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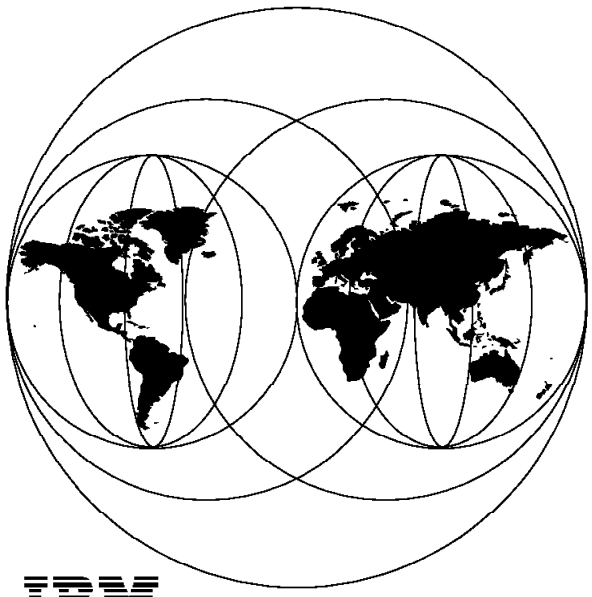
AS/400 Wireless LAN Products Family: Configuration Examples, Tips and Techniques

March 1996



IBM

International Technical Support Organization
Rochester Center

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Take Note!

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

Second Edition (March 1996)

This edition applies to the IBM Operating System/400 Version 3 Release 1, 5763-SS1. Wherever the information is relevant to V3R2 of OS/400, a label box calls it to your attention.

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Abstract

This document covers the AS/400 wireless LAN Products Family. It provides a general description of the configuration of the products with many configuration examples for each device. It also provides the information about network management and tips and techniques related to the products.

This document was written for customers, business partners, and IBM system specialists. Some knowledge of general AS/400 configurations and installation of LAN Support Program and LAN Adapter and Protocol Support is assumed. Where it is relevant, a knowledge of TCP/IP configuration for the AS/400 system, DOS, and OS/2 is assumed.

(167 pages)

Contents

Figures

Tables

Special Notices

This publication is intended to help the system administrator and the users of the AS/400 Wireless LAN Products Family to configure and manage their devices and network. The information in this publication is not intended as the specification of any programming interfaces that are provided by the AS/400 Wireless LAN Products Family. See the PUBLICATIONS section of the IBM Hardware Announcement for the AS/400 Wireless LAN Products Family for more information about what publications are considered to be product documentation.

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Preface

This document is unique in its detailed coverage of AS/400 Wireless LAN Product Family. It provides the general description of the configuration of the products with many configuration examples for each device. It also provides the information of the network management and tips and techniques related to the products.

This version is the update of the original redbook. The update includes new devices and their configurations, and some additional tips. It is also restructured to reduce the redundancy of configuration examples as much as possible.

This document was written for customers, business partners, and IBM system specialists. Some knowledge of the general AS/400 configurations and installation of LSP and LAPS is assumed. Where it is relevant, a knowledge of TCP/IP configuration for the AS/400 system, DOS, and OS/2 is assumed.

How This Document is Organized

The document is organized as follows:

- Chapter 1, “Introduction”

  This chapter provides the general description of the AS/400 Wireless LAN Product Family. It also covers the concepts and terminology of the product, performance considerations, and the importance of the site survey. If you are already familiar with these topics, you may skip this chapter.

- Chapter 2, “Configuration”

  This chapter first describes the general topics of the AS/400 Wireless LAN configuration. Then the chapter provides various working configuration examples of the AS/400 Wireless LAN.

- Chapter 3, “Tips and Techniques”

  This chapter of the tips and techniques of the AS/400 Wireless LAN includes such topics as network management issues, portable transaction computer related issues, and problem determination issues of the AS/400 Wireless LAN.

Related Publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this document.

- *AS/400 Local Area Network Support 3.1.0*, SC41-3404
- *AS/400 Wireless Installation and Planning Guide*, G571-0303
- *2482 AS/400 Wireless Portable Transaction Computer User's Manual*, G571-0319
- *2483 AS/400 Wireless Integrated Laser Portable Transaction Computer User's Manual*, G571-0320
- *2484 AS/400 Wireless Industrial Portable Transaction Computer User's Manual*, G571-0321

- *AS/400 5250 Emulation User's Guide for Portable Transaction Computer's*, G571-0322
- *AS/400 Wireless Ethernet Local Area Network Access Point User's Manual*, G571-0323
- *AS/400 Wireless RS-485 Local Area Network Access Point User's Manual*, G571-0324
- *AS/400 Wireless Local Area Network Industry Standard Architecture Adapter User's Manual*, G571-0325
- *AS/400 Wireless Local Area Network Micro Channel Architecture Adapter User's Manual*, G571-0326
- *AS/400 Wireless Site Survey Guide*, G571-0339
- *AS/400 Wireless Portable Devices Hardware Maintenance Library*, G571-0334
- *AS/400 Wireless Ethernet LAN Bridge Access Point*, G571-0426
- *AS/400 Wireless PCMCIA Adapter User's Manual*, G571-0427

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```

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To obtain more details about this service, employees may type the following:

```
TOOLS SENDTO USDIST MKTTOOLS MKTTOOLS GET LISTSERV PACKAGE
```

Note: INEWS users can select RelInfo from the action bar to execute this command automatically.

