to a backbone. The base station will need appropriate hardware and software, and must be reconfigured.

3.3 Choosing the Base Station

You choose the base by defining the protocols it needs to communicate with its remote workstations, and the connectivity it needs to a backbone.

1 Find the network application used on the workstation, on Table 6 on page 27. You will see that some applications can run under more than one operating system. This is not a selection criterion for a base station, but will be important if you have to buy that application.

Table 6 (Page 1 of 2). Protocols Used by Networking Software on Workstation

Network application	NDIS or ODI[1]	Operating system[2]	Protocol used
Communication Manager*	NDIS	OS/2 2.11	IBM IEEE 802.2
PC 3270*	NDIS	DOS 5.0[3] Windows 3.1	IBM IEEE 802.2
LAN Requester from LAN Server**	NDIS	OS/2 2.11 DOS 5.0[3] Windows 3.1	Netbios
Lan Manager**	NDIS	DOS 5.0[3] Windows 3.1	Netbios
Windows for Workgroups 3.11*	NDIS	Windows for Workgroups 3.11	NetBEUI
Lantastic**	NDIS	DOS 5.0[3] Windows 3.1	Netbios
NetWare Requester or NetWare for SAA**	ODI	OS/2 2.11 DOS 5.0[3] Windows 3.1	IPX (Internetwork Packet Exchange)
NetWare Lite**	ODI	DOS 5.0[3] Windows 3.1	IPX (Internetwork Packet Exchange)
TCP for OS/2 Package	NDIS	OS/2 2.11	IP(Internet Protocol)
TCP for DOS/Windows	NDIS	DOS 5.0[3] Windows 3.1	IP(Internet Protocol)
NetWare for SAA	ODI	DOS 5.0[3]	IP(Internet Protocol)
LAN WorkPlace	ODI	DOS 5.0[3] Windows 3.1	IP(Internet Protocol)
Banyan Vines	NDIS	DOS 5.0[3] Windows 3.1	VINES
NetWare Requester over ODI2NDI (requires LAPS CSD 7060)	NDIS	OS/2 2.11	IPX (Internetwork Packet Exchange)

Table 6 (Page 2 of 2). Protocols Used by Networking Software on Workstation

Network application	NDIS or ODI[1]	Operating system[2]	Protocol used
NetWare Requester over LANSUP Mapper	NDIS	DOS 5.0[3] Windows 3.1	IPX (Internetwork Packet Exchange)
NDIS applications over ODINSUP Mapper	ODI	DOS 5.0[3] OS/2 2.11	IBM IEEE 802.2 Netbios IP

Note: The procedures in this manual have been designed to install one of two communication drivers. Each driver operates to one of two standards:

Network Driver Interface Specification (NDIS).

Open Data link Interface (ODI)

Follow the procedures, and you will have the correct driver.

2 Note the protocol used by your networking application. Find the protocol in Table 7, or Table 8 on page 29. You will notice that some protocols are used in more than one situation.

Table 7 (Page 1 of 2). Capability of an OS/2 Base Station

Main protocol on workstations	Mobility for workstations	Base connectivity
IBM IEEE 802.2 Netbios IP IPX and others	Yes	Bridged to Token Ring

1 The ODI device driver for OS/2 does not support PCMCIA adapters.

2 Minimum version required.

3 If a PCMCIA Type II slot is installed, DOS 5.02 or above is required.

Table 7 (Page 2 of 2). Capability of an OS/2 Base Station		
Main protocol on workstations	**Mobility for workstations**	**Base connectivity**
IBM IEEE 802.2 Netbios IP IPX and others	Yes	Bridged to Ethernet
IP	No	Routing (not bridged)
Any protocol	N/A	Stand-alone (not bridged)

Table 8. Capability of a NetWare Base Station		
Protocol on workstations	**Mobility for workstations**	**Base connectivity**
IP IPX	No	Routing
Any protocol	N/A	Stand-alone (not bridged)

Note: When the mobility function is not supported by the base, the mobility parameter must be configured as off on the wireless workstation.

Choose the connectivity required for the base station. You are recommended to have all bases with the same connectivity. Your selection process points to either an OS/2 base or a NetWare base.

Notes:

1. The networking and operating systems are shown with the minimum version levels required for running IBM Wireless LAN software.
2. The list of networking applications is not exhaustive. If you have one not shown in this table, find out from its documentation what protocol it uses, and use that as the link for the base.

Examples of choosing a base station

The examples below show some combinations of requirements and the choice of base station available. It is not an exhaustive list.

Table 9. Examples of Choosing a Base Station

Characteristics of workstations	What base you will need
Runs Communication Manager under OS/2, uses protocol IBM IEEE 802.2, and requires mobility.	The choice is between an OS/2 base station bridged to Ethernet, or to Token Ring.
Runs NetWare Lite under DOS, uses protocol IPX, mobility not required.	The choice is both OS/2 bases (either bridged to Token Ring or Ethernet), and NetWare Wired LAN bases.
Runs Lan Manager under Windows, uses protocol Netbios, mobility not required.	The choice is an OS/2 base bridged either to Token Ring or Ethernet.
Runs PC 3270 under Windows, uses protocol IBM IEEE 802.2, needs connection through to a service on a Token Ring.	The only choice is an OS/2 base bridged to Token Ring.

There are many combinations possible. Use these tables to determine the best base for workstations. If you are building a new network, choose the simplest set of possibilities to minimize conflicts between workstations, and enhance the performance of the total network. You can organize groups of users into cells according to the needs of their working environment. All users share the same resources, regardless of their geographical positions.

3.4 Network Administration Program

The IBM Wireless LAN provides a program that carries out network administration for the entire network, including all bases and all cells. This program is called Network Administration Program (NAP) and provides:

Base and wireless workstation administration.

Security for base stations and wireless workstations.

Access control of remote stations to base stations.

The NAP can be on any station on the network, but you only need one NAP for the entire network. It is represented on the computer screen as a notebook with tab dividers for each administration function.

Base station administration

The NAP monitors and displays the status of all bases in the network and provides status displays when required. It keeps a log of all activity and any errors or problems with communication between base and workstations for later analysis.

Security

A security function is delivered as part of the IBM Wireless LAN software. It is not mandatory, but you are strongly advised to use it to protect your network. The NAP uses a system of security codes, one of which is assigned to each workstation.

The NAP computes a workstation security code, from the workstation name and the Universally Administered Address (UAA) that is encoded in the IBM Wireless LAN adapter. No communication can be possible from unauthorized computers because they won't have a recognized security code. To prevent guessing, the security code is 18 hexadecimal digits long.

Access Control

An access control function is delivered as part of the IBM Wireless LAN software. It is not mandatory, but you are strongly advised to use it to protect your network. It is a NAP feature that controls the times when a workstation can access its base and the network beyond. Access is based on one of two addresses:

The UAA encoded in the adapter card, in the computer.

The Locally Administered Address (LAA) that is assigned to the workstation as an alternative to the UAA.

A workstation's access can be limited to:

Selected base stations.

Times of the day.

Days of the week.

You can display, on an OS/2 NAP, a list of workstations registered to each OS/2 base.

3.5 Defining Your Cells

Once you determine the configuration, the number of bases, and the number and the location of the wireless workstations you want, fill out the worksheets in this chapter. The worksheets help you identify the characteristics of each base and wireless workstation in your wireless network.

Designing Your Network, GA33-0189, contains the same worksheets. If you have already filled out the worksheets in that book, you can use them to follow the procedures in this book. *Designing Your Network* also contains examples of filled out worksheets.

If you need to make copies of the worksheets, use the blank originals in this chapter. You are hereby authorized to copy pages in this chapter.

3.6 Filling Out the Base Planning Worksheet

This section contains the *Base Planning Worksheet* to be used for installing only wired LAN cells.

To fill out the *Base Planning Worksheet* on page 36, enter:

Network name. This name uniquely identifies your network. The network name must contain between 5 and 8 alphanumeric characters. At least two of the characters must be numbers. The first character cannot be a number. You cannot repeat a character in three consecutive positions.

Base name. (one to eight alphanumeric characters, without any spaces).

IP address. This unique Internet protocol (IP) address must be in Internet dotted notation in the format:

nnn.nnn.nnn.nnn

where nnn is a number between 1 and 254.

For an explanation of IP addresses in practice, see the Readme file.

Connectivity. For each base, tick the box that defines its relationship to the network. This can be only Token Ring, Ethernet, or Not Bridged.

Operating system. For a base bridged to Token Ring or Ethernet, this can be either OS/2 2.11, or OS/2 Warp. For a base not bridged to a network and using IP routing, or a standalone wireless cell, there is the additional choice, for a Netware base of NetWare 3.11 above (PTF 940228 for Japan).

Note: OS/2 2.11 or OS/2 Warp needs MPTS, or LAPS CSD 7020 as a prerequisite.

Backbone adapter. Defines the adapter, depending on the connectivity, that connects the base to the network. The following adapters are recommended for a bridge:

Token Ring Adapters

Token Ring Network 16/4 Adapter/A (Part 74F9410, feature 0419)

Token Ring Network Adapter/A (Part 69X8138, feature 4790)

Token Ring Network 16/4 Adapter/A (Part 25F7367, feature 7367)

Token Ring Network Adapter II (Part 25F9858, feature 9858)

Token Ring Auto 16/4 ISA Adapter (Part 92G7632, feature 3626)

Token Ring Auto 16/4 MCA Adapter (Part 92G7682, feature 3610)

Ethernet Adapters

IBM LAN Adapter/A for Ethernet (ISA Bus) (Part 48G7169, feature 7169)

IBM LAN Adapter for Ethernet TP (Part 60G0605, feature 0605)

IBM LAN Adapter for Ethernet CX (Part 60G0615, feature 0615)

IBM LAN Adapter/A for Ethernet (Micro Channel) (Part 48G7171, feature 7171)

IBM PS/2 Adapter/A for Ethernet Networks (Part 6451091, feature 1091)

Write the adapter name in this box.

Unique Ring Number. (This applies only to a base bridged to Token Ring.) In a Token Ring network, each ring is assigned a unique ring number. For the Token Ring side, ask your network administrator for the ring number already assigned to this ring. For the wireless LAN side, ask your network administrator for a value that has not been assigned to any other rings in the network.

Ethernets do not have ring numbers, but you must enter a number (of any value).

NDIS or ODI supported adapter or none. For a routed base, write the name of the adapter required for this computer. It must be a suitable adapter that supports ODI or NDIS, as appropriate for this computer. For a standalone cell, write NONE.

Network Administration (NAP). There can only be one NAP station on the network:

- If the NAP is on this base station tick the box **Local NAP** (base with NAP).
- If the NAP on this base controls other bases, tick the box **Controls Other Bases**, and give the local IP address for this base.
- If the NAP is on another base, tick the box **NAP on the Backbone** (base without NAP), and give its IP address.

Note: A base that controls other bases, or is controlled by a NAP on the backbone requires TCP/IP as a prerequisite. TCP/IP can come from one of these:

- MPTS
- IBM TCP/IP for an OS/2 base station

– NetWare for a NetWare base station

Base Station Planning Worksheet

1. Base identification (used in the Network Administration Program)

Network Name: _____ Base Name: _____ Base IP Address: _____

2. Wireless connectivity (used for configuring the base)

Connectivity:	Operating System:	Backbone Adapter:
☐ Bridge to Token Ring	OS/2 2.11 or WARP (1)	..... Ring Number LAN Side: ..... Ring Number Wireless Side: .....
☐ Bridge to Ethernet	OS/2 2.11 or WARP (1)	.....
☐ Not Bridged (routed or standalone cell)	☐ OS/2 2.11 or WARP (1)	NDIS Supported Adapter or None: .....
	☐ NetWare 3.11 or above (PTF 940228 for Japan)	ODI Supported Adapter or None: .....

(1) requires MPTS or LAPS CSD 7020

3. NAP inputs for base (used for configuring the base)

☐ Local NAP ☐ Controls other base (2) Local IP address: _____

☐ NAP on the backbone (2) NAP IP address: _____

(2) requires TCP/IP: from MPTS or IBM TCP/IP V2 for OS/2 station, or from Netware for Netware station

Figure 9. Base Planning Worksheet

3.7 Filling out the Workstation Planning Worksheet

This section contains the *Workstation Planning Worksheet* to be used for installing either a stand-alone cell or wired LAN cells.

To fill out the *Workstation Planning Worksheet* on page 39, enter:

Network name. This name uniquely identifies your network. The network name must contain between 5 and 8 alphanumeric characters. At least two of the characters must be numbers. The first character cannot be a number. You cannot repeat a character in three consecutive positions.

Workstation name. Each wireless workstation must have a unique name of five to eight alphanumeric characters, without any spaces.

Locally administered address(LAA). This parameter is optional. Enter this address only if you are using Locally Administered Addresses in your LAN as an alternative to Universally Administered Address (UAA).

- For a Token Ring, this address must be between 400000000000 and 7FFFFFFFFFFF and unique within the wireless network.
- For an Ethernet, this address must be between 020000000000 and FEFFFFFFFFFF and unique within the wireless network.

Universally administered address. This address is permanently encoded in the personal computer or Personal System/2 adapters manufactured by IBM. Each universally administered address is unique. You do not need this address if you are using the LAA.

If this workstation does not have a hard disk drive, you will need to run the Diagnostics option from the Utilities diskette to get the UAA.

Workstation security code. This code is eighteen hexadecimal characters long. It is computed by the Network Administration Program from the workstation name and UAA.

Mobility. If Mobility is allowed for this workstation, record whether high or low sensitivity is required.

Base type. You must enter the type of base to which the workstation is connected. Select:

- Ethernet for a base bridged to Ethernet.
- Token Ring for all others.

Operating system. Record the operating system under which the IBM Wireless LAN software will run.

Prerequisite and networking software. Write the names and release level of any software that must be installed in this workstation before the IBM Wireless LAN can be installed. See Table 6 on page 27 for a list.

- DOS and Windows workstation will require LAN Support Program (LSP) level 1.35 or higher for configuration.
- ODI workstations will require Link Support Layer (LSL) level 1.2 or higher to be installed before configuration.

Protocols. Record **all** the protocols required for the networking application on this workstation to communicate with applications on other stations. If there are other protocols not listed, write them below the boxes. See Table 6 on page 27 for a list.

Workstation Planning Worksheet

Network Name... _____ NDIS ☐ ODI ☐

Workstation Name _____ Type ☐ or ☐

Base Type:

OS/2 Base Ethernet.... ☐

Others..... ☐

Mobility:

None..... ☐

Low sensitivity..... ☐

High sensitivity..... ☐

Optional information:

Universal Administered Address. _____

or

generate

Locally Administered Address.... _____

Security Code.... _____

	OS/2 WARP		OS/2 2.11		WINDOWS 3.1		DOS 5.0(1)
Operating System.....	☐	or	☐	or	☐	or	☐

Prerequisite and Networking Software.... _____

	802.2	NETBIOS	IP	IPX
Protocols.....	☐	☐	☐	☐

Other Protocols..... (if any) _____

(1) PCMCIA adapters require DOS 5.02

Figure 10. Workstation Planning Worksheet

Chapter 4. Installing The Adapter

You must install an IBM Wireless LAN adapter in each base and each wireless workstation of your wireless network. The IBM Wireless LAN adapter consists of a adapter card and a radio module.

To install the adapter, follow the steps described in one of these sections:

For computers having an Industry Standard Architecture (ISA) bus, go to 4.1, “Using an ISA Bus” on page 42.

For computers having a Micro-Channel Architecture (MCA)* bus, go to 4.2, “Using an MCA Bus” on page 46.

For computers having a Personal Computer Memory Card Industry Association (PCMCIA) Type II Slot, go to 4.3, “Using a PCMCIA Type II Slot” on page 50.

If you do not know the type of bus in your computer, refer to the installation manual supplied with the computer. The bus type for IBM computers is as follows:

IBM PC/AT* or compatible has an ISA type bus.
IBM PS/2* Models 50 and above have an MCA type bus.
IBM ThinkPad* has a PCMCIA Type II slot.

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4.1 Using an ISA Bus

Each adapter card in your computer has:

Input/Output (IO) Base Address. This is the address used by the computer to identify and communicate with each adapter.

Interrupt Level (also called an Interrupt Request Level IRQ). This establishes the priority by which the adapter can interrupt the computer.

Remote Program Loading (RPL) capability.

Direct memory access (DMA) arbitration level. This parameter establishes the priority by which the adapter can access the computer memory.

You need to set one of each of these values on the DIP switches of the adapter card. The values you use must not be in use by other adapter cards on the same computer.

Figure 11 shows the location of the DIP switches on an ISA adapter card.

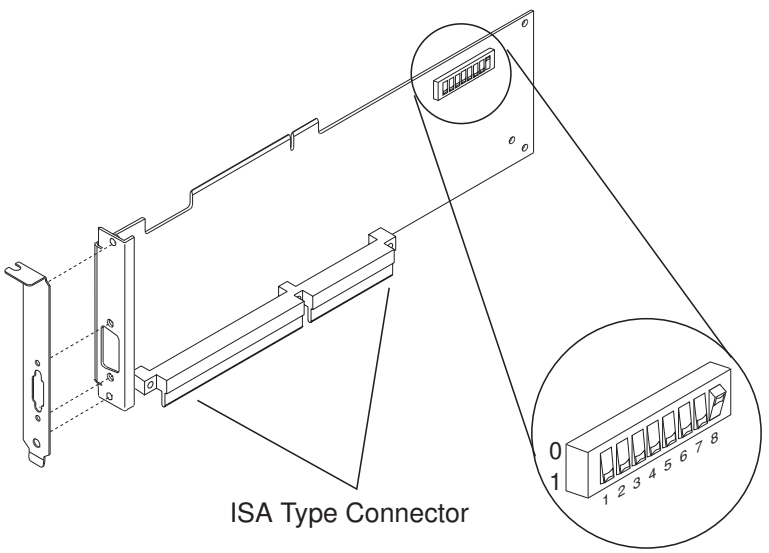

Figure 11. Preparing the Adapter Card for an ISA Based Computer

The switch positions shown in Figure 11 represent the value 00000001, that is, switch 8 has been set to value 1 (one), the others are set to value 0 (zero).

Attention: For setting the switch positions 0 or 1, use the values shown on the adapter card. DO NOT use the values printed or inscribed on the switch itself.

To install the adapter in a computer with an ISA bus, follow these steps:

1 On your adapter card position the DIP switches to set the IO Base Address.

The possible IO Base Address settings are shown in Table 10.

Table 10. I/O Base Address, ISA Mode

Switch Positions 1 2 3	I/O Base Address
0 0 0	86A0
1 0 0	96A0
0 1 0	A6A0
1 1 0	B6A0
0 0 1	C6A0
1 0 1	D6A0
0 1 1	E6A0
1 1 1	F6A0

2 On your adapter card position the DIP switches to enable or disable the RPL memory.

Table 11. RPL Memory Enable, ISA Mode	
Switch Position 4	**RPL Memory**
0	Disabled (***not*** using the RPL feature)
1	Enabled

If your wireless workstation will be using this feature, see Chapter 15, “Using Remote Program Load” on page 167, you will have to enable memory for RPL by setting a DIP switch on this adapter card.

3 On your adapter card position the DIP switches to set the Interrupt Level (IRQ). The lowest value is given the highest priority.

The adapter is preset to **10**, but should be changed if it conflicts with any other adapter card in this computer.

Note: The IBM Wireless LAN adapter **does not support** interrupt level sharing. Therefore, make sure that no other adapter in your computer uses the same interrupt level. If necessary, change the interrupt level of the IBM Wireless LAN adapter.

If you want to use interrupt level 9 for the IBM Wireless LAN adapter, make sure that no other adapter in your computer uses interrupt level 2.

Table 12. Interrupt Level (IRQ), ISA Mode	
Switch Positions 5 6	**Interrupt Level**
0 0	9
1 0	10
0 1	11
1 1	15

4 On your adapter card position the DIP switches to set the Direct Memory Access arbitration level.

This parameter establishes the priority by which the adapter can access the computer memory. The lowest value is given the highest priority. The recommended value is **3**.

Table 13. DMA Arbitration Level, ISA Mode

Switch Positions 7 8	ISA DMA Level
0 0	0
1 0	1
0 1	3
1 1	Invalid

5. Put the ISA type front metallic bracket in place and make sure that it is screwed in firmly.
6. Turn OFF the computer and all attached options, such as the display and printer.
7. Unplug all power cords from electrical outlets.
8. Remove the computer cover.
9. Install the adapter card in a free extension slot, by following the documentation supplied with your computer.
10. Install the computer cover.
11. Open the cover masking the cable connector on the radio module.
12. Connect the flat connector of the cable to the radio module.
13. Close the cover of the radio module.
14. Plug the 15-pin connector of the radio module cable into the adapter card connector.
15. Place the radio module next to your computer following the instructions described in 2.4, “Placement of Radio Modules” on page 21.
16. Plug all power cords into electrical outlets.

17 Turn ON the computer and all attached options, such as the display and printer.

The adapter is now installed. Repeat this procedure for each computer with an ISA bus.

Next Step

To install the IBM Wireless LAN software, go to Chapter 5, "Choosing a Setup Procedure" on page 63.

4.2 Using an MCA Bus

To install the adapter in a computer with an MCA bus:

1 Follow these steps as shown in Figure 12 on page 47:

- **a** Put the MCA-type front metallic bracket in place and make sure that it is screwed in firmly.
- **b** Put the blue plastic holder on the adapter card and continue tightening the screw.
- **c** Place the adapter card at an angle to fit it into the blue plastic retainer.
- **d** Lock the blue plastic retainer into position by flexing it carefully, just enough to fit it into its slot.

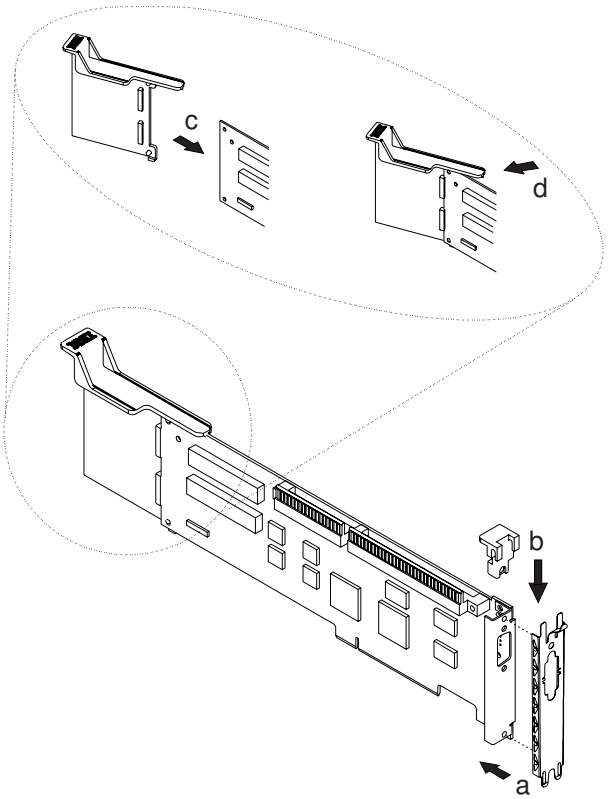

Figure 12. Preparing the Adapter Card for an MCA Based Computer

2 Turn OFF the computer and all attached options, such as the display and printer.

3 Unplug all power cords from electrical outlets.

4 Remove the computer cover.

5 Install the adapter card in a free extension slot, by following the documentation supplied with your computer

6 Install the computer cover.

7 Open the cover masking the cable connector on the radio module.

8 Connect the flat connector of the cable to the radio module.

9 Close the cover of the radio module.

10 Plug the 15-pin connector of the radio module cable into the adapter card connectors.

11 Place the radio module next to your computer following the instructions described in 2.4, “Placement of Radio Modules” on page 21.

12 Plug all power cords into electrical outlets.

13 Insert the backup copy of the PS reference diskette in drive A.

Note: Use the back up copy of the reference diskette dedicated to your computer, containing parameters and configuration information relevant to this computer.

14 Turn ON the computer and all attached options, such as the display and printer.

15 When the IBM logo screen is displayed, press **Enter**.

16 To update the computer configuration, type Y at the prompt:
Automatically configure the system? (Y/N).
Then follow the instructions displayed on your screen.

Note: If you want to use interrupt level 9 for the IBM Wireless LAN adapter, make sure that no other adapter in your computer uses interrupt level 2.

See the online help for more information about the configuration parameters.

17 Insert the IBM Wireless LAN OS/2 base/workstation diskette (volume 2) in drive A when you see the following warning message displayed:
The description file for the adapter in slot x was not found. Insert the diskette....
Then press **Enter**.

Note: The IBM Wireless LAN OS/2 base/workstation diskette (volume 2) is your option diskette, containing the adapter description file (ADF).

18 When prompted, remove the IBM Wireless LAN OS/2 base/workstation diskette (volume 2) from drive A, and insert the backup copy of the PS reference diskette again. Then press **Enter**.

19 When the following message is displayed:
Automatic configuration complete,
press **Enter**.

20 Remove the diskette from the drive and reboot your system.

21 To update the backup copy of the reference diskette, follow these steps:

- **a** Insert the back up copy of the reference diskette again.
- **b** When the IBM logo screen is displayed, press **Enter**.
- **c** On the main menu, select **Copy an Option Diskette** and press **Enter**. Then follow the instructions displayed on your screen.
- **d** Press **F3** to exit the configuration menu.

22 Press **Enter** to restart the computer.

The adapter for an MCA bus is now installed. Repeat this procedure for each computer with an MCA bus.

Next Step

To install the IBM Wireless LAN software, go to Chapter 5, "Choosing a Setup Procedure" on page 63.

4.3 Using a PCMCIA Type II Slot

If you are installing the adapter in an IBM computer with a PCMCIA Type II slot, the computer can be either ON or OFF during the installation procedure. If you are using a non-IBM computer, refer to the documentation supplied with the computer.

The PCMCIA Credit Card has a 68-pin connector on one end and a flat 22-pin connector on the other end. To install the Credit Card, follow these steps:

1. Locate the PCMCIA Type II slot on your computer.
2. Note how the Credit Card should be positioned.
3. Align the 68-pin connector on the Credit Card with the guides on the PCMCIA Type II slot, and slide the Credit Card (label side up) into the slot as far as it will go. The 22-pin connector should be visible. See Figure 13.

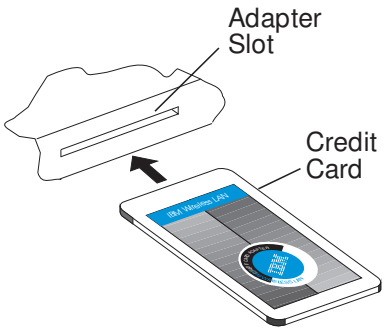

Figure 13. Inserting the Credit Card into the PCMCIA Type II Slot

Note: The Credit Card is keyed to go in one way only. If you feel resistance before the Credit Card is fully inserted, remove the Credit Card, turn it over, and reinsert it.

4. Open the cover masking the cable connector on the radio module.
5. Connect the 15-pin connector of the cable to the radio module.
6. Close the cover of the radio module.

7 Plug the flat 22-pin connector of the radio module cable into the Credit Card.

Note: The cable is keyed to attach to the Credit Card one way only. If you feel any resistance, remove the cable, turn it over, and attach it.

8 Start (or restart) the computer.

9 Place the radio module next to your computer following the instructions described in 2.4, “Placement of Radio Modules” on page 21.

The Credit Card is now installed. Repeat this procedure for each computer with a PCMCIA Type II slot.

4.4 PCMCIA Portable Computer Support

To operate a Wireless adapter and NDIS Device Driver in a computer using PCMCIA, you must have installed and configured the set of Card and Socket Services support delivered with your computer, by following the instructions in the computer documentation. The chosen set of Card and Socket Services must match the machine model and operating system used.

This section also applies to computers with a PCMCIA slot connected to a PCI bus.

Note: In B.3, “ThinkPad 750 PCMCIA CONFIG.SYS Statements Example for an NDIS DOS Workstation” on page 232 there is a complete example CONFIG.SYS file for a ThinkPad 750.

Initialization Success or Failure

At boot time, the IBM Wireless driver will log messages indicating if initialization was successful or not, see Appendix C, “Alerts, Warnings and Messages” on page 233. A specific message will show the origin of the problem. These messages refer to Card and Socket Services problems, for example not found, or incorrect parameters, or IO Base Address or Interrupt Level assignment problems.

The following sections of this chapter tell you what you must do for successful initialization of the PCMCIA adapter, and how to resolve any failures, see Table 14 on page 52 for their location.

You cannot proceed to install IBM Wireless LAN software until the adapter has been installed successfully. Each section contains any initialization messages that can be logged for that feature, like those shown after the table.

Table 14. Factors Affecting Successful Initialization of the PCMCIA Adapter

Factor	Find it on ...
Card and Socket Services Parameters for EMM386 users (DOS or Windows)	Page 53
Multiple Adapter Slots	Page 53
Incompatibility Problems with Card and Socket Services*	Page 54
Setting IO Base Address and Interrupt Request Level	Page 54
Finding Existing IO Base Address or Interrupt Level Values	Page 56
IO Base Address or Interrupt Level Conflicts	Page 55
Detection Problem for ODI Workstations	Page 56

Messages IWL0209 and IWL0210 indicate successful initialization. You can proceed to installing and configuring the IBM Wireless LAN software.

Message IWL0211 will be logged if there is a problem. Another message, specifying the particular problem, will have been logged immediately before this one.

Message IWL0012 will be logged if you need to run diagnostics to find the cause of the problem, see 4.5, “Running Adapter Diagnostics from the Utilities Diskette” on page 57.

Card and Socket Services Parameters for EMM386 users (DOS or Windows)

One of two areas must be excluded from EMM386, if you use this program:

1. **Resource Manager** from the Card and Socket Services you are using. The memory area used by the Resource Manager, for example DIRMU01.SYS for PlayAtWill, and the memory area used by the EMS driver EMM386.EXE must not interfere with one another. You must reserve 16K of memory to be used as attribute memory for PC cards. This is the /MA parameter for Resource Manager and the X=nnnn parameter for EMM386 in the CONFIG.SYS file.

   For example:

   ```
   DEVICE=C:\DOS\EMM386.EXE RAM X=C   -C3FF
   DEVICE=C:\THINKPAD\DICRMU 1.SYS /MA=C   -C3FF
   ```

   In this example, X=C -C3FF and /MA=C -C3FF reserve that area of memory, C000 to C3FF, for the PCMCIA adapter attribute area.

2. **Enabler on ODI Workstations**
   If you are using Enabler on ODI workstations, you must exclude memory area C000 to C1FF in the parameter for EMM386 in the CONFIG.SYS file.

   ```
   DEVICE=C:\DOS\EMM386.EXE RAM X=C   -C1FF
   ```

   Note: If you are using both Enabler on ODI workstations and Card and Socket Services, exclude only the memory area used by the Enabler.

Messages IWL0206 or IWL0207 will be logged if there is a memory reservation problem.

Multiple Adapter Slots

For a PCMCIA machine with multiple adapter slots, update the corresponding switch parameter according to the documentation supplied with the socket services support.

For example, for a PCMCIA DOS IBM ThinkPad with two slots, the S0 parameter must be set to /S =2, as in:

DEVICE=C:\THINKPAD\IBMDSS 1.SYS /S =2

Message IWL0026 will be logged if there is an insertion problem.

Incompatibility Problems with Card and Socket Services

Compatibility problems may exist with non-IBM PCMCIA Card & Socket Services. In such cases you are recommended to use "universal" Card and Socket Services such as "PlayAtWill" (Ref: 5764-085) when available.

For more information, contact your IBM representative or dealer.

Note: When using PlayAtWill, make sure that no statements from a former Card and Socket Services installation are left in your CONFIG.SYS.

Messages IWL0202 to IWL0205 will be logged if there are any problems with Card and Socket Services.

Setting IO Base Address and Interrupt Request Level

The IBM Wireless device driver allows you to set up an IO Base Address and Interrupt Request Level (IRQ).

Note: In system files, IO Base Address is known as PORT parameter, Interrupt Request Level is known as INT parmeter. You will find these parameters:

For NDIS workstations, in the PROTOCOL.INI file. They can be edited with LSP, LAPS/MPTS, or CUSTOM.

For ODI workstations, in the NET.CFG file. They can be edited with any ASCII editor.

The default values for the IBM Wireless LAN in an NDIS environment are:

INT=11
PORT= x4

Once the station has started, messages are displayed to show the initialized values for IO Base address and Interrupt level.

The IRQ value set in the PROTOCOL.INI file is the value used by the computer. If this value is rejected or if no value is set in the PROTOCOL.INI file, the initialization routine will iterate within the applicable range (11, 15, 5, 10), starting with the provided value. Depending on the available resources in the computer you use, the initialization routine may finish with another value within that range. The same process is used for IO Base address.

Specific Machine Type Problem:
For the IBM ThinkPad 750/755 and 360 series, the IO BASE Address must be set to 0x220.

IO Base Address or Interrupt Level Conflicts

Sometimes the Resource Manager (part of Card and Socket Services support) returns an IRQ or an IO Base Adress as valid, even if already used by the system. For example, the loud speaker on ThinkPad 755C uses IRQ 10 by default, and the Pen interface on ThinkPad 750P uses IRQ 5.

You can resolve the conflicts by finding available values.

You can change the IRQ or IO Base Address settings:

Of your computer with its utilities.

Of the IBM Wireless LAN adapter by updating these parameters in the:

- PROTOCOL.INI file, for NDIS workstations.
- NET.CFG file, for ODI workstations.

If a potential conflict is identified, a switch could also be added to the Resource Manager Device statement in CONFIG.SYS file to exclude interrupt request levels that cannot be used by the PC card.

For example for a ThinkPad 755C with loud speaker using IRQ 10:

```
DEVICE=C:\THINKPAD\DICRMU 1.SYS /IX=1
```

Here, IRQ 10 cannot be used by the PC Card and will be reserved for the loud speaker.

Messages IWL0209 and IWL0210 will be logged if initialization was successful. They tell you the IO base address and interrupt request level (IRQ) for this computer.

Message IWL0212 will be logged if there are no IO base addresses or interrupt levels available in this computer. You will have to remove at least one adapter card to make room for the IBM Wireless LAN PCMCIA adapter.

Finding Existing IO Base Address or Interrupt Level Values

You can use a configuration analysis program to tell you which adapter uses which interrupt level and IO base address. Examples of configuration programs (this is not an exhaustive list) are:

HP Omnibook**: use PCMCIA **CardView** under Windows.

System Soft: use **CardInfo****.

Microsoft Diagnostics: use (**MSD**)**

IBM PCMCIA utilities: use **EZPlay***, or **EZPlayW*** for Windows.

Refer to the product's documentation for instructions on using the program.

Detection Problem for ODI Workstations

Note: This section only applies to DOS and Windows ODI wireless workstations with a PCMCIA Type II slot.

If the PCMCIA Credit Card is not detected when you start your computer, refer to the following procedures:

If you use Card and Socket Services or only Socket services, you can edit the CONFIG.SYS file and comment out the Card and Socket Services device statements (these statements are determined by your type of computer).

Then press **Ctrl+Alt+Del** to restart the computer.

If the problem persists refer to the following procedure:

If you do not use either Card or Socket Services and conflicts are still not resolved by the ODI Enabler:

– Edit the NET.CFG file and add: /R:C to the following statement:
  Enabler c:\xxxx\IBMWLENA.EXE
  where C is a memory zone between C000 to EF00 in multiples of 100 and xxxx is the directory where the IBM Wireless LAN has been installed, for example, WIRELESS.
– Exclude the memory area used by the Enabler. See “Card and Socket Services Parameters for EMM386 users (DOS or Windows)” on page 53 for detailed information.