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```
http://www.redbooks.ibm.com/redbooks
```

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```
http://w3.itso.ibm.com/redbooks/redbooks.html
```

Acknowledgments

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Standard Conventions

Several conventions appear in this redbook to make it easier for you to use.

- **Boldface**

  Choices made from the actual screen or to emphasize the character strings or values on the actual screen.

- *Italics*

  For emphasizing single words.

- `Monospace`

  What a user would type on the terminal.

- UPPERCASE

  Commands, parameters, device names, file names.

This redbook also adopts the following general conventions.

MB	Mega bytes
Mb	Mega bits
Mbps	Mega bits per second
Kbps	Kilo bits per second
MHz	Mega Hertz
GHz	Giga Hertz

Chapter 1. Introduction

Today 40 to 50% of the workers are mobile, and mobile computing is the fastest growing segment of the computer industry. If you have read recent articles in computer and networking magazines, you noticed the increasing interests in mobile computing. Just to quote some of them:

″Wireless LANs: No Strings Attached, we like to be mobile even when we′re at the office.″ PC Magazine, 1/95.

″The wireless personal communications market is set to explode worldwide...″ EDP Weekly, 3/93.

″Radio/Wireless technology will have as much, if not more impact in 1990′s as micro-processors did in the 1980′s...″ BIS Strategic Decisions.

As stressed by these magazines, mobile computing and information is an important segment of today′s business. New applications and new hardware are emerging to solve your new problems.

The AS/400 Advanced Systems already addressed part of the mobile computing problem with the announcement of RadioPac/400 and PagerPac/400, the wireless WAN solutions. To address the wireless LAN environment, IBM announced on May 3, 1994, the AS/400 wireless LAN family of products.

1.1 AS/400 Wireless LAN Products Family

This section provides the products description. For further technical information, refer to *Askinfo* on *HONE*. For further product information located on the World Wide Web, the address is http://as400.rochester.ibm.com.

1.1.1 Products Overview

The current products include:

- AS/400 Wireless LAN Adapter
- AS/400 Wireless LAN Access Points
  - AS/400 Ethernet Access Points
  - AS/400 Ethernet Bridge Access Points
  - AS/400 Token-Ring Access Points
- AS/400 - PC Wireless Adapters
  - AS/400 - PC Wireless LAN Micro Channel Adapter
  - AS/400 - PC Wireless LAN ISA Adapter
  - AS/400 - ThinkPad PCMCIA type II Adapter
- Portable Transaction Computers for AS/400 Wireless LAN

These products allow the AS/400 system to communicate wireless to other AS/400 systems, PCs, or hand-held devices, also called portable transaction computers (PTCs).

The base technology under these products includes:

- Radio Frequency
- Spread Spectrum
- Direct Sequence
- 2.4GHz

1.1.2 AS/400 Wireless LAN Characteristics

The AS/400 wireless LAN RF characteristics are country dependent. In most countries, the characteristics are:

- Up to five center frequency user selectable.
- 2.4 to 2.4835GHz frequency span.
- Raw bit rate of 1 or 2 Mbps.
- Transmit power of 100 milliwatts.

Microcell size depends on many factors, but you can use the following figures as general guidelines:

Environment		Range 2.4 GHz
Access Point Antenna elevated 6 feet / 1.8 m	Cluttered Office	Up to 150 feet / 30 to 45 m
	Open Office	Up to 300 feet / 45 to 91 m
Warehouse		Up to 500 feet / 150 m
Outdoors line-of-sight		Up to 3 miles / 5 km [1]
Outdoors line-of-sight		Up to .25 miles / 400 m [2]

Note:

- [1]Distances of up to three miles may be achieved with a Yagi antenna.
- [2]In Europe, the Yagi antenna is not allowed under ETSI regulations.

1.1.3 Products Description

The Wireless LAN family of products includes the following devices:

- AS/400 Wireless LAN Adapter (AS/400 Feature #2668)
- 2480-RS0 Access Point
- 2480-E00 Access Point
- 2480-EB0 Access Point
- 2480-TR0 Access Point
- LAN ISA Adapter
- LAN Micro Channel Adapter
- LAN PCMCIA Adapter
- AS/400 Data Collection Devices

Together, these products provide a comprehensive and extremely flexible wireless networking solution providing wireless connectivity for full function PCs and portables, and for lightweight compact data collection devices (portable transaction computer).

1.1.3.1 AS/400 Wireless LAN Adapter (AS/400 Feature #2668)

The AS/400 Wireless LAN Adapter provides wireless connectivity from AS/400 systems to workstations, portable transaction computers, or other AS/400 systems connected to a wireless LAN network. The area of coverage may be extended beyond the coverage provided by the antenna attached to the adapter by adding AS/400 wireless LAN access points to the network through an unshielded twisted-pair wired, RS-485, or backbone.

1.1.3.2 2480-RS0 Access Point

2480-RS0 access points may be used with the AS/400 Wireless LAN Adapter where a multiple cell wireless network is required. Each 2480-RS0 creates a cell of wireless network coverage and acts as a network repeater to extend the area of coverage beyond the initial cell created by the AS/400 wireless LAN adapter.

Networks are designed to create overlapping cells to ensure consistent coverage of the area desired. The access points may connect to the AS/400 wireless LAN adapter through an RS-485 twisted pair wired backbone or using the RF network. The twisted pair wired backbone may extend up to 8000 feet in four 2000 feet segments with a data rate of 230 Kbps. The raw bit rate between RF connected access points is 2 Mbps. 2480-RS0 is supported on any AS/400 system with an AS/400 wireless LAN adapter (AS/400 feature #2668) installed.

1.1.3.3 2480-E00 Access Point

2480-E00 attaches to an Ethernet 10Base2, 10Base5, or 10BaseT wired LAN and creates an AS/400 wireless LAN network. Multiple units can be used to create a multi-cell network. The first access point attaches to the AS/400 system through Ethernet cabling or through an RF connection created by the AS/400 Wireless LAN Adapter. Additional access points may be attached either to the Ethernet cabling or attached without wires, acting as wireless repeaters. The 2480 Model E00 is supported on any AS/400 system provided with an Ethernet adapter or AS/400 model D or later when connected to an AS/400 Wireless LAN Adapter.

1.1.3.4 2480-EB0 Access Point

2480-EB0 attaches to an Ethernet 10Base2, 10Base5, or 10BaseT wired LAN and creates an AS/400 wireless LAN network. Multiple units can be used to create a multi-segment network. The first access point attaches to the AS/400 system through Ethernet cabling or through an RF connection created by the AS/400 Wireless LAN Adapter. A set of two or more Ethernet Bridge Access Points can function as a multi-port Ethernet Bridge. A bridge allows two or more Ethernet LANs to be wirelessly connected together. The 2480 Model EB0 is supported on any AS/400 system provided with an Ethernet adapter or model D or later when connected to an AS/400 Wireless LAN Adapter.

1.1.3.5 2480-TR0 Access Point

2480-TR0 attaches to a Token-Ring segment directly to STP (Shielded Twisted Pair) or UTP (Unshielded Twisted Pair) Token-Ring segment and creates an AS/400 wireless LAN segment. The segment must conform to IEEE 802.5 specifications. The first access point attaches to the AS/400 system through Token-Ring cabling or through an RF connection created by the AS/400 Wireless LAN Adapter. The 2480 Model TR0 is supported on any AS/400 system provided with a Token-Ring adapter or AS/400 model D or later when connected to an AS/400 Wireless LAN Adapter.

1.1.3.6 LAN ISA Adapter

This is a wireless network interface card for ISA bus computers. This adapter operates with the AS/400 wireless LAN adapter and the 2480-RS0 and 2480-E00 wireless LAN access points to provide wireless client access to the AS/400 system.

The following drivers are supplied:

- ODI Driver
- NDIS Driver for DOS and OS/2
- Packet Driver

This card requires a PS/2 with a 386SX or higher processor.

1.1.3.7 LAN Micro Channel Adapter

This is a wireless network interface card for MCA bus computers. This adapter operates with the AS/400 wireless LAN adapter and the 2480-RS0 and 2480-E00 wireless LAN access points to provide wireless client access to the AS/400 system. The MCA Adapter card can be installed in any computer using Micro Channel Architecture in its expansion bus.

The following drivers are supplied:

- ODI Driver
- NDIS Driver for DOS and OS/2
- Packet Driver

This card requires a PS/2 with a 386SX or higher processor.

1.1.3.8 LAN PCMCIA Type II Adapter

This is a wireless network interface card for PCMCIA bus computers. This adapter operates with the AS/400 wireless LAN adapter and the 2480-RS0/E00/EB0/TR0 wireless LAN access points to provide wireless client access to the AS/400 system. The PCMCIA adapter inserts into any notebook PC such as IBM ThinkPad that supports a type II PCMCIA slot.

The following drivers are supplied:

- ODI Driver
- NDIS Driver for DOS
- NDIS Driver for OS/2 - SOD (Statement Of Direction)

  Note: This driver is pending to a full system test.
- Packet Driver

System requirements:

- DOS 6.0 or higher
- 82365 host controller chip or PCMCIA card socket services compliant with revision 2.10 of the PCMCIA specification
- One free 8K expansion memory address block
- 386SX or higher processor

1.1.4 AS/400 Data Collection Devices

Portable Transaction Computers (PTCs) are data collection devices used to collect, store, and transmit data to a host computer. These hand-held computers may have optional features such as bar-code laser scanners or wands for more efficient use. IBM portable transaction computers have 5250 Display Emulation built-in. This allows a transparent access to the existing applications on the AS/400 system without changing one line of code.