  Note: If you are using both Enabler on ODI workstations and Card and Socket Services, exclude only the memory area used by the Enabler.

Then press **Ctrl+Alt+Del** to restart the computer.

Note: If you are using only Socket Services you can edit the CONFIG.SYS file and add the Card Services device statement.

4.5 Running Adapter Diagnostics from the Utilities Diskette

To run the adapter diagnostics, follow these steps:

1. Insert the IBM Wireless LAN 'Utilities diskette' in drive A.
2. Restart the workstation by pressing **Ctrl+Alt+Del**.

   Note: If a prompt message is displayed turn the power OFF back ON again.
3. If the workstation has a PCMCIA Type II slot:

   If you have problems when booting the Utilities diskette, you would need to modify your Utilities diskette CONFIG.SYS file to call DOS Card and Socket Services support. This may be the case if your PCMCIA machine does not have an INTEL** 82365SL port controller.

   For example, in the DOS environment for an IBM ThinkPad 720C computer, the four lines to copy might be:

```
DEVICE=C:\IBMDSS 2.SYS
DEVICE=C:\IBMDOSCS.SYS
DEVICE=C:\DICRMU 2.SYS
DEVICE=C:\$ICPMDOS.SYS
```

4. Select **Diagnostics Utilities** from the main menu
5. Wait for the diagnostics to complete and follow the recommended action.
6. If the problem persists:
   a. Note the resulting diagnostic message and code.
   b. Go to A.16, “Problem Resolution Worksheet” on page 191 and fill in the information on the worksheet.
   c. Then call your IBM service representative or your dealer.

Next Step

To install the IBM Wireless LAN software, go to Chapter 5, “Choosing a Setup Procedure” on page 63.

4.6 Upgrading Adapter Microcode from the Utilities Diskette.

We recommend that you upgrade the microcode on every station of your wireless network if you have already installed a previous version of IBM Wireless LAN.

Warning: When you update the adapter functional code on a wireless workstation, data traffic on the wireless workstation is stopped.

To update the adapter functional code, take the following steps:

1. Stop all work on the computer.
2. Restart the workstation by pressing **Ctrl+Alt+Del**.

   Note: If a prompt message is displayed turn the power OFF back ON again.

3 Insert the IBM Wireless LAN Utilities diskette in drive A. If you have a PCMCIA slot and you experience problems when you start your system, refer to the step 3 on page 57.

4 Select **Wireless LAN Adapter Utilities** from the main menu and press **Enter**.

5 Select **Functional Code Update** from the Utility menu and press **Enter**.

6 When the confirmation message is displayed select **Y**

7 When prompted insert the diskette containing the code update files (IBMWLMC1.UPD for ISA/MCA and IBMWLMC2.UPD for PCMCIA) in drive A and press **Enter**.

Note: Code update files are available from CSD distribution centers, or from the IBM Wireless Utilities diskette.

8 When the completion message is displayed:

Remove the diskette containing the code update from the drive A,

Insert again the IBM Wireless LAN Utilities diskette.

9 Press **F3** to exit and follow the instructions on the screen. The computer reboots automatically and you can resume work when you have reloaded your applications.

Next Step

To install the IBM Wireless LAN software, go to Chapter 5, "Choosing a Setup Procedure" on page 63.

Part 2. Software Installation and Set Up Processes

Part 2 describes how to install an IBM Wireless LAN.

Chapter 5. Choosing a Setup Procedure 63

Chapter 6. Installing NDIS Software Files 71

Chapter 7. Configuring OS/2 Bases 77

Chapter 8. Configuring NDIS Workstations 93

Chapter 9. Setting Up Network Management on OS/2 Bases 103

Chapter 10. Setting Up NetWare Bases 111

Chapter 11. Setting Up ODI Workstations 121

Chapter 12. Setting Up Network Management on NetWare Bases 135

Chapter 13. Security 141

Chapter 14. Access Control 161

Chapter 15. Using Remote Program Load 167

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Chapter 5. Choosing a Setup Procedure

The IBM Wireless LAN can be used with a wide range of networking applications, operating systems, and connectivity. To help you find the correct process for a particular setup situation, this guide contains tables to point you to the appropriate chapter.

Making Life Easier for The Installer

There appear to be many things to do. However, of all the sets of procedures shown in these tables, each computer needs ***only one table*** of procedures, and ***only one subset*** from a table for a complete install and configure.

Choose Procedures Before You Start

1 Install and configure the station containing the NAP.

2 Make sure you have your base or workstation worksheet available before you start.

3 For each computer that you want in the wireless network, select its table of procedures, see Table 15.

Table 15. Guide to procedures

Type of computer	Where to choose the set up procedures
OS/2 base station, with or without NAP, any connectivity	Table 16 on page 65
NetWare base station	Table 17 on page 66
OS/2 workstation	Table 18 on page 67
Windows workstation	Table 19 on page 68
DOS workstation	Table 20 on page 70

4 Make a note of the processes relevant for that computer, as shown in the table you accessed in Step 3.

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5 Run the processes you have selected, and return to the table at the end of each process for the next. When you complete a process, mark your notes in some way.

5.1 Setting Up an OS/2 Base

Select the installation or configuration process according to Table 16.

Table 16. Processes for an OS/2 Base

1- Install files: see Page 71, for all variations of an OS/2 base.
2- Configuration. Choose either basic or advanced: **Basic**: This is recommended to give you a working environment that can get your base started quickly. See Page 77. **Advanced**: – Base bridged to Token Ring, see Page 78. – Base bridged to Ethernet, see Page 83. – Base not bridged, IP routing, see Page 87. – Base not bridged, stand-alone, see Page 89. – NAP only, see Page 90.
3- Optional processes: **Network management:** Not dependant on the connectivity, must be defined for each base. See Page 103. **Security:** Not dependant on the connectivity, set up only from the NAP station. See Page 142. **Access control:** Not dependant on the connectivity, set up only from the NAP station. See Page 161.

Note: If you need to make changes after you have set up your base, use the same processes above.

5.2 Setting Up a NetWare Base

Select the installation and configuration process according to Table 17.

Table 17. Processes for a NetWare Base

1- Installation and Configuration for all NetWare bases: Stand-alone base: see Page 111. Base with NAP: see Page 114. Base without NAP.: see Page 117.
2- Optional processes: **Network Management**: Not dependant on the connectivity, must be defined for each base. See Page 135. **Security**: Not dependant on the connectivity, set up only from the NAP station. See Page 142. **Access control**: Not dependant on the connectivity, set up only from the NAP station. See Page 164.

Note: If you need to make changes after you have set up your base, use the same processes above.

5.3 Setting Up a Workstation Running Under OS/2

Select the installation and configuration process according to Table 18.

Table 18. Processes for a Workstation Running Under OS/2

Network application	1- Installation	2- Configuration		3- Security (optional)
		Protocol used	Procedure	
NDIS applications				
Communication Manager	Page 72	IBM IEEE 802.2	Page 93	Page 148
Lan Server/Requester	Page 72	Netbios	Page 93	Page 148
NetWare Requester plus Mapper ODI2NDI	Page 72	IPX	Page 93	Page 148
TCP/IP for OS/2	Page 72	IP	Page 93	Page 148
ODI applications				
NetWare Requester/ NetWare for SAA	Page 130 [4]	IPX IP	N/A	Page 151

Notes:

1. The ODI device driver for OS/2 **does not support** PCMCIA adapters.
2. If you need to make changes after you have set up your NDIS or your ODI workstation, use the same processes above.

[4] This is both install and configure.

5.4 Setting Up a Workstation Running Under Windows

Select the installation and configuration process according to Table 19.

Table 19 (Page 1 of 2). Processes for a Workstation Running Under Windows

Network application	1- Installation	2- Configuration		3- Security (optional)
		Protocol used	Procedure	
NDIS applications				
PC 3270	Page 73	IBM IEEE 802.2	Page 97	Page 147
LANSUP mapper plus NetWare Requester	Page 73	IBM IEEE 802.2	Page 97	Page 147
LAN Server Requester	Page 73	Netbios	Page 97	Page 147
LAN Manager Requester	Page 73	Netbios 802.2 (DLC) IP	Readme	Readme
Windows for Workgroups	Page 73	NetBEUI 802.2 (DLC) IPX IP	Readme	Readme
Lantastic	Page 73	Netbios	Readme	Page 147
IBM TCP/IP for DOS/ Windows	Page 73	IP	Page 101	Page 147
Banyan VINES**	Page 73	VINES**	Readme	Page 147

Table 19 (Page 2 of 2). Processes for a Workstation Running Under Windows

Network application	1- Installation	2- Configuration		3- Security (optional)
		Protocol used	Procedure	
ODI applications				
NetWare Requester/ NetWare for SAA/ LAN WorkPlace	Page 126 [5]	IPX IP	N/A	Page 150
NetWare Lite	Page 126 [5]	IPX	N/A	Page 150

Note: If you need to make changes after you have set up your NDIS or your ODI workstation, use the same processes above.

5 This is both install and configure.

5.5 Setting Up a Workstation Running Under DOS

Select the installation and configuration process according to Table 20.

Table 20. Processes for a Workstation Running Under DOS

Network application	1- Installation	2- Configuration		3- Security (optional)
		Protocol used	Procedure	
NDIS applications				
PC 3270	Page 74	IBM IEEE 802.2	Page 97	Page 146
LANSUP mapper plus NetWare Requester	Page 74	IBM IEEE 802.2	Page 97	Page 146
LAN Server Requester	Page 74	Netbios	Page 97	Page 146
LAN Manager Requester	Page 74	Netbios 802.2 (DLC) IP	Readme	Readme
Lantastic	Page 74	Netbios	Readme	Readme
IBM TCP/IP for DOS/ Windows	Page 74	IP	Page 101	Page 146
Banyan VINES	Page 74	VINES	Readme	Page 146
ODI applications				
NetWare Requester/ NetWare for SAA/ LAN WorkPlace	Page 121 [6]	IPX IP	N/A	Page 148
NetWare Lite	Page 121 [6]	IPX	N/A	Page 148

Note: If you need to make changes after you have set up your NDIS or your ODI workstation, use the same processes above.

6 This is both install and configure.

Chapter 6. Installing NDIS Software Files

The very first action for all installation options for NDIS stations, is to install files from the installation diskettes to your hard drive.

Each of the procedures in this chapter installs NDIS software files to a different station type:

OS/2 base.

NDIS workstation running under OS/2.

NDIS workstation running under Windows.

NDIS workstation running under DOS.

The procedures can only be run in the circumstances determined by the tables in Chapter 5, “Choosing a Setup Procedure” on page 63. After you have completed a procedure, return to the table you came from to find the next procedure for that computer.

6.1 Installing NDIS Files for an OS/2 Base

1 Make a backup copy of each of these system files:

CONFIG.SYS

PROTOCOL.INI

2 Load the diskette labelled 'OS/2 Base/Workstation Volume 1' into drive A. At the OS/2 prompt, type A:INSTOS2 and press **Enter**.

3 When the Install window is displayed keep **Update CONFIG.SYS** selected and click on **OK**. The IBM Wireless LAN software is loaded automatically each time OS/2 starts.

4 Install - directories window is displayed. Select **OS/2 Base/NAP station**.

5 You can accept the default directory name C:\WIRELESS, or enter one of your own.

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Install Progress panel is displayed with a progress bar showing how much of the process has been completed. Load diskettes as requested by messages on the screen.

6 Installation and Maintenance panel is displayed. Unload the diskette in drive A.

7 Select **File** from the menu bar, then **Exit**.

Next Step

Return to Table 16 on page 65, ***do not*** run the following procedure.

6.2 Installing NDIS Workstation Files for OS/2

1 Make a backup copy of each of these system files:

CONFIG.SYS

PROTOCOL.INI

2 Load the diskette labelled 'OS/2 Base/Workstation Volume 1' into drive A. At the OS/2 prompt, type A:INSTOS2 and press **Enter**.

3 When the Install window is displayed keep **Update CONFIG.SYS** selected and click on **OK**. The IBM Wireless LAN software is loaded automatically each time OS/2 starts.

4 Install - directories window is displayed. Select **Software for NDIS Workstation**.

5 You can accept the default directory name C:\WIRELESS, or enter one of your own.

Install Progress panel is displayed with a progress bar showing how much of the process has been completed. Load diskettes as requested by messages on the screen.

6 Installation and Maintenance panel is displayed. Unload the diskette in drive A.

7 Select **File** from the menu bar, then **Exit**.

Next Step

Return to Table 18 on page 67, ***do not*** run the following procedure.

6.3 Installing NDIS Workstation Files for Windows

1 Make a backup copy of each of these system files:

CONFIG.SYS

AUTOEXEC.BAT

PROTOCOL.INI

2 Check that the CONFIG.SYS file has Files=nn where nn is 50 or more. If it isn't, use any ASCII text editor to add or modify the value. If you have to make any changes to the file, reboot your computer before you continue with this procedure.

3 Load the diskette labelled 'DOS and Windows Workstation' into drive A. Select the **Run** option from the Program Manager **File** menu, type A:INSTWIN and press **Enter**.

4 When the Install window is displayed keep **Update CONFIG.SYS/AUTOEXEC.BAT** selected and click on **OK**.

5 Install - Directories window is displayed. Select **Software for NDIS Workstation**.

You can accept the default directory name C:\WIRELESS, or enter one of your own.

Install Progress panel is displayed with a progress bar showing how much of the process has been completed.

6 Installation and Maintenance panel is displayed.

7 Unload the diskette in drive A.

8 Select **File** from the menu bar, then **Exit**.

Next Step

Return to Table 19 on page 68, ***do not*** run the following procedure.

6.4 Installing NDIS Workstation Files for DOS

1 Make a backup copy of each of these system files:

CONFIG.SYS

AUTOEXEC.BAT

PROTOCOL.INI

2 Check that the CONFIG.SYS file has Files=nn where nn is 20 or more. If it isn't, use any ASCII text editor to add or modify the value. If you have to make any changes to the file, reboot your computer before you continue with this procedure.

3 Load the diskette labelled 'DOS and Windows Workstation' into drive A. From the DOS prompt type A:INSTDOS and press **Enter**.

4 The Main Menu is displayed. Select **NDIS Workstation Installation**.

5 You can accept the default directory name C:\WIRELESS, or enter one of your own.

6 Keep **Update AUTOEXEC.BAT** selected and click on **OK**. The Received Signal Strength Indicator (RSSI) software will be loaded automatically each time DOS starts.

7 Unload the diskette in drive A.

Next Step

Return to Table 20 on page 70, ***do not*** run the following procedure.

6.5 Uninstalling IBM Wireless LAN Software

Follow these instructions to uninstall the software. Read the instructions first and ensure that you have the backups of the system files that were saved before you installed the IBM Wireless LAN software.

1. Abandon the current install process.
2. Restore the backup copies of CONFIG.SYS and PROTOCOL.INI.
3. If you ran INSTDOS or INSTWIN to install the software, restore the backup copy of AUTOEXEC.BAT.
4. If running under OS/2 or Windows, run the install program, INSTOS2 or INSTWIN, that you used to install the software, and choose the option **Delete and Reinstall**. When components have been deleted, choose **File** menu, **Exit** option.
5. Delete the directory C:\WIRELESS, or the one you nominated in its place, and all its files.
6. If running under OS/2 or Windows, delete the IBM Wireless LAN Services folder, or program group, and contents.
7. Shutdown and restart your system.

Chapter 7. Configuring OS/2 Bases

The procedures in this chapter can only be run in the circumstances determined by the tables in Table 16 on page 65.

7.1 Basic Configuration for an OS/2 Base

Before you start these procedures, you should have some information ready, see 3.6, “Filling Out the Base Planning Worksheet” on page 32. This will save you time when you run this procedure.

1 Open the IBM Wireless Services folder and double click the OS/2 Base/NAP Station Configuration icon.

2 Select the **Basic** option, from the Configuration menu.

3 The limitations of a Basic Configuration are displayed. **If these are not acceptable for this base, cancel configuration and return to Table 16 on page 65** to choose an advanced procedure.

4 Wireless Connectivity and Network Administration Program panels are displayed, side by side.

5 Choose the connectivity for this base:

Bridged to Token Ring.

Bridged to Ethernet.

Not Bridged. You will be asked for the LAN type, even for a standalone cell. You can choose either Token Ring or Ethernet, but Token Ring gives better performance.

6 To the question **Do you want to update parameters?**, select **NO**.

7 You must enter the NAP details on the Network Administration Program panel.

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If the NAP is on another base station, select **NAP on backbone** and enter the address.

If the NAP is on this base station, select **Local NAP** and enter the network name.

See your worksheet for this base.

8 When you have completed connectivity and NAP requirements, click **Save**.

9 Shutdown and reboot your system to start the new configuration.

10 Start the supervisor by double clicking on the IBM Wireless LAN supervisor icon.

Next Step

Return to Table 16 on page 65, ***do not*** run the following procedures.

7.2 Advanced Configuration for an OS/2 Base Bridged to Token Ring

Before you start these procedures, you should have some information ready, see 3.6, “Filling Out the Base Planning Worksheet” on page 32. This will save you time when you run this procedure.

You will also have to enter parameters related to this particular base station. Check the tables below against the README file in case any values have changed since this book was printed. All parameters are mandatory unless marked as:

Default Accept the default value supplied by LAPS/MPTS.

Optional You do not have to enter a value, or you can enter a value supplied by either the worksheet or your Network Administrator.

1 Open the IBM Wireless Services folder and double click the OS/2 Base/NAP Station Configuration icon.

2 Select the **Advanced** option, from the Configuration menu, and click **OK**.

3 You must enter the NAP details on the Network Administration Program panel.

If the NAP is on another base station, select **NAP on backbone** and enter the address.

If the NAP is on this base station, select **Local NAP** and enter the network name.

See your worksheet for this base.

4 When you have completed NAP requirements, click **Save**.

5 Now you must run LAPS/MPTS to define the connectivity for this base station to the network. You need to have the current configuration window displayed. (Refer to LAPS/MPTS documentation for detailed instructions.)

Follow the instructions displayed by LAPS/MPTS, even if it tells you to reboot the system.

a Starting with the ***cell*** side of the bridge, add to the current configuration the **IBM Wireless LAN Network Adapter for base station**.

Edit the parameters for this adapter to those shown in the table below.

Table 21. Mandatory Parameters for IBM Wireless LAN Network Adapter for Token Ring Bridge

Parameter	Value
Bridge activation	YES
Buffer size	256
LAN Type	T (for Token Ring)

b Add to the current configuration these protocols:

IBM IEEE 802.2. Edit parameters if any have been superseded by values in the README file.

IBM Wireless LAN Bridge. Edit parameters for:

- Those that have been superseded by values in the README file.
- **Port type**, which should be **T**.
- **Ring number**. This should be different on either side of the bridge.

Table 22. Parameters for IBM Wireless LAN Bridge Protocol, Cell Side of Token Ring Bridge.

Parameter	Value
Port type	T
Ring number for this LAN appearance	See your worksheet (mandatory)
Maximum size data unit	4472
Bridge priority for spanning tree	32768
Maximum age for a BPDU as root bridge	20
Time period between BPDU as root bridge	2
802.2 device driver	(optional)
Linespeed in bits per second	2048000
Bridge number for this bridge	1
Transparent bridge database aging time	300
Transparent bridge database overflow policy	LEARN
Maximum outstanding small frames	50
Maximum outstanding large frames	50

c For the ***backbone*** side of the bridge, add to the current configuration the **IBM Token Ring Network Adapter**.

Edit the parameters for this adapter to those shown in the table below.

Table 23. Parameters for Token Ring Adapter

Parameter	Value
Early release	(default)
Adapter mode	PRIMARY
Network adapter address	(optional)
Shared RAM address	(optional)
Maximum number of queued transmits	6 (optional)
Number of receive buffers	20
Receive buffer size	256
Number of Transmit buffer	1
Transmit buffer size	4456
Enable bridge	YES
Bridge transmit control RAM	5296

d Add to the current configuration these protocols:

IBM IEEE 802.2. Edit parameters if any have been superseded by values in the README file.

IBM Wireless LAN Bridge. Edit parameters for:

- Those that have been superseded by values in the README file.
- **Port type**, which should be **T**.
- **Ring number**. This should be different on either side of the bridge.

Table 24. Parameters for IBM Wireless LAN Bridge Protocol, Backbone Side of Token Ring bridge.

Parameter	Value
Port type	T (mandatory)
Ring number for this LAN appearance	See your worksheet (mandatory)
Maximum size data unit	4472
Bridge priority for spanning tree	32768
Maximum age for a BPDU as root bridge	20
Time period between BPDU as root bridge	2
802.2 device driver	(optional)
Linespeed in bits per second	2048000
Bridge number for this bridge	1
Transparent bridge database aging time	300
Transparent bridge database overflow policy	LEARN
Maximum outstanding small frames	50
Maximum outstanding large frames	50

TCP/IP if this base is to communicate with the NAP station.

6 When you have finished with LAPS/MPTS, shutdown and reboot your system to start the new configuration.

7 Start the supervisor by double clicking on the IBM Wireless LAN supervisor icon.

Next Step

Return to Table 16 on page 65, ***do not*** run the following procedures.

7.3 Advanced Configuration for an OS/2 Base Bridged to Ethernet

Before you start these procedures, you should have some information ready, see 3.6, “Filling Out the Base Planning Worksheet” on page 32. This will save you time when you run this procedure.

You will also have to enter parameters related to this particular base station. Check the tables below against the README file in case any values have changed since this book was printed. All parameters are mandatory unless marked as:

Default Accept the default value supplied by LAPS/MPTS.

Optional You do not have to enter a value, or you can enter a value supplied by either the worksheet or your Network Administrator.

1 Open the IBM Wireless Services folder and double click the OS/2 Base/NAP Station Configuration icon.

2 Select the **Advanced** option from the Configuration menu, and click **OK**.

3 You must enter the NAP details on the Network Administration Program panel.

If the NAP is on another base station, select **NAP on backbone** and enter the address.

If the NAP is on this base station, select **Local NAP** and enter the network name.

See your worksheet for this base.

4 When you have completed NAP requirements, click **Save**.

5 Now you must run LAPS/MPTS to define the connectivity for this base station to the network. You need to have the current configuration window displayed. (Refer to LAPS/MPTS documentation for detailed instructions.)

Follow the instructions displayed by LAPS/MPTS, even if it tells you to reboot the system.

a For the **cell** side of the bridge, add to the current configuration the **IBM Wireless LAN Network Adapter for base station**.

Edit the parameters for this adapter to those shown in the table below.

Table 25. Mandatory Parameters for IBM Wireless LAN Network Adapter for Ethernet Bridge

Parameter	Value
Bridge activation	YES
Buffer size	256
LAN Type	E (for Ethernet)

b Add to the current configuration these protocols:

IBM IEEE 802.2. Edit parameters if any have been superseded by values in the README file.

IBM Wireless LAN Bridge. Edit parameters for:

- Those that have been superseded by values in the README file.
- **Port type**, which should be **E**.
- **Ring number**. This should be different on either side of the bridge.

Table 26. Parameters for IBM Wireless LAN Bridge Protocol, Cell Side of Ethernet Bridge

Parameter	Value
Port type	E
Ring number for this LAN appearance	Any value (not blank)
Maximum size data unit	4472
Bridge priority for spanning tree	32768
Maximum age for a BPDU as root bridge	20
Time period between BPDU as root bridge	2
802.2 device driver	(optional)
Linespeed in bits per second	2048000
Bridge number for this bridge	1
Transparent bridge database aging time	300
Transparent bridge database overflow policy	LEARN
Maximum outstanding small frames	50
Maximum outstanding large frames	50

Note: If you are using LAN Server on the OS/2 base bridged to Ethernet, add the Netbios protocol.

c For the **backbone** side of the bridge, add to the current configuration the Ethernet adapter installed in this base station.

Note: Check with the adapter documentation. Values entered with LAPS/MPTS must be consistent with those set when the adapter was installed, otherwise ***the bridge will not operate***.

d Add to the current configuration these protocols:

IBM IEEE 802.2. Edit parameters if any have been superseded by values in the README file.

IBM Wireless LAN Bridge. Edit parameters for:

- Those that have been superseded by values in the README file.
- **Port type**, which should be **E**
- **Ring number**. This should be different on either side of the bridge.

Table 27. Parameters for IBM Wireless LAN Bridge Protocol, Backbone Side of Ethernet bridge

Parameter	Value
Port type	E
Ring number for this LAN appearance	Any value (not blank)
Maximum size data unit	4472
Bridge priority for spanning tree	32768
Maximum age for a BPDU as root bridge	20
Time period between BPDU as root bridge	2
802.2 device driver	(optional)
Linespeed in bits per second	2048000
Bridge number for this bridge	1
Transparent bridge database aging time	300
Transparent bridge database overflow policy	LEARN
Maximum outstanding small frames	50
Maximum outstanding large frames	50

TCP/IP if this base is to communicate with the NAP station.

Note: If you are using LAN Server on the OS/2 base bridged to Ethernet, add the Netbios protocol.

6 When you have finished with LAPS/MPTS, shutdown and reboot your system to start the new configuration.

7 Start the supervisor by double clicking on the IBM Wireless LAN supervisor icon.

Next Step

Return to Table 16 on page 65, ***do not*** run the following procedures.

7.4 Advanced Configuration for an OS/2 Base Not Bridged (IP Routing)

1 Open the IBM Wireless Services folder and double click the OS/2 Base/NAP Station Configuration icon.

2 Select the **Advanced** option from the Configuration menu, and click **OK**.

3 You must enter the NAP details on the Network Administration Program panel.

If the NAP is on another base station, select **NAP on backbone** and enter the address.

If the NAP is on this base station, select **Local NAP** and enter the network name.

See your worksheet for this base.

4 When you have completed connectivity and NAP requirements, click **Save**.

5 Now you must run LAPS/MPTS to define the connectivity for this base station to the network. You need to have the current configuration window displayed. (Refer to LAPS/MPTS documentation for detailed instructions.)

a For the **cell** side of the base, add to the current configuration the **IBM Wireless LAN Network Adapter for base station** and these protocols:

IBM IEEE 802.2

TCP/IP

b For the **backbone** side of the base, add to the current configuration any NDIS supported adapter and the TCP/IP protocol.

6 You need now to install IP routing for this not-bridged base, by following the instructions given in the Readme file.

Notes:

a. Note that the install procedure is given first, and the technical descriptions given after, if you need them.

b. If this is the first time you have installed IP routing, you are strongly advised to read the technical descriptions before you start.

7 When you have finished with LAPS/MPTS, and IP routing is installed on this base, shutdown and reboot your system to start the new configuration.

8 Start the supervisor by double clicking on the IBM Wireless LAN supervisor icon.

Next Step

Return to Table 16 on page 65, **do not** run the following procedures.

7.5 Advanced Configuration for an OS/2 Base Not Bridged (Standalone)

1 Open the IBM Wireless Services folder and double click the OS/2 Base/NAP Station Configuration icon.

2 Select the **Advanced** option from the Configuration menu and click **OK**.

3 You must enter the NAP details on the Network Administration Program panel. See your worksheet for this base.

4 When you have completed NAP requirements, click **Save**.

5 Now you must run LAPS/MPTS. You need to have the current configuration window displayed. (Refer to LAPS/MPTS documentation for detailed instructions.)

Follow the instructions displayed by LAPS/MPTS, even if it tells you to reboot the system.

a Add to the current configuration the **IBM Wireless LAN Network Adapter for base station**.

Edit the parameters for this adapter to those shown in the table below.

Table 28. Mandatory Parameters for IBM Wireless LAN Network Adapter for a Base in a Standalone Cell (Not Bridged)

Parameter	Value
Bridge activation	NO
Buffer size	256
LAN Type	T

Note: You can choose any LAN type as long as you choose the same for the workstations. T, for Token Ring, is preferred as it gives better performance.

b. Add to the current configuration any protocol used to communicate with the wireless workstations. You must select at least one protocol.

6. When you have finished with LAPS/MPTS, shutdown and reboot your system to start the new configuration.

7. Start the supervisor by double clicking on the IBM Wireless LAN supervisor icon.

Next Step

Return to Table 16 on page 65, **do not** run the following procedures.

7.6 Advanced Configuration for OS/2 NAP Station

You must have already configured the backbone adapter in this station before you can configure it as a NAP station.

1. Open the IBM Wireless Services folder and double click the OS/2 Base/NAP Station Configuration icon.

2. Select the **Advanced** option from the Configuration menu, and click **OK**.

3. You must enter the NAP details on the Network Administration Program panel.

   a. Select **Local NAP**.

   b. Select **NAP controls other bases**

   c. If this is a NAP station only, then select **NAP station only**

   See your worksheet for this base.

4. When you have completed NAP requirements, click **Save**.

5. Now you must run LAPS/MPTS to add the TCP/IP protocol to the backbone adapter in this station. You need to have the current configuration window displayed. (Refer to LAPS/MPTS

documentation for detailed instructions.) Follow the instructions displayed by LAPS/MPTS, even if it tells you to reboot the system.

6 When you have finished, shutdown and reboot your system to start the new configuration.

7 Start the supervisor by double clicking on the IBM Wireless LAN supervisor icon.

Next Step

Return to Table 16 on page 65.

Chapter 8. Configuring NDIS Workstations

Each of the procedures in this chapter configures a different kind of NDIS workstation:

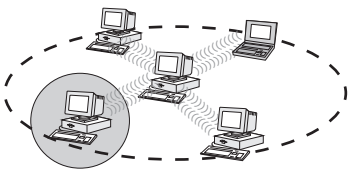
Workstation running under OS/2

Workstation running under Windows

Workstation running under DOS.

The procedures can only be run in the circumstances determined by the tables in Chapter 5, “Choosing a Setup Procedure” on page 63.

8.1 NDIS Workstation Running Under OS/2



1 You must run LAPS/MPTS to define the connection of this workstation to the base station. You need to have the current configuration window showing the possible adapter boards and protocols. (Refer to LAPS/MPTS documentation for operating instructions.)

2 Add to the current configuration the **IBM Wireless LAN Network Adapter for workstation** and any protocol used by the networking application on your workstation. Refer to Table 18 on page 67 or to the application documentation for the protocol it uses.

Edit the parameters for this adapter to those shown in the table below. Refer to online help for allowed ranges on all these fields. The fields shown in this table are mandatory. Check with your worksheets or the network operator for values for other fields.

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Note: There are other parameters, but you should accept the default value.

Table 29. Mandatory Parameters for an NDIS OS/2 Workstation

Parameter	Value
Network Name	See your worksheet.
Workstation Name	See your worksheet.
Country type	See Table 2 on page 17.
Base type	The value depends on the kind of base connected to this workstation. Enter E for OS/2 base bridged to Ethernet, T for everything else.
Mobility	OFF LOW (low sensitivity). Choose this if you want to emphasize the cell coverage (maximum range) rather than the overall data throughput (maximum performance). HIGH (high sensitivity). Choose this otherwise.
Compression	YES Data sent will occupy less space and you will get potentially higher throughput.
Data Masking [7]	NONE This is to ensure there are no security and access problems when you first set up the workstation or network. When the workstation is working to your satisfaction, you can set this parameter as you want it.

3 At the OS/2 prompt, type the following command to verify that parameters are correctly set:

[7] In some countries encryption, that is data masking, is not allowed, so this parameter should be set to NO. The adaptor supplied in these countries is called a 'non cipher' board and will cause a failure if you try to set data masking to YES.

CHKPARMS

This checks the parameters in CONFIG.SYS and PROTOCOL.INI.

The results of the verification are displayed on your screen.

4 Carry out the following procedure to ensure your workstation is receiving radio signals from its base station.

Checking the RSSI on Your OS/2 or Windows Workstation

1 Make sure you have removed any diskettes from the drives. Press **Ctrl+Alt+Del** to restart the computer. The IBM Wireless LAN application starts automatically.

If the wireless workstation has a PCMCIA Type II slot and there is an interrupt level conflict when you restart the computer, see "IO Base Address or Interrupt Level Conflicts" on page 55.

2 Start Windows, if it is not already started.

3 Double-click on the **RSSI icon** in the Wireless Services group. This starts the received signal strength indication (RSSI) application that displays the level of the radio signal received on the wireless workstation.

The indicator consists of five colored squares, red or green. A monochrome screen shows minus signs for red, plus signs for green. Position the radio module to display green squares. Three green squares displayed will give you an adequate level of reception. If you get five red squares, and repositioning does not change them, try one of these:

Check that the workstation radio module is installed properly.

Check that the base station is operating and transmitting.

You might need to load your networking application before you try the test. The adapter could be waiting for the application to start it. For example, if you had PC3270 (using protocol 802.2), you would need to load this first.

If no application has been installed yet, use the diagnostics diskette.

Note: If the RSSI display interferes with your graphic applications, close the RSSI application.

When the RSSI application is running, an audio alarm is emitted if the radio signal received becomes too weak. Reposition the radio module to recover an adequate level of radio reception. You can turn OFF the audio alarm or change some of its options through a dialog box.

Your computer is now set up as an OS/2 or Windows wireless workstation. A wireless program group has been created. The wireless workstation is operational.

Note: Once you have an adequate level of radio reception, you can install other software applications you may want to run, for example, Communication Manager or Lantastic.

Next Step

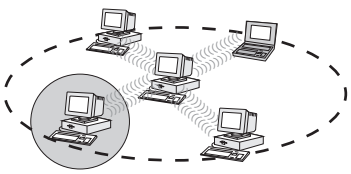
Return to:

Table 18 on page 67 for an NDIS workstation running under OS/2.

Table 19 on page 68 for an NDIS workstation running under Windows.

Do not run the following procedures.

8.2 NDIS Workstation Running Under DOS or Windows



You will need the LAN Support Program (LSP), version 1.35 or higher diskettes for this process.

1. Insert the LSP diskette in drive A.
2. At the DOS prompt, type A:DXMAID and press **Enter**. You need to have the current configuration menu showing the adapter boards and protocols. (Refer to the LSP documentation for operating instructions.)
3. At the question **Do you have the driver diskettes?** keep **YES** selected. Insert the IBM Wireless LAN driver diskette 'DOS and Windows workstations'. Follow the instructions on the screen.
4. When the Current Configuration panel is displayed:

   Select **IBM Wireless Network Adapter** in the Selection For Adapter Window.

   Press **F5** to view or change the wireless adapter parameters.

   Edit the parameters for this adapter to those shown in the table below. Refer to online help for allowed ranges on all these fields. The fields shown in this table are mandatory. Check with your worksheets or the network operator for values for other fields.

Table 30. Mandatory Parameters for an NDIS DOS or Windows Workstation

Parameter	Value
Network Name	See your worksheet.
Workstation Name	See your worksheet.
Country type	See Table 2 on page 17.
Base type	The value depends on the kind of base connected to this workstation. Enter E for OS/2 base bridged to Ethernet, T for everything else.
Mobility	OFF LOW (low sensitivity). Choose this if you want emphasize the cell coverage (maximum range) rather than the overall data throughput (maximum performance). HIGH (high sensitivity). Choose this otherwise.
Compression	YES Data sent will occupy less space and you will get potentially higher throughput.
Data Masking [8]	NONE This is to ensure there are no security and access problems when you first set up the workstation or network. When the workstation is working to your satisfaction, you can set this parameter as you want it.

Note: Some parameters apply only to PCMCIA Type II Slot wireless workstations. For more information, refer to the on-line help.