IBM 2482 and 2483 portable transaction computers feature Nickel-Cadmium batteries. There are three types of IBM portable transaction computers:

- IBM 2482 Portable Transaction Computer

  This is a battery-powered, hand-held computer that collects, stores, and transmits data using IBM 5250 Display Emulation. You can connect a bar-code laser scanner or a wand to this device.
- IBM 2483 Portable Transaction Computer

  The IBM 2483 Integrated Laser Portable Transaction Computer is a battery-powered, hand-held computer with integrated bar code laser scanner and is pre-configured with 5250 Display Emulation. Three models are available:

  – Model 5S0 uses the standard range laser. The range goes up to 40 inches / 1 meter.

  – Model 5L0 uses the long range laser. The range goes from 6 to 76 inches / 0.15 to 1.93 meter.

  – Model 5X0 uses the extra range laser. The range goes up to 35 feet / 10.7 m.

A reminder: The barcode label reading capability really depends on the label type. Affecting factors include:

  - Paper label (Retro-reflective label / Paper label)
  - Barcode label density (MILS)
  - Barcode standard

- IBM 2484 Portable Transaction Computer

  IBM 2484 Industrial Portable Transaction Computer is a battery or AC-powered computer designed for harsh environment. It features a waterproof case with a heavy-duty industrial bracket for vehicle or workstation mounting. There are two models available:

  - Model 520

    This model is for use on vehicles with 10-16 V DC batteries.

  - Model 540

    This model is for use on vehicles with 24-72 V DC batteries. An optional AC power pack is available for this model.

There are hand held laser scanners that you can attach to 2984 Portable Transaction Computers. The following models are available and they work with any model of 2984 Portable Transaction Computers.

- 5310 HP
- 5300 50
- 5370 IP

The following shows the reading capability for each model of these laser scanners.

5310 HP (Standard laser scanner)

* Maximum pitch: +- 55 degrees
* Maximum skew : +- 65 degrees
* Lase class II

Bar code width	Depth of field
5.0 MIL	0,5″ - 3,0″ (1.3 - 7.6 Cm)
6.0 MIL	0,5″ - 4,0″ (1.3 - 10.1 Cm)
7.5 MIL	0,0″ - 7,0″ (0 - 17.7 Cm)
10.0 MIL	0,0″ - 12,0″ (0 - 30 Cm)
15.0 MIL	0,0″ - 16,0″ (0 - 40 Cm)
20.0 MIL	0,0″ - 20,0″ (0 - 50 Cm)
40.0 MIL	* - 30,0″ (* - 76 Cm)
55.0 MIL	* - 40,0″ (* - 101 Cm)

Note = (*) Near point depends on label width

5300 50 (Long range laser scanner)

* Maximum pitch: +- 55 degrees
* Maximum skew : +- 65 degrees
* Lase class IIIa

Bar code width	Depth of field using paper labels

```
   7.5 MIL        6,0″ - 10,0″ ( 15   -  25   Cm )
  10.0 MIL        5,0″ - 20,0″ ( 12.7 -  50   Cm )
  15.0 MIL        4,0″ - 32,0″ ( 10.1 -  81   Cm )
  20.0 MIL        6,0″ - 48,0″ ( 15   - 121   Cm )
  40.0 MIL        8,0″ - 84,0″ ( 20   - 213   Cm )
  55.0 MIL       15.0″ - 96,0″ ( 38   - 243   Cm )

Bar code width   Depth of field using retro-reflective labels
  40.0 MIL       24,0″ -  8,3″ ( 60   - 250   Cm )
  55.0 MIL       30,0″ - 10,0′ ( 76   - 300   Cm )
  70.0 MIL       40,0″ - 13,6′ (101   - 400   Cm )
 100.0 MIL       40,0″ - 22,0′ (101   - 670   Cm )

5370 IP (Extra Long range laser scanner)

* Maximum pitch: +- 55 degrees
* Maximum skew : +- 65 degrees
* Lase class IIIa

Bar code width   Depth of field using paper labels
  15.0 MIL        3,0′ -  5,0′ ( 90   - 150   Cm )
  40.0 MIL        3,0′ - 12,0′ ( 90   - 360   Cm )
 100.0 MIL        4,0′ - 17,0′ (120   - 520   Cm )

Bar code width   Depth of field using retro-reflective labels
  30.0 MIL        8,0′ - 12,0′ (240   - 360   Cm )
  70.0 MIL       10,0′ - 25,0′ (300   - 760   Cm )
 100.0 MIL       10.0′ - 35,0′ (300   -1070   Cm )
```

The actual reading capability, again, will depend. For this, refer to the consideration we mentioned previously with 2983 Portable Transaction Computers.