[8] In some countries encryption, that is data masking, is not allowed, so this parameter should be set to NO. The adaptor supplied in these countries is called a 'non cipher' board and will cause a failure if you try to set data masking to YES.

5. Press **F4** to save your entries.

   For the correct values, refer to the worksheet you filled out on page 39 or in *Designing Your Network*. Contact your network operator if you need assistance.

6. When the Current Configuration panel is displayed again, select the protocol used by your application.

   If you do not know which protocol is used, depending on your operating system, refer to Table 19 on page 68 or Table 20 on page 70, or to the application documentation. on page 39 or in *Designing Your Network*.

   Press **F4** again to install (bind) your protocol.

7. If requested, insert the LSP diskette in drive A and press **Enter**.

8. When the completion message is displayed, remove the LSP diskette.

9. Enter the following command to verify that parameters are correctly set:

   For Windows: CHKPARMW

   For DOS: CHKPARMD

   CHKPARMx checks the parameters in CONFIG.SYS, AUTOEXEC.BAT, and PROTOCOL.INI.

   The results of the verification are displayed on your screen.

10. Carry out the following procedure to ensure your workstation is receiving radio signals from its base station.

If you have just installed a Windows NDIS workstation, then run the procedure in "Checking the RSSI on Your OS/2 or Windows Workstation" on page 95, not this one below.

Checking the RSSI on Your NDIS DOS Workstation

1. Make sure you have removed the LSP diskette. Then press **Ctrl+Alt+Del** to restart the computer.

   Note: If the wireless workstation has a PCMCIA Type II slot and there is an interrupt level conflict when the computer restarts, see "IO Base Address or Interrupt Level Conflicts" on page 55.

2. Verify that you are receiving an adequate level of radio signals:

   If you selected **Yes** for Automatic Update of the AUTOEXEC.BAT file, the received signal strength indication (RSSI) application will be automatically loaded. Go to step 3.

   If you selected **No** for Automatic Update of the AUTOEXEC.BAT file, the file remains unchanged. The received signal strength will **Not** be automatically loaded the next time the wireless workstation starts.

   At the DOS prompt, type RSSI2 /L and press **Enter**. This loads the received signal strength indication (RSSI) application.

   At the DOS prompt, type RSSI2 /D and press **Enter**. This displays a visual indication of the level of the radio signal received on the wireless workstation.

3. Five symbols (+ or –) are displayed in the top right corner of your screen. Position the radio module to display + signs. Three + signs show an adequate level of reception. If you get five – signs, and repositioning does not change them, try one of these:

   Check that the workstation radio module is installed properly.

   Check that the base station is operating and transmitting.

   You might need to load your networking application before you try the test. The adapter could be waiting for the application to start it. For example, if you had PC3270 (using protocol 802.2), you would need to load this first.

Note: If the RSSI display interferes with your graphic applications, enter RSSI2 /V (instead of RSSI2 /D) to show only the RSSI value rather than the + and − symbols.

An audio alarm is emitted if the radio signal received becomes too weak. Reposition the radio module to recover an adequate level of radio reception.

You can turn OFF the audio alarm or change some of its options. To display the syntax, enter RSSI2 at the DOS prompt and press **Enter**.

Your computer is now set up as a DOS wireless workstation. The wireless workstation is operational.

Note: Once you have an adequate level of radio reception, you can install other software applications you may want to run, for example, DOS Requester from the LAN server.

Next Step

Return to Table 20 on page 70 for an NDIS workstation running under DOS, ***do not*** run the following procedures.

8.3 NDIS Workstation Running Under DOS/Windows for IBM TCP/IP

1. Install TCP/IP according to the instructions in the TCP/IP documentation.
2. Use a text editor to insert file NDISWL.DDI (installed by IBM Wireless LAN software in the C:\WIRELESS directory) at the **top** of file NDIS.DDI (installed by TCP/IP in directory C:\TCPDOS\ETC.)
3. Run CUSTOM provided by TCP/IP.
4. When the message **Insert IBM TCP/IP for DOS Disk D1** is displayed, use instead the IBM Wireless 'DOS and Windows Workstation' diskette.

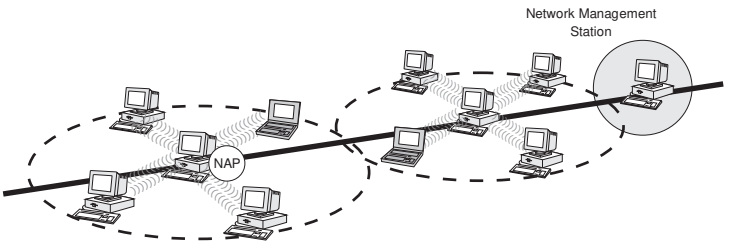
5 If you edit IBM Wireless LAN Adapter parameters, they must be entered enclosed in quotes, **except** for COUNTRYCODE, INT, PORT. For example:

```
NETWORKID="CELL 1"
COUNTRYCODE=1
```

Next Step

For DOS return to Table 20 on page 70.
For Windows return to Table 19 on page 68.

Chapter 9. Setting Up Network Management on OS/2 Bases



Notes: This chapter does not describe the installation and configuration of the network management station itself. For this information, please refer to the documentation supplied with the network management station.

Verify the mandatory prerequisites. To do so, refer to 3.6, “Filling Out the Base Planning Worksheet” on page 32. During the installation of the base, you must bind the TCP/IP protocol to your backbone adapter using the LAPS Configure Workstation window. This step is necessary in order to use network management facilities.

The IBM Wireless LAN extends the facility provided by the Simple Network Management Protocol (SNMP) agent of TCP/IP for OS/2. The following MIBs are supported:

MIB II

The IBM Wireless LAN specific MIB

The bridge MIB (RFC1286).

The IBM Wireless LAN-specific MIB contains information about the base and all the wireless workstations connected to that base. The GET and the GET-NEXT SNMP operations are supported on all the management objects and can be issued from any SNMP manager, such as IBM NetView/6000. The IBM Wireless LAN initiates SNMP

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traps in response to various events, such as configuration or security problems.

To configure the network management function for your IBM Wireless LAN, follow these steps:

1. Update the **network management station** by following the procedure below, 9.1, “Updating the Network Management Station.”
2. Configure the **base** for network management by following the procedure in 9.2, “Configuring a Base for Network Management” on page 105.

9.1 Updating the Network Management Station

The installation procedure at the network management station depends on the network management system that you have installed. The README.DOC file, stored in the WLSAMPLE directory on the IBM Wireless LAN 'Utilities diskette', contains information on where to find the different installation procedures.

Note: If you prefer to configure network management yourself instead of following the installation procedure provided, you will need the IBM Wireless LAN-specific MIB and IBM Wireless LAN-specific traps.
The /WLSAMPLE/README.DOC file on the IBM Wireless LAN 'Utilities diskette' gives the name and location of the files containing this information.

To update the network management station, follow these steps:

1. Insert the IBM Wireless LAN 'Utilities diskette' in drive A of the network management station.
2. Locate the /WLSAMPLE/README.DOC file, and then use any ASCII editor to view the file.
3. Using the information provided in the README.DOC file, locate the file that contains the installation procedure for the network management system that you are using.
4. Print the file using any ASCII editor or print procedure.

Note: Although you can also view the file using an ASCII editor, you will need a printed copy to perform the installation procedure.

5 Follow the installation instructions in the printout that you make.

9.2 Configuring a Base for Network Management

This section describes how to configure a base for network management. To do so, follow these steps:

1 Configure the SNMP Agent for TCP/IP for OS/2 by following the procedure in “Configuring the SNMP Agent for TCP/IP for OS/2.”

2 Configure the IBM Wireless SNMP Proxy Agent by following the procedure in “Configuring the IBM Wireless SNMP Proxy Agent” on page 108.

Configuring the SNMP Agent for TCP/IP for OS/2

This section describes how to configure the components of Transmission Control Protocol/Internet Protocol (TCP/IP) V2.0 for OS/2 using the TCP/IP Configuration Notebook. For more information about the configuration of TCP/IP for OS/2, you should refer to the documentation "TCP/IP for OS/2 v2.0 installation and interoperability".

From the TCP/IP folder, double click on the **TCP/IP configuration** icon (or from an OS/2 session, type TCPIPCFG.EXE) and click on the **SNMP** tab. Using the TCP/IP configuration notebook, you will:

1 Set the required environment management objects.

2 Set the address of the SNMP manager that will receive the SNMP traps sent by the base station.

3 Set community names that you want the SNMP Agent to consider valid.

Setting Environment Management Objects
On page 1 of the TCP/IP configuration notebook for SNMP fill in the following two fields:

SYSCONTACT
Name of the person responsible for the OS/2 base station.

SYSLOCATION
Location of the OS/2 base station.

Setting the Address of the SNMP managers
Move to page 2 of the TCP/IP configuration notebook for SNMP:

In the SNMPTRAP.DST fields, specify the hosts where the base station will send SNMP traps. Enter the address of the SNMP manager that will monitor the base station.

Setting valid community names
The community name is the authentication mechanism used by the OS/2 SNMP agent to verify that a request for information is valid. A community name is similar to a password. Each request sent to the OS/2 SNMP agent must be accompanied by the correct community name. The community names defined at the SNMP manager and at the OS/2 agent must match before any request can be verified.

When a request is received from an SNMP manager, the community name received is checked against the entries in the PW.SRC file. Page 2 of the TCP/IP configuration notebook for SNMP allows you to add entries in the PW.SRC file and therefore set community names that will be accepted by the SNMP agent of TCP/IP for OS/2.

An entry is made in three fields:

```
community_name    desired_network    snmp_mask
```

The following is an example of the contents of a PW.SRC file containing multiple entries:

```
passwd1      9. . .           255. . .
passwd2      129.34.81.22     255.255.255.255
```

If the community name received does not match any of the entries listed in the PW.SRC file, an Authentication Failure Trap

is sent (provided that a destination exists in the SNMPTRAP.DST file) and no response is sent to the SNMP manager.

If the community name received matches an entry in the PW.SRC file, the originating IP address of the incoming SNMP request is logically ANDed with the snmp_mask. The result of the logical ANDing process is compared with the desired_network:

- If they are equal, the request is accepted (this allows the agent to accept requests only from certain managers, which can have different community names).
- If they are not equal an Authentication Failure Trap is sent (provided that a destination exists in the SNMPTRAP.DST file) and no response is sent to the SNMP manager.

Using the previously described example file PW.SRC, assume a request from an SNMP manager at IP address 9.34.22.122 is received and the correct community name of passwd1 is used by the manager. The IP address 9.34.22.122 is ANDed with 255.0.0.0. The result is 9.0.0.0, which equals the specified desired_network, and the request is valid.

Looking at the second entry of the example PW.SRC file, a request that contains the community name passwd2 is accepted from the SNMP client only at host 129.34.81.22. If a request is received from any other SNMP manager with the passwd2 community name, an Authentication Failure Trap is sent. A desired_network and snmp_mask of all zeros allows any host with the correct community_name to make requests.

Note that you need to configure your SNMP manager so that it uses in its requests valid community names that you have set up in your base station.

In order for the wireless proxy agent to operate, you must at a minimum establish the community name *public* as a valid name for SNMP requests coming from the IP address of the base itself. This is necessary because the wireless SNMP proxy agent and the SNMP agent for TCP/IP for OS/2 exchange SNMP requests

within the base. For example, assuming that the IP address of the base is 129.34.81.22, you can add the entry:

```
public          129.34.81.22      255.255.255.255
```

After leaving the TCP/IP configuration Notebook, go to the \TCPIP\ETC directory and run the MAKE_PW program.

Make sure that the HOSTNAME is set to the host name of the base station in the CONFIG.SYS file.

Starting the SNMP agent for OS/2
To start the OS/2 SNMP agent, type at the OS/2 command prompt:

1. START SNMPREQD
2. START SNMPD -t 8

The t parameter specifies the maximum timeout value that the OS/2 Agent sets for the wireless Proxy Agent to respond to a request. The recommended value is 80 (time is in seconds).

Configuring the IBM Wireless SNMP Proxy Agent

To configure the IBM Wireless SNMP Proxy Agent, you must enable **Network Management** for each base. To do so follow these steps:

1 On the OS/2 desktop, double-click on the **IBM Wireless Services** folder which contains the IBM Wireless LAN icon.

2 Double-click on the OS/2 Base/NAP Station Configuration icon. Select either **Basic** or **Advanced** option from the Configuration menu, then select Network Management.

3 When the Network Management Configuration window is displayed:

a In the Network Management group box:

Click on the **Enable** check box.

Click on the **Auto Start** check box if you want network management to start automatically each time the IBM Wireless LAN Supervisor is started.

When Auto Start is not selected, you must manually start network management by selecting **Start** from the Network Management menu in the IBM Wireless LAN Supervisor window.

b If you selected **Enable** in the Configuration group box, select any of the following options:

SNA Enable SNA* if you want SNA network management, such as OS/2 LAN Network Manager. The IBM Wireless LAN will report generic alerts in an SNA session via Communication Manager to either OS/2 LAN Network Manager or a NetView host. See Communication Manager documentation for information on how to specify the destination of these alerts.

SNMP Enable SNMP if you want SNMP network management, such as NetView/6000.

c If you enable SNMP network management, fill in the parameters in the SNMP Parameters group box:

Local IP Address
Specify the IP address of this station.

Topology Traps
Select this option to generate traps each time a wireless workstation is registered or deregistered on the network. When this option is not selected, traps are not sent, reducing data traffic on the network.

4 After entering network management information, click on **OK**.

5 In the Supervisor main window, select **Start** from the Network Management menu. This starts network management without requiring that you shut down and restart the computer.

9.3 Sending SNA Alerts from a Base

An OS/2 Base station uses Communication Manager to build SNA alerts which may be forwarded to IBM Netview, IBM LAN Network Manager and logged locally. This section explains how you can:

Generate SNA alerts at a base station

Display the Base station SNA alerts at the LAN Network Manager.

Note that this section does not replace the IBM Communication Manager and IBM LAN Network Manager documentation, it is only placed here for information.

For details and in case of problems, you should refer to the documentation you received with those products.

Configuring the Base Station to Generate Alerts

The following statement should be inserted in your CONFIG.SYS if not already present:

```
RUN=C:\OS2\EPW.EXE
RUN=C:\OS2\EPWROUT.EXE n
```

The n after EPWROUT.EXE specifies the routing of the SNA Alerts:

-1: Alerts are only logged in a local file, \os2\system\epwalert.dmp

0: Alerts are not sent

1: Alerts are routed to the netview host and logged locally

2: Alerts are routed to the IBM LAN Network manager and logged locally.

If you modified your CONFIG.SYS, you need to reboot your Base.

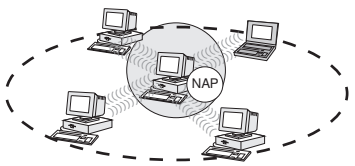
If you choose to route alerts to Netview host there must be an active link present between the Base and the managing node. Refer to your Communication Manager documentation on how to set up that link.

Chapter 10. Setting Up NetWare Bases

This chapter describes how to set up:

The NetWare base of a stand-alone cell.
The NetWare base with NAP, and the NetWare bases without NAP of wired LAN cells.

10.1 Setting Up the NetWare Base of a Stand-Alone Cell



Go to the computer you want to use as the base of the stand-alone cell. Make sure that NetWare server version 3.11, 3.12, 4.0 or higher is installed by following the instructions in your Novell* * documentation.

To set up the base, follow these steps:

1. Start the NetWare server by following the procedure in the Novell documentation.
2. Insert the IBM Wireless LAN 'NetWare base diskette' in drive A.
3. Type SEARCH ADD A: at the system console prompt and press **Enter**. A message such as the following is displayed:
   Search 2:[DOS Path] A:
4. Type LOAD A:INSTNET and press **Enter**.
5. When the IBM logo screen is displayed, press **Enter**.
6. In the Wireless Installation Settings window:

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a. For Station Type, keep **Base (Stand-Alone Cell)** selected. This is the default value.

b. Keep **No** for Network Management as it is not available for a stand-alone cell. This is the default value.

c. Keep **Yes** for Update AUTOEXEC.NCF. The computer updates the AUTOEXEC.NCF file, and automatically loads the IBM Wireless LAN software the next time the server starts.

   If you select **No** for **Update AUTOEXEC.NCF**, the AUTOEXEC.NCF file remains unchanged. The IBM Wireless LAN software will **not** be automatically loaded. See system files examples for "NetWare Base of a Stand-Alone Cell" on page 199.

7. Press **F10** to start the installation.

8. When you are prompted that the installation is complete, press **any key** to exit from the IBM Wireless LAN installation program.

9. Remove the IBM Wireless LAN 'NetWare base diskette' from drive A.

10. Follow this step only if you are using NetWare 3.11:

    a. If you selected **No** for Update AUTOEXEC.NCF, you must edit the AUTOEXEC.NCF file and add the following statements:
    LOAD LSLENH
    LOAD MSM31X

    Note: LSLENH.NLM must be the first Netware Loadable Module (NLM) to load in your AUTOEXEC.NCF.

    b. On the NetWare server, follow these steps:
    Type DOWN to shut down the server and press **Enter**.
    Type EXIT to return to DOS and press **Enter**.
    Restart the server.

11. If you are using NetWare Version 3.11:

If you selected **No** for Update AUTOEXEC.NCF, type IBMWL at the server prompt and press **Enter**. This loads the IBM Wireless LAN modules and starts the NAP.

If you selected **Yes** for Update AUTOEXEC.NCF, the IBM Wireless LAN software is automatically loaded.

If you are using another NetWare version, type IBMWL at the server prompt and press **Enter**. The next time the server starts the procedure will be as described for version 3.11.

12 When the IBM logo screen is displayed, press **Enter**.

13 Select **Display/Modify Network Data** on the main menu.

14 When the **Display/Modify Network Data** screen is displayed enter a value for **Network Name**.

For the correct values, refer to the worksheet you filled out on 3.6, “Filling Out the Base Planning Worksheet” on page 32 or in *Designing Your Network*.

15 Press **Esc** to return to the main menu.

Note: The base name has been set to LOCALBS (default value). If you want to change this name, use the **Display/Modify Base Data** option on the NAP main menu.

16 Hang the radio module as high as possible on the wall or on another suitable stand. You can affix the radio module using the Velcro provided in the package.

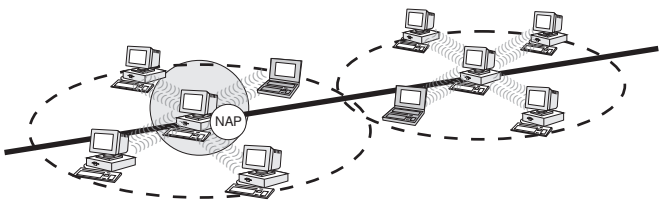
This completes the setup of the base. The file IBMWL.NCF has been created. See system files examples of “NetWare Base of a Stand-Alone Cell” on page 199 for further information.

If you have a problem starting your base, see Appendix A, “Troubleshooting Wireless Network Problems” on page 181.

Next Step

Return to Table 17 on page 66, ***do not*** run the following procedures.

10.2 Setting Up The NetWare Base With NAP in Wired LAN Cells



Go to the computer you want to use as the base containing the NAP. Make sure that NetWare server version 3.11, 3.12, 4.0 or higher is installed by following the instructions in your Novell documentation.

To set up the computer as the **base with NAP**, follow these steps:

1. Start the NetWare server by following the procedure in the Novell documentation.
2. Insert the IBM Wireless LAN 'NetWare base diskette' in drive A.
3. Type SEARCH ADD A: at the system console prompt and press **Enter**. A message such as the following is displayed:
   Search 2:[DOS Path] A:
4. Type LOAD A:INSTNET and press **Enter**.
5. When the IBM logo screen is displayed, press **Enter**.
6. In the Wireless Installation Settings window:
   a. Select **Base (Wired LAN Cell)** for Station Type.
   b. Select:
      Yes for Network Management if you want to use a network management station.

      If you are using NetWare version 3.11, you need to perform additional steps in order to upgrade the Novell version 3.11 SNMP Agent. Follow the instructions provided in the section "Upgrading the NetWare 3.11 SNMP Agent" in the README.NET

file. This file is located in the root directory of the IBM Wireless LAN 'NetWare Base Diskette'.
No if you do not want to use a network management station.

c Enter a value for **IPX Network Number**, if different from the default value.

For the correct value, refer to the worksheet you filled out on 3.7, "Filling out the Workstation Planning Worksheet" on page 37 or in *Designing Your Network*. Contact your network operator if you need assistance.

d Select **Yes** for Update AUTOEXEC.NCF. The computer updates the AUTOEXEC.NCF file, and automatically loads the IBM Wireless LAN software the next time the server starts.

If you select **No** for Update AUTOEXEC.NCF, the AUTOEXEC.NCF file remains unchanged. The IBM Wireless LAN software will **not** be automatically loaded. See system files examples for "NetWare Bases of a Wired LAN Cell" on page 200.

7 Press **F10** to start the installation.

8 When you are prompted that the installation is complete, press **any key** to exit from the IBM Wireless LAN installation program.

9 Remove the IBM Wireless LAN 'NetWare base diskette' from drive A.

10 Follow this step only if you are using NetWare 3.11:

a If you selected **No** for Update AUTOEXEC.NCF, you must edit the AUTOEXEC.NCF file and enter:
LOAD LSLENH
LOAD MSM31X

Note: The LSLENH.NLM statement must be the first NLM to load in your AUTOEXEC.NCF.

b On the NetWare server, follow these steps:
Type DOWN to shut down the server and press **Enter**.

Type EXIT to return to DOS and press **Enter**.
Restart the server.

11 If you are using NetWare Version 3.11:

If you selected **No** for Update AUTOEXEC.NCF, type IBMWL at the server prompt and press **Enter**. This loads the IBM Wireless LAN modules and starts the NAP.

If you selected **Yes** for Update AUTOEXEC.NCF the IBM Wireless LAN software is automatically loaded.

If you are using another NetWare version type IBMWL at the server prompt and press **Enter**. The next time the server starts the procedure will be as described for version 3.11.

12 When the IBM logo screen is displayed, press **Enter**.

13 Select **Display/Modify Network Data** from the main menu.

14 When the Display/Modify Network Data screen is displayed enter a value for **Network Name**. Then press **Enter**.

For the correct values, refer to the worksheet you filled out on 3.7, “Filling out the Workstation Planning Worksheet” on page 37 or in *Designing Your Network*. Contact your network operator if you need assistance.

15 Press **Esc** to return to the main menu.

Note: The base name is set to LOCALBS (default value). If you want to change this name, use the **Display/Modify Base Data** option from the NAP main menu.

16 Hang the radio module as high as possible on the wall or on another suitable stand. You can affix the radio module with the Velcro provided in the package

This completes the setup of the base containing the NAP. The file IBMWL.NCF has been created. See system files examples of “NetWare Bases of a Wired LAN Cell” on page 200 for further information.

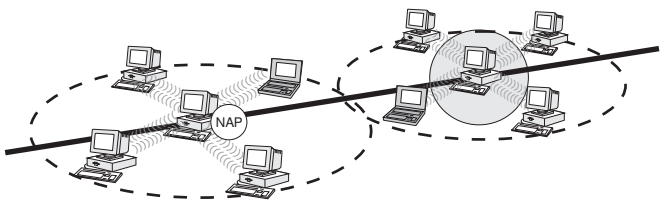
If you have a problem starting your base, see Appendix A, “Troubleshooting Wireless Network Problems” on page 181.

Note: NAP data files are essential for the configuration of your wireless network. It is recommended that you make a backup copy of existing data files each time you update your IBM Wireless LAN configuration at the NAP, by following the procedure described in A.10, “Backing Up NAP Data Files” on page 188.

Next Step

Return to Table 17 on page 66, ***do not*** run the following procedures.

10.3 Setting Up NetWare Bases Without NAP in Wired LAN Cells



Go to the computer you want to use as a base in your network. Make sure that NetWare server version 3.11, 3.12, 4.0 or higher is installed by following the instructions in your Novell documentation.

To set up the computer as **base without NAP**, follow these steps:

1. Start the NetWare server by following the procedure in the Novell documentation.
2. Insert the IBM Wireless LAN 'NetWare base diskette' in drive A.
3. Type SEARCH ADD A: at the system console prompt and press **Enter**. A message such as the following is displayed:
   Search 2:[DOS Path] A:
4. Type LOAD A:INSTNET and press **Enter**.

5 When the IBM logo screen is displayed, press **Enter**.

6 In the Wireless Installation Settings window:

a Select **Base (Wired LAN Cell) without NAP** for Station Type.

b Select:

Yes for Network Management if you want to use a network management station.

If you are using NetWare version 3.11, you need to perform additional steps in order to upgrade the Novell version 3.11 SNMP Agent. Follow the instructions provided in the section "Upgrading the NetWare 3.11 SNMP Agent" in the README.NET file. This file is located in the root directory of the IBM Wireless LAN 'NetWare Base Diskette'.

No if you do not want to use a network management station.

c Enter values for:

NAP IP Address, the TCP/IP address of the base containing the NAP.

IPX Network Number, if different from the default value.

For the correct values, refer to the worksheet you filled out on 3.6, “Filling Out the Base Planning Worksheet” on page 32 or in *Designing Your Network*. Contact your network operator if you need assistance.

d Select **Yes** for Update AUTOEXEC.NCF. The computer updates the AUTOEXEC.NCF file, and automatically loads the IBM Wireless LAN software the next time the server starts.

If you select **No** for Update AUTOEXEC.NCF, the AUTOEXEC.NCF file remains unchanged. The IBM Wireless LAN software will **not** be automatically loaded. See system files examples for “NetWare Bases of a Wired LAN Cell” on page 200.

7. Press **F10** to start installation.
8. When you are prompted that the installation is completed, press any key to exit from the IBM Wireless LAN installation.
9. Remove the IBM Wireless LAN 'NetWare base diskette' from drive A.
10. Go to the base containing the NAP.
11. Select **Display/Modify Base Data** from the NAP main menu.
12. Press **Insert** to add the new base.
13. Enter values for:
    New Base Name, the name of this base.
    New IP Address, the TCP/IP of the base you have installed.

    Then press **F10** to validate this information.

    Note: The base state is set to **Not Ready**. It will be updated the first time the base contacts the base with the NAP. To refresh the screen, press **Esc** and select again **Display/Modify Base Data** from the NAP main menu.
14. Go back to the base without NAP that you are installing.
15. Follow this step only if you are using NetWare 3.11:
    a. If you selected **No** for Update AUTOEXEC.NCF, you must edit the AUTOEXEC.NCF file and enter:
    LOAD LSLENH
    LOAD MSM31X

    Note: The LSLENH.NLM statement must be the first NLM to load in your AUTOEXEC.NCF.

    b. On the NetWare server, follow these steps:
    Type DOWN to shut down the server and press **Enter**.
    Type EXIT to return to DOS and press **Enter**.
    Restart the server.
16. If you are using NetWare Version 3.11:

If you selected **No** for Update AUTOEXEC.NCF, type IBMWL at the server prompt and press **Enter**. This loads the IBM Wireless LAN modules and starts the NAP.

If you selected **Yes** for Update AUTOEXEC.NCF, the IBM Wireless LAN software is automatically loaded.

If you are using another NetWare version you must type IBMWL at the server prompt. The next time the server starts the procedure will be as described for version 3.11.

Note: To verify the setup of your base, follow these steps:
Go to the base containing the NAP.
Select **Display/Modify Base Data** from the NAP main menu. Your base state should be updated to **Ready**. To refresh the screen, press **Esc** and select again **Display/Modify Base Data** from the NAP main menu.

17 Hang the radio module as high as possible on the wall or on another suitable stand. You can affix the radio module with the Velcro provided in the package.

This completes the setup of a base without NAP. The file IBMWL.NCF has been created. See system files examples of "NetWare Bases of a Wired LAN Cell" on page 200 for further information.

Repeat this procedure for the other bases in your wireless network.

If you have a problem starting your base, see Appendix A, "Troubleshooting Wireless Network Problems" on page 181.

Next Step

Return to Table 17 on page 66, ***do not*** run the following procedures.

Chapter 11. Setting Up ODI Workstations

Each of the procedures in this chapter describes installation and configuration for different kind of ODI workstation:

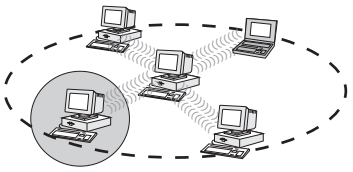
Workstation running under OS/2

Workstation running under Windows

Workstation running under DOS

The procedures can only be run in the circumstances determined by the tables in Chapter 5, “Choosing a Setup Procedure” on page 63.

11.1 ODI Wireless Workstation Running Under DOS



Before you start the following procedures, refer to the worksheet you filled out on page 39 or in *Designing Your Network*, to have the correct values of the workstation parameters. Contact your network operator if you need assistance.

Go to the computer you want to use as an ODI wireless workstation running under DOS:

Make sure that DOS 5.0 or higher is installed.

Note: To see what version of DOS is currently installed type ver at the DOS prompt (such as C:\>) and press **Enter**.

Edit the CONFIG.SYS file with any ASCII text editor, and verify that in statements:

- FILES=xx the value for xx is at least 20.
- BUFFERS=yy the value for yy is at least 20.

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Note: If the file statement needs to be added or if the value needs to be changed, you must reboot the system.

Installing/Configuring a Novell Requester for the IBM Wireless LAN

To set up an ODI wireless workstation running under DOS, you need first to install and configure for the IBM Wireless LAN a Novell Requester, such as:

Novell NetWare ODI Shell for DOS
NetWare Workstation for DOS/Windows
NetWare Lite.

Note: Follow this procedure only if the Novell Requester:

Needs to be installed.
Is already installed but configured for an adapter which is not an IBM wireless LAN adapter.

To install/configure the Novell Requester for the IBM Wireless LAN:

1. Run the Novell Requester installation program and follow the *Install a New Network Board Driver* instructions in your Novell documentation. When you are prompted to insert the diskette containing third-party ODI drivers, insert the IBM Wireless LAN 'DOS and Windows workstation diskette' in drive A and press **Enter**.
2. When the device driver list appears, select:
   IBMWLETH.COM, if the base, where the wireless workstation will be connected to, is an OS/2 base, bridged to an Ethernet LAN.
   Otherwise, select **IBMWL.COM**.
   Then press **Enter** and follow the instructions on the screen.

   Note: It is not possible to update the NET.CFG file, at this time.

ODI DOS Workstation Setup

To set up your DOS wireless workstation, follow these steps:

1. Insert the 'DOS and Windows workstation diskette', type A:INSTDOS at the DOS prompt and press **Enter**.

   Note: If you are experiencing problems during installation, increase again the values for the parameters FILES and BUFFERS in the CONFIG.SYS file.

2. When the IBM logo screen is displayed, press **Enter**.
3. Select **ODI Workstation Installation** from the main menu and press **Enter**.
4. Select **Software Installation** and press **Enter**.
5. Enter the drive and the directory where you installed the NetWare Requester (for example, the default is C:\NWLITE for NetWare Lite).
6. When the Wireless Workstation Parameters screen is displayed:
   Enter the **Network Name**.
   Select a country type for your **Country** using the **F4** key. For your country type, refer to Table 2 on page 17.
   Enter the **Workstation Name**.
   If you want data compression on your wireless communications, select **Yes** for Compression by pressing the space bar.
   Depending on the base connectivity where the wireless workstation is connected to, for **Base Type**, select:
   - OS/2 Base Bridged Ethernet, for an OS/2 base bridged to an Ethernet LAN (IBMWLETH.COM device driver selected).
   - Others, for the other bases (IBMWL.COM device driver selected).

   by using the **F5** key.
   Depending on the base capability where the wireless workstation is connected to (see Table 7 on page 28 or Table 8 on page 29), for **Mobility**, select:
   - Disabled, if the mobility function is not available for workstations.

– Low Sensitivity, if you want to emphasize the cell coverage (maximum range) rather than the overall data throughput (maximum performance).
– High Sensitivity, otherwise.

by using the **F6** key.

If your LAN uses Locally Administered Addresses, enter the **LAA** of the wireless workstation (12 hexadecimal digits).

Then press **Enter**.

7 Enter the drive and the directory where you want to install the IBM Wireless LAN. Then press **Enter**. The default is C:\WIRELESS.

8 Select **Yes** for Automatic Update of the AUTOEXEC.BAT file, and press **Enter**.

Note: If you select **No** for Automatic Update of the AUTOEXEC.BAT file, the receive signal strength (RSSI) will **not** start automatically.

9 When you are prompted that the installation is complete, press **any key** to return to the DOS prompt.

Note: The default value for the frame is:
Ethernet_802.2 for the device driver IBMWLETH.COM.
Token–ring for the device driver IBMWL.COM.
If the frame value needs to be changed, add the statement: FRAME xxxxxxxx in the NET.CFG file, where xxxxxxxx, is the new frame value. Update this parameter **before** restarting the computer.

10 Remove the IBM Wireless LAN 'DOS and Windows workstation diskette' from drive A.

11 Press **Ctrl+Alt+Del** to restart the computer.

Note: If the wireless workstation has a PCMCIA Type II slot, and you are experiencing a problem, see 4.4, “PCMCIA Portable Computer Support” on page 51.

Checking the RSSI on Your ODI DOS Workstation

Verify that you are receiving an adequate level of radio signals:

1. Start your NetWare Requester, and at the DOS prompt, type RSSI /L, then press **Enter**. This loads the received signal strength indication (RSSI) application, if it is not already started.
2. At the DOS prompt, type RSSI /D and press **Enter**. This displays a visual indication of the level of the radio signal received on the wireless workstation. Five symbols (+ or –) are displayed in the upper right corner of your screen.

   Note: If the RSSI display interferes with your graphic applications, type RSSI /V (instead of RSSI /D) to show only the RSSI value rather than the + and – symbols.
3. Position the radio module in order to obtain at least three symbols. An audio alarm is emitted if the radio signal received becomes too weak. Reposition the radio module to restore an adequate level of radio reception.

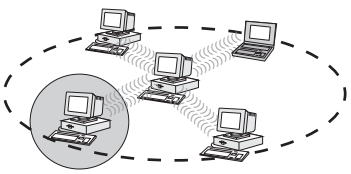
   Note: You can turn OFF the audio alarm or modify some of the options. To display the syntax, type RSSI ? at the DOS prompt and press **Enter**.

Your computer is now set up as an ODI wireless workstation running under DOS. The wireless workstation is operational.

Next Step

Return to Table 20 on page 70, ***do not*** run the following procedures.

11.2 ODI Wireless Workstation Running Under Windows



Before you start the following procedures, refer to the worksheet you filled out on page 39 or in *Designing Your Network*, to have the correct values of the workstation parameters. Contact your network operator if you need assistance.

Go to the computer you want to use as an ODI wireless workstation running under Windows. Make sure that Windows 3.1 or higher is installed.

Note: To see what version of Windows is currently installed type winver at the command prompt (such as C:\>) and press **Enter**.

Installing/Configuring a Novell Requester for the IBM Wireless LAN

To set up an ODI wireless workstation running under Windows, you need first to install and configure for the IBM Wireless LAN a Novell Requester, such as:

Novell NetWare ODI Shell for DOS
NetWare Workstation for DOS/Windows
NetWare Lite.

Note: Follow this procedure only if the Novell Requester:

Needs to be installed.
Is already installed but configured for an adapter which is not an IBM wireless LAN adapter.

To install/configure the Novell Requester for the IBM Wireless LAN:

1. Run the Novell Requester installation program and follow the *Install a New Network Board Driver* instructions in your Novell documentation. When you are prompted to insert the diskette containing third-party ODI drivers, insert the IBM Wireless LAN 'DOS and Windows workstation diskette' in drive A and press **Enter**.
2. When the device driver list appears, select:
   IBMWLETH.COM, if the base, where the wireless workstation will be connected to, is an OS/2 base, bridged to an Ethernet LAN.
   Otherwise, select **IBMWL.COM**.
   Then press **Enter** and follow the instructions on the screen.

   Note: It is not possible to update the NET.CFG file, at this time.

ODI Windows Workstation Setup

To set up your Windows workstation, follow these steps:

1. Start Windows, if it is not already started.
2. Choose **Run...** from the File pull-down in the Program Manager window.
3. Insert the IBM Wireless LAN 'DOS and Windows workstation diskette', type A:INSTWIN on the command line and click on **OK**.
4. When the Install window is displayed, keep **Update CONFIG.SYS/AUTOEXEC.BAT** selected, and click on **OK**.

   If you de-select the **Update CONFIG.SYS/AUTOEXEC.BAT** option, the RSSI will **not** start automatically.
5. When the Install-directories window is displayed:
   Select **Software for ODI Workstation**.
   Enter the drive and the directory where you want to install the IBM Wireless LAN. The default is C:\WIRELESS.
   Then click on **Install...**.
6. If necessary, change the default directory path where you installed the NetWare Requester. Then click on **OK**.

7 When the Software Installation Parameters window is displayed:

Enter a value for **Network name**.
Enter a value for **Workstation name**.
Select a country type for your **Country**. For your country type, refer to Table 2 on page 17.
If you want data compression on your wireless communications, keep **Compression** selected.
Depending on the base connectivity where the wireless workstation is connected to, for **Base Type**, select:
- OS/2 Base Ethernet, for an OS/2 base bridged to an Ethernet LAN (IBMWLETH.COM device driver selected).
- Others, for the other bases (IBMWL.COM device driver selected).

Depending on the base capability where the wireless workstation is connected to (see Table 7 on page 28 or Table 8 on page 29), for **Mobility**, select:
- Disabled, if the mobility function is not available for workstations.
- Low sensitivity, if you want to emphasize the cell coverage (maximum range) rather than the overall data throughput (maximum performance).
- High Sensitivity, otherwise.

If your LAN uses Locally Administered Addresses, enter the **LAA** of the wireless workstation (12 hexadecimal digits).

Then click on **OK**.

8 When the Installation and Maintenance information message is displayed, click on **OK**.

9 Choose **Exit** from the File pull-down.

10 Remove the IBM Wireless LAN 'DOS and Windows workstation diskette' from drive A.

11 Choose **Exit Windows...** from the File pull-down in the Program Manager window.

Note: The default value for the frame is:

Ethernet_802.2 for the device driver IBMWLETH.COM.
Token–ring for the device driver IBMWL.COM.
If the frame value need to be changed, add the statement: FRAME xxxxxxxx in the NET.CFG file, where xxxxxxxx, is the new frame value. Update this parameter **before** restarting the computer.

12 Press **Ctrl+Alt+Del** to restart the computer.

Note: If the wireless workstation has a PCMCIA Type II slot and you are experiencing a problem, see 4.4, "PCMCIA Portable Computer Support" on page 51.

Checking the RSSI on Your ODI Windows Workstation

1 Start your NetWare Requester. Double-click on the **RSSI icon** in the Wireless Services group, and then minimize the application. This starts the received signal strength indication (RSSI) application, if it is not already started, which displays the level of the radio signal received on the wireless workstation. The minimized RSSI icon has five colored squares.

2 Position the radio module in order to obtain at least three green squares or three plus signs (+++).

Note: If the RSSI display interferes with your graphic applications, close the RSSI application.

When the RSSI application is running, an audio alarm is emitted if the radio signal received becomes too weak. Reposition the radio module to restore an adequate level of radio reception.

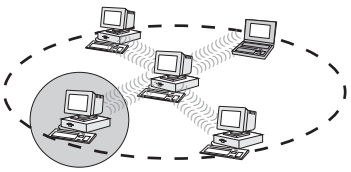
Note: You can turn OFF the audio alarm or change some of the options through a dialog box.

Your computer is now set up as a Windows wireless workstation. The wireless workstation is operational.

Next Step

Return to Table 19 on page 68 if you want to install the security or the access control feature.

11.3 ODI Wireless Workstation Running Under OS/2



The ODI device driver for OS/2 does not support the PCMCIA adapters.

Before you start the following procedures, refer to the worksheet you filled out on page 39 or in *Designing Your Network*, to have the correct values of the workstation parameters. Contact your network operator if you need assistance.

Go to the computer you want to use as an ODI wireless workstation running under OS/2. Make sure that OS/2 2.1 (or higher), or OS/2 Warp is installed.

Note: To see what version of OS/2 is currently installed type ver at the OS/2 command prompt (such as C:\)and press **Enter**.

Installing/Configuring a Novell Requester for the IBM Wireless LAN

To set up the computer as an ODI wireless workstation running under OS/2, you need first to install and configure for the IBM Wireless LAN a Novell Requester such as NetWare Workstation for OS/2.

Note: Follow this procedure only if the Novell Requester:

Needs to be installed.

Is already installed but configured for an adapter which is not an IBM wireless LAN adapter.

To install/configure the Novell Requester for the IBM Wireless LAN:

1. Run the Novell Requester installation program and follow the *Install a New Network Board Driver* instructions in your Novell documentation. When you are prompted to insert the diskette containing third-party ODI drivers:
   Insert the IBM Wireless LAN 'OS/2 base diskette (volume 2)'
   Enter the drive and directory: A:\OS2,
   click on **OK**, and follow the instructions on the screen.
2. When the device driver list appears, select:
   IBMWLETH.SYS, if the base, where the wireless workstation will be connected to, is an OS/2 base, bridged to an Ethernet LAN.
   Otherwise, select **IBMWL.SYS**.
   Then press **Enter**. Follow the instructions on the screen to complete the Novell Requester installation/configuration.

   Note:
   Do not reboot the wireless workstation as prompted in the Exit Installation message box.
   It is not possible to update the NET.CFG file, at this time.

OS/2 Workstation Setup

To set up your OS/2 wireless workstation, follow these steps:

1. Insert the IBM Wireless LAN 'OS/2 base/workstation diskette (volume 1)' in drive A.
2. At the OS/2 prompt, type A:INSTOS2 and press **Enter**.
3. When the Install window is displayed, keep **Update CONFIG.SYS** selected and click on **OK**. This updates the CONFIG.SYS file with the IBM Wireless LAN statements, and automatically loads the wireless LAN software when you start the computer.

4 When the Install-directories window is displayed, select **Software for ODI Workstation**. If necessary, change the default directory paths. The default drive and directory for the IBM Wireless LAN is C:\WIRELESS. Then click on **Install...**

5 When the Software Installation Parameters window is displayed:

Enter a value for **Network name**.
Enter a value for **Workstation name**.
Select a country type for your **Country**. For your country type, refer to Table 2 on page 17.
If you want data compression on your wireless communications, keep **Compression** selected.
Depending on the base connectivity where the wireless workstation is connected to, for **Base Type**, select:

- OS/2 Base Ethernet, for an OS/2 base bridged to an Ethernet LAN (IBMWLETH.SYS device driver selected).
- Others, for the other bases (IBMWL.SYS device driver selected).

Depending on the base capability where the wireless workstation is connected to (see Table 7 on page 28 or Table 8 on page 29), for **Mobility**, select:

- Disabled, if the mobility function is not available for workstations.
- Low sensitivity, if you want to emphasize the cell coverage (maximum range) rather than the overall data throughput (maximum performance).
- High Sensitivity, otherwise.

If your LAN uses Locally Administered Addresses, enter the **LAA** of the wireless workstation (12 hexadecimal digits).

Then click on **OK**.

6 Remove the diskette from drive A and select **Exit** from the File pull-down.

Note: The default value for the frame is:
Ethernet_802.2 for the device driver IBMWLETH.SYS.
Token–ring for the device driver IBMWL.SYS.

If the frame value need to be changed, add the statement: FRAME xxxxxxxx in the NET.CFG file, where xxxxxxxx, is the new frame value. Update this parameter **before** restarting the computer.

7 Shut down OS/2 and press **Ctrl+Alt+Del** to restart the computer.

Checking the RSSI on Your ODI OS/2 Workstation

Verify that you are receiving an adequate level of radio signals:

1 Double-click on the **RSSI icon** in the Wireless Services folder, and then minimize the application. This starts the received signal strength indication (RSSI) application, which displays the level of the radio signal received on the wireless workstation. The minimized RSSI icon has five colored squares.

2 Position the radio module in order to obtain at least three green squares or three plus signs (+++).

Note: If the RSSI display interferes with your graphic applications, close the RSSI application.

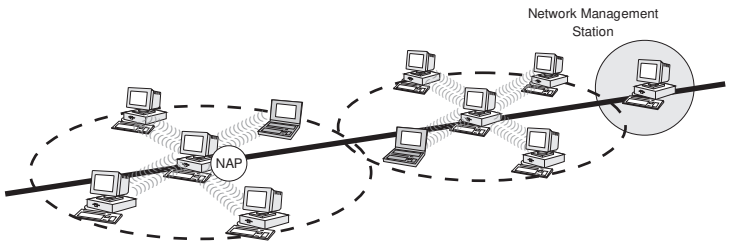
When the RSSI application is running, an audio alarm is emitted if the radio signal received becomes too weak. Reposition the radio module to restore an adequate level of radio reception. You can turn OFF the audio alarm and change some of the options through a dialog box.

Your computer is now set up as an OS/2 wireless workstation. A wireless services folder has been created. The wireless workstation is operational.

Next Step

Return to Table 18 on page 67.

Chapter 12. Setting Up Network Management on NetWare Bases



Note: This chapter does not describe the installation and configuration of the network management station itself. For this information, please refer to the documentation supplied with the network management station.

The IBM Wireless LAN extends the facility provided by the NOVELL Simple Network Management Protocol (SNMP) agent for NetWare. The following Management Information Bases (MIBs) are supported:

MIB II

The IBM Wireless LAN-specific MIB

The IBM Wireless LAN-specific MIB contains information about the base and all the wireless workstations connected to the base. The GET and GET-NEXT SNMP operations are supported on all the management objects and can be issued from any SNMP manager, such as IBM NetView/6000 or NOVELL NMS**. The IBM Wireless LAN initiates SNMP traps in response to various events, such as configuration and security problems.

The following sections describe how to configure the network management function for your IBM Wireless LAN, by following these steps:

1 Update the **network management station** by following the procedure in 12.1, “Updating the Network Management Station” on page 136.

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2 Configure the **base** for network management by following the procedure in 12.2, “Configuring a Base for Network Management” on page 137.

12.1 Updating the Network Management Station

The procedure for updating your network management station depends on the network management system that you have installed. The README.DOC file, stored in the WLSAMPLE directory on the IBM Wireless LAN 'Utilities diskette', contains information on where to find the different installation procedures.

If you prefer to configure network management yourself instead of following the installation procedure provided, you need the IBM Wireless LAN-specific MIB and IBM Wireless LAN-specific traps. The /WLSAMPLE/README.DOC file on the IBM Wireless LAN 'Utilities diskette' gives the name and location of the files containing this information.

To update the network management station, follow these steps:

1 Insert the IBM Wireless LAN 'Utilities diskette' in drive A of the network management station.

2 Locate the /WLSAMPLE/README.DOC file, and then use any ASCII editor to view the file.

3 Using the information provided in the README.DOC file, locate the file that contains the installation procedure for the network management system that you are using.

4 Print the file using any ASCII editor or print procedure.

Note: Although you can also view the file using an ASCII editor, you will need a printed copy to perform the installation procedure.

5 Follow the installation instructions in the printout that you make.

12.2 Configuring a Base for Network Management

This section describes how to configure a base for network management. To do so, follow these steps:

1. Configure the Novell SNMP Agent by following the procedure in "Configuring the Novell SNMP Agent."
2. Configure the IBM Wireless SNMP Proxy Agent by following the procedure in "Configuring the IBM Wireless SNMP Proxy Agent" on page 139.

Configuring the Novell SNMP Agent

To configure the SNMP Agent for Novell, follow these steps:

1. To establish the community names used by the Novell SNMP Agent, specify optional LOAD parameters:

   MonitorCommunity describes the read-only community. The SNMP agent will respond only to GET and GET NEXT commands with a community name that matches the one established through this option. When this option is not specified, the default value is **public**.

   ControlCommunity describes the read-write community. The SNMP agent will respond only to a SET command with a community name that matches the one established through this option. When this option is not specified, the default is to disable the community; all SET commands are ignored.

   TrapCommunity describes the community name that the SNMP agent will put in the traps that it sends to the network management station. When this option is not specified, the default value is **public**.

   To change any of these parameters, edit the AUTOEXEC.NCF file, and enter the LOAD SNMP statement with the appropriate parameters **before** the LOAD TCPIP statement, if it exists in the file. If the LOAD TCPIP statement does not exist, enter the LOAD SNMP statement **before** the IBMWL statement, for example:

```
⋮
LOAD SNMP {parameters}
LOAD TCPIP
IBMWL
⋮
```

Examples showing the correct syntax for optional parameters in the LOAD SNMP statement are given in “Examples of How to Establish Community Names” on page 139.

The names of the LOAD parameters you enter for establishing community names are not case-sensitive. In addition, when specifying optional parameters, you need only enter the first character of the option name. For example, **T**, **TrapCom**, or **Trap**, are all interpreted as **TrapCommunity**.

The value assigned to any of these community names, however, is case-sensitive. For example, the names **Public**, **public**, and **PUBLIC**, denote three different communities. A name must be an ASCII string, up to 32 characters long, and can include any character except space, tab, open square bracket ([), equal (=), colon (:), semicolon (;), or number sign (#).

To enable access to a community for a single community name, enter the option parameter followed by an equal (=) sign and the community name. If the community name provided by the SNMP management station does not match the specified value, the Agent denies access for the request.

To enable access by any community name, enter the option name followed only by an equal (=) sign with no argument. The Agent then accepts any community name provided by an SNMP management station for that community.

To disable access to a community, enter the associated option name without following it by an equal (=) sign.

2 To receive traps sent by the SNMP agent, make sure that your management station address is listed in the IP or IPX section of the \ETC\TRAPTARG.CFG file.

Edit the file with any ASCII text editor, and follow the instructions given in the file comments.

3. Update the SYSCONTACT and SYSLOCATION MIB environment objects.

   Edit the \ETC\SNMP.CFG file with any ASCII text editor, and follow the instructions given in the file comments.

Examples of How to Establish Community Names

To change any of the community name parameters, edit the AUTOEXEC.NCF file. The following examples show the correct syntax:

To set the read-write community name to **secret**, the LOAD SNMP line of the AUTOEXEC.NCF file should be:

```
LOAD SNMP ControlCommunity=secret
```

To disable all read-write access, the LOAD SNMP line of the AUTOEXEC.NCF file should be:

```
LOAD SNMP ControlCommunity
```

To allow any community name to be used for read access, the LOAD SNMP line of the AUTOEXEC.NCF file should be:

```
LOAD SNMP MonitorCommunity=
```

To allow any community name to have read-only access, and set the read-write community name to **private**, the LOAD SNMP line of the AUTOEXEC.NCF file should be:

```
LOAD SNMP M= C=private
```

To set the community name for traps to **AgentTrap**, the LOAD SNMP line of the AUTOEXEC.NCF file should be:

```
LOAD SNMP TrapCommunity=AgentTrap
```


Configuring the IBM Wireless SNMP Proxy Agent

To configure the IBM Wireless SNMP Proxy Agent, follow these steps:

1. Make sure that **Yes** is selected for **Network Management** at the base during installation. If you do not know whether Network Management is selected, edit the IBMWL.NCF file with any ASCII text editor. If the file contains a LOAD IBMWLPRX statement, Network Management is enabled.

If the IBMWL.NCF file does not contain a LOAD IBMWLPRX statement, you selected **No** for **Network Management** during installation of the base. You must re-install the base and select **Yes** for **Network Management** instead.

If the IBMWL.NCF file contains a LOAD IBMWLPRX statement, you selected **Yes** for **Network Management** during installation of the base. The IBM Wireless SNMP Proxy Agent is automatically loaded with default options when the server starts. Go to step 2.

2 If needed, specify the optional Topology parameter for the LOAD command:

Topology=On generates traps each time a wireless workstation is registered or deregistered on the network. By default, Topology is not specified explicitly and these traps are not sent. This reduces data traffic on the network.

To change the default, edit the IBMWL.NCF file, and add the Topology parameter to the LOAD IBMWLPRX statement. See "Example of How to Generate Traps with the LOAD Command" for an example.

Example of How to Generate Traps with the LOAD Command

To change the optional Topology parameter for generating traps, edit the IBMWL.NCF file. For example, to have registration and deregistration of wireless workstations reported, the LOAD IBMWLPRX line of the IBMWL.NCF file should be:

```
LOAD IBMWLPRX Topology=On
```

Restarting the Base

After you modify the system files, restart the base to activate your changes. To do so:

1 Stop the base by typing IBMWLSTP and press **Enter**.

2 Restart the base by typing IBMWL and press **Enter**.

Chapter 13. Security

The security function allows you to restrict network access to only authorized wireless workstations. It does this by generating a security code for each wireless workstation through a NAP function. Each security code is unique, and cannot be used by another wireless workstation. This protects your network from unauthorized access.

The following sections describe how to:

1. Activate security:

   For bases, see 13.1, “Activating Security for Bases” on page 142,

   For workstations, see 13.2, “Activating Security on Workstations” on page 145.

2. Deactivate security:

   For bases, see 13.3, “Deactivating Security on Bases” on page 153,

   For workstations, see 13.4, “Deactivating Security on Workstations” on page 154.

3. Reset network security codes.

4. Restart security after you have changed an adapter.

Important: If the security function is installed on the base of a stand-alone cell, or on only one base of a wired LAN cell, and you change the adapter card in that base, you will need to reinstall and reconfigure the security function, see Chapter 5, “Choosing a Setup Procedure” on page 63.

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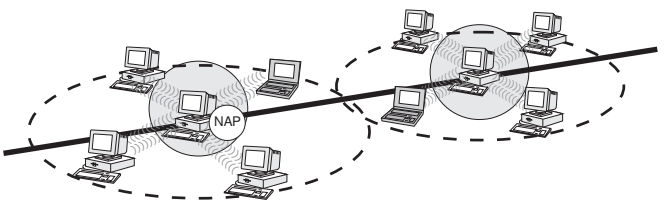
13.1 Activating Security for Bases



The procedures for activating security on bases depends on the operating system on the NAP station:

For an OS/2 NAP station, follow the procedure in “Activating Security on Bases from an OS/2 NAP.”

For a NetWare NAP station, follow the procedure in “Activating Security on Bases from a NetWare NAP” on page 144.

You activate security for bases **from the NAP station**, not from the base.

Activating Security on Bases from an OS/2 NAP

To set up the security function, go to the station containing the NAP and follow these steps:

1. Start the NAP, if it is not already started.
2. Click on the **Security** tab divider at the bottom of the NAP notebook. You will move to the Network/Base and Workstation Security page (Page 1 of the Security section) of the notebook.
3. On the Network/Base and Workstation Security page of the notebook, the base list shows the name, IP address, operational status, and security status of every base in the network. Select the first base whose security status is **Not Installed** or **Action Needed**. (Action Needed means that the Network Security Code was reset after security was installed on the base.)
4. Click on **Activate security**.

This generates a Network Security Code. The status of the base changes to **Activated**

Note: You can activate security on a base only if its operational status is **Ready**.

5. Repeat steps 3 and 4 for each base whose security status is **Not Installed** or **Action Needed**.
6. Click on the **Right Arrow** pushbutton to scroll to Page 2 of the Security section of the NAP notebook. This page allows you to compute the security codes for wireless workstations.
7. A security code for a wireless workstation is based on its workstation name and the Universally Administered Address (UAA) of the IBM Wireless LAN adapter card in the workstation. Ask each workstation operator for the UAA and the name of the workstation.
8. In the fields provided on the Workstation Security page of the NAP notebook:

   Enter the **UAA of the adapter card** installed in the workstation for which you are setting up security.

   Enter the **name of the workstation**.

9. Click on **Compute** to compute the security code for that workstation. When the code has been computed, it is displayed in the Workstation Security Code field.
10. Record this code on the Workstation Planning Worksheet.
11. Provide the code to the workstation operator when security is being installed at the wireless workstation.

After setting up the security function from the base, you must install security on all wireless workstations (in any order).

If, at a future time, you need to change the security code for your network, you can do so by following the procedure in 13.5, “Modifying the Network Security Code on an IBM Wireless LAN” on page 155. You might need to perform this operation if, for example, the security of your network has been compromised.

Note: NAP data files are essential for the configuration of your wireless network. It is recommended that you make a backup copy of existing data files each time you update your IBM Wireless LAN configuration at the NAP, by following the procedure described in A.10, “Backing Up NAP Data Files” on page 188.

Activating Security on Bases from a NetWare NAP

The security function must be set up for a base by the **NAP station operator**.

To set up the security function, go to the station containing the NAP and follow these steps:

1. From the NAP main menu, select **Security** and press **Enter**.
2. Select **Install Base Security** and press **Enter**.
3. On the Install Base Security menu, select each base that has **Not installed** or **Action needed**, for Security Status, and press **Insert** to activate the security function. The status of the base changes to **Activated**.
4. Press **Esc** to return to the Security menu.
5. Select **Compute Workstation Security Code** and press **Enter**.
6. Ask each workstation operator for the Universally Administered Address (UAA) and the name of his workstation. Enter the information for each workstation in the Compute Workstation Security Code window.
7. Press **F10** to get the workstation security code. You can write these codes on the planning worksheets.

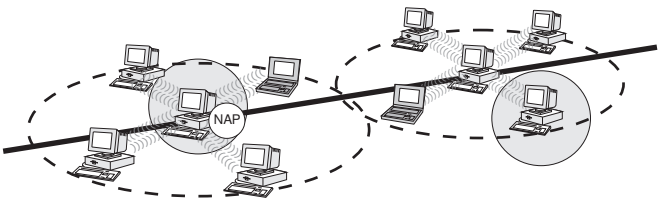
   Repeat this step for each wireless workstation.
8. Provide the code to the workstation operator when security is being installed at the wireless workstation.

After setting up the security function for bases, you must install it on all wireless workstations (in any order).

If, at a future time, you need to change the security code for your network, you can do so by following the procedure in 13.5, “Modifying the Network Security Code on an IBM Wireless LAN” on page 155. You might need to perform this operation if, for example, the security of your network has been compromised.

Note: NAP data files are essential for the configuration of your wireless network. It is recommended that you make a backup copy of existing data files each time you update your IBM Wireless LAN configuration at the NAP, by following the procedure described in A.10, “Backing Up NAP Data Files” on page 188.

13.2 Activating Security on Workstations



The procedures for activating security depend on the type of driver installed, NDIS or ODI, and on the operating system under which the workstation is running:

For NDIS workstations:

- For a DOS NDIS workstation, follow the procedure in “Activating DOS NDIS Workstation Security” on page 146.
- For a Windows NDIS workstation, follow the procedure in “Activating NDIS Windows Workstation Security” on page 147.
- For an OS/2 NDIS workstation, follow the procedure in “Activating NDIS OS/2 Workstation Security” on page 148.

For ODI workstations:

- For a DOS ODI workstation, follow the procedure in “Activating DOS ODI Workstation Security” on page 148.

– For a Windows ODI workstation, follow the procedure in "Activating Windows ODI Workstation Security" on page 150.

– For an OS/2 ODI workstation, follow the procedure in "Activating OS/2 ODI Workstation Security" on page 151.

You activate security for a workstation from the workstation itself, not from its base or the NAP station.

Activating DOS NDIS Workstation Security

Go to each DOS wireless workstation and take the following steps:

1 At the DOS prompt, type:

IBMWLDDM and press **Enter**, only if this module is not already loaded.

GETUAA and press **Enter**. The Universally Administered Address of the adapter is displayed on the screen. Give this address and your workstation name to the NAP station operator who will compute your workstation security code. Write both the Universally Administered Address and the workstation security code on the worksheet on page 39 or in *Designing Your Network*.

2 To access parameters:

Use the documented configuration process referred to in Table 20 on page 70, or

Edit the PROTOCOL.INI file.

3 Update the two following parameters:

For **Data Masking** (keyword=DataMasking), enter AUTH for authentication or ENCR for encryption and authentication.

Enter the **Workstation Security Code** that the NAP station operator gives you (keyword=ENCODEDNAME).

4 To verify that parameters are correctly set for security, type in the wireless directory:

CHKPARMD

The results of the verification are displayed on your screen.

5 Press **Ctrl+Alt+Del** to restart the computer.

Repeat this process for all DOS wireless workstations in your wireless network.

Activating NDIS Windows Workstation Security

Go to each Windows wireless workstation and take the following steps:

1. Start Windows.
2. Double-click on the **Wireless Services** folder.
3. In the Windows Wireless Services group, double-click on the **Get UAA** icon. The Universally Administered Address of your adapter is displayed. Give this address and your workstation name to the NAP station operator who will compute your workstation security code. Write both the Universally Administered Address and the workstation security code on the worksheet on page 39 or in *Designing Your Network*. Then click on **OK**.
4. To access parameters:
   Use the documented configuration process referred to in Table 19 on page 68, or
   Edit the PROTOCOL.INI file.
5. Update the two following parameters:
   For **Data Masking** (keyword=DataMasking), enter AUTH for authentication or ENCR for encryption and authentication.
   Enter the **Workstation Security Code** that the NAP station operator gives you (keyword=ENCODEDNAME).
6. Select **Run** from the File Menu in the Program Manager window. To verify that parameters are correctly set for security, type, in the wireless directory:

   CHKPARMW

   The results of the verification are displayed on your screen.
7. Select **Exit Windows...** from the Program Manager **File** menu and press **Ctrl+Alt+Del** to restart the computer.

Repeat this process for all Windows wireless workstations in your wireless network.

Activating NDIS OS/2 Workstation Security

Go to each OS/2 wireless workstation and take the following steps:

1. Double-click on the **Wireless Services** folder.
2. In the Wireless Services folder, double-click on the **Get UAA** icon. The Universally Administered Address of your adapter is displayed. Give this address and your workstation name to the NAP station operator who will compute your workstation security code. Write both the Universally Administered Address and the workstation security code on the worksheet on page 39 or in *Designing Your Network*. Then click on **OK**.
3. To access parameters:
   Use the documented configuration process referred to in Table 18 on page 67, or
   Edit the PROTOCOL.INI file.
4. Update the two following parameters:
   For **Data Masking** (keyword=DataMasking), enter AUTH for authentication or ENCR for encryption and authentication.
   Enter the **Workstation Security Code** that the NAP station operator gives you (keyword=ENCODEDNAME).
5. To verify that parameters are correctly set for security, type at the OS/2 prompt:

   CHKPARMS

   The results of the verification are displayed on your screen.
6. Shut down OS/2 and press **Ctrl+Alt+Del** to restart the computer.

Repeat this process for all OS/2 wireless workstations in your wireless network.

Activating DOS ODI Workstation Security

The security function must be set up on workstations by the **workstation operator**.

The following process applies to the first security installation. If you need to make changes after you have set up security on your ODI

DOS workstation, edit the NET.CFG file. Refer to the examples of system files on Page 205 for correct keywords.

To set up the security function on DOS wireless workstations, go to each DOS wireless workstation and follow these steps:

1. At the DOS prompt, type GETUAA and press **Enter**. The Universally Administered Address of the adapter card is displayed on the screen. Give this address and your workstation name to the NAP station operator who will compute your workstation security code. Write both the Universally Administered Address and the workstation security code on the worksheet on page 39, or in *Designing Your Network*.
2. Insert the IBM Wireless LAN 'DOS and Windows workstation diskette' in drive A.
3. At the DOS prompt, type A:INSTDOS and press **Enter**.
4. Select **ODI Workstation Installation** and press **Enter**.
5. Select **Security installation** and press **Enter**.
6. Enter the drive and directory where NetWare ODI Shell for DOS, NetWare Workstation for DOS/Windows, or NetWare Lite is installed.
7. Enter the **workstation security code** that the NAP station operator gives you.
8. If you want data masking on your wireless communications, keep **Yes** for Data Masking, and press **Enter**.
9. When the completion message is displayed, press **Enter** to return to the DOS prompt.
10. Remove the IBM Wireless LAN 'DOS and Windows workstation diskette' from drive A.
11. Press **Ctrl+Alt+Del** to restart the computer.

This completes the security setup on a DOS wireless workstation. Repeat these steps for all DOS wireless workstations in your wireless network.

Activating Windows ODI Workstation Security

The security function must be set up on workstations by the **workstation operator**.

The following process applies to the first security installation. If you need to make changes after you have set up security on your ODI DOS workstation, edit the NET.CFG file. Refer to the examples of system files on Page 205 for correct keywords.

To set up the security function on Windows wireless workstations, go to each Windows wireless workstation and follow these steps:

1. Insert the IBM Wireless LAN 'DOS and Windows workstation diskette' in drive A.
2. Double click on the **Wireless Services** icon.
3. In the Windows **Wireless Services** group, double click on the **Get UAA** icon. The Universally Administered Address of your adapter card is displayed. Give this address and your workstation name to the NAP station operator who will compute your workstation security code. Write both the Universally Administered Address and the workstation security code on the worksheet on page 39, or in *Designing Your Network*. Then click on **OK**.
4. Select **Run...** from the File pull-down in the Program Manager window.
5. Type A:INSTWIN on the command line and click on **OK**.
6. When the Installation Options window is displayed, select **Install additional components** and click on **Continue**.
7. When the Install window is displayed, click on **OK**.
8. When the Install-directories window is displayed:
   Select **Security for ODI Workstation**.
   Enter the drive and the directory where you have already installed the IBM Wireless LAN. The default is C:\WIRELESS.
   Then click on **Install....**

9 If necessary, change the default directory path in the NetWare Directory window. Then click on **OK**.

10 When the Security Installation Parameters window is displayed:
Enter the **workstation security code** that the NAP station operator gives you.
Keep **Enable Data Masking** selected if you want data masking on your wireless communications.
Then click on **OK**.

11 When the completion message is displayed, click on **OK**.

12 Press **Ctrl+Esc** to display the Task List window.

13 Select **Windows Wireless Workstation Installation** and click on **End Task** to stop the installation program.

14 Remove the IBM Wireless LAN 'DOS and Windows workstation diskette' from drive A.

15 Press **Ctrl+Alt+Del** to restart the computer.

This completes the security setup on a Windows wireless workstation. Repeat these steps for all Windows wireless workstations in your wireless network.

Activating OS/2 ODI Workstation Security

The security function must be set up on workstations by the **workstation operator**.

The following process applies to the first security installation. If you need to make changes after you have set up security on your ODI DOS workstation, edit the NET.CFG file. Refer to the examples of system files on Page 208 for correct keywords.

To set up the security function on OS/2 wireless workstations, go to each OS/2 wireless workstation and follow these steps:

1 Open an OS/2 window or an OS/2 full-screen session.

2 Insert the IBM Wireless LAN 'OS/2 base/workstation diskette (volume 1)' in drive A.

3. Double click on the **Wireless Services** icon.
4. In the Windows Wireless Services group, double click on the **Get UAA** icon. The Universally Administered Address of your adapter card is displayed. Give this address and your workstation name to the NAP station operator who will compute your workstation security code. Write both the Universally Administered Address and the workstation security code on the worksheet on page 39, or in *Designing Your Network*. Then click on **OK**.
5. At the OS/2 prompt, type A:INSTOS2 and press **Enter**.
6. When the Installation Options window is displayed, select **Install additional components**. Then click on **Continue**.
7. When the Install window is displayed, keep **Update CONFIG.SYS** selected and click on **OK**.
8. When the Install-directories window is displayed:
   Enter the drive and the directory where you have already installed the IBM Wireless LAN. The default is C:\WIRELESS.
   Select **Security for ODI Workstation**.
   Then click on **Install...**.
9. If necessary, change the default directory path in the NetWare Directory window. Then click on **OK**.
10. When the Security Installation Parameters window is displayed:
    Enter the **workstation security code** that the NAP station operator gives you.
    If you want data masking on your wireless communications, keep **Enable Data Masking** selected.
    Then click on **OK**.
11. When the completion message is displayed, click on **OK**.
12. Select **Exit** from the **File** pull down to stop the installation program.
13. Remove the IBM Wireless LAN 'OS/2 base/workstation diskette (volume 1)' from drive A.
14. Shut down OS/2.

15 Press **Ctrl+Alt+Del** to restart the computer.

This completes the security setup for an OS/2 wireless workstation. Repeat these steps for all OS/2 wireless workstations in your wireless network.

13.3 Deactivating Security on Bases

The procedures for deactivating security depend on the operating system on the NAP station:

For an OS/2 NAP station, follow the procedure in "Deactivating Security of Bases from an OS/2 NAP."

For a NetWare NAP station, follow the procedure in "Deactivating Security on Bases from a NetWare NAP" on page 154.

You deactivate security for **all** bases from the NAP station, not from the base.

When security is deactivated, workstation security codes remain valid. If you later want to reactivate security, you will not need to compute these security codes again.

Deactivating Security of Bases from an OS/2 NAP

To deactivate security on all bases, go to the NAP and follow these steps.

1 Start the NAP, if it is not already started.

2 Click on the **Security** tab divider at the bottom of the NAP notebook. You scroll to the Network/Base and Workstation Security page (Page 1 of the Security section) of the notebook.

3 On the Network/Base and Workstation Security page 1, the base list shows the name, IP address, operational status, and security status of each base in the network. Select the first base where the security is to be deactivated.

4 Click on **Deactivate security**.

After a few seconds, the security status of the base changes.

Note: You can only deactivate security on a base if its operational status is **Ready**.

5 Repeat this procedure for all bases where the security is to be deactivated.

After deactivating security on all bases, you must also deactivate it on all wireless workstations.

Deactivating Security on Bases from a NetWare NAP

To deactivate the security function on all bases, go to the NAP server and follow these steps:

1 From the NAP main menu, select **Security** and press **Enter**.

2 Select **Install Base Security** and press **Enter**.

3 From the Install Base Security menu, select each base that has **Activated** for Security Status and press **Delete** to deactivate the security feature.

The status of each base changes to **Not activated**.

4 Press **Esc** to return to the Security menu.

After deactivating the security function in all bases, you must also deactivate it in all wireless workstations.

13.4 Deactivating Security on Workstations

You deactivate security for a workstation from the workstation itself, not from its base station nor the NAP station.

Deactivating NDIS Workstation Security

To deactivate security on wireless workstations, you must enter **NONE** for the Data Masking workstation parameter on **each** wireless workstation. To do so, refer to the relevant procedure depending on the type of wireless workstation in Chapter 8, “Configuring NDIS Workstations” on page 93.

Deactivating ODI Workstation Security

To deactivate the security function on all wireless workstations, go to each wireless workstation and follow these steps:

1. Edit the NET.CFG file with a text editor. Enter **None** for the Data-masking parameter. Examples of NET.CFG files are shown in "ODI DOS and Windows Wireless Workstation Connected to an OS/2 Base Bridged to Token Ring or to a NetWare Base" on page 205, and in "ODI OS/2 Wireless Workstation Connected to an OS/2 Base Bridged to Token Ring or to a NetWare Base" on page 208.
2. Save the NET.CFG file.
3. Restart the computer by pressing **Ctrl+Alt+Del**. This activates the new parameters.