1.2 Wireless Concepts

1.2, “Wireless Concepts” explains new concepts specific to wireless LANs, or the AS/400 wireless LAN products family that you should understand before we start showing you how to configure the AS/400 wireless LAN products family.

1.2.1 Microcell

A microcell is a 3D space within which a device can transmit and receive data. Generally, the microcell is centered on an access point or the AS/400 Wireless LAN Adapter. In a wireless design, the most important part is the microcell area coverage.

1.2.2 Bus

The bus is a linear topology in which all workstations are connected to a single cable. A bus is also referred to as a *backbone* or *wired backbone*.

1.2.3 Repeater

A repeater is a device that relays data to and from other network devices (access points can be configured as repeaters or root nodes). When a repeater is powered on, it inserts itself in the Wireless LAN. It accomplishes this by registering itself to another repeater or root node.

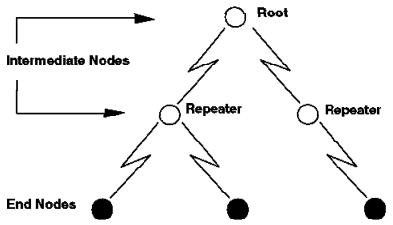


Figure 1. RF Network

1.2.4 Root Node

A root node or root is the topmost device in a hierarchical network. Access points can be configured as either root nodes or repeaters. In a bus or wired backbone environment, all access points interconnected by the bus are root nodes.

Note: In some documentation, the term *router* is used interchangeably with the term root node.

1.2.5 End Node

All devices that connect to a wireless LAN and do not have any access point capabilities are end nodes. Portable transaction computer, PC card, and the AS/400 wireless card can be end nodes. In addition to being an end node, the AS/400 Wireless LAN Adapter is also either a root node or a repeater.

1.2.6 Intermediate Node

As the name suggests, intermediate nodes transfer data between end nodes. They receive, verify, store data, determine routes to forward the data, and maintain links to end nodes and other intermediate nodes. Intermediate nodes are access points configured as repeaters.

1.2.7 Registration

When a device wants to communicate using the wireless network, it must register to the network. The device broadcasts a find router packet. All potential parents, root nodes, and repeaters sends the device a router ID packet. Mainly based on the strongest signal and lowest hop counts, the device chooses a parent. The parent, root node, or repeater stores the device ID, device type, and link mode in their routing tables. This intermediate node also notifies its parent, if it has one, of the new device.

1.2.8 Roaming

Roaming is the capability of moving from one microcell to another without breaking connection with a host or server and the AS/400 wireless LAN products family has one of the most robust roaming capabilities in the industry. As the device moves within the network, it counts the RF retries. When this value is bigger than the RF retry limit, the device issues a find router packet, starting a new registration process. If data transmission stops for an extended period, the link is maintained by a registration refresh packet. If an intermediate node, root node, or repeater does not receive packets from a particular device during a two minute period, it de-registers that device and notifies its parent.

1.2.9 Gateway

A gateway is a device that provides an interface between a network and other networks that use a different protocol. AS/400 wireless IOP/IOA accomplishes the function of a standard LAN adapter but also supports a portable transaction computer as 5250 local devices through a gateway function.

1.2.10 Server Card

There are combined function cards, such as the one in the AS/400 system that combine the end node functions and access point functions. These cards are sometimes called server cards.

The AS/400 wireless LAN IOP/IOA is more than a server card because it also supports the 5250 gateway function. In fact, the AS/400 wireless LAN IOP/IOA contains an end node, a root, or repeater and the 5250 gateway.

1.3 Performance Considerations

In a wireless LAN, the performance issues are related to network design, bitrate, and environment RF noise.

1.3.1 Link Speed

The wireless network designed with repeaters has elements of a store and forward network, which means that each packet may be stored in the intermediate node before it is sent to the next hop. The overall data transfer rate between two end nodes is the rate for a single RF hop divided by the number of hops. In addition, each hop adds a delay to the data transfer. To optimize performance, you should restrict the depth of the tree structure to two wireless hops.

AS/400 wireless LAN may be configured for 1 or 2 Mbps RF link speed. The difference between 1 and 2 Mbps is the way the carrier is modulated. Two Phase Shift Keyed (2-PSK) is used for 1 Mbps while 4-PSK is used for 2 Mbps. Higher levels of modulation require a higher value of carrier-to-noise ratio to achieve a given bit error rate (BER). Using a higher bit rate may mean having a smaller effective microcell size. If your environment is RF noisy, you should check if 1 Mbps gives you the best performance with the best microcell size.

1 and 2 Mbps are RF link speeds. Your real wireless LAN throughput is a function of protocol overhead, packet retries, packet size, hop count, and number of active devices. You should take all of these facts into consideration when designing a wireless LAN.

1.3.2 AS/400 Connectivity through RF

When directly attaching three or more AS/400 systems through RF, an access point is recommended. The access point should be configured as a Root and the AS/400 wireless cards should be configured as a Repeater.

1.4 Site Survey

Unlike the other LANs (such as wired LANs), the design of a wireless LAN is only completed after a field trial. This field trial, called a site survey, is used to validate initial LAN design and to test for unexpected problems that are otherwise found during implementation.

A site survey is carried out by trained professionals who survey the customer site with RF equipment to determine the optimal position for the access points and antennas. Site surveys should be performed in live conditions. An empty warehouse, for example, shows microcell sizes that are impossible to achieve during normal operation.

Environment and microcell shape and size are not independent. Changing the environment may have an impact in the wireless LAN behavior. You should be aware that a change in the site layout, stocked products, and so on may require a re-tuning of the wireless LAN.

Site surveys are offered as a fee service by IBM service personnel in many countries.

Chapter 2. Configuration

This chapter provides working configurations for various scenarios. These scenarios cover almost every possible configuration and are very useful for the initial setups. Before we present the real-life configuration examples, the first section contains the general description of the AS/400 wireless LAN.

Assumptions

We make these assumptions about what you know:

- General AS/400 configurations including LAN configuration
- Installation of LSP for DOS and LAPS for OS/2
- TCP/IP configuration for the AS/400 system, DOS, and OS/2
- CA/400 V3R1 DOS configuration
- CA/400 V3R1 for Windows configuration
- IPX for Novell
- Windows for Workgroup
- NetBIOS for OS/2 LAN Requester

2.1 General Description of the Configuration

The AS/400 wireless LAN is a LAN. Therefore, the basics of the AS/400 wireless LAN configurations are the same as other AS/400 LAN configurations. But there are some differences due to its distinctive characteristics such as *wireless* and its special devices such as *Portable Transaction Computers* and *Access Points*. Just to remind you, a couple of differences are:

- The AS/400 wireless LAN adapter is configured as *both* a LAN and an LWS controller.
- The line must be varied on before configuring an LWS controller.

The AS/400 wireless LAN adapter can appear to the system as two separate controllers. It can appear as a LAN controller and as a workstation controller. The virtual workstation controller is identified as a type *266A*. It is *not* capable of supporting a system console, however.

Provided that you are already familiar with the AS/400 configurations for LAN, you only have to understand the additional configuration objects and characteristics for the AS/400 wireless LAN. They are:

- Extended wireless members
- AS/400 wireless LAN resource and addressing parameters

2.1.1 Extended Wireless Members

There are many characteristics unique to RF (radio frequency) technology that the AS/400 wireless LAN adopts. As a consequence, the AS/400 has special configurations parameters that only apply to the AS/400 wireless LAN. Extended wireless members are the containers that hold these AS/400 wireless LAN specific configuration parameters and their values.

The Extended Wireless Members include:

- Extended Wireless Line Member

  This member describes the radio characteristics of the AS/400 wireless LAN line. The parameters include:

  – Frequency

    This parameters defines the center spread spectrum radio frequency used in the link. The number of choices for frequencies depend on the country. For example, AS/400 wireless LAN allows you to choose between five frequencies in the U.S. and Canada.

  – Data rate

    The AS/400 Wireless LAN can be configured to use two link bit rates: 1 Mbps or 2 Mbps.

  – Radio system identifier

    To assure the uniqueness of the radio communication, each radio packet carries a system identifier. If there are two independent systems using the same frequency and the same bit rate, they must be configured to use different system identifiers.

  – Hop identifier

    AS/400 Wireless IOP/IOA implements two functions: wireless end node and wireless access point. HOPID is the address of the access point function.

  – Wireless configuration

    Wireless configuration is very flexible. AS/400 Wireless can be configured in three ways: as a wireless repeater, wireless root, and wired root.

- Extended Wireless Controller Member

  The controller member describes how your portable transaction computers are connected to an LWS controller in the AS/400 wireless LAN adapter. The parameters include:

  – Transport address

    This is the address of the gateway function of the wireless IOP/IOA. The gateway function uses this address to validate portable transaction computer connections to that IOP/IOA.

  – Transport port

    This is the port on the gateway function of the IOP/IOA. AS/400 wireless LAN V3R1 implementation only allows 0 (zero) as a parameter. Zero stands for 5250 emulation.

- Extended Wireless Controller Portable Transaction Computer Member

  In this member, you define portable transaction computer groups and their characteristics.

- Extended Wireless Controller Barcode Member

  If a portable transaction computer group has barcode scanning capabilities, then you have to create an extended wireless barcode member. In this member, you define the barcodes you want to scan.

Figure 2 on page 13 shows the related commands to configure these parameters, the flow of the commands sequence, and their relations. On the command, CRTLINWLS, you see the value of QZXCINZ in the parameter of INZPGM. If you specify QZXCINZ, which is the default, the program of the same name automatically takes you to the display for the command, ADDEWLM. There you can specify the values previously mentioned.