13.5 Modifying the Network Security Code on an IBM Wireless LAN

If you need to change the security code of your network, you must first reset security, then activate security with the new code on bases and each workstation. For:

Resetting the Network Security Code from a NetWare NAP.

To reset the security code of your entire network, go to the station containing the NAP and follow these steps:

1. Select **Security** from the NAP main menu and press **Enter**.
2. Select **Reset Network Security Code** and press **Enter**.
3. Select **Yes** when the message **Do you want to reset the Network Security Code?** is displayed, and press **Enter**.
4. Press **Esc** to return to the Security menu.

   When the network security code has been reset, the security status changes from **Activated or Not Activated** to **Action Needed**.

Resetting the Network Security Code from an OS/2 NAP.

To reset the security code of your network, go to the station containing the NAP and follow these steps:

1. Click on the **Security** tab divider at the bottom of the NAP notebook. You will move to the Network/Base and Workstation Security page.
2. On the Network/Base and Workstation Security page, click on **Reset Network Security Code**.
3. When the message **Do you want to reset the Network Security Code?** is displayed, click on **Yes**.

The network security code has now been reset.

Setting Up a New Security Code.

After resetting the network security code for an IBM Wireless LAN you must:

1. Activate the security on the bases from the NAP station, see 13.1, “Activating Security for Bases” on page 142.
2. Set up a new security code for each workstation, see 13.2, “Activating Security on Workstations” on page 145.

Note: This only applies to the base and workstations of the IBM Wireless LAN whose network security code was reset. If there is a wireless LAN in the network that had no security functions defined, then it does not have any security codes to set up.

13.6 Restarting after Changing the Adapter Card

This section describes how to restart a base or a workstation if there is a problem with the adapter card and you need to change it.

Note: If you change the adapter card on a base or workstation that does not have either access control set up nor the security installed, you can restart the IBM Wireless LAN without taking any further action.

Restarting a Base Controlled by a NetWare NAP

When you change the adapter card on a base where the **security function** is installed, restart the base as follows:

If the base is part of a stand-alone cell or the only base of a wired LAN cell, you must:

- Set up again security on the base from the NAP station. Refer to “Activating Security on Bases from a NetWare NAP” on page 144.
- Set up security again on all your wireless workstations authorized to access the base by referring to the procedure for ODI workstations:
  - For ODI OS/2 workstations, see “Activating OS/2 ODI Workstation Security” on page 151.
  - For ODI DOS workstations, see “Activating DOS ODI Workstation Security” on page 148.
  - For ODI Windows workstations, see “Activating Windows ODI Workstation Security” on page 150.

If there is more than one base in your wired LAN cell, you need only re-install security on the base where you have changed the adapter card. You do **Not** need to re-install the security on your workstations.

Restarting a Base Controlled by an OS/2 NAP

When you change the adapter card on a base where the **security function** is installed, restart the base as follows:

If the base is part of a stand-alone cell or the only base of a wired LAN cell, you must:

- Set up again security on the base from the NAP station. Refer to “Activating Security on Bases from an OS/2 NAP” on page 142.
- Set up security again on all your wireless workstations authorized to access the base by referring to the procedure for NDIS workstations:

- For NDIS OS/2 workstations, see “Activating NDIS OS/2 Workstation Security” on page 148.
- For NDIS DOS workstations, see “Activating DOS NDIS Workstation Security” on page 146.
- For NDIS Windows workstations, see “Activating NDIS Windows Workstation Security” on page 147.

If there is more than one base in your wired LAN cell, you need only re-install security on the base where you have changed the adapter card. You do **Not** need to re-install the security on your workstations.

Restarting an ODI Workstation

When you change the adapter card on a workstation where the **security function** is installed, you must set up again security by referring to the procedures for ODI workstations:

– For ODI OS/2 workstations, see “Activating OS/2 ODI Workstation Security” on page 151.

– For ODI DOS workstations, see “Activating DOS ODI Workstation Security” on page 148.

– For ODI Windows workstations, see “Activating Windows ODI Workstation Security” on page 150.

When you change the adapter card on a workstation where **access control** has been enabled from the NAP:

– If your network uses **LAAs**, you do **Not** need to reset access control.

– If your network has **no LAAs defined**, you must update access control on this workstation by following the procedure depending on the type of NAP:

  - 14.1, “Setting Up Access Control from an OS/2 NAP” on page 161.
  - 14.2, “Setting Up Access Control from a NetWare NAP” on page 164.

Restarting an NDIS Workstation

When you change the adapter card on a workstation where the **security function** is installed, you must set up security again by referring to the procedures for NDIS workstations:

- For NDIS OS/2 workstations, see “Activating NDIS OS/2 Workstation Security” on page 148.
- For NDIS DOS workstations, see “Activating DOS NDIS Workstation Security” on page 146.
- For NDIS Windows workstations, see “Activating NDIS Windows Workstation Security” on page 147.

When you change the adapter card on a workstation where **access control** has been enabled from the NAP:

- If your network uses **LAAs**, you do **Not** need to reset access control.
- If your network has **no LAAs defined**, you must update access control on this workstation by following the procedure depending on the type of NAP:
  - 14.1, “Setting Up Access Control from an OS/2 NAP” on page 161.
  - 14.2, “Setting Up Access Control from a NetWare NAP” on page 164.

Chapter 14. Access Control

You can control the times when a workstation can access its base and the network beyond. Access is based on one of two addresses:

The UAA encoded in the adapter card, in the computer.

The Locally Administered Address (LAA) that is assigned as an alternative to the UAA.

A workstation's access can be limited to:

Selected base stations.

Note: The cell of the bases selected must not overlap the cell of bases not selected.

Times of the day.

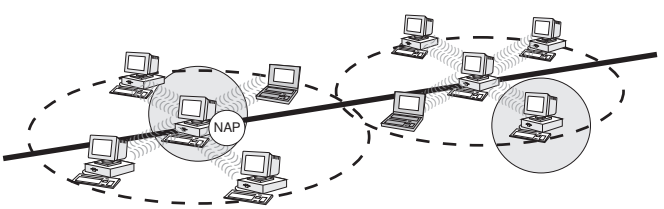
Days of the week.

The procedures for defining access control depend on the type of NAP station:

For an OS/2 NAP station, follow the procedure in 14.1, “Setting Up Access Control from an OS/2 NAP.”

For a NetWare NAP station, follow the procedure in 14.2, “Setting Up Access Control from a NetWare NAP” on page 164.

14.1 Setting Up Access Control from an OS/2 NAP



Access control allows you to define the days and times when a wireless workstation can access each base. For example, you can

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give a wireless workstation access to a base only from Monday to Friday, between 8:00 and 12:00.

To set up access control, go to the station containing the NAP and follow these steps:

1. Start the NAP, if it is not already started.
2. Click on the **Access** tab divider at the bottom of the NAP notebook. You scroll to the Workstation Access Control page of the NAP notebook. The Workstation list shows the name and MAC address of the wireless workstations in the network. The Authorized bases list shows the name of each base to which a selected wireless workstation is allowed to connect.
3. To add a new wireless workstation to the list and define its access rights, click on **Add**. You move to the Add Workstation window where you can enter the information.

   Note: The first wireless workstation that you configure has access to **all bases at all times**. Afterwards, your previously selected settings are displayed as the default choices.

4. In the **Workstation name** field, enter the name of the wireless workstation whose access rights you are defining.
5. In the **MAC address** field, enter the Medium Access Control (MAC) address of the wireless workstation. The MAC address is the Universally Administered Address (UAA) or the Locally Administered Address (LAA) of the IBM Wireless LAN adapter card in the workstation. In both cases, the address consists of 12 hexadecimal characters (0 through 9 and A through F).
6. Select the checkbox for the day(s) of the week on which connection is authorized. When a checkbox has a check mark in it, the workstation is authorized to connect on that day.
7. In the **Starting time** field, enter the hour at which connection is authorized to begin. In the **Ending time** field, enter the hour at which connection is no longer authorized.

   Note: The hours of connection (starting time and ending time) apply to all days for which connection is authorized.

8. To authorize the connection of the wireless workstation to a base, click on the **name of the base** in the Authorized bases list. You can select more than one base.
9. After you finish specifying the access rights of the wireless workstation, click on **OK** to put your changes into effect. You return to the Workstation Access Control page of the NAP notebook.
10. Define access rights of each wireless workstation in the network by repeating steps 3 through 9.
11. When you finish defining access rights for each wireless workstation, select **Access control** to enable access control. You are prompted to confirm.

    Important:

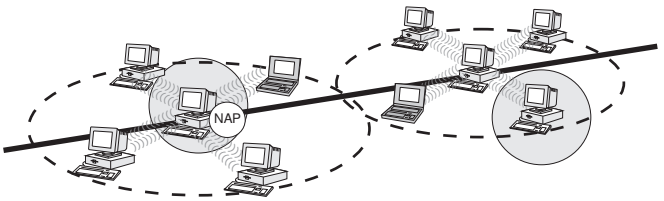
    Before you enable access control, be sure you have defined access rights for all wireless workstations in the network. Workstations without access rights will not be able to access the network.

    Access control parameters are checked only during registration of workstations. For an immediate set up of access control, use the function Disconnect Workstations, by double clicking on Display pushbutton, in the Security panel.

This completes access control setup.

NAP data files are essential for the configuration of your wireless network. It is recommended that you make a backup copy of existing data files each time you update your IBM Wireless LAN configuration at the NAP by following the procedure described in A.10, “Backing Up NAP Data Files” on page 188.

14.2 Setting Up Access Control from a NetWare NAP



Access control allows you to define the day and time when a wireless workstation can access each base. For example, you can give a wireless workstation access to the network only from Monday to Friday, between 8:00 and 12:00.

To set up access control, you need the following parameters for each workstation:

Workstation name.
MAC address (Universally Administered Address or Locally Administered Address.)

To get these parameters:

If your network uses LAAs refer to the worksheet you filled out on page 39 or in *Designing Your Network*. or in your NETCFG. file.

If your network uses UAAs then:

If the security function is installed on your network, refer to the worksheet you filled out on page 39 or in *Designing Your Network*.

If the security function is not installed on your network, go to each workstation and follow these steps:

- For DOS workstations, type GETUAA at the DOS prompt, and press **Enter**.
- For Windows and OS/2 workstations:

  1 Double click on the **Wireless Services** icon.

  2 Double click on the **GET UAA** icon.

You can write these values on the planning worksheets.

To set up access control, follow these steps:

1. Access the NAP main menu.
2. Select **Workstation Access Control** and press **Enter**.
3. Select **Workstation Access List** and press **Enter**.
4. Press **Insert** to enter the parameters for each wireless workstation, such as day, time, and authorized bases list. To authorize bases, select the **Base Station List** parameter and press **Enter**.

   Note: The first wireless workstation that you configure has access to all bases at all times. Afterwards, your previously selected settings are displayed as the default choices.

5. Press **F10** to validate your entries.
6. Press **Esc** to return to the Workstation Access Control menu.
7. Select **Access Control Enabled** and press **Enter**.
8. On the Access Control Enabled menu, select **Yes** to enable access control on your network. Then press **Enter**.

   Important:

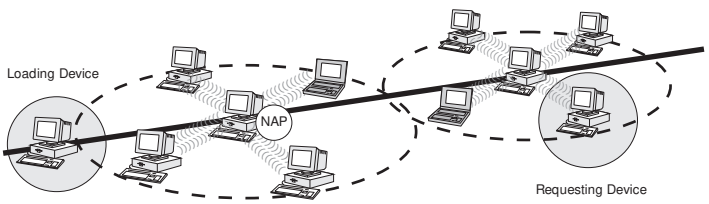
   Before you enable access control, be sure you have specified the access rights for all wireless workstations in the network. Workstations without access rights will not be able to access the network.

   Access control parameters are checked only during registration of workstations.

This completes the access control setup.

Note: NAP data files are essential for the configuration of your wireless network. It is recommended that you make a backup copy of existing data files each time you update your IBM Wireless LAN configuration at the NAP, by following the procedure described in A.10, “Backing Up NAP Data Files” on page 188.

Chapter 15. Using Remote Program Load



The IBM Wireless LAN allows wireless workstations to access a network by loading an operating system and adapter support code from their fixed disk or diskette drive.

Important:

> The Remote Program Load (RPL) function will only operate with an IBM Wireless LAN adapter. Do not install other LAN adapters.
>
> Some computers may not support the RPL function as they do not correspond to a recent version of the Basic Input/Output System (BIOS). If this is the case, contact your IBM representative.

For wireless workstations that do not have a hard disk or diskette drive, the Remote Program Load (RPL) function allows them to access the network and request operating system code and applications to be downloaded.

The network must have a loading device and one or more requesting devices. For the IBM Wireless LAN, the loading device and the requesting device must be in the same wireless network, but can be located in different cells of this network.

The loading device can be a base including a LAN server, or any IBM LAN server connected to the wired LAN. It must have a fixed disk. Its purpose is to supply files to the requesting devices.

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The requesting device is a wireless workstation. It does not need to have a fixed disk or diskette drive. It receives the programs it needs from the loading device.

The following sections describe how to:

1. Set up the RPL function on a server.
2. Set up and use the RPL function on a wireless workstation.

15.1 Setting Up the RPL Function on a Server

Setting Up the RPL Function on an OS/2 Server

The RPL files are copied to each base when you install the IBM Wireless LAN. The following steps are necessary to set up the loading device:

Note: See the Network Administration Manual volume 1 and 3 and other LAN server documentation for a complete explanation of the procedure.

1. Install the remote IPL Service (also called the Reboot Service) on the LAN server loading device (RPL server). The IPL Service function is part of the LAN server package.
2. Customize your remote IPL function. To do so, follow these steps:
   a. Define your wireless workstation using the RPL in the RPL.MAP file.
   b. Build an image diskette of the operating system and application software files that the wireless workstations can request by using the IPL function of the LAN requester.
   c. Use the MAKEIMG utility to create the image in the LAN server.

See 15.3, “Setting up RPL for an NDIS DOS Wireless Workstation” on page 172 for image samples.

Setting Up the RPL Function on a NetWare Server

The following steps are necessary in order to set up a NetWare server loading device:

Note: See your NetWare Installation documentation for a complete explanation of the individual procedures.

1. This step applies **only** if you are using NetWare 3.11:
   a. Copy the RPL.NLM file from the IBM Wireless LAN 'NetWare base diskette' to the SYS\SYSTEM directory on the NetWare server loading device.
   b. Copy the RBOOT.RPL file from the IBM Wireless LAN 'NetWare base diskette' to the SYS\LOGIN directory on the NetWare server loading device.
2. This step applies for **all** versions of NetWare.

   Use NetWare tools to prepare an image diskette of the operating system and application software files that the wireless workstations can request.
3. Copy the image diskette to the SYS\LOGIN directory on the NetWare server loading device.
4. Load and bind the protocol stack. At the server prompt, type the following commands:

   LOAD RPL
   BIND RPL to {name}

   where name is the name specified in the LOAD IBMWL statement for the Token-Ring frame format. By default, this name is IBMWL_TOKEN.

15.2 Using the RPL Function from a Wireless Workstation

To set up and use the RPL function from a wireless workstation, follow these steps:

1. Configure the adapter card that supports the RPL function as follows:

For a wireless workstation with an ISA bus, the RPL function is controlled by DIP switch 4. Set DIP switch 4 to **position 1**. (By default, RPL is disabled and DIP switch 4 is set to position 0.) See 4.1, “Using an ISA Bus” on page 42 for information on DIP switch settings.

For a wireless workstation with an MCA bus, the RPL function is enabled by using the PS reference diskette. Insert the backup copy of the PS reference diskette in drive A of the wireless workstation and enable RPL by changing the configuration. Then restart the computer.

Note: To see if the PS reference diskette is pre-installed on the hard disk of your computer, refer to the documentation supplied with the computer.

2 Start the wireless workstation.

3 The first time you use the adapter card, the RPL Parameters panel is automatically displayed. Fields are filled in with default values.

After the adapter has been initialized, the RPL Parameters panel is no longer displayed. The RPL function uses the last parameter values stored in the adapter. To change a parameter, reboot the wireless workstation and press the **Insert** key within the first 5 seconds when prompted. This redisplays the RPL Parameters panel.

4 On the RPL parameters panel, enter the following information about your network and wireless workstation:

Network Name

The name that uniquely identifies your network, as specified in the Network Administration Program (NAP).

Country Type

This is the country type for the country in which your network is located. Several communication parameters are country-dependent. Therefore, it is important that you specify the correct country for your network. See Table 2 on page 17 for a list of country types.

If required, enter the following parameters:

Minimum Radio Frequency (Freq. Min)
This is the lowest radio frequency supported for your country. See Table 2 on page 17 for a list of minimum frequencies.

Maximum Radio Frequency (Freq. Max)
This is the highest radio frequency supported for your country. See Table 2 on page 17 for a list of maximum frequencies.

Number of Spare Frequencies (Spare Freq.)
This is the number of reserved (spare) radio frequencies in your country. See Table 2 on page 17 for a list of the number of spare frequencies.

Workstation Name (Station Name)
This is the name of your wireless workstation. Refer to the worksheet you filled out on page 3.7, "Filling out the Workstation Planning Worksheet" on page 37 or in *Designing Your Network*. Contact your network operator if you need assistance.

Base Type (Frame type)
The value depends on the kind of base connected to this workstation:

Ethernet for an OS/2 base bridged to Ethernet

Token-Ring for the others.

Data Masking (Data Masking)
Select Authentication, Encryption, or None. Contact your network operator if you need assistance.

Workstation Security Code (Security Code)
This is the unique security code for your wireless workstation, and is applicable only if Data Masking is set to a value other than None. Refer to the worksheet you filled out on page 39 or in *Designing Your Network*. Contact your network operator if you need assistance.

On the RPL Parameters panel, use the plus (+) and minus (–) keys on the numeric keypad to increase and decrease numeric values. Use the space bar to cycle through the allowed values for the Data Masking field.

Function keys are as follows:

F1 Clears all fields to their default values

F2 Recalls the values last stored in the adapter

F3 Toggles the keyboard between the QWERTY, AZERTY, and QWERTZ layouts.

F4 Starts the remote program load.

5 After entering the required information, press **F4** to start the remote program load.

If you enter an invalid parameter, the remote program load does not start. The cursor is positioned in the invalid field. Correct the information and press **F4** again.

15.3 Setting up RPL for an NDIS DOS Wireless Workstation

Installing a DOS RIPL Wireless Workstation has the same requirement as other LAN RIPL stations using the LAN Support.

1 Configure your Wireless adapter card to support the RPL function:

For a MCA bus, this needs to be done through the configuration using your Personal computer reference diskette.

For an ISA bus, this needs to be done setting the DIP switch 4 of your Wireless adapter to position 1.

2 Reboot your workstation. If RPL function is correctly enabled, the RPL parameters panel is automatically displayed. For the appropriate values, see the list of values starting on Page 170.

3 Customize your Lan Server on which REMOTEBOOT service has been installed with a Wireless boot block. A Wireless PROTOCOL.INI example follows:

```
    Bootblock sample file
; File: DOSNDWL.CNF from C/\IBMLAN\RPL directory
; DOS Boot Block Configuration (IBM Wireless Lan)
; NDIS LAN Support Program Drivers
BASE 7C H
RPL DOS\RPLBOOT.SYS
LDR DOS\RPLLOADR.COM
DAT DOS\LTH.MSG
DAT C:\IBMLAN\DOSLAN\LSP\DXM.MSG
DAT DOS\WIRELESS\PROTOCOL.INI
EXE C:\IBMLAN\DOSLAN\LSP\NETBIND.COM
DRV C:\IBMLAN\DOSLAN\LSP\DXMJ MOD.SYS    17
DRV C:\IBMLAN\DOSLAN\LSP\DXMA MOD.SYS   1
DRV DOS\IBMWL.DOS
DRV C:\IBMLAN\DOSLAN\LSP\PROTMAN.DOS /I:


    Wireless Protocol.ini sample file
fflPROTMAN_MOD“
        DriverName = PROTMAN$
fflDXMAIDXCFG“
        DXMJ MOD_NIF = DXMJ MOD.NIF
        IBMWL_NIF = IBMWL.NIF
fflDXMJ MOD_NIF“
        DriverName = NETBEUI$
        Bindings = IBMWL_NIF
fflIBMWL_NIF“
        DriverName = IBMWL$
        NETWORKID = "SACELL 1"
        STATIONNAME = "RPLDOS77"
        COUNTRYCODE = 1
        COMPRESSION = "YES"
        DATAMASKING = "NONE"
```

4 Build a bootable DOS image using MAKEIMG utility offered by Lan Server.

DOS 5. Image sample including Dos LAN Requester

```
COMMAND  COM      4799      1/ 9/92   12:
CONFIG   SYS       419   3 / 1/95   15:17
EMM386   EXE     91742     1/ 9/92    12:
SETENV   BAT      1177   3 / 1/95   14:51
INT21USE COM       431   3 / 1/95   14:51
SMDISP   EXE     4 643   3 / 1/95   14:52
XSRW     SM        276    3 / 1/95   14:52
NET      COM     13568   3 / 1/95   14:52
NETWORK  MSG     26559   3 / 1/95   14:52
NETWORK1 CMD     12979   3 / 1/95   14:52
RAMDRIVE SYS      5819   3 / 1/95   14:52
REDIR4   EXE   1 519    3 / 1/95   14:53

XSI4     EXE     5935    3 / 1/95    14:53
COUNTRY  SYS     1733    3 / 1/95   14:53
KEYBOARD SYS     4171    3 / 1/95   14:53
DISPLAY  SYS    15773   3 / 1/95   14:54
NLSFUNC  EXE      7  7   3 / 1/95   14:54
EGA      CPI    58848   3 / 1/95   14:54
MODE     COM     236 1   3 / 1/95   14:54
KEYB     COM    15339   3 / 1/95   14:54
CHKDBCS  COM       2 7   3 / 1/95   14:54
USEWRK   COM       399   3 / 1/95   14:54
LTH      MSG      5728   3 / 1/95   14:55
DXM      MSG      4736   3 / 1/95   14:55
PROTOCOL INI       398   3 / 1/95   14:55
AUTOEXEC BAT      1317   3 / 1/95   15:29
HIMEM    SYS     1168     1/ 9/92    12:
```

5 Update the RPL.MAP file with your boot block, images and Workstation address information.

This example shows the RPL.MAP inputs needed for a DOS RPL station with UAA 08005A78004C, using boot block DOSNDWL.CNF and DOS image DOSNDIS3.

```
; server record fields:
;   1       =  yyyyyyyyyyy
;    2       = boot block configuration file (.cnf)
;    3       = number of retries before default boot
;    4       = time window for retries (in seconds)
;    5       = acknowledge (A,N)
;    6       = loader parameters (  for os2, image share namdos)
;    7       = descriptive comment
;   8,9,  =
;   A       =  ,,,
;   B       =
;    C       = workstation type; first letter is always R
;   D,E   =

; server records for dos
yy dosndwl.cnf    1  12  N IBMLAN$ DOS WIRELESS NDIS    ,,, Z R_DWL_NDIS

; workstation record fields:
;    1         = adapter id (12 hex digits)
;    2         = workstation name
;   3         =
;    4         = image file for dos (.img), fit file for os2 (.fit)
;    5         = name of rpl server
;    6         = boot drive for OS2, domain name for DOS
;    7,8,9 = parameters for device drivers 1,2,3
;    A         = additional memory for device drivers 1,2,3. Default: ,,,
;    B         =    for os2, Z for dos
;    C         = workstation type; first letter is R=enabled, D=disabled
;   D         =
;    E         = volumeid string

; default workstation records
 8  5A78  4C WIRELESS    DOSNDIS3 LWSRIPLS LWSRIPLD    ,,, Z R_DWL_
```

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Appendix A. Troubleshooting Wireless Network Problems

This appendix provides information on how to handle problems with your IBM Wireless LAN. For additional help, refer to the user's guides for the computer you are using.

A.1 Base or NAP Station Initialization Failure

The procedure depends on whether the failure was for a NetWare base or an OS/2 base.

NetWare Base

A message will be displayed on the server console screen.

Check that the NAP has been started. If it is not already started, type IBMWL at the prompt.

Check the error log files, see Appendix C, “Alerts, Warnings and Messages” on page 233.

If the problem persists, re-install the NetWare base.

OS/2 Base

Pop up messages will be displayed or the status of the IBM Wireless LAN will be 'Not ready' on the supervisor screen.

Check that the supervisor has been started by double clicking on the icon.

Check the error log files, see Appendix C, “Alerts, Warnings and Messages” on page 233.

If the problem persists, re-install the OS/2 base.

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A.2 OS/2 Bridge Does Not Operate

If you have edited adapter or protocol parameters with LAPS/MPTS or a similar tool, then the values you chose are probably causing a problem. Reconfigure the bridged base:

For any OS/2 base, see 7.1, “Basic Configuration for an OS/2 Base” on page 77

For advanced configuration, accept all the default values for both types of bridge.

- 7.2, “Advanced Configuration for an OS/2 Base Bridged to Token Ring” on page 78.
- 7.3, “Advanced Configuration for an OS/2 Base Bridged to Ethernet” on page 83.

If you did not edit any of the parameters, or you have reconfigured and the bridge still does not operate:

Check the error log, see Appendix C, “Alerts, Warnings and Messages” on page 233.

Check the Base status, see A.3, “Base Status Is 'Not Ready' At The NAP” on page 183.

Check A.4, “Data Exchange Problems Through OS/2 Bridged Base” on page 183

If the bridge has started properly, you will have the following statements in the LANTRAN.LOG file:

Statements example for an OS/2 base bridged to Token Ring:

```
Wireless adapter successfully open.
SRB0120: Source Route Spanning Tree Bridge 800008005AD30282 Port A Lan 2931 Node 08005AD302824200 started
SRB0120: Source Route Spanning Tree Bridge 800008005AD30282 Port B Lan 2669 Node 08005A78004A4200 started
SRB0065: Port #A starting bridge operation
SRB0065: Port #B starting bridge operation
SRB0124: Good Connectivity (re)established between port#A and #B
```

Statements example for an OS/2 base bridged to Ethernet:

```
Wireless adapter successfully open.
SRB0065: Port #A starting bridge operation
SRB0065: Port #B starting bridge operation
SRB0169: Transparent Spanning Tree Port A Node 08005A98B8954200 started
SRB0169: Transparent Spanning Tree Port B Node 08005A5F00E14200 started
```

A.3 Base Status Is 'Not Ready' At The NAP

Refresh the NAP display by leaving and re-entering the **BASE** window.

Consult the NAP station error log files, see Appendix C, “Alerts, Warnings and Messages” on page 233 and follow the recommended action.

If the problem persists, re-install the OS/2 base.

A.4 Data Exchange Problems Through OS/2 Bridged Base

Check the LANTRAN.LOG to see if it contains any error messages. Both adapters (on the Wireless LAN side and backbone side) should be opened, and the bridge should have been successfully started on both sides of the bridge.

Check that the backbone adapter you are using is supported by IBM Wireless Bridge (error message SRB0075 may appear in LANTRAN.LOG). See page 33 for a list of Token Ring and Ethernet adapters.

Check also, that the bridge is enabled on both Wireless and Token Ring adapters.

If you have code SRB0066 in LANTRAN.LOG check that the hardware shared RAM parameter of your backbone adapter has a minimum value of 16K. This value is updated during the hardware configuration of the adapter.

Check that the LAPS version you are using matches the prerequisite level. See 3.6, “Filling Out the Base Planning Worksheet” on page 32.

Check that the IBM IEEE 802.2 and IBM Wireless LAN Bridge protocol stacks are bound to both adapters (wireless and backbone). See 7.2, “Advanced Configuration for an OS/2 Base Bridged to Token Ring” on page 78 and 7.3, “Advanced Configuration for an OS/2 Base Bridged to Ethernet” on page 83.

Apply the recommended tuning parameters for IBM Wireless bridge, see the README.OS2 file.

For Token Ring bridged bases only:

Check that the **segment number** on the backbone side matches the one specified in other backbone bridges. See 3.6, “Filling Out the Base Planning Worksheet” on page 32 for the numbers assigned to this bridge. See Chapter 7, “Configuring OS/2 Bases” on page 77 for the numbers that were actually configured.

Check that the **segment number** on wireless side is different from the one specified for the backbone side. See 3.6, “Filling Out the Base Planning Worksheet” on page 32 for the numbers assigned to this bridge. See Chapter 7, “Configuring OS/2 Bases” on page 77 for the numbers that were actually configured.

Since the wireless cell appears as a bridged segment to the Token Ring backbone, all existing bridges that are crossed by traffic to and from this wireless LAN cell must have their **hop count** parameter incremented by one. See the documentation for the other bridges.

If your network is under control of a network management station, make sure that your backbone adapter is authorized to join the network. For Token Ring networks, if LAN insertion control is enabled, then the adapter may be removed from the network (a "Force Remove MAC Frame Received" message should be present in LANTRAN.LOG).

If your backbone network contains routers, make sure that Token Ring source routing support is enabled on each of them. See the documentation for the router.

If you are accessing a NetWare server through an OS/2 bridged base, be sure that source routing is enabled on the server and on the workstation. Run:

- ROUTE.COM for DOS/Windows.
- ROUTE.SYS for OS/2.
- ROUTE.NLM for Netware.

These are supplied with the Novell software.

A.5 The NAP Application Is Not Available

Check that the base was configured as **Local NAP**.

Make sure the NAP station has been started.

Consult the NAP station error log files, see Appendix C, “Alerts, Warnings and Messages” on page 233.

If the problem persists re-install the NAP.

A.6 Workstation Registration Problems (All Red RSSI)

A workstation registers to a base when its wireless adapter is opened. A registration problem is shown by an RSSI with all minuses, that is, all red.

For ODI workstations:
Check all messages displayed on the screen when the device driver (IBMWL or IBMWLETH) is loaded. See C.4, “Workstation Error Messages” on page 242 for message explanations.

For NDIS workstations:
If a message appears on the workstation screen, see C.4, “Workstation Error Messages” on page 242 for message explanations.

If no message is displayed, this may be for one of two reasons:

On DOS/Windows NDIS workstations, if the IBMWLDDM.EXE utility is not loaded, no message will be displayed. Add the loading statement in the AUTOEXEC.BAT file and restart the workstation.

The adapter has not been OPENed because some protocol stacks do not perform the OPEN when loaded. This is the case for NETBIOS for OS/2, DXMT0MOD.SYS (NETBIOS for DOS) and DXME0MOD.SYS (802.2 for DOS). This situation is normal. Starting the corresponding network application will open the

adapter. You may see some wireless messages displayed when this happens, but you do not need to take any action unless they are errors. See C.4, “Workstation Error Messages” on page 242 for error messages.

If none of the above cases apply, you need to check your configuration by using the installation checker available on the IBM Wireless LAN software diskettes. It provides checking for system files (CONFIG.SYS, AUTOEXEC.BAT, PROTOCOL.INI). Run this utility according to your operating system:

Under OS/2: CHKPARMS

Under DOS: CHKPARMD

Under WINDOWS: CHKPARMW

A.7 Workstation Performance Problems

The performance of the workstation can vary because of a number of factors. The factors shown below assume that there is some communication with the base station, but at a low level:

Low signal strength can affect the performance. Check the position of your radio. Go to the RSSI application to verify the level of the radio signals.

- For an NDIS workstation running under:
  - OS/2 or Windows see Page 95,
  - DOS see Page 100.
- For an ODI workstation running under:
  - DOS see Page 125
  - Windows see Page 129.
  - OS/2 see Page 133

The base may be congested due to heavy traffic:

- Check the backbone broadcast rate, and try to reduce it.

– If cell traffic is too heavy, perhaps you need to redesign your cells. You could add one or more bases to your wireless network.

You can try to set one or both of these configuration parameters:

– Set the Compression parameter to YES. This will compress data so that the same amount of data can be sent in a shorter time.

– If you have mobility set for this workstation, change the Mobility sensitivity parameter to HIGH. You will have to use the workstation in a more limited range, but you should get higher performance.
  Depending on the type of workstation see:

  - 8.1, “NDIS Workstation Running Under OS/2” on page 93.
  - 8.2, “NDIS Workstation Running Under DOS or Windows” on page 97.
  - 11.1, “ODI Wireless Workstation Running Under DOS” on page 121.
  - 11.2, “ODI Wireless Workstation Running Under Windows” on page 126.

Check also the respective README files for this workstation, there might be some late information about fine tuning performance your IBM Wireless LAN.

If your applications have heavy disk usage, or your disk is nearly full, check the file fragmentation. There are a number of products that can do this and reorganize the files to improve data access times.

If a number of workstations are using the same service on the network, like a common database on a server, you might need to rearrange the use of it to improve your access.

A.8 Network Management Does Not Operate (NetView 6000, NMS,WNM)

This could be one of the following:

Management operation from the Network Management station to the Base does not operate.

Traps and alerts are not transmitted to the Network Management station.

1. Check the TCP/IP and SNMP configuration on your base (IP address, Community Name).

2. In a NetWare environment, check the configuration of the SNMP agent. To do so, refer to step 2 in “Configuring the IBM Wireless SNMP Proxy Agent” on page 139.

   In an OS/2 environment, check the configuration of the SNMP agent. Refer to “Configuring the SNMP Agent for TCP/IP for OS/2” on page 105.

A.9 SNA Alert Invalid Format At NetView Host

Verify your NetView Version. If the version is older than V2R4, then see Appendix D, “Network Management Code Points” on page 251.

A.10 Backing Up NAP Data Files

NAP data files are essential for the configuration of your wireless network. It is recommended that you make a backup copy of existing data files each time you update your IBM Wireless LAN configuration at the NAP.

To **back up** existing NAP data files use the IBMWTOOL utility. This utility also displays the name of each file as it is being backed up. To display the syntax for IBMWTOOL, type IBMWTOOL /H at the operating system prompt.

To backup your files, insert a diskette into drive A and type

IBMWTOOL /CONFIG = BACKUP.

If you have a problem with the NAP server in your network, this backup copy will be used.

To **restore** the NAP data files, copy them to the same system directory that the IBM Wireless LAN has been installed on. Copy them to the NAP station using the IBMWTOOL utility.

To restore your files, insert a diskette into drive A and type

IBMWTOOL /CONFIG = RESTORE.

A.11 LAPS Installation Problem

If you cannot run the IBM Wireless LAN because LAPS aborted during installation, do **not** reboot the computer when prompted by the instructions displayed on your screen. Go to the OS\2 Install directory and erase the file IBMLANLK.LST, then restart your installation.

A.12 Degraded Mode

When contact is lost between a base and its NAP station, the access control function runs in degraded mode. The effect depends on whether or not access control has been defined for workstations on the base:

Access control not defined

Any workstation can register with this base.

Access control has been defined.

All workstations that are registered will continue to operate.

All workstations that are not registered will not be able to register. The exception is for an OS/2 base where a workstation has previously registered, in which case the workstation is already known to the base and will be allowed to register.

A.13 Resolving Radio Interference

If there is radio interference caused by other equipment, follow these steps:

Determine what equipment is creating the interference. For example, a microwave oven or any product working in the 2.4 to 2.5 GHz frequency band.

Move the base radio module.

Move the equipment (if possible) that is causing the interference.

Move the base itself.

When you have identified the frequency on which there is interference, go to the NAP and forbid that frequency.