It sounds quite confusing and the diagram is not very self explanatory, but do not be too frustrated. If you pick one of the configuration examples immediately following this section, everything is quite clear. Here, understanding the configuration at the conceptual level is more than enough.

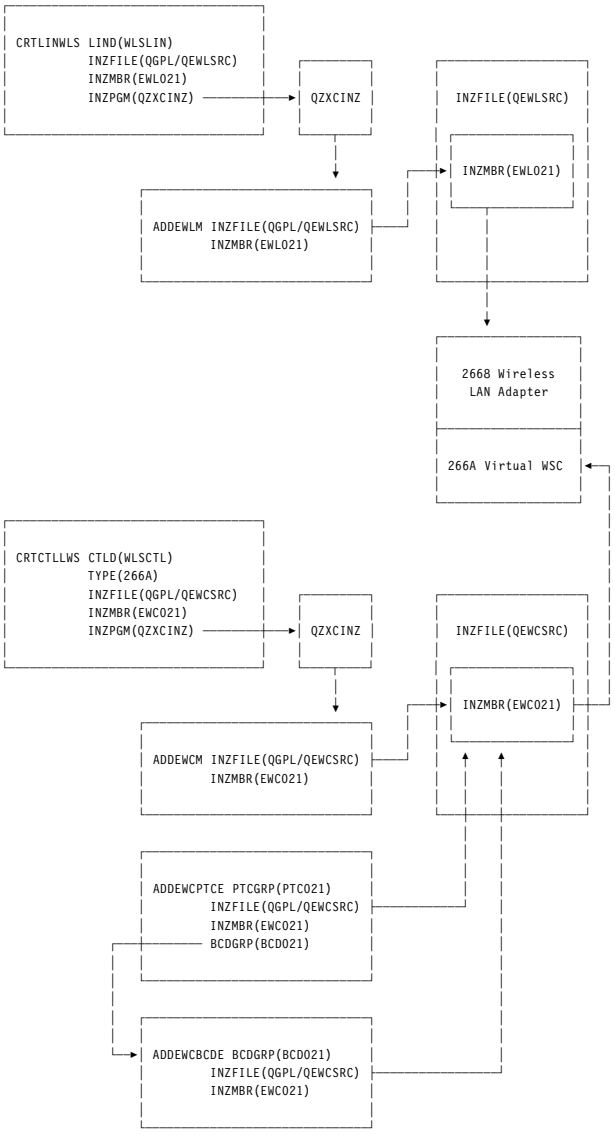


Figure 2. Extended Wireless Member Relations

2.1.2 Resources and Addressing Parameters

2.1.2.1 AS/400 wireless LAN Addressing Parameters

Next, you need to understand the addresses for the AS/400 wireless LAN. Unlike the addresses of the other LAN adapters, the AS/400 wireless LAN adapter has two addresses: ADPTADR (adapter address) and HOPID (access point address).

We have explained what they are and what they are needed for. Look at Figure 3.

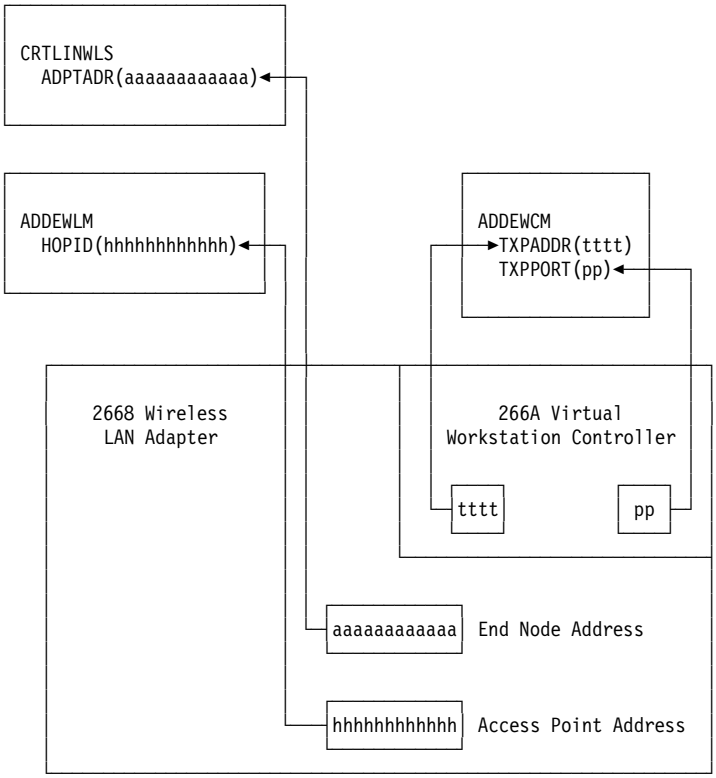


Figure 3. Wireless Addressing Parameters

The AS/400 wireless LAN is different from other LANs because it supports LAN devices and portable transaction computers. LAN devices are transparently supported, which means that after wireless configuration, it is similar to any other LANs.