See Table 2 on page 17 for a list of radio frequencies for your country. If the problem persists, call your IBM service representative or your dealer.

A.14 Using 3270 Emulation

3270 emulation requires that the 802.2 protocol stack is bound to your IBM Wireless LAN device driver within the workstation. Your application 3270 profile (either for DOS using PC3270 or with OS/2 using Communication Manager) will need to be customized with the host information provided by your network administrator, such as IDBLOCK, IDNUM and supported PIU size.

If you experience communication error codes, refer to your application documentation. Main problems are:

COM682 The adapter is not opened. (In this case RSSI should be red.)

Check that you have no error when registering to the base.

Check PIU size configuration which may be too big for the adapter.

Check that the bridge is running.

COM685 Your IDNUM may be used by somebody else.

Check the amount of bridge traffic, see A.4, “Data Exchange Problems Through OS/2 Bridged Base” on page 183

Check that the PIU size on your workstation is the same as in the host definition.

COM686 There may be a problem on the host side. Check the configuration with your host administrator.

A.15 Wireless Utilities for MCA Bus with Ethernet Adapter

Computers with an MCA bus and an Ethernet adapter may lock up if the Wireless Utilities diskette is booted when the Ethernet cable is not present or unplugged. A specific message identifies the problem (Code 06421 referring to Ethernet cable unplugged). Once the cable is plugged back in, the Utilities diskette works properly.

A.16 Problem Resolution Worksheet

Before calling your service representative:

1 Make a copy of the problem resolution worksheet (Table 31 on page 192), and collect and fill in the information listed in it.

In the section following, there is an explanation of how to obtain the data requested.

Table 31. Problem Resolution Worksheet	
Description of the problem	
Level of IBM Wireless LAN software.	
Hardware change level	
Product change level	
Radio Type and Model	
Radio Country Type	
PS model and type (see the documentation for your computer)	
Bus type (ISA, MCA, or PCMCIA) (see the documentation for your computer)	
Disk type (ESDI or SCSI) (see the documentation for your computer)	
Operating System and Level	
Protocol used - level and Type of application (contact your network administrator)	
Any other significant displayed messages	
Network Configuration Number of cells Number of bases Number of workstations Type of backbone attachment	

2 Make a backup copy of the following files:

For a NetWare base (directory: SYS:\SYSTEM\):

- IBMWL*.LOG
- IBMWL*.BAK
- IBMWL.NCF
- AUTOEXEC.NCF

For an OS/2 base:

- IBMWL*.LOG
- IBMWL*.BAK
- IBMWL.NCF
- AUTOEXEC.NCF
- LANTRAN.LOG
- CONFIG.SYS
- PROTOCOL.INI

For an ODI wireless workstation:

- CONFIG.SYS
- NET.CFG
- AUTOEXEC.BAT, if this workstation is running under DOS or Windows.

For an NDIS wireless workstation:

- CONFIG.SYS
- PROTOCOL.INI
- LANTRAN.LOG, if this workstation is running under OS/2.
- WIRELESS.LOG and AUTOEXEC.BAT, if this workstation is running under DOS or Windows.

Obtaining the Necessary Data

Find the level of the operating system, and the date and size of certain system files:

- **OS/2 base**:
  - Type SYSLEVEL at the OS/2 Prompt and record the IBM Wireless LAN application level.
  - Get the size and dates for files by typing:

DIR IBMWLB.OS2 /S.

– **NetWare Base**:

  Type MODULE at the server prompt on the system console and get size and dates for the following modules:

  - IBMWLCOM.NLM
  - IBMWLNAP.NLM
  - IBMWLWNC.NLM
  - IBMWLWCA.NLM
  - IBMWLERL.NLM

    or

  - IBMWLPRX.NLM
  - and IBMWL.LAN

– **OS/2 Workstation**:

  - Type SYSLEVEL at the OS/2 Prompt and record the IBM Wireless LAN application level.
  - For an NDIS workstation, get size and dates for files by typing DIR IBMWLO.OS2 /S.
  - For an ODI workstation, get size and dates for files by typing DIR IBMWL .SYS /S.

– **DOS/Windows Remote station**

  - For an NDIS workstation:

    Type IBMWLLV2 at the DOS Prompt and record the IBM Wireless LAN application level.

    Get the size and dates for files by typing DIR IBMWL.DOS /S.

  - For an ODI workstation:

    Type IBMWLLV1 at the DOS Prompt and record the IBM Wireless LAN application level.

    Get the size and dates for files by typing DIR IBMWL .COM /S.

Obtain vital product data for adapter and radio. To do so, follow these steps:

- Insert the IBM Wireless LAN Utilities diskette in drive A.
- Restart your workstation.
- Select **Diagnostic Utilities** from the main menu.
- When the first set of instruction panels is displayed note the following information:
  - Hardware Change Level
  - Product change level
  - Radio Type and Model
  - Radio Country Type.

Appendix B. Modifying System Files

Important: Only advanced users should modify system files.

The syntax for all statements in the system files can be found in the documentation provided by the operating system. Use any editor to add statements to a file. The statements take effect the next time you start up the operating system.

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B.1 System File Statements in a Netware Environment

The following section covers system file statements in a Netware environment.

Warning: We recommend that you keep all statements in the order they appear in the following examples.

This is where you will find examples of system files for:

NetWare Base of a Stand-Alone Cell on Page 199.

NetWare Bases of a Wired LAN Cell on Page 200.

NAP station which is Not a Base on Page 204.

ODI DOS and Windows Wireless Workstation Connected to an OS/2 Base Bridged to Token Ring or to a NetWare Base on Page 205.

ODI DOS and Windows Wireless Workstation Connected to an OS/2 Base Bridged to Ethernet on Page 207.

ODI OS/2 Wireless Workstation Connected to an OS/2 Base Bridged to Token Ring or to a NetWare Base on Page 208.

ODI OS/2 Wireless Workstation Connected to an OS/2 Base Bridged to Ethernet on Page 209.

NetWare Base of a Stand-Alone Cell

Add the following statements to the AUTOEXEC.NCF file:

```
# All statements must be added after IPX INTERNAL NET xxxx statement
# The two next lines are only for NetWare 3.11
LOAD LSLENH
LOAD MSM31X
# This statement calls the IBMWL.NCF startup file
IBMWL
```

Figure 14. AUTOEXEC.NCF File Example for a NetWare Base of a Stand-Alone Cell

Create an IBMWL.NCF startup file with the following statements:

```
# Initialization module for IBM Wireless LAN
LOAD IBMWLCOM CONFIG=SA
# IBM wireless error log function
LOAD IBMWLERL
# IBM Wireless LAN driver
LOAD IBMWL FRAME=Token-Ring NAME=IBMWL_TOKEN
LOAD IBMWL FRAME=Token-Ring_SNAP NAME=IBMWL_TOKEN_SNAP
# IBM wireless control agent
LOAD IBMWLWCA
# IBM wireless network control
LOAD IBMWLWNC
# Links IBM Wireless LAN driver to protocol stack used such as IPX
BIND IPX TO IBMWL_TOKEN NET=1
# Links wireless network control protocol stack to IBM Wireless LAN driver
BIND WLNC TO IBMWL_TOKEN_SNAP
# Links wireless network management protocol stack to IBM Wireless LAN driver
BIND WLNM TO IBMWL_TOKEN_SNAP
# IBM Wireless LAN network administration program
LOAD IBMWLNAP
```

Figure 15. IBMWL.NCF File Example for a NetWare Base of a Stand-Alone Cell

NetWare Bases of a Wired LAN Cell

NetWare Base without NAP and without Network Management

Add the following statements to the AUTOEXEC.NCF file:

```
# All statements must be added after IPX INTERNAL NET xxxx statement
# The two next lines are only for NetWare 3.11
LOAD LSLENH
LOAD MSM31X
# Backbone LAN driver used such as TOKEN
LOAD TOKEN
# NetWare Loadable Module of TCP/IP
LOAD TCPIP
# Links IP protocol to backbone LAN driver used such as TOKEN,
# where x.x.x.x is an IP address and y.y.y.y is the mask
BIND IP TO TOKEN ADDR=x.x.x.x MASK=y.y.y.y
# This statement calls the IBMWL.NCF startup file
IBMWL
```

Figure 16. AUTOEXEC.NCF File Example for NetWare Base of a Wired LAN Cell Without NAP and Without Network Management

Create an IBMWL.NCF startup file with the following statements:

```
# Initialization module for IBM Wireless LAN
LOAD IBMWLCOM CONFIG=BS NCIP=yyy[9]
# IBM wireless error log function
LOAD IBMWLERL
# IBM Wireless LAN driver
LOAD IBMWL FRAME=Token-Ring NAME=IBMWL_TOKEN
LOAD IBMWL FRAME=Token-Ring_SNAP NAME=IBMWL_TOKEN_SNAP
# IBM wireless control agent
LOAD IBMWLWCA
# Links IBM Wireless LAN driver to protocol stack used such as IPX
BIND IPX TO IBMWL_TOKEN
# Links wireless network control protocol stack to IBM Wireless LAN driver
BIND WLNC TO IBMWL_TOKEN_SNAP
# Links wireless network management protocol stack to IBM Wireless LAN driver
BIND WLNM TO IBMWL_TOKEN_SNAP
```

Figure 17. IBMWL.NCF File Example for NetWare Base of a Wired LAN Cell Without NAP and Without Network Management

[9] The NAP IP host address.

NetWare Base with Network Management but No NAP
Add the following statements to the AUTOEXEC.NCF file:

```
# All statements must be added after IPX INTERNAL NET xxxx statement
# The two next lines are only for NetWare 3.11
LOAD LSLENH
LOAD MSM31X
# Backbone LAN driver used such as TOKEN
LOAD TOKEN
# NetWare Loadable Module of TCP/IP
LOAD TCPIP
# Links IP protocol to backbone LAN driver used such as TOKEN
# where x.x.x.x is an IP address and y.y.y.y is the mask
BIND IP TO TOKEN ADDR=x.x.x.x MASK=y.y.y.y
# This statement calls the IBMWL.NCF startup file
IBMWL
```

Figure 18. AUTOEXEC.NCF File Example for NetWare Base of a Wired LAN Cell With Network Management but No NAP

Create an IBMWL.NCF startup file with the following statements:

```
# Initialization module for IBM Wireless LAN
LOAD IBMWLCOM CONFIG=BS NCIP=yyy[10]
# IBM wireless Proxy agent
LOAD IBMWLPRX
# IBM Wireless LAN driver
LOAD IBMWL FRAME=Token-Ring NAME=IBMWL_TOKEN
LOAD IBMWL FRAME=Token-Ring_SNAP NAME=IBMWL_TOKEN_SNAP
# IBM wireless control agent
LOAD IBMWLWCA
# Links IBM Wireless LAN driver to protocol stack used such as IPX
BIND IPX TO IBMWL_TOKEN
# Links wireless network control protocol stack to IBM Wireless LAN driver
BIND WLNC TO IBMWL_TOKEN_SNAP
# Links wireless network management protocol stack to IBM Wireless LAN driver
BIND WLNM TO IBMWL_TOKEN_SNAP
```

Figure 19. IBMWL.NCF File Example for NetWare Base of a Wired LAN Cell With NetWork Management but No NAP

[10] The NAP IP host address.

NetWare Base with NAP but without Network Management
Add the following statements to the AUTOEXEC.NCF file:

```
# All statements must be added after IPX INTERNAL NET xxxx statement
# The two next lines are only for NetWare 3.11
LOAD LSLENH
LOAD MSM31X
# Backbone LAN driver used such as TOKEN
LOAD TOKEN
# NetWare Loadable Module of TCP/IP
LOAD TCPIP
# Links IP protocol to backbone LAN driver used such as TOKEN
# where x.x.x.x is an IP address and y.y.y.y is the mask
BIND IP TO TOKEN ADDR=x.x.x.x MASK=y.y.y.y
# This statement calls the IBMWL.NCF startup file
IBMWL
```

Figure 20. AUTOEXEC.NCF File Example for NetWare Base of a Wired LAN Cell With NAP but Without Network Management

Create an IBMWL.NCF startup file with the following statements:

```
# Initialization module for IBM Wireless LAN
LOAD IBMWLCOM CONFIG=NSBS
# IBM wireless error log function
LOAD IBMWLERL
# IBM Wireless LAN driver
LOAD IBMWL FRAME=Token-Ring NAME=IBMWL_TOKEN
LOAD IBMWL FRAME=Token-Ring_SNAP NAME=IBMWL_TOKEN_SNAP
# IBM wireless control agent
LOAD IBMWLWCA
# IBM wireless network control
LOAD IBMWLWNC
# Links IBM Wireless LAN driver to protocol stack used such as IPX
BIND IPX TO IBMWL_TOKEN
# Links wireless network control protocol stack to IBM Wireless LAN driver
BIND WLNC TO IBMWL_TOKEN_SNAP
# Links wireless network management protocol stack to IBM Wireless LAN driver
BIND WLNM TO IBMWL_TOKEN_SNAP
# IBM Wireless LAN network administration program
LOAD IBMWLNAP
```

Figure 21. IBMWL.NCF File Example for NetWare Base of a Wired LAN Cell With NAP but Without Network Management

NetWare Base with NAP and Network Management

Add the following statements to the AUTOEXEC.NCF file:

```
# All statements must be added after IPX INTERNAL NET xxxx statement
# The two next lines are only for NetWare 3.11
LOAD LSLENH
LOAD MSM31X
# Backbone LAN driver used such as TOKEN
LOAD TOKEN
# NetWare Loadable Module of TCP/IP
LOAD TCPIP
# Links IP protocol to backbone LAN driver used such as TOKEN
# where x.x.x.x is an IP address and y.y.y.y is the mask
BIND IP TO TOKEN ADDR=x.x.x.x MASK=y.y.y.y
# This statement calls the IBMWL.NCF startup file
IBMWL
```

Figure 22. AUTOEXEC.NCF File Example for NetWare Base of a Wired LAN Cell With NAP and With Network Management

Create an IBMWL.NCF startup file with the following statements:

```
# Initialization module for IBM Wireless LAN
LOAD IBMWLCOM CONFIG=NSBS
# IBM wireless Proxy agent
LOAD IBMWLPRX
# IBM Wireless LAN driver
LOAD IBMWL FRAME=Token-Ring NAME=IBMWL_TOKEN
LOAD IBMWL FRAME=Token-Ring_SNAP NAME=IBMWL_TOKEN_SNAP
# IBM wireless control agent
LOAD IBMWLWCA
# IBM wireless network control
LOAD IBMWLWNC
# Links IBM Wireless LAN driver to protocol stack used such as IPX
BIND IPX TO IBMWL_TOKEN
# Links wireless network control protocol stack to IBM Wireless LAN driver
BIND WLNC TO IBMWL_TOKEN_SNAP
# Links wireless network management protocol stack to IBM Wireless LAN driver
BIND WLNM TO IBMWL_TOKEN_SNAP
# IBM Wireless LAN network administration program
LOAD IBMWLNAP
```

Figure 23. IBMWL.NCF File Example for NetWare Base of a Wired LAN Cell With NAP and With Network Management

NAP station which is Not a Base

NAP Server Without Network Management

Add the following statements to the AUTOEXEC.NCF file:

```
# All statements must be added after IPX INTERNAL NET xxxx statement
# The two next lines are only for NetWare 3.11
LOAD LSLENH
LOAD MSM31X
# Backbone LAN driver used such as TOKEN
LOAD TOKEN
# NetWare Loadable Module of TCP/IP
LOAD TCPIP
# Links IP protocol to backbone LAN driver used such as TOKEN
# where x.x.x.x is an IP address and y.y.y.y is the mask
BIND IP TO TOKEN ADDR=x.x.x.x MASK=y.y.y.y
# This statement calls the IBMWL.NCF startup file
IBMWL
```

Figure 24. AUTOEXEC.NCF File Example for NetWare NAP Station only (Without Network Management)

Create an IBMWL.NCF startup file with the following statements:

```
# Initialization module for IBM Wireless LAN
LOAD IBMWLCOM CONFIG=NS
# IBM wireless error log function
LOAD IBMWLERL
# IBM wireless network control
LOAD IBMWLWNC
# Links IBM wireless network management protocol stack to
# LAN driver used such as TOKEN
BIND WLNM TO TOKEN
# IBM Wireless LAN network administration program
LOAD IBMWLNAP
```

Figure 25. IBMWL.NCF File Example for NetWare NAP Station only (Without Network Management)

ODI DOS and Windows Wireless Workstation Connected to an OS/2 Base Bridged to Token Ring or to a NetWare Base

The NET.CFG file contains the following information:

```
; Link IBM wireless device driver
LINK DRIVER IBMWL
  ; Network name, 5 to 8 alphanumeric digits
  network_id aaaaaaaa
  ; Country code, emitted power, minimum frequency,
  ; maximum frequency, and spare frequencies -- each in digits
  country_code cc p lf hf s
  ; Name of workstation, 5 to 8 alphanumeric digits
  station_name bbbbbbbb
  ; Workstation security code, 18 hexadecimal digits
  encoded_name hhhhhhhhhhhhhhhhhh
  ; Compression selection, yes or no
  compression yes
  ; Data masking selection, none, auth, or encr
  data_masking none
```

Figure 26. NET.CFG File Example for an ODI DOS/Windows Workstation Connected to an OS/2 Base Bridged to Token Ring ,to a NetWare Base

See Figure 27 on page 206 for AUTOEXEC.BAT file example of this type of workstation.

Using Novell NetWare ODI Shell for DOS or NetWare Workstation for DOS/Windows

The AUTOEXEC.BAT file should contain the following mandatory statements:

```
REM Add the IBM Wireless LAN directory to the PATH
SET PATH=%PATH%;C:\WIRELESS
REM Link support layer
LSL.COM
REM IBM Wireless LAN driver
IBMWL.COM
REM Protocol stack used in the base station such as IPXODI
IPXODI.COM
REM To enable Token Ring source routing
ROUTE.COM
REM Shell file. x refers to DOS version such as 5 for DOS 5.0
NETx.COM
REM IBM received signal strength indicator executable file
RSSI.COM /L /D[11]
```

Figure 27. AUTOEXEC.BAT File Ex. for an ODI DOS/Windows Workstation Connected to an OS/2 Base Bridged to Token Ring or to NetWare Base

[11] This statement loads the RSSI application at startup. If RSSI interferes with your graphic applications, comment out this statement and load RSSI manually, only when needed.

ODI DOS and Windows Wireless Workstation Connected to an OS/2 Base Bridged to Ethernet

The NET.CFG file contains the following information:

```
; Link IBM wireless device driver
LINK DRIVER IBMWLETH
  ; Network name, 5 to 8 alphanumeric digits
  network_id aaaaaaaa
  ; Country code, emitted power, minimum frequency,
  ; maximum frequency, and spare frequencies -- each in digits
  country_code cc p lf hf s
  ; Name of workstation, 5 to 8 alphanumeric digits
  station_name bbbbbbbb
  ; Workstation security code, 18 hexadecimal digits
  encoded_name hhhhhhhhhhhhhhhhhh
  ; Compression selection, yes or no
  compression yes
  ; Data masking selection, none, auth, or encr
  data_masking none
  ; Mobility selection, disabled, low or high sensitivity
  mobility high_sensitivity
```

Figure 28. NET.CFG File Example for an ODI DOS/Windows Workstation Connected to an OS/2 Base Bridged to Ethernet

Using Novell NetWare ODI Shell for DOS or NetWare Workstation for DOS/Windows

Add the following mandatory statements to the AUTOEXEC.BAT file to set the automatic start of the IBM Wireless LAN application:

```
REM Add the IBM Wireless LAN directory to the PATH
SET PATH=%PATH%;C:\WIRELESS
REM Link support layer
LSL.COM
REM IBM Wireless LAN driver
IBMWLETH.COM
REM Protocol stack used in the base station such as IPXODI
IPXODI.COM
REM Shell file. x refers to DOS version such as 5 for DOS 5.0
NETx.COM
REM IBM received signal strength indicator executable file
RSSI.COM /L /D
```

Figure 29. AUTOEXEC.BAT File Example for an ODI DOS/Windows Workstation Connected to an OS/2 Base Bridged to Ethernet

ODI OS/2 Wireless Workstation Connected to an OS/2 Base Bridged to Token Ring or to a NetWare Base

The NET.CFG file contains the following information:

```
; Link IBM wireless device driver
LINK DRIVER IBMWL
  ; Network name, 5 to 8 alphanumeric digits
  network_id aaaaaaaa
  ; Country code, emitted power, minimum frequency,
  ; maximum frequency, and spare frequencies -- each in digits
  country_code cc p lf hf s
  ; Name of workstation, 5 to 8 alphanumeric digits
  station_name bbbbbbbb
  ; Workstation security code, 18 hexadecimal digits
  encoded_name hhhhhhhhhhhhhhhhhh
  ; Compression selection, yes or no
  compression yes
  ; Data masking selection, none, auth, or encr
  data_masking none
```

Figure 30. NET.CFG File Example for an ODI OS/2 Workstation Connected to an OS/2 Base Bridged to Token Ring or to a NetWare Base

The CONFIG.SYS file should contain the following mandatory statements:

```
REM Add the IBM Wireless LAN directory to the PATH
PATH=%PATH%;C:\WIRELESS
REM Link support layer
DEVICE=C:\NETWARE\LSL.SYS
REM IBM Wireless LAN driver
DEVICE=C:\NETWARE\IBMWL.SYS
REM To enable Token Ring source routing
DEVICE=C:\NETWARE\ROUTE.SYS
REM Protocol stack used such as IPX
DEVICE=C:\IPX.SYS
REM NetWare requester driver
DEVICE=C:\NETWARE\NWREQ.SYS
REM NetWare installable file system
IFS=C:\NETWARE\NWIFS.IFS
REM NetWare Daemon
RUN=C:\NETWARE\NWDAEMON.EXE
```

Figure 31. CONFIG.SYS File Example for an ODI OS/2 Workstation Connected to an OS/2 Base Bridged to Token Ring or to a NetWare Base

ODI OS/2 Wireless Workstation Connected to an OS/2 Base Bridged to Ethernet

The NET.CFG file contains the following information:

```
; Link IBM wireless device driver
LINK DRIVER IBMWLETH
  ; Network name, 5 to 8 alphanumeric digits
  network_id aaaaaaaa
  ; Country code, emitted power, minimum frequency,
  ; maximum frequency, and spare frequencies -- each in digits
  country_code cc p lf hf s
  ; Name of workstation, 5 to 8 alphanumeric digits
  station_name bbbbbbbb
  ; Workstation security code, 18 hexadecimal digits
  encoded_name hhhhhhhhhhhhhhhhhh
  ; Compression selection, yes or no
  compression yes
  ; Data masking selection, none, auth, or encr
  data_masking none
  ; Mobility selection, disabled, low or high sensitivity
  mobility high_sensitivity
```

Figure 32. NET.CFG File Example for an ODI OS/2 Workstation Connected to an OS/2 Base Bridged to Ethernet

The CONFIG.SYS file should contain the following mandatory statements:

```
REM Add the IBM Wireless LAN directory to the PATH
PATH=%PATH%;C:\WIRELESS
REM Link support layer
DEVICE=C:\NETWARE\LSL.SYS
REM IBM Wireless LAN driver
DEVICE=C:\NETWARE\IBMWLETH.SYS
REM Protocol stack used such as IPX
DEVICE=C:\IPX.SYS
REM NetWare requester driver
DEVICE=C:\NETWARE\NWREQ.SYS
REM NetWare installable file system
IFS=C:\NETWARE\NWIFS.IFS
REM NetWare Daemon
RUN=C:\NETWARE\NWDAEMON.EXE
```

Figure 33. CONFIG.SYS File Example for an ODI OS/2 Workstation Connected to an OS/2 Base Bridged to Ethernet

B.2 System File Statements in an OS/2 Environment

The following section covers system files in an OS/2 environment.

Warning: We recommend that you keep all statements in the order they appear in the following examples.

This is where you will find examples of system files for:

OS/2 Base Bridged to Token Ring on Page 211.

OS/2 Base Bridged to Ethernet on Page 216.

NDIS OS/2 Workstation Connected to an OS/2 Base Bridged to Token Ring on Page 220.

NDIS OS/2 Workstation (Connected to an OS/2 Base), with Ethernet Frame Type Using MPTS on Page 224.

NDIS DOS Workstation (Connected to an OS/2 Base), Using DXME0/DXMT0 and Ethernet Frame Type on Page 228.

NDIS DOS Workstation (Connected to an OS/2 Base), and Using DXMJ0 and Ethernet Frame Type on Page 229.

NDIS DOS Workstation (Connected to an OS/2 Base),Using DOS LAN Requester 4.0 and Token Ring Frame Type on Page 231.

OS/2 Base Bridged to Token Ring

PROTOCOL.INI

```
;------- Protocol Manager Definition ----------
[PROT_MAN]
     DRIVERNAME = PROTMAN$
[IBMLXCFG]
     GSDSRB_nif = GSDSRB.NIF
     LANDD_nif = LANDD.NIF
     NETBEUI_nif = NETBEUI.NIF
     TCPIP_nif = TCPIP.NIF
     IBMTOK_nif = IBMTOK.nif
     IBMWLB_nif = IBMWLB.nif
;------- IBM Wireless LAN Bridge Definition --------
[GSDSRB_nif]
     DriverName = GSDSRB$
     Bindings = IBMTOK_nif,IBMWLB_nif
     PortType = "T","T"
     RING =  xB75, xB7E
     MSDU = 4472
     PRIORITY = 32768
     MAXAGE = 2
     HELLOTIME = 2
     LINESPEED = 2 48   ,2 48
     BRIDGENUM = 12
     AgingTime = 3
     OverflowPolicy = "LEARN"
     Max_Out_Frames = 5 ,5
     Max_Out_LFrames = 5 ,5
;------- IBM 8 2.2 (LLC) Protocol Definition -------
[LANDD_nif]
     DriverName = LANDD$
     Bindings = IBMTOK_nif,IBMWLB_nif
     ETHERAND_TYPE = "I","I"
     SYSTEM_KEY =  x , x
     OPEN_OPTIONS =  x2   , x2
     TRACE =  x , x
     LINKS = 8,8
     MAX_SAPS = 3,3
     MAX_G_SAPS =  ,
     USERS = 3,3
     TI_TICK_G1 = 255,255
     T1_TICK_G1 = 15,15
     T2_TICK_G1 = 3,3
     TI_TICK_G2 = 255,255
     T1_TICK_G2 = 25,25
     T2_TICK_G2 = 1 ,1
     IPACKETS = 25 ,25
     UIPACKETS = 1  ,1
     MAXTRANSMITS = 6,6
     MINTRANSMITS = 2,2
     TCBS = 64,64
     GDTS = 3 ,3
     ELEMENTS = 8  ,8
```

Figure 34 (Part 1 of 2). PROTOCOL.INI File Example for an OS/2 Base Bridged to Token Ring

```
;------- IBM NETBIOS Protocol Definition ----------
ffINETBEUI_nif"
     DriverName = netbeui$
     Bindings = IBMTOK_nif
     ETHERAND_TYPE = "I"
     USEADDRREV = "YES"
     OS2TRACEMASK =  x
     SESSIONS = 4
     NCBS = 95
     NAMES = 21
     SELECTORS = 5
     USEMAXDATAGRAM = "NO"
     ADAPTRATE = 1
     WINDOWERRORS =
     MAXDATARCV = 4168
     TI = 3
     T1 = 5
     T2 = 2
     MAXIN = 1
     MAXOUT = 1
     NETBIOSTIMEOUT = 5
     NETBIOSRETRIES = 8
     NAMECACHE =
     PIGGYBACKACKS = 1
     DATAGRAMPACKETS = 2
     PACKETS = 35
     LOOPPACKETS = 1
     PIPELINE = 5
     MAXTRANSMITS = 6
     MINTRANSMITS = 2
     DLCRETRIES = 8
     NETFLAGS =  x
;------- IBM TCP/IP    Protocol Definition ----------
ffITCPIP_nif"
     DriverName = TCPIP$
     Bindings = IBMTOK_nif
;------- IBM Token Ring Adapter Definition ---------
ffIBMTOK_nif"
     DriverName = IBMTOK$
     ADAPTER = "PRIMARY"
     MAXTRANSMITS = 6
     RECVBUFS = 2
     RECVBUFSIZE = 256
     XMITBUFS = 1
    ENABLEBRIDGE
;------- IBM Wireless LAN Adapter Definition -------
ffIBMWLB_nif"
     DriverName = IBMWL$
     ENABLEBRIDGE = "YES"
     BUFFERSIZE = 256
     LAN_TYPE = "T"
     MOBILITY = "OFF"
```

Figure 34 (Part 2 of 2). PROTOCOL.INI File Example for an OS/2 Base Bridged to Token Ring

CONFIG.SYS

```
IFS=C:\OS2\HPFS.IFS /CACHE:512 /CRECL:4
PROTSHELL=C:\OS2\PMSHELL.EXE
SET USER_INI=C:\OS2\OS2.INI
SET SYSTEM_INI=C:\OS2\OS2SYS.INI
SET OS2_SHELL=C:\OS2\CMD.EXE
SET AUTOSTART=PROGRAMS,TASKLIST,FOLDERS
SET RUNWORKPLACE=C:\OS2\PMSHELL.EXE
SET COMSPEC=C:\OS2\CMD.EXE
LIBPATH=C:\IBMCOM\DLL;C:\MUGLIB\DLL;D:\IBMLAN\NETLIB;.;C:\OS2\DLL;
LIBPATH=C:\OS2\MDOS;C:
SET PATH=D:\IBMLAN\NETPROG;C:\OS2;C:\MUGLIB;C:\OS2\SYSTEM;
SET PATH=C:\OS2\MDOS\WINOS2;C:
SET DPATH=C:\IBMCOM;D:\IBMLAN\NETPROG;D:\IBMLAN;C:\OS2;C:\MUGLIB\DLL;
SET DPATH=C:\CMLIB;C:
SET PROMPT=$lfff$P“
SET HELP=C:\CMLIB\APPN;C:\OS2\HELP;C:\OS2\HELP\TUTORIAL;E:\TCPIP\HELP;
SET HELP=E:\TCPIP\U
SET GLOSSARY=C:\OS2\HELP\GLOSS;
SET IPF_KEYS=SBCS
rem ------------NDIS trace support--------
TRACEBUF=63
TRACE=ON 165,164
rem ------------end of NDIS trace support--------
PRIORITY_DISK_IO=YES
FILES=2
DEVICE=C:\IBMCOM\PROTOCOL\LANPDD.OS2
DEVICE=C:\IBMCOM\PROTOCOL\LANVDD.OS2
DEVICE=C:\IBMCOM\LANMSGDD.OS2 /I:C:\IBMCOM
DEVICE=C:\IBMCOM\PROTMAN.OS2 /I:C:\IBMCOM
DEVICE=C:\OS2\R CSDD.SYS
rem DEVICE=C:\IBMCOM\PROTOCOL\theseus2.sys
DEVICE=C:\OS2\TESTCFG.SYS
DEVICE=C:\OS2\DOS.SYS
DEVICE=C:\OS2\PMDD.SYS
BUFFERS=3
IOPL=YES
DISKCACHE=512,LW,AC:C
MAXWAIT=1
MEMMAN=SWAP,PROTECT
rem   ------------------------------------------------------------
rem      define the path to the swap partition
      SWAPPATH=F:\  2 48
rem   ------------------------------------------------------------
BREAK=OFF
THREADS=256
PRINTMONBUFSIZE=134,134,134
COUNTRY= 33,C:\OS2\SYSTEM\COUNTRY.SYS
SET KEYS=ON
REM SET DELDIR=C:\DELETE,512;D:\DELETE,512;
BASEDEV=PRINT 2.SYS
BASEDEV=IBM2FLPY.ADD
```

Figure 35 (Part 1 of 3). CONFIG.SYS File Example for an OS/2 Base Bridged to Token Ring

```
rem ---------------------------------------------------------------          --
rem select the type of disk ------ SCSI
      BASEDEV=IBM2SCSI.ADD  /LED
      BASEDEV=OS2SCSI.DMD
rem select the type of disk ------ ESDI
rem BASEDEV=IBM2ADSK.ADD
rem ---------------------------------------------------------
BASEDEV=OS2DASD.DMD
SET BOOKSHELF=D:\IBMLAN\BOOK;C:\OS2\BOOK;E:\TCPIP\DOC;
SET EPMPATH=C:\OS2\APPS;
PROTECTONLY=NO
SHELL=C:\OS2\MDOS\COMMAND.COM C:\OS2\MDOS
FCBS=16,8
RMSIZE=64
DEVICE=C:\OS2\MDOS\VEMM.SYS
DOS=LOW,NOUMB
DEVICE=C:\OS2\MDOS\VDPX.SYS
DEVICE=C:\OS2\MDOS\VXMS.SYS /UMB
DEVICE=C:\OS2\MDOS\VDPMI.SYS
DEVICE=C:\OS2\MDOS\VCDROM.SYS
DEVICE=C:\OS2\PCMCIA.SYS
DEVICE=C:\OS2\MDOS\VPCMCIA.SYS
DEVICE=C:\OS2\MDOS\VMOUSE.SYS
DEVICE=C:\OS2\POINTDD.SYS
DEVICE=C:\OS2\MOUSE.SYS
DEVICE=C:\OS2\COM.SYS
DEVICE=C:\OS2\MDOS\VCOM.SYS
CODEPAGE=85 ,437
REM ---------Keyboard definition -------begin---------------
      DEVINFO=KBD,FR189,C:\OS2\KEYBOARD.DCP
rem DEVINFO=KBD,US,C:\OS2\KEYBOARD.DCP
REM ---------Keyboard definition -------end----------------------------------
DEVINFO=SCR,VGA,C:\OS2\VIOTBL.DCP
SET VIDEO_DEVICES=VIO_VGA
SET VIO_VGA=DEVICE(BVHVGA)
DEVICE=C:\OS2\MDOS\VVGA.SYS
DEVICE=C:\CMLIB\ACSLDLAN.SYS
RUN=C:\OS2\EPW.EXE
DEVICE=C:\CMLIB\APPN\CMKFMDE.SYS

REM ---------TCP/IP definition -------begin----------------------------
rem -------- the DISPLAY value must be set to your specific TCPIP address
SET DISPLAY=9.1  .51.143:
rem -------- The HOSTNAME value must be set to your NAME
SET HOSTNAME=pstestndis2.lagaude.ibm.com
rem ---If your keyboard is a QWERTY (US) change the value Fr_FR to En_US
SET LANG=Fr_FR
rem -------- Your own definition may be filled to comply to SNMP
SET SYSCONTACT=JOHN
SET SYSLOCATION=CER Lagaude
```

Figure 35 (Part 2 of 3). CONFIG.SYS File Example for an OS/2 Base Bridged to Token Ring

```
rem -------- change Drive if TCPIP install on other drive than C:
SET TCPIPDRV=E:
SET ETC=E:\TCPIP\ETC
SET TMP=E:\TCPIP\TMP
TIMESLICE=1  ,1
SET XFILES=E:\TCPIP\X11
SET TZ=NFT-1GMT
SET IBMAV=C:\IBMAV
SET READIBM=E:\TCPIP\DOC
RUN=E:\TCPIP\BIN\CNTRL.EXE
IFS=E:\TCPIP\BIN\NFS.IFS
SET TELNET.PASSWORD.ID=telnet
REM ------TCP/IP definition --------end------------------------------
rem ------------------------------------------------------
rem ---------- LAN SERVER STATEMENTS --------------------
rem ---------- Keep this order -------------------------
RUN=C:\IBMCOM\PROTOCOL\NETBIND.EXE
RUN=C:\IBMCOM\LANMSGEX.EXE
DEVICE=C:\IBMCOM\PROTOCOL\NETBEUI.OS2
DEVICE=D:\IBMLAN\NETPROG\RDRHELP.2
IFS=D:\IBMLAN\NETPROG\NETWKSTA.2   /I:D:\IBMLAN /N
DEVICE=C:\IBMCOM\PROTOCOL\NETBIOS.OS2
DEVICE=C:\IBMCOM\PROTOCOL\LANDD.OS2
DEVICE=C:\IBMCOM\PROTOCOL\LANDLLDD.OS2
RUN=C:\IBMCOM\PROTOCOL\LANDLL.EXE
RUN=D:\IBMLAN\NETPROG\LSDAEMON.EXE
rem ---------- End of LAN Server Statements ------------
DEVICE=C:\IBMCOM\PROTOCOL\INET.SYS
DEVICE=C:\IBMCOM\PROTOCOL\IFNDIS.SYS
DEVICE=C:\IBMCOM\MACS\IBMTOK.OS2
rem ---------- IBM Wireless LAN Bridge -----------------
DEVICE=C:\IBMCOM\PROTOCOL\GSDSRB.2
rem ---------- IBM Wireless LAN Device Driver ----------
DEVICE=C:\IBMCOM\MACS\IBMWLB.OS2
```

Figure 35 (Part 3 of 3). CONFIG.SYS File Example for an OS/2 Base Bridged to Token Ring

OS/2 Base Bridged to Ethernet

PROTOCOL.INI

```
;------- Protocol Manager Definition ---------------
fflPROT_MAN“
     DRIVERNAME = PROTMAN$
fflIBMLXCFG“
     TCPIP_NIF = TCPIP.nif
     GSDSRB_nif = GSDSRB.NIF
     LANDD_nif = LANDD.NIF
     IBMENII_nif = IBMENII.nif
     IBMWLB_nif = IBMWLB.nif
;------- IBM Wireless LAN Bridge Definition --------
fflGSDSRB_nif“
     DriverName = GSDSRB$
     Bindings = IBMENII_nif,IBMWLB_nif
     PortType = "E","E"
     RING =  XB79, XA44
     MSDU = 4472
     PRIORITY = 32768
     MAXAGE = 2
     HELLOTIME = 2
     LINESPEED = 2 48   ,2 48
     BRIDGENUM = 1
     AgingTime = 3
     OverflowPolicy = "LEARN"
     Max_Out_Frames = 5 ,5
     Max_Out_LFrames = 5 ,5
;------- IBM 8 2.2 (LLC) Protocol Definition -------
fflLANDD_nif“
     DriverName = LANDD$
     Bindings = IBMENII_nif,IBMWLB_nif
     ETHERAND_TYPE = "I","I"
     SYSTEM_KEY =  x , x
     OPEN_OPTIONS =  x2   , x2
     TRACE =  x , x
     LINKS = 8,8
     MAX_SAPS = 3,3
     MAX_G_SAPS =  ,
     USERS = 3,3
     TI_TICK_G1 = 255,255
     T1_TICK_G1 = 15,15
     T2_TICK_G1 = 3,3
     TI_TICK_G2 = 255,255
     T1_TICK_G2 = 25,25
     T2_TICK_G2 = 1 ,1
     IPACKETS = 25 ,25
     UIPACKETS = 1  ,1
     MAXTRANSMITS = 6,6
     MINTRANSMITS = 2,2
     TCBS = 64,64
     GDTS = 3 ,3
     ELEMENTS = 8  ,8
```

Figure 36 (Part 1 of 2). PROTOCOL.INI File Example for an OS/2 Base Bridged to Ethernet

```
;------- IBM Wireless LAN Adapter Definition -------
ffIBMWLB_nif“
     DriverName = IBMWL$
     LAN_TYPE = "E"
     ENABLEBRIDGE = "YES"
     BUFFERSIZE = 256
;------- IBM Ethernet Adapter Definition -----------
ffIBMENII_nif“
     DriverName = IBMENII$
;------- IBM TCP/IP    Protocol Definition -----------
ffTCPIP_NIF“
     DriverName = TCPIP$
     BINDINGS = IBMENII_NIF
```

Figure 36 (Part 2 of 2). PROTOCOL.INI File Example for an OS/2 Base Bridged to Ethernet

CONFIG.SYS

```
DEVICE=C:\IBMCOM\LANMSGDD.OS2 /I:C:\IBMCOM
DEVICE=C:\IBMCOM\PROTMAN.OS2 /I:C:\IBMCOM
DEVICE=C:\OS2\INSTALL\PRELOAD\PREL_IMG.SYS C:\OS2\INSTALL\PRELOAD\WELCOME.RGB 5
IFS=C:\OS2\HPFS.IFS /CACHE:64 /CRECL:4
DEVICE=C:\IBMCOM\PROTOCOL\LANPDD.OS2
DEVICE=C:\IBMCOM\PROTOCOL\LANVDD.OS2
PROTSHELL=C:\OS2\PMSHELL.EXE
SET USER_INI=C:\OS2\OS2.INI
SET SYSTEM_INI=C:\OS2\OS2SYS.INI
SET OS2_SHELL=C:\OS2\CMD.EXE
SET AUTOSTART=PROGRAMS,TASKLIST,FOLDERS,CONNECTIONS
SET RUNWORKPLACE=C:\OS2\PMSHELL.EXE
SET COMSPEC=C:\OS2\CMD.EXE
LIBPATH=C:\MPTN\DLL;C:\IBMCOM\DLL;;.;C:\OS2\DLL;C:\OS2\MDOS;C:\;
C:\OS2\APPS\DLL;C:\MMOS2\DLL;C:\OS2\APPS\IBMWORKS;C:\VIEWER\DLL;
C:\OS2\APPS\NETFIN;C:\WIRELESS;
SET PATH=C:\MPTN\BIN;C:\IBMCOM;C:\OS2;C:\OS2\SYSTEM;C:\OS2\INSTALL;C:\;
C:\OS2\MDOS;C:\OS2\APPS;C:\MMOS2;C:\OS2\APPS\IBMWORKS;C:\VIEWER\B
IN;C:\OS2\APPS\NETFIN;C:\WINDOWS;C:\WIRELESS;
SET DPATH=C:\IBMCOM;C:\OS2;C:\OS2\SYSTEM;C:\OS2\INSTALL;C:\;C:\OS2\BITMAP;
C:\OS2\MDOS;C:\OS2\APPS;C:\MMOS2;C:\MMOS2\INSTALL;
C:\VIEWER\DATA;C:\OS2\APPS\NETFIN;C:\WINDOWS;C:\WIRELESS;
SET PROMPT=$lffl$P“
SET HELP=C:\OS2\HELP;C:\OS2\HELP\TUTORIAL;C:\MMOS2\HELP;
C:\OS2\APPS\IBMWORKS;C:\VIEWER\HELP;
SET GLOSSARY=C:\OS2\HELP\GLOSS;
SET IPF_KEYS=SBCS
PRIORITY_DISK_IO=YES
```

Figure 37 (Part 1 of 3). CONFIG.SYS File Example for an OS/2 Base Bridged to Ethernet

```
FILES=2
BASEDEV=IBMKBD.SYS
DEVICE=C:\OS2\BOOT\TESTCFG.SYS
DEVICE=C:\OS2\BOOT\DOS.SYS
DEVICE=C:\OS2\BOOT\PMDD.SYS
BUFFERS=9
IOPL=YES
DISKCACHE=D,LW,AC:C
MAXWAIT=3
MEMMAN=SWAP,PROTECT
SWAPPATH=C:\OS2\SYSTEM 2 48 2 48
BREAK=OFF
THREADS=256
PRINTMONBUFSIZE=134,134,134
COUNTRY= 33,C:\OS2\SYSTEM\COUNTRY.SYS
SET KEYS=ON
SET BOOKSHELF=C:\OS2\BOOK;C:\MMOS2;
SET SOMIR=C:\OS2\ETC\SOM.IR;C:\OS2\ETC\WPSH.IR;C:\OS2\ETC\WPDSERV.IR
SET SOMDDIR=C:\OS2\ETC\DSOM
REM SET DELDIR=C:\DELETE,512;
BASEDEV=XDFLOPPY.FLT
BASEDEV=OS2DASD.DMD
SET EPMPATH=C:\OS2\APPS;
PROTECTONLY=NO
VME=NO
SHELL=C:\OS2\MDOS\COMMAND.COM C:\OS2\MDOS
FCBS=16,8
RMSIZE=64
DEVICE=C:\OS2\MDOS\VEMM.SYS
DOS=LOW,NOUMB
DEVICE=C:\OS2\MDOS\VXMS.SYS /UMB
DEVICE=C:\OS2\MDOS\VDPMI.SYS
DEVICE=C:\OS2\MDOS\VDPX.SYS
DEVICE=C:\OS2\MDOS\VWIN.SYS
DEVICE=C:\OS2\MDOS\VW32S.SYS
DEVICE=C:\OS2\BOOT\APM.SYS
DEVICE=C:\OS2\MDOS\VAPM.SYS
DEVICE=C:\OS2\MDOS\VMOUSE.SYS
DEVICE=C:\OS2\BOOT\POINTDD.SYS
DEVICE=C:\OS2\BOOT\MOUSE.SYS
DEVICE=C:\OS2\BOOT\COM.SYS
DEVICE=C:\OS2\MDOS\VCOM.SYS
CODEPAGE=85 ,437
DEVINFO=KBD,FR189,C:\OS2\KEYBOARD.DCP
DEVINFO=SCR,VGA,C:\OS2\BOOT\VIOTBL.DCP
```

Figure 37 (Part 2 of 3). CONFIG.SYS File Example for an OS/2 Base Bridged to Ethernet

```
SET VIDEO_DEVICES=VIO_SVGA
DEVICE=C:\OS2\MDOS\VSVGA.SYS
SET MMBASE=C:\MMOS2;
SET DSPPATH=C:\MMOS2\DSP;
SET NCDEBUG=4
DEVICE=C:\MMOS2\SSMDD.SYS
DEVICE=C:\MMOS2\R STUB.SYS
SET IBMWORKS_INI=C:\OS2\APPS\IBMWORKS
SET UMPATH=C:\VIEWER\DATA;
SET WORKPLAC=C:\VIEWER
SET VIEWER=C:\VIEWER
DEVICE=C:\MMOS2\VCSHDD.SYS
BASEDEV=IBM1FLPY.ADD
BASEDEV=IBM2ADSK.ADD
BASEDEV=IBM2FLPY.ADD
BASEDEV=OS2SCSI.DMD /Q
BASEDEV=IBMINT13.I13
DEVICE=C:\OS2\APPS\NETFIN\SYSINFO.SYS
BASEDEV=NFDASD.FLT
SET VIO_SVGA=DEVICE(BVHVGA,BVHSVGA)
DEVICE=C:\MMOS2\CSBSAUD.SYS P:53  D: ,1 I:1  N:CSAUD1$
DEVICE=C:\MMOS2\VCSBSAUD.SYS CSAUD1$
DEVICE=C:\MMOS2\TIMER .SYS
DEVICE=C:\MMOS2\OPL3.SYS /P:388 /N:OPL31$
RUN=C:\OS2\APPS\NETFIN\ECCMEM.EXE /INIT /QUIET
DEVICE=C:\OS2\APPS\NETFIN\REFPART.SYS
BASEDEV=PRINT 2.SYS
REM DEVICE=C:\OS2\APPS\SASYNCDB.SYS
CALL=C:\IBMCOM\PROTOCOL\NETBIND.EXE
RUN=C:\IBMCOM\LANMSGEX.EXE
SET ETC=C:\MPTN\ETC
DEVICE=C:\IBMCOM\PROTOCOL\LANDD.OS2
DEVICE=C:\IBMCOM\PROTOCOL\LANDLLDD.OS2
RUN=C:\IBMCOM\PROTOCOL\LANDLL.EXE
rem ---------- IBM Wireless LAN Device Driver ----------
DEVICE=C:\IBMCOM\MACS\IBMWLB.OS2
DEVICE=C:\IBMCOM\MACS\IBMENII.OS2
rem ---------- MPTS Statements ------------------------
DEVICE=C:\MPTN\PROTOCOL\MPTN.SYS
DEVICE=C:\MPTN\PROTOCOL\LIPC.SYS
DEVICE=C:\MPTN\PROTOCOL\INET.SYS
DEVICE=C:\MPTN\PROTOCOL\IFNDIS.SYS
RUN=C:\MPTN\BIN\CNTRL.EXE /P mptn_os$ mptn_in$
CALL=C:\OS2\CMD.EXE /Q /C C:\MPTN\BIN\MPTSTART.CMD
rem ---------- End of MPTS Statements ------------------
rem ---------- IBM Wireless LAN Bridge -----------------
DEVICE=C:\IBMCOM\PROTOCOL\GSDSRB.2
```

Figure 37 (Part 3 of 3). CONFIG.SYS File Example for an OS/2 Base Bridged to Ethernet

NDIS OS/2 Workstation Connected to an OS/2 Base Bridged to Token Ring

PROTOCOL.INI

```
;------- Protocol Manager Definition ---------------
ffIPROT_MAN“
    DriverName = PROTMAN$
ffIIBMLXCFG“
    NETBEUI_nif = NETBEUI.NIF
    TCPIP_nif = TCPIP.NIF
    IBMWLO_nif = IBMWLO.nif
;------- IBM NETBIOS Protocol Definition -----------
ffINETBEUI_nif“
    DriverName = netbeui$
    Bindings = IBMWLO_nif
    ETHERAND_TYPE = "I"
    USEADDRREV = "YES"
    OS2TRACEMASK =  x
    SESSIONS = 4
    NCBS = 95
    NAMES = 21
    SELECTORS = 5
    USEMAXDATAGRAM = "NO"
    ADAPTRATE = 5
    WINDOWERRORS =
    MAXDATARCV = 4168
    TI = 3
    T1 = 4
    T2 = 2
    MAXIN = 1
    MAXOUT = 1
    NETBIOSTIMEOUT = 5
    NETBIOSRETRIES = 8
    NAMECACHE =
    PIGGYBACKACKS = 1
    DATAGRAMPACKETS = 2
    PACKETS = 35
    LOOPPACKETS = 1
    PIPELINE = 5
    MAXTRANSMITS = 6
    MINTRANSMITS = 2
    DLCRETRIES = 8
    FCPRIORITY = 5
    NETFLAGS =  x
;------- IBM TCP/IP    Protocol Definition -----------
ffITCPIP_nif“
    DriverName = TCPIP$
    Bindings = IBMWLO_nif
```

Figure 38 (Part 1 of 2). PROTOCOL.INI File Example for an NDIS OS/2 Workstation Connected to an OS/2 Base Bridged to Token Ring

```
;------- IBM Wireless LAN Adapter Definition -------
fflIBMWLO_nif‘
     DriverName = IBMWL$
     NetWorkId = "TOKEN 1"
     StationName = "REMOTET1"
     CountryCode = 1
     LAN_TYPE = "T"
     MOBILITY = "HIGH"
     Compression = "YES"
     DataMasking = "ENCR"
     EncodedName = "1342d78915aedc6397"
```

Figure 38 (Part 2 of 2). PROTOCOL.INI File Example for an NDIS OS/2 Workstation Connected to an OS/2 Base Bridged to Token Ring

CONFIG.SYS

```
TRACEBUF=63
IFS=C:\OS2\HPFS.IFS   /CACHE:64  /CRECL:4
PROTSHELL=C:\OS2\PMSHELL.EXE
SET USER_INI=C:\OS2\OS2.INI
SET SYSTEM_INI=C:\OS2\OS2SYS.INI
SET OS2_SHELL=C:\OS2\CMD.EXE
SET AUTOSTART=PROGRAMS,TASKLIST,FOLDERS
SET RUNWORKPLACE=C:\OS2\PMSHELL.EXE
SET COMSPEC=C:\OS2\CMD.EXE
LIBPATH=C:\IBMCOM\DLL;C:\IBMLAN\NETLIB;C:\MUGLIB\DLL;.;C:\OS2\DLL;
C:\OS2\MDOS;C:\;C:\OS2\APPS\DLL;C:\TCPIP\DLL;
SET PATH=C:\IBMLAN\NETPROG;C:\MUGLIB;C:\OS2;C:\OS2\SYSTEM;
C:\OS2\MDOS\WINOS2;C:\OS2\INSTALL;C:\;C:\OS2\MDOS;
C:\OS2\APPS;\IBMCOM;\SRVIFS;
C:\TCPIP\BIN;C:\WIRELESS
SET
DPATH=C:\IBMCOM;C:\IBMLAN\NETPROG;C:\IBMLAN;C:\MUGLIB;C:\OS2;
C:\OS2\SYSTEM;C:\OS2\MDOS\WINOS2;C:\OS2\INSTALL;C:\;C:\OS2\BITMAP;
C:\OS2\MDOS;C:\OS2\APPS;\SRVIFS;\SRVIFS;C:\WIRELESS
SET PROMPT=$iffl$p‘
SET HELP=C:\OS2\HELP;C:\OS2\HELP\TUTORIAL;C:\TCPIP\HELP;
SET GLOSSARY=C:\OS2\HELP\GLOSS;
SET IPF_KEYS=SBCS
SET LANXCOPY_ID=RS7GL
PRIORITY_DISK_IO=YES
FILES=2
DEVICE=C:\IBMCOM\PROTOCOL\LANPDD.OS2
DEVICE=C:\IBMCOM\PROTOCOL\LANVDD.OS2
DEVICE=C:\IBMCOM\LANMSGDD.OS2 /I:C:-IBMCOM
DEVICE=C:\IBMCOM\PROTMAN.OS2 /I:C:\IBMCOM
rem DEVICE=C:\IBMCOM\PROTOCOL\LANVDD.OS2
DEVICE=C:\OS2\TESTCFG.SYS
DEVICE=C:\OS2\DOS.SYS
DEVICE=C:\OS2\PMDD.SYS /C1
```

Figure 39 (Part 1 of 3). CONFIG.SYS File Example for an NDIS OS/2 Workstation Connected to an OS/2 Base Bridged to Token Ring

```
BUFFERS=3
IOPL=YES
DISKCACHE=512,LW,AC:C
MAXWAIT=3
MEMMAN=SWAP,PROTECT
SWAPPATH=E:\ 2 48 4 96
BREAK=OFF
THREADS=256
PRINTMONBUFSIZE=134,134,134
COUNTRY= 33,C:\OS2\SYSTEM\COUNTRY.SYS
SET KEYS=ON
BASEDEV=PRINT 2.SYS
BASEDEV=IBM2FLPY.ADD
BASEDEV=IBM2ADSK.ADD
BASEDEV=OS2DASD.DMD
SET BOOKSHELF=C:\IBMLAN\BOOK;C:\OS2\BOOK;C:\TCPIP\DOC;
SET EPMPATH=C:\OS2\APPS;
PROTECTONLY=NO
SHELL=C:\OS2\MDOS\COMMAND.COM C:\OS2\MDOS
FCBS=16,8
RMSIZE=64
DEVICE=C:\OS2\MDOS\VEMM.SYS
DOS=LOW,NOUMB
DEVICE=C:\OS2\MDOS\VDPX.SYS
DEVICE=C:\OS2\MDOS\VXMS.SYS /UMB
DEVICE=C:\OS2\MDOS\VDPMI.SYS
DEVICE=C:\OS2\MDOS\VCDROM.SYS
DEVICE=C:\OS2\MDOS\VWIN.SYS
DEVICE=C:\OS2\PCMCIA.SYS
DEVICE=C:\OS2\MDOS\VPCMCIA.SYS
DEVICE=C:\OS2\MDOS\VMOUSE.SYS
DEVICE=C:\OS2\POINTDD.SYS
DEVICE=C:\OS2\MOUSE.SYS
DEVICE=C:\OS2\COM.SYS
DEVICE=C:\OS2\MDOS\VCOM.SYS
CODEPAGE=85 ,437
DEVINFO=KBD,FR189,C:\OS2\KEYBOARD.DCP
DEVINFO=SCR,VGA,C:\OS2\VIOTBL.DCP
SET VIDEO_DEVICES=VIO_VGA
SET VIO_VGA=DEVICE(BVHVGA)
DEVICE=C:\OS2\MDOS\VVGA.SYS
rem ------------------------------------------------------
rem ---------- LAN SERVER STATEMENTS -------------------
rem ---------- Keep this order -------------------------
DEVICE=C:\IBMCOM\PROTOCOL\NETBEUI.OS2
DEVICE=C:\IBMLAN\NETPROG\RDRHELP.2
IFS=C:\IBMLAN\NETPROG\NETWKSTA.2   /I:C:\IBMLAN /N
DEVICE=C:\IBMCOM\PROTOCOL\NETBIOS.OS2
```

Figure 39 (Part 2 of 3). CONFIG.SYS File Example for an NDIS OS/2 Workstation Connected to an OS/2 Base Bridged to Token Ring

```
RUN=C:\IBMCOM\PROTOCOL\NETBIND.EXE
RUN=C:\IBMCOM\LANMSGEX.EXE
RUN=\SRVIFS\SRVREXX.EXE
DEVICE=\SRVIFS\SRVIFS.SYS
IFS=\SRVIFS\SRVIFSC.IFS
RUN=C:\IBMLAN\NETPROG\LSDAEMON.EXE
rem ---------- End of LAN Server Statements ------------
DEVICE=C:\IBMCOM\PROTOCOL\INET.SYS
DEVICE=C:\IBMCOM\PROTOCOL\IFNDIS.SYS
REM -----TCP/IP definition -------begin-------------------------------
SET ETC=C:\TCPIP\ETC
SET TMP=C:\TCPIP\TMP
SET READIBM=C:\TCPIP\DOC
RUN=C:\TCPIP\BIN\CNTRL.EXE
IFS=C:\TCPIP\BIN\NFS2  .IFS
DEVICE=C:\TCPIP\BIN\VDOSTCP.VDD
DEVICE=C:\TCPIP\BIN\VDOSTCP.SYS
RUN=C:\TCPIP\BIN\VDOSCTL.EXE
SET TZ=est5edt
SET NFS.PERMISSION.BITS=7
SET NFS.PERMISSION.DBITS=7
REM --------TCP/IP definition --------end--------------------------------
rem ---------- IBM Wireless LAN Device Driver ----------
DEVICE=C:\IBMCOM\MACS\IBMWLO.OS2
SET IBMAV=C:\IBMAV
SET LANXCOPY_ID=WKS2
```

Figure 39 (Part 3 of 3). CONFIG.SYS File Example for an NDIS OS/2 Workstation Connected to an OS/2 Base Bridged to Token Ring

NDIS OS/2 Workstation (Connected to an OS/2 Base), with Ethernet Frame Type Using MPTS

PROTOCOL.INI

```
;------- Protocol Manager Definition ---------------
fflPROT_MAN“
     DRIVERNAME = PROTMAN$
fflIBMLXCFG“
     NETBEUI_nif = NETBEUI.NIF
     TCPIP_nif = TCPIP.NIF
     IBMWLO_nif = IBMWLO.nif
;------- IBM NETBIOS Protocol Definition -----------
fflNETBIOS“
     DriverName = netbios$
     ADAPTER  = netbeui$,
fflNETBEUI_nif“
     DriverName = netbeui$
     Bindings = IBMWLO_nif
     ETHERAND_TYPE = "I"
     USEADDRREV = "YES"
     OS2TRACEMASK =  x
     SESSIONS = 13
     NCBS = 225
     NAMES = 21
     SELECTORS = 15
     USEMAXDATAGRAM = "NO"
     ADAPTRATE = 1
     WINDOWERRORS =
     MAXDATARCV = 4168
     TI = 3
     T1 = 4
     T2 = 2
     MAXIN = 1
     MAXOUT = 1
     NETBIOSTIMEOUT = 5
     NETBIOSRETRIES = 8
     NAMECACHE = 1
     RNDOPTION =
     PIGGYBACKACKS = 1
     DATAGRAMPACKETS = 1
     PACKETS = 35
     LOOPPACKETS = 8
     PIPELINE = 5
     MAXTRANSMITS = 6
     MINTRANSMITS = 2
     DLCRETRIES = 1
     FCPRIORITY = 5
     NETFLAGS =  x
;------- IBM TCP/IP    Protocol Definition -----------
fflTCPIP_nif“
     DriverName = TCPIP$
     Bindings = IBMWLO_nif
```

Figure 40 (Part 1 of 2). PROTOCOL.INI File Example for an NDIS OS/2 Workstation (Connected to an OS/2 Base), with Ethernet Frame Type Using MPTS

```
;------- IBM Wireless LAN Adapter Definition -------
fflIBMWLO_nif‘
     DriverName = IBMWL$
     NetWorkId = "MOBIL 1"
     StationName = "REMOTE16"
     CountryCode = 1
     LAN_TYPE = "E"
     MOBILITY = "LOW"
     Compression = "YES"
     DataMasking = "none"
     EncodedName = "deed57a3e38247582a"
    NETADDRESS    =  "42        5 "
```

Figure 40 (Part 2 of 2). PROTOCOL.INI File Example for an NDIS OS/2 Workstation (Connected to an OS/2 Base), with Ethernet Frame Type Using MPTS

CONFIG.SYS

```
IFS=C:\OS2\HPFS.IFS /CACHE:64 /CRECL:4
PROTSHELL=C:\OS2\PMSHELL.EXE
SET USER_INI=C:\OS2\OS2.INI
SET SYSTEM_INI=C:\OS2\OS2SYS.INI
SET OS2_SHELL=C:\OS2\CMD.EXE
SET AUTOSTART=PROGRAMS,TASKLIST,FOLDERS,CONNECTIONS,LAUNCHPAD
SET RUNWORKPLACE=C:\OS2\PMSHELL.EXE
SET COMSPEC=C:\OS2\CMD.EXE
LIBPATH=C:\MPTN\DLL;C:\IBMCOM\DLL;C:\IBMLAN\NETLIB;C:\MUGLIB\DLL;.;
C:\OS2\DLL;C:\OS2\MDOS;C:\;C:\OS2\APPS\DLL;
SET PATH=C:\MPTN\BIN;C:\IBMCOM;C:\IBMLAN\NETPROG;C:\MUGLIB;C:\OS2;
C:\OS2\SYSTEM;C:\OS2\INSTALL;C:\;C:\OS2\MDOS;C:\OS2\APPS;C:\WIRELESS;
C:\WIRos2
SET DPATH=C:\IBMCOM;C:\IBMLAN\NETPROG;C:\IBMLAN;C:\MUGLIB;C:\OS2;
C:\OS2\SYSTEM;C:\OS2\INSTALL;C:\;C:\OS2\BITMAP;C:\OS2\MDOS;C:\OS2\APPS;
C:\WIRELESS;C:\WIRos2
SET PROMPT=$iffl$p‘
SET HELP=C:\OS2\HELP;C:\OS2\HELP\TUTORIAL;C:\MPTN\HELP;
SET GLOSSARY=C:\OS2\HELP\GLOSS;
SET IPF_KEYS=SBCS
PRIORITY_DISK_IO=YES
FILES=2
BASEDEV=IBMKBD.SYS
DEVICE=C:\IBMCOM\PROTOCOL\LANPDD.OS2
DEVICE=C:\IBMCOM\PROTOCOL\LANVDD.OS2
DEVICE=C:\IBMCOM\LANMSGDD.OS2 /I:C:\IBMCOM
DEVICE=C:\IBMCOM\PROTMAN.OS2 /I:C:\IBMCOM
DEVICE=C:\OS2\BOOT\TESTCFG.SYS
DEVICE=C:\OS2\BOOT\DOS.SYS
DEVICE=C:\OS2\BOOT\PMDD.SYS
BUFFERS=9
IOPL=YES
DISKCACHE=D,LW,AC:C
MAXWAIT=3
MEMMAN=SWAP,PROTECT
```

Figure 41 (Part 1 of 3). CONFIG.SYS File Example for an NDIS OS/2 Workstation (Connected to an OS/2 Base), with Ethernet Frame Type Using MPTS

```
SWAPPATH=C:\OS2\SYSTEM 2 48 4 96
BREAK=OFF
THREADS=256
PRINTMONBUFSIZE=134,134,134
COUNTRY=  1,C:\OS2\SYSTEM\COUNTRY.SYS
SET KEYS=ON
SET BOOKSHELF=C:\IBMLAN\NETPROG;C:\OS2\BOOK;C:\MPTN\DOC;
SET SOMIR=C:\OS2\ETC\SOM.IR;C:\OS2\ETC\WPSH.IR;C:\OS2\ETC\WPDSERV.IR
SET SOMDDIR=C:\OS2\ETC\DSOM
REM SET DELDIR=C:\DELETE,512;
BASEDEV=PRINT 2.SYS
BASEDEV=IBM2FLPY.ADD
BASEDEV=IBM1FLPY.ADD
BASEDEV=IBM2ADSK.ADD
BASEDEV=XDFLOPPY.FLT
BASEDEV=OS2DASD.DMD
SET EPMPATH=C:\OS2\APPS;
PROTECTONLY=NO
SHELL=C:\OS2\MDOS\COMMAND.COM C:\OS2\MDOS
FCBS=16,8
RMSIZE=64
DEVICE=C:\OS2\MDOS\VEMM.SYS
DOS=LOW,NOUMB
DEVICE=C:\OS2\MDOS\VXMS.SYS /UMB
DEVICE=C:\OS2\MDOS\VDPMI.SYS
DEVICE=C:\OS2\MDOS\VDPX.SYS
DEVICE=C:\OS2\MDOS\VMOUSE.SYS
DEVICE=C:\OS2\BOOT\POINTDD.SYS
DEVICE=C:\OS2\BOOT\MOUSE.SYS
DEVICE=C:\OS2\BOOT\COM.SYS
DEVICE=C:\OS2\MDOS\VCOM.SYS
CODEPAGE=437,85
DEVINFO=KBD,FR189,C:\OS2\KEYBOARD.DCP
DEVINFO=SCR,VGA,C:\OS2\BOOT\VIOTBL.DCP
SET VIDEO_DEVICES=VIO_VGA
SET VIO_VGA=DEVICE(BVHVGA)
DEVICE=C:\OS2\MDOS\VVGA.SYS
rem SET MMBASE=C:\MMOS2;
rem SET DSPPATH=C:\MMOS2\DSP;
SET NCDEBUG=4
rem DEVICE=C:\MMOS2\SSMDD.SYS
rem DEVICE=C:\MMOS2\R STUB.SYS
CALL=C:\IBMCOM\PROTOCOL\NETBIND.EXE
RUN=C:\IBMCOM\LANMSGEX.EXE
rem ---------- MPTS Statements -------------------------
SET ETC=C:\MPTN\ETC
DEVICE=C:\MPTN\PROTOCOL\MPTN.SYS
DEVICE=C:\MPTN\PROTOCOL\LIPC.SYS
DEVICE=C:\MPTN\PROTOCOL\INET.SYS
DEVICE=C:\MPTN\PROTOCOL\IFNDIS.SYS
RUN=C:\MPTN\BIN\CNTRL.EXE /P mptn_os$ mptn_in$
CALL=C:\OS2\CMD.EXE /Q /C C:\MPTN\BIN\MPTSTART.CMD
rem ---------- End of MPTS Statements ------------------
```

Figure 41 (Part 2 of 3). CONFIG.SYS File Example for an NDIS OS/2 Workstation (Connected to an OS/2 Base), with Ethernet Frame Type Using MPTS

```
rem ------------------------------------------------------
rem ---------- LAN SERVER STATEMENTS -------------------
rem ---------- Keep this order -------------------------
DEVICE=C:\IBMCOM\PROTOCOL\NETBEUI.OS2
DEVICE=C:\IBMLAN\NETPROG\RDRHELP.2
IFS=C:\IBMLAN\NETPROG\NETWKSTA.2   /I:C:\IBMLAN /N
DEVICE=C:\IBMCOM\PROTOCOL\NETBIOS.OS2
RUN=C:\IBMLAN\NETPROG\LSDAEMON.EXE
rem ---------- End of LAN Server Statements ------------
SET NWDBPATH=C:\IBMLAN\NETPROG
SET DLSINI=C:\IBMLAN\NETPROG\NETGUI.INI
SET INIT_FILE_NAMES=netgui
SET INIT_FILE_RANGES=2
SET WPS_COMMUNICATION=YES
SET LOCPATH=C:\IBMLAN\XPG4\LOCALE
SET LANG=ENUS437
SET TMP=C:\MPTN\TMP
SET READIBM=C:\MPTN\DOC
IFS=C:\MPTN\BIN\NFS2  .IFS
rem ---------- IBM Wireless LAN Device Driver ----------
DEVICE=C:\IBMCOM\MACS\IBMWLO.OS2
```

Figure 41 (Part 3 of 3). CONFIG.SYS File Example for an NDIS OS/2 Workstation (Connected to an OS/2 Base), with Ethernet Frame Type Using MPTS

NDIS DOS Workstation (Connected to an OS/2 Base), Using DXME0/DXMT0 and Ethernet Frame Type

PROTOCOL.INI

```
;------- Protocol Manager Definition ----------
fflPROTMAN_MOD“
        DriverName = PROTMAN$
fflDXMAIDXCFG“
        DXME _NIF = DXME .NIF
        DXMJ MOD_NIF = DXMJ MOD.NIF
        IBMWL_NIF = IBMWL.NIF
        IBMWL2_NIF = IBMWL.NIF
fflDXME _NIF“
        DriverName = DXME $
        Bindings = IBMWL_NIF
fflIBMWL_NIF“
        DriverName = IBMWL$
        NETWORKID = "MOBIL 1"
        STATIONNAME = "REMOTE19"
        COUNTRYCODE = 1
        LAN_TYPE = "E"
        MOBILITY = "HIGH"
        COMPRESSION = "YES"
        DATAMASKING = "encr"
        ENCODEDNAME = " 3357aca7fae438b9 "
```

Figure 42. PROTOCOL.INI File Example for an NDIS DOS Workstation (Connected to an OS/2 Base), Using DXME0/DXMT0 and Ethernet Frame Type

CONFIG.SYS

```
DEVICEHIGH=C:\DOS5 2\SETVER.EXE
DEVICE=E:\WINDOWS\HIMEM.SYS
DOS=HIGH,UMB
REM COUNTRY= 33,85 ,C:\DOS5 2\COUNTRY.SYS
DEVICEHIGH=C:\DOS5 2\DISPLAY.SYS CON=(EGA,,1)
SHELL=C:\COMMAND.COM /E:2    /P
BREAK=ON
DEVICE=E:\WINDOWS\SMARTDRV.EXE /DOUBLE_BUFFER
STACKS=9,256
DEVICE=C:\LSP\PROTMAN.DOS /I:C:\LSP
DEVICE=C:\LSP\IBMWL.DOS
DEVICE=C:\LSP\DXMA MOD.SYS   1
DEVICE=C:\LSP\DXME MOD.SYS N ,16
DEVICE=C:\LSP\DXMT MOD.SYS    ES=1 EST=1 O=N
FILES=75
BUFFERS=16
LASTDRIVE=Z
FCBS=32,8
```

Figure 43. PROTOCOL.INI File Example for an NDIS DOS Workstation (Connected to an OS/2 Base), Using DXME0/DXMT0 and Ethernet Frame Type

NDIS DOS Workstation (Connected to an OS/2 Base), and Using DXMJ0 and Ethernet Frame Type

PROTOCOL.INI

```
;------- Protocol Manager Definition ----------
 fflPROTMAN_MOD“
        DriverName = PROTMAN$
fflDXMAIDXCFG“
        DXME _NIF = DXME .NIF
        DXMJ MOD_NIF = DXMJ MOD.NIF
        IBMWL_NIF = IBMWL.NIF
        IBMWL2_NIF = IBMWL.NIF
fflDXMJ MOD_NIF“
        DriverName = NETBEUI$
        Bindings = IBMWL_NIF
        ETHERAND_TYPE = "I"
        NCBS = 16
        ADAPTRATE = 1
        WINDOWERRORS =
        TI = 3
        T1 = 4
        T2 = 2
        NETBIOSRETRIES = 8
        PIGGYBACKACKS = 1
        DATAGRAMPACKETS = 2
        PACKETS = 5
        PIPELINE = 2
        MAXTRANSMITS = 6
        MINTRANSMITS = 2
        DLCRETRIES = 8
        LANABASE =
fflIBMWL_NIF“
        DriverName = IBMWL$
        NETWORKID = "MOBIL 1"
        STATIONNAME = "REMOTE 2"
        COUNTRYCODE = 1
        LAN_TYPE = "e"
        MOBILITY = "HIGH"
        COMPRESSION = "YES"
        DATAMASKING = "auth"
        ENCODEDNAME = "22DA783EE6851C6C97"
        NETADDRESS = "42       42"
```

Figure 44. PROTOCOL.INI File Example for an NDIS DOS Workstation (Connected to an OS/2 Base), Using DXMJ0 and Ethernet Frame Type

CONFIG.SYS

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
DEVICE=C:\DOS\SETVER.EXE
DEVICE=C:\DOS\DISPLAY.SYS CON=(,,1)
COUNTRY= 33,,C:\DOS\COUNTRY.SYS
INSTALL=C:\DOS\NLSFUNC.EXE C:\DOS\COUNTRY.SYS
FILES=3
BUFFERS=1
DEVICE=C:\WINDOWS\SMARTDRV.EXE /DOUBLE_BUFFER
STACKS=9,256
LASTDRIVE=Z
DEVICE=C:\LSP\PROTMAN.DOS /I:C:\LSP
DEVICE=C:\LSP\IBMWL.DOS
DEVICE=C:\LSP\DXMA MOD.SYS   1
DEVICE=C:\LSP\DXMJ MOD.SYS
SHELL=C:\COMMAND.COM /E:2    /P
```

Figure 45. CONFIG.SYS File Example for an NDIS DOS Workstation (Connected to an OS/2 Base), Using DXMJ0 and Ethernet Frame Type

NDIS DOS Workstation (Connected to an OS/2 Base),Using DOS LAN Requester 4.0 and Token Ring Frame Type

PROTOCOL.INI

```
;------- Protocol Manager Definition ----------
fflnetwork.setup“
version= x31
netcard=ibmwl,1,IBMWL
transport=ibm$netbeui,IBM$NETBEUI
lana =ibmwl,1,ibm$netbeui
fflprotman“
DriverName=PROTMAN$
PRIORITY=ibm$NETBEUI
ffIBM$NETBEUI“
DriverName=netbeui$
SESSIONS=2
NCBS=2
BINDINGS=IBMWL
LANABASE=
fflIBMWL“
DriverName=IBMWL$
COUNTRYCODE=1
LAN_TYPE=T
COMPRESSION=YES
DATAMASKING=NONE
MOBILITY=HIGH
```

Figure 46. PROTOCOL.INI File Ex.for an NDIS DOS Station (Connected to an OS/2 Base), Using LAN Requester 4.0 and Token Ring Frame Type

CONFIG.SYS

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
DEVICE=C:\DOS\SETVER.EXE
FILES=6
BUFFERS=2
DEVICE=C:\WINDOWS\SMARTDRV.EXE
STACKS=9,256
device=C:\NET\protman.dos /i:C:\NET
device=C:\NET\IBMWL.DOS
device=C:\NET\dlshelp.sys
LASTDRIVE=Z
```

Figure 47. CONFIG.SYS File Ex. for an NDIS DOS Station (Connected to an OS/2 Base), Using LAN Requester 4.0 and Token Ring Frame Type

B.3 ThinkPad 750 PCMCIA CONFIG.SYS Statements Example for an NDIS DOS Workstation

```
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\WINDOWS\EMM386.EXE NOEMS X=C   -C3FF
FILES=3
BUFFERS=5
DOS=HIGH,UMB
rem ---Card and socket services device statements---------
DEVICEHIGH=C:\THINKPAD\IBMDSS 1.SYS /S =2
DEVICEHIGH=C:\THINKPAD\IBMDOSCS.SYS
DEVICEHIGH=C:\THINKPAD\DICRMU 1.SYS /MA=C   -C3FF
DEVICEHIGH=C:\THINKPAD\$ICPMDOS.SYS
rem ------------------------
COUNTRY= 33,85 ,C:\DOS\COUNTRY.SYS
DEVICEHIGH=C:\DOS\DISPLAY.SYS CON=(EGA,,1)
LASTDRIVE=Z
STACKS=9,256
DEVICE=C:\IBMVESA\VESA.EXE
DEVICE=C:\DOS\ansi.sys
SHELL=C:\COMMAND.COM /E:2    /P
DEVICE=C:\LSP\PROTMAN.DOS /I:C:\LSP
DEVICE=C:\LSP\IBMWL.DOS
DEVICE=C:\LSP\DXMA MOD.SYS   1
DEVICE=C:\LSP\DXMJ MOD.SYS
```

Figure 48. CONFIG.SYS File Example for a ThinkPad 750 PCMCIA Configured as an NDIS DOS Workstation

Appendix C. Alerts, Warnings and Messages

This appendix lists the events (alerts, warnings, and messages) generated by the IBM Wireless LAN software.

C.1 Error Management Overview

The IBM Wireless LAN software processes the events occurring in each base, such as:

Hardware errors on wireless LAN adapter cards
Significant events such as software load completion
Software errors during data transfer.

The most critical events are reported to the network management system through simple network management protocol (SNMP) traps, and can be displayed on the network management station.

Using a network management system such as NetView/6000 or NetWare Management system (NMS) is optional but strongly recommended. It allows you to manage your network from a single point.

Table 32. Where error messages are logged

Station	Error Log Files
NetWare Base	IBMWLERL.LOG
OS/2 Base	LANTRAN.LOG and IBMWLERL.LOG
ODI Workstations	Messages are displayed on the screen only at loading time.
NDIS Workstations	Display screen and log: WIRELESS.LOG for DOS and Windows workstations LANTRAN.LOG for OS/2 workstations

Important: For NDIS workstations running under DOS or Windows, you must have loaded IBMWLDDM.EXE. This enables logging of workstation messages.

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C.2 Alerts

Alerts are reported to the network management system through simple network management protocol (SNMP) traps and are displayed at the network management station.

Alert 1

Explanation: Adapter card initialization failure. The initialization of a wireless adapter card in a base has failed because of a hardware configuration error or hardware error.

Operator Response: Check your hardware configuration. To do so, refer to Chapter 4, “Installing The Adapter” on page 41. If the problem persists, run your diagnostics. See 4.5, “Running Adapter Diagnostics from the Utilities Diskette” on page 57.

Alert 2 Reserved

Explanation: Not currently used.

Alert 3 Reserved

Explanation: Not currently used.

Alert 4 Reserved

Explanation: Not currently used.

Alert 5

Explanation: Radio module initialization failure or radio module cable disconnected. A problem occurred in the radio module.

Operator Response: Check if the radio module is installed, then check the radio module cable. If the problem persists, run your diagnostics. See 4.5, “Running Adapter Diagnostics from the Utilities Diskette” on page 57.

Alert 6 Reserved

Explanation: Not currently used.

Alert 7

Explanation: At initialization, base did not contact the NAP station and is not working.

Operator Response:

1. Check all communication equipment between the base and the NAP.
2. On an OS/2 computer, check the IP connectivity between the base and the NAP by using the command ping xxxxx, where xxxxx is any valid IP address.

Alert 8

Explanation: At initialization, base did not contact the NAP station and is working in degraded mode. Refer to A.12, “Degraded Mode” on page 189.

Operator Response:

1. Check all communication equipment between the base and the NAP.
2. On an OS/2 computer, check the IP connectivity between the base and the NAP by using the command ping xxxxx, where xxxxx is any valid IP address.

Alert 9

Explanation: The base lost contact with the NAP station and is working in degraded mode. Refer to A.12, “Degraded Mode” on page 189.

Operator Response:

Check all communication equipment between the base and the NAP.

On an OS/2 computer, check the IP connectivity between the base and the NAP by using the command ping xxxxx, where xxxxx is any valid IP address.

Alert 10

Explanation: Network name has not been entered at NAP. Base is waiting for this parameter.

Operator Response: Contact your network administrator to update the NAP.

Alert 11 Reserved

Explanation: Not currently used.

Alert 12

Explanation: Base adapter request rejected. Interference has been detected, and the IBM Wireless LAN system cannot recover because there are no more frequencies available.

Operator Response: Refer to A.13, “Resolving Radio Interference” on page 190, and to Table 2 on page 17.

Alert 13

Explanation: The loading or binding of an IBM wireless LAN module failed.

Operator Response: For an OS/2 base, if TCP/IP is required for the NAP functions, make sure that it is correclty installed and bound to the backbone adapter. Otherwise, re-install the base. If problem persists, contact your IBM representative or your dealer, and save from the log files any other information for this message.

Alert 14

Explanation: Base could not contact the NAP because Base IP address is either wrong or not defined at NAP.

Operator Response:

1. Check the Base IP Address in the NAP station in 13.1, “Activating Security for Bases” on page 142, or contact your network administrator to update the NAP.
2. On an OS/2 computer, check the IP connectivity between the base and the NAP by using the command ping xxxxx, where xxxxx is any valid IP address.

Alert 15

Explanation: The NAP station lost contact with the base.

Operator Response:

1. Check all communication equipment between the base and the NAP.
2. On an OS/2 computer, check the IP connectivity between the base and the NAP by using the command ping xxxxx, where xxxxx is any valid IP address.

Alert 16

Explanation: Software error. Adapter is going to be reinitialized.

Operator Response: If the problem persists, contact your IBM service representative or your dealer, and save from the log any other information for this message.

Alert 17 Reserved

Explanation: Not currently used.

Alert 18 Reserved

Explanation: Not currently used.

Alert 19 Reserved

Explanation: Not currently used.

Alert 20

Explanation: Registration of workstation rejected by NAP because of access control. Either access rights are not defined properly by the network operator or an intruder or an unauthorized workstation is trying to access this base.

Operator Response: Contact your network administrator to check access rights at the NAP.

Alert 21

Explanation: Registration of the workstation rejected by the base because of duplicated Locally Administered Address. The workstation is using an LAA already in use by another workstation in the same cell.

Operator Response: Assign a unique LAA to the wireless workstation.

Alert 22

Explanation: Registration of workstation through the base failed because of authentication failure detected by the base or the workstation. Either this workstation does not have security properly installed, the network security code has been reset, or an intruder is trying to access your network.

Operator Response: Verify that there is no mismatch between the workstation and the base for the security installation or contact your network administrator to check the workstation security code at the NAP.

Alert 23 Reserved

Explanation: Not currently used.

Alert 24

Explanation: Communication with the workstation through the base has been lost because of protocol error.

Operator Response: If the problem persists then restart and reboot the base.

If the problem occurs frequently, contact your IBM service representative or your dealer, and save from the log any other information for this message.

C.3 Warnings on Bases

Warning 1 The adapter has not been successfully opened.

Operator Response: Shut down and restart your station. If the problem persists, contact your IBM representative or your dealer, and save from the log any other information for this message.

Warning 2 The last base with security installed has been deleted at NAP. Workstation security codes are no longer valid.

Operator Response: Restore backup files or re-install the security function on bases and workstations as described in this manual.

To restore NAP files, see A.10, “Backing Up NAP Data Files” on page 188.

Re-install the security function by following the procedure in Chapter 13, “Security” on page 141.

Warning 3 The last base with security installed has received a new adapter card. Workstation security codes are no longer valid.

Operator Response: Re-install the security function by following the procedure in Chapter 13, “Security” on page 141.

Warning 4 Alert could not be sent to the network management station.

Operator Response: If the problem occurs frequently, contact your IBM representative or your dealer, and save from the log any other information for this message.

Warning 5 Adapter is going to be reinitialized.

Operator Response: No action to perform. If the problem persists, contact your IBM representative or your dealer, and save from the log any other information for this message.

Warning 6 Microcode error; adapter is going to be reinitialized.

Operator Response: No action to perform. If the problem persists, contact your IBM representative or your dealer, and save from the log any other information for this message.

Warning 7 Device driver error; adapter is going to be reinitialized.

Operator Response: No action to perform. If the problem persists, contact your IBM representative or your dealer, and save from the log any other information for this message.

Warning 8 Radio module error; adapter is going to be reinitialized.

Operator Response: No action to perform. If the problem persists, contact your IBM representative or your dealer, and save from the log any other information for this message.

Warning 9 Adapter card error, adapter is going to be re-initialized.

Operator Response: No action to perform. If the problem persists, contact your IBM representative or your dealer, and save from the log any other information for this message.

Warning 10 Maximum number of registered workstations reached.

Explanation: Too many workstations are registered to this base. The maximum number of workstations has been reached. It is possible that too many mobile workstations have moved into the cell at the same time.

Operator Response: There may have been a planning problem. Check the design and set up of your IBM Wireless LAN. Refer to Chapter 2, “Radio Propagation” on page 15.

Warning 11 Alert description file (IBMWLALR.DAT) has not been found. No alert will be sent to the network management station.

Operator Response: In a NetWare environment, re-install your base by following the procedure in Chapter 10, “Setting Up NetWare Bases” on page 111. In an OS/2 environment, re-install your base and enable network management by following the procedure in “Configuring the IBM Wireless SNMP Proxy Agent” on page 108. If the problem persists, contact your IBM representative or your dealer, and save from the log any other information for this message.

Warning 12 Unusable data file ignored.

Explanation: The IBM Wireless LAN system is unable to start or is working in degraded mode because a system file is missing or has been corrupted. See A.12, “Degraded Mode” on page 189.

Operator Response: Re-install your station. If the problem persists, contact your IBM representative or your dealer, and save from the log any other information for this message.

Warning 13 Country file (IBMWLFYL.DAT) is missing.

Explanation: The file is missing or has been corrupted.

Operator Response: Re-install your station. If the problem persists, contact your IBM representative or your dealer, and save from the log any other information for this message.

Warning 14 Wireless LAN SNMP Agent start-up failure.

Explanation: The IBM Wireless LAN SNMP agent did not start successfully. SNMP functions are not available.

Operator Response: Make sure the TCP/IP is running. Check your SNMP configuration. To do this, refer to “Configuring the SNMP Agent for TCP/IP for OS/2” on page 105.

Warning 15 Device driver received a frame from adapter that is too big.

Explanation: The device driver can not process a frame that it has received from the adapter because it is too big.

Operator Response: Check that the maximum frame size defined in your workstation is not bigger than the maximum frame size defined in your base. Reboot and restart your workstations and bases. If the problem persists, contact your IBM representative or your dealer.

C.4 Workstation Error Messages

IWL0001 Adapter open software error.

Operator Response: Note the return code, shut down and restart your workstation. If the problem occurs frequently, contact your IBM representative or your dealer, and save from the log any other information for this message.

IWL0002 No base heard.

Explanation: The workstation could not contact the base.

Operator Response: Make sure your workstation is within the radio coverage of an active base station. Make sure your configuration contains the correct country type, see Table 2 on page 17, "Checking the RSSI on Your OS/2 or Windows Workstation" on page 95, and "Checking the RSSI on Your NDIS DOS Workstation" on page 100.

IWL0003 RSSI too low.

Explanation: The workstation could not contact the base.

Operator Response: Position your radio module as described in this manual, see Table 2 on page 17, "Checking the RSSI on Your OS/2 or Windows Workstation" on page 95, and "Checking the RSSI on Your NDIS DOS Workstation" on page 100.

IWL0004 Base heard but too much interference.

Explanation: Performance is too low to be worthwhile.

Operator Response: Refer to A.13, "Resolving Radio Interference" on page 190.

IWL0005 No base contacted has the Network Name specified in your configuration.

Operator Response: Make sure your workstation is within radio coverage of an active base with the correct Network Name. Contact the network administrator to obtain the valid Network Name and update it in your configuration.

IWL0006 Maximum number of workstations reached on base contacted.

Explanation: Too many workstations are registered to this base. The maximum number of workstations has been reached. It is possible that too many mobile workstations have moved into the cell at the same time.

Operator Response: There may have been a planning problem. Check the design and set up of your IBM Wireless LAN. Refer to Chapter 2, “Radio Propagation” on page 15.

IWL0007 Country code mismatch with the contacted base.

Operator Response: Contact the network administrator to obtain the valid Country Type and update it in your configuration.

IWL0008 Security mismatch with the contacted base.

Operator Response: Install security on your workstation only if it is installed on your network bases. If necessary, refer to this manual to install security.

IWL0009 Registration rejected by the NAP because of access control.

Operator Response: Contact your network administrator to check the workstation access rights at the NAP.

IWL0010 Security problem detected by the workstation.

Explanation:

Operator Response: In an OS/2 environment verify that the Workstation Encoded Name is correct.

In a NetWare and OS/2 environment, if necessary, re-install the security on the workstations as described in Chapter 13, “Security” on page 141.

IWL0011 Security problem detected by the base.

Operator Response: In an OS/2 environment verify that the Workstation Encoded Name is correct. Refer to step 4

In a NetWare and OS/2 environment, if necessary re-install the security on the workstations as described in 13.2, “Activating Security on Workstations” on page 145.

IWL0012 Adapter card initialization failure.

Operator Response: Check the configuration. If the problem persists, run your diagnostics to get detailed information on the error. See 4.5, “Running Adapter Diagnostics from the Utilities Diskette” on page 57.

IWL0013 Radio module initialization failure.

Operator Response: Check if the radio module is installed, and check the radio module cable. If the problem persists, run your diagnostics. See 4.5, “Running Adapter Diagnostics from the Utilities Diskette” on page 57.

IWL0014 Radio module cable disconnected.

Operator Response: Check the radio module cable. If the problem persists, run your diagnostics. See 4.5, “Running Adapter Diagnostics from the Utilities Diskette” on page 57.

IWL0015 Initialization software error.

Operator Response: This error may be caused by a possible conflict between I/O base address, interrupt level or DMA arbitration level between the wireless adapter and other devices. Fix the conflict, shut down and restart your workstation. If the problem persists, run your diagnostics. See 4.5, “Running Adapter Diagnostics from the Utilities Diskette” on page 57. Contact your IBM representative or your dealer.

IWL0016 An unrecognized parameter was found in PROTOCOL.INI.

Operator Response: Check the contents of your PROTOCOL.INI file, and correct, if needed, the value for the parameter in error.

IWL0017 Open adapter failure.

Operator Response: Shut down and restart your workstation. Make sure your configuration contains the correct country type, Table 2 on page 17. If the problem is on several workstations, restart the base to which these workstations are connected. If the problem persists, contact your network administrator.

IWL0018 Registration rejected. Base has lost contact with the NAP.

Operator Response: Check all communication equipment between the base and the NAP.

IWL0019 Registration rejected because of duplicate MAC address.

Operator Response: Assign a unique LAA to the wireless workstation.

IWL0020 LAN type mismatch: Token Ring on one side, Ethernet on the other.

Operator Response: Make sure your workstation is within radio coverage of an active base with the correct LAN type. Contact the network administrator to obtain the valid LAN type and update it in your configuration.

IWL0022 A failure occured during wireless device driver initialization.

Operator Response: This error may be caused by a possible conflict between I/O base address, interrupt level or DMA arbitration level between the wireless adapter and other devices. Fix the conflict, shut down and restart your workstation. If the problem persists, run your diagnostics. See 4.5, “Running Adapter Diagnostics from the Utilities Diskette” on page 57. Contact your IBM representative or your dealer.

IWL0026 The adapter is not responding or was not found.

Operator Response: Install the adapter, if one is supposed to be fitted to this workstation. If an adapter is present, run your diagnostics. See 4.5, “Running Adapter Diagnostics from the Utilities Diskette” on page 57.

If the following message is displayed:
Card Services Driver could not be found, install and configure the set of Card and Socket Services delivered with your computer. See 4.4, “PCMCIA Portable Computer Support” on page 51, for further information.
If the following message is displayed:
Wireless LAN Credit Card is currently not in a socket, the PCMCIA Credit Card is not present or baddly inserted. For a PCMCIA machine with multiple adapter slots, update the corresponding switch parameter, see “Multiple Adapter Slots” on page 53 for further information.

IWL0027 The protocol manager could not be opened.

Explanation: The Protman driver is not correctly loaded from the CONFIG.SYS file.

Operator Response: Check that your LAN support program (LSP, LAPS/MPTS, ...) is correctly installed. If not, re-install it.

IWL0035 Software error detected by the adapter.

Explanation: Adapter is going to be reinitialized.

Operator Response: If the problem persists, contact your IBM service representative or your dealer, and save from the log any other information for this message.

IWL0036 Software error detected by adapter. No retry scheduled.

Operator Response: If the problem persists, contact your IBM service representative or your dealer, and save from the log any other information for this message.

IWL0040 Your Wireless card does not allow to encrypt data (local regulation)

Operator Response: Set the data masking parameter to NONE in this workstation configuration.

IWL0041 Read adapter configuration failure: IRQ, IO port or DMA conflict.

Operator Response: Check your adapter configuration: Switches if ISA, Reference Diskette if DMA or PROTOCOL.INI file if PCMCIA card. To do so refer to Chapter 4, “Installing The Adapter” on page 41.

IWL0046 The adapter microcode is not up to date

Operator Response: Refer to 4.6, “Upgrading Adapter Microcode from the Utilities Diskette.” on page 58 for updating microcode to the latest level from your installation diskettes.

IWL0047 The Base station this Remote was connected to is down.

Explanation: Your wireless workstation is not mobile and its base is down.

Operator Response: Contact your network operator for the reason, and to find out how long before the base station returns to service.

IWL0191 Wireless LAN Credit Card reset failure. Check LANTRAN.LOG file

Operator Response: Check LANTRAN.LOG for more information and take recommended action.

IWL0202 Wireless LAN Credit Card Request IO failed

Explanation: This is a PCMCIA initialization problem with the IO base address.

Operator Response: See:

"Setting IO Base Address and Interrupt Request Level" on page 54,
"IO Base Address or Interrupt Level Conflicts" on page 55., and
"Detection Problem for ODI Workstations" on page 56 for an **ODI workstation**.

IWL0203 Wireless LAN Credit Card Request IRQ failed

Explanation: This is a PCMCIA initialization problem with the interrupt level IRQ.

Operator Response: See:

"Setting IO Base Address and Interrupt Request Level" on page 54,
"IO Base Address or Interrupt Level Conflicts" on page 55., and
"Detection Problem for ODI Workstations" on page 56 for an **ODI workstation**.

IWL0204 Wireless LAN Credit Card Request Configuration failed

Explanation: This is a PCMCIA initialization problem.

Operator Response: Check your Card and Socket Services installation support. If the problem persists, see “Incompatibility Problems with Card and Socket Services” on page 54, for further information.

IWL0205 Wireless LAN Credit Card Register Client failed

Explanation: This is a PCMCIA initialization problem.

Operator Response: Check your Card and Socket Services installation support. If the problem persists, see “Incompatibility Problems with Card and Socket Services” on page 54, for further information.

IWL0206 Wireless LAN Credit Card GetFirstTuple failed

Operator Response:

Check that your card is correctly inserted.
This could be a memory reservation problem on DOS or Windows workstations. See “Card and Socket Services Parameters for EMM386 users (DOS or Windows)” on page 53 and take the recommended actions.
Otherwise, verify that your computer complies with PCMCIA standard release 2.0 (minimum level).

IWL0207 Wireless LAN Credit Card GetTupleData failed

Operator Response:

Check that your card is correctly inserted.
This could be a memory reservation problem on DOS or Windows workstations. See “Card and Socket Services Parameters for EMM386 users (DOS or Windows)” on page 53 and take the recommended actions.
Otherwise, verify that your computer complies with PCMCIA standard release 2.0 (minimum level).

IWL0211 Wireless LAN Credit Card initialization fails. Check LANTRAN.LOG

Operator Response: This is a PCMCIA initialization problem. The log files will contain an error message that tells you the specific problem. See also “Initialization Success or Failure” on page 51.

IWL0212 No Resource Available (IRQ, PORT): Remove unnecessary adapters and reboot

Operator Response: Remove a adapter card if you want to use the IBM Wireless LAN on this computer. See also “Finding Existing IO Base Address or Interrupt Level Values” on page 56 and “Setting IO Base Address and Interrupt Request Level” on page 54.

Appendix D. Network Management Code Points

The code points in Table 33 have been defined for the IBM Wireless LAN.

These code points are used by NetView/6000 when building generic alerts from IBM Wireless LAN SNMP traps.

If you are using NetView/6000 to report alerts to NetView, you may need to update NetView with these code points, depending on your NetView release, as follows:

If you are using NetView V2R4 or above, no update is necessary because these code points are already included.

If you are using an older version of NetView, you must add these code points to the User Tables. Refer to your NetView documentation for information on updating the User Tables.

Table 33 (Page 1 of 3). IBM Wireless LAN Code Points

Nbr	Subvector or Subfield ID	Corresponding String
1	SV 93	Wireless ADAPTER card. X'3390'
2	SV 96	Wireless ADAPTER card. X'3313'
3	SV 92	Excessive single frequency interferences X'3255'
4	SV 92	Excessive multifrequency interferences X'3256'
5	SV 93	Cell environment interferences X'2601'
6	SV 96	Other wireless network or MICROWAVE equipment X'3605'
7	SV 96	Wireless transceiver X'3606'

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Code Points

Table 33 (Page 2 of 3). IBM Wireless LAN Code Points

Nbr	Subvector or Subfield ID	Corresponding String
8	SV 85 - detailed data ID 2	frequency X'012A'
9	SV 93	Wireless transceiver X'3630'
10	SF 85 - detailed data ID 2	Wireless transceiver number X'012B'
11	SV 92	No link to wireless network program X'3253'
12	SV 96	Wireless Network Administration program X'1003'
13	SV 93	Wireless network configuration X'8040'
14	SV 93	Wireless network program data lost X'1027'
15	SV 92	Wireless Base START-UP failure X'160B'
16	SV 92	Wireless workstation start-up failure X'160C '
17	SV 94	Unauthorized user attempted insertion into Wireless network X'7123'
18	SV 93	Wireless Duplicate MAC address X'371B'
19	SV 95	Invalid wireless workstation security code X'8054'
20	SV 95	Invalid wireless Base security code X'8055'
21	SV 93	Remote node out of range X'2202'
22	SV 92	Deregistration command received X'3254'
23	SV 93	Security procedure X'6703'

Table 33 (Page 3 of 3). IBM Wireless LAN Code Points

Nbr	Subvector or Subfield ID	Corresponding String
24	SV 96	Local wireless adapter X'3314'
25	SV 96	Remote wireless adapter X'3315'

Code Points

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Addendum to Safety Instructions

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c. All circuits are SELV (Safety Extra Low Voltage) and energy limited (less than 240 VA).

d. Adequate Fire enclosure parts are provided to house the subject user installed card.

Addendum aux Consignes de Sécurité

Attention:

CETTE CARTE, INSTALLEE PAR L'UTILISATEUR, EST DESTINEE A ETRE INSTALLEE DANS UN EQUIPEMENT CERTIFIE* OU APPROUVE* ET DANS LA ZONE D'ACCES DE L'UTILISATEUR** DEFINIE PAR LE FABRICANT. VERIFIEZ LES INSTRUCTIONS D'OPERATION ET DE MAINTENANCE DE L'EQUIPEMENT OU DU FABRICANT POUR VOUS ASSURER QUE CET EQUIPEMENT EST CONFORME (INCLUANT LA PUISSANCE ELECTRIQUE DISPONIBLE DE L'EQUIPEMENT) ET AUTORISE L'INSTALLATION DE CARTE D'APPLICATION PAR L'UTILISATEUR.

* Certifié ou approuvé signifie que l'équipement est certifié ou approuvé par les autorités compétentes du pays d'utilisation.

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a. L'installation ne nécessite pas d'outil spécial.

b. Pendant l'installation, il ne doit y avoir ni risque de choc électrique, ni risque de feu, ni risque mécanique ou chimique, ni risque de brûlure.

c. Tous les circuits sont des circuits a très basse tension de sécurité (TBTS) et à courant limité (moins de 240 VA).

d. Une protection anti-feu est fournie par le logement où la carte est intallée par l'utilisateur.

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Glossary

This glossary defines all new terms used in this manual. It also includes terms and definitions from the *IBM Dictionary of Computing,* GC20-1699.

access control. In computer security ensuring that the resources of a computer system can be accessed only by authorized users in authorized ways.

adapter. In a LAN, within a communicating device, a circuit card that, with its associated software and/or microcode, enables the device to communicate over the network.

address. A character, group of characters, or a value that identifies a register, a particular part of storage, a data source, or a data sink.

agent. In the client-server model, the agent is the part of the system that performs information preparation and exchange on behalf of a client or server application.

alert. In the NetView program, a high priority event that warrants immediate attention. A database record is generated for certain types that are defined by user-constructed filters.

ASCII. (American National Standard Code for Information Interchange) The standard code, using a coded character set consisting of 7-bit coded characters (8-bits including parity check), that is used for information interchange among data processing systems, data communication systems and associated equipment. The ASCII set consists of control characters and graphic characters.

authentication. (1) In computer security, verification of the identity of a user or the users eligibility to access an object. (2) A process used to verify the integrity of transmitted data, especially a message.

base. The device that concentrates and regulates the communication on the air surface within a wireless cell. It can be connected to a Token Ring or Ethernet backbone.

BIOS. (Basic Input/Output System). In an IBM personal computer, microcode that controls basic hardware operations such as interactions with diskette drives, hard disk drives and the keyboard.

board. See adapter.

bridge. A functional unit that connects two local area networks (LANs) that use the same logical link control (LLC) procedure but may use different medium access control (MAC) procedures.

bus. (1) A facility for transferring data between several devices, located between two end points,

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only one device being able to transmit at a given moment. (2) One or more conductors used for transmitting signals or power.

cell. Geographical zone covered by a base. For the IBM Wireless LAN, a cell can be considered as a circle with the base in its center.

client. (1) A user. (2) A functional unit that receives shared services from a server.

compression. The process of eliminating gaps, empty fields, redundancies, and unnecessary data to shorten the length of records or blocks.

data. (1) A representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by human or automated means. (2) Any representations such as characters or analog quantities to which meaning is or might be assigned.

data masking. See encryption

default. Pertaining to an attribute, value or option that is assumed when none is explicitly specified.

diagnostics. Modules or tests used by computer users and service personnel to diagnose hardware problems.

DIP switch. In an IBM personal computer, a two-position switch on a circuit board that is preset to control certain functions, the user can change the position of a DIP switch to satisfy special requirements.

DOS. Disk Operating System

encryption. In computer security, the process of transforming data into an unintelligible form in such a way that the original data can not be obtained or can be obtained only by using a decryption process.

Ethernet. A 10-megabit baseband local area network that allows multiple stations to access the transmission medium at will without prior co-ordination, avoids contention by using carrier sense and deference and resolves contention by using collision detection and transmission. Ethernet uses carrier sense multiple access with collision detection (CSMA/CD).

FCC. Federal Communications Commission.

frequency. The rate of signal oscillation, expressed in hertz (cycles per second).

GHz. Gigahertz. See hertz.

hertz (Hz). A unit of frequency equal to one cycle per second.

IBM Token-Ring Network. A high speed, star-wired local area network to which a variety of IBM products can be connected.

IEEE.. Institute of Electrical and Electronics Engineers.

Internet. A wide area network connecting thousands of disparate networks in industry, education, government and research. The Internet network uses TCP/IP as the standard for transmitting information.

IP. Internet protocol (ISO)

IPX. Internet packet exchange

ISA. Industry standard architecture

LAN. Local area network

LAN segment. (1) Any portion of a LAN (for example a single ring or bus) that can operate independently but is connected to other parts of the establishment network via bridges. (2) An entire ring or bus network without bridges.

LAPS. Lan adapter and protocol support.

LSP. LAN Support Program.

locally administered address (LAA). An adapter address that the user can assign to override the universally administered addresses. Contrast with *universally administered address*.

MAC. Medium access control.

MCA. Micro-channel architecture (PS/2)

MIB. Management information base (OSI management)

Microwave. Any electromagnetic wave in the radio frequency spectrum above 890 megahertz.

MPTS. MultiProtocol Transport Services

NAP. See Network Administration Program.

NDIS. Network Driver Interface Specifications

Network Administration Program. Facility providing user interface to perform wireless network administration.

NLM. NetWare loadable modules (Novell, Inc.)

NTS/2. Network Transport Services/2

ODI. open data-link interface, the device driver interface specification from Novell

OS/2. IBM Operating System/2

PCMCIA. Personal Computer Memory Card International Association

RFC. Request for comment

protocol. A set of semantic and syntactic rules that determines the behaviour of functional units in achieving communication.

protocol stack. The software module that takes data from an application and transforms or encapsulates it for transmission over a network.

router. The computer that determines the path of network traffic flow.

routing. (1) The process of determining the path to be used for transmission of a message over a network. (2) The assignment of the path by which a message will reach its destination.

RPL. Remote program load

RSSI. Received signal strength indicator. The IBM Wireless LAN function through which the wireless workstation user monitors the level of the radio signal received from the base.

security. (1)Concepts, techniques, technical measures and administrative measures used to protect the hardware, software and data of an information processing system from deliberate or inadvertent unauthorized acquisition, damage, destruction, disclosure, manipulation, modification, or use, or loss. (2)Protection resulting from the application of computer security.

server. On a local area network, a data station that provides facilities to other data stations, for example, a file server, a print server, a mail server.

service point. An entry point that supports applications that provide network management for resources not under the direct control of itself as an entry point. Each resource is either under the direct control of another entry point or not under the direct control of any entry point. A service point accessing these resources is not required to use SNA sessions (unlike a focal point). A service point is needed when entry point support is not yet available for some network management function.

signal. (1) A time-dependent value attached to a physical phenomenon for conveying data. (2) A variation of a physical quantity, used to convey data.

SNAP. sub-network access protocol (OSI)

SNMP. simple network management protocol.

spectrum. A continuous range of frequencies, usually wide in extent; for example, the audible spectrum.

stand-alone cell configuration. A wireless cell that is not connected to another LAN.

supervisor. The part of a control program that coordinates the use of resources and maintains the flow of processing unit operations.

TCP/IP. transmission control protocol / internet protocol.

trap. An unsolicited message that is sent by an SNMP agent to an SNMP network management station.

universally administered address. The address permanently encoded in an adapter at the time of

manufacture. Each universally administered address is unique. Contrast with *locally administered address*.

wired LAN cells configuration. The IBM Wireless LAN configuration in which several wireless cells are connected through their bases to a wired LAN.

Wireless network. A wireless network made of several cells administered by a NAP.

wireless network administrator. The device that manages the wireless network.

wireless workstation. The device that offers wireless LAN attachment to the end user on the air surface.

workstation. A terminal or microcomputer, usually one that is connected to a mainframe or to a network, at which a user can perform applications.

workstation security code. The eighteen hexadecimal digit code that is computed by the base when installing the security feature.

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Installing and Operating Your Network

Part Number 25H0863

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