The ADPTADR parameter represents the 2668 wireless LAN adapter. This is the value used as the destination address for all LAN devices that want to communicate with the AS/400 system.

The HOPID parameter on the ADDEWLM command represents the local access point function of the wireless adapter. This value should always be left as the default, which is *ADPT.

Portable transaction computers are supported as local workstation devices attached to an AS/400 virtual controller. This gateway function is implemented by the wireless IOP/IOA code. This virtual controller is linked to the wireless through the TXPADDR and the TXPPORT. The TXPADDR of portable transaction computers must match the AS/400 Wireless LAN TXPADDR. The TXPPORT defines the gateway communication application, that is, 5250 emulation.

The TXPADDR parameter is used to identify the transport address used by this virtual workstation controller. This entry has to match the entry used by portable transaction computers that connect to the AS/400 Wireless adapter.

The TXPPORT parameter is used to define the application running on the portable transaction computer port 0 and indicates that the application is 5250 emulation.

2.1.2.2 AS/400 Wireless LAN Resource

Before you start configuring the wireless LAN, you need to know the resource name as well as the addressing parameters of the AS/400 wireless LAN adapter. The RSRCNAME parameter on the line description describes the location of the wireless LAN adapter. The line must have been varied on previously. To find out the resource name, type:

```
WRKHDWRSC *CMN
```

This command shows a display similar to the one in Figure 4.

```
                      Work with Communication Resources
                                                              System:   SYSNM040
Type options, press Enter.
  2=Edit   4=Remove   5=Work with configuration descriptions


Opt  Resource        Type  Text
     CMB01           2615  Combined function IOP
       LIN01         6152  Comm Adapter
         LIN011      6152  V.24 Port
       LIN02         6152  Comm Adapter
         LIN021      6152  V.24 Port
     CC01            6160  Comm Processor
       LIN03         6160  LAN Adapter
         LIN031      6160  Token-Ring Port
     CMB04           2663  Combined function IOP
         LIN08       2668  LAN Adapter
         LIN081      2668  Wireless Connection
     CC02            2623  Comm Processor
       LIN04         2605  ISDN Adapter

F3=Exit   F5=Refresh   F6=Print   F11=Display resource addresses/statuses
F12=Cancel
```

Figure 4. Work with Communication Resources

Note: Line resource names on V3R6 machines are *CMNnn* instead of *LINnn*.

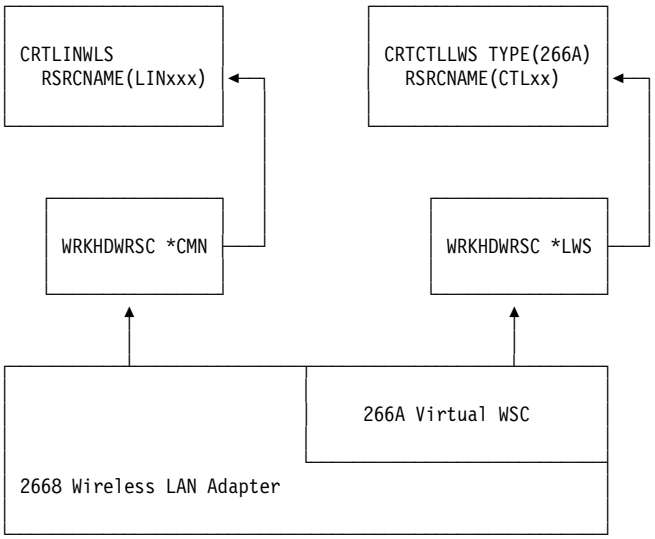


Figure 5. Wireless Resource Names

The RSCNAME on the local work station controller description represents the virtual controller attachment to the portable transaction computer. This resource name is not assigned until the line is varied on. To find out the resource name of the 266A virtual controller, type:

```
WRKHDWRSC *LWS
```

This command shows a display similar to the one in Figure 6.

```
                    Work with Local Work Station Resources
                                                          System:   SYSNM040

Type options, press Enter.
  2=Edit   4=Remove   5=Work with controller descriptions


Opt  Resource        Type  Text
     WC01            6140  Work Station Processor
       CTL01         6140  Work Station Controller
     CMB04           2663  Combined function IOP
       CTL03         266A  Virtual Controller
     WC02            6141  Work Station Processor
       CTL02         6141  Work Station Controller
     CMB03           2663  Combined function IOP




F3=Exit   F5=Refresh   F6=Print   F11=Display resource addresses/statuses
F12=Cancel
```

Figure 6. Work with Local Work Station Resources

2.1.3 AS/400 Wireless LAN Adapter Commands Diagram

Figure 7 summarizes the commands we have discussed so far. Note that those on the left-side block, titled PTC Configuration, are only needed when you have the portable transaction computers in your network. If you only have PCs with the radio adapters, you do not need to configure these.

Also note that the TCP/IP configurations are automatically created when you configure the TCP/IP interface.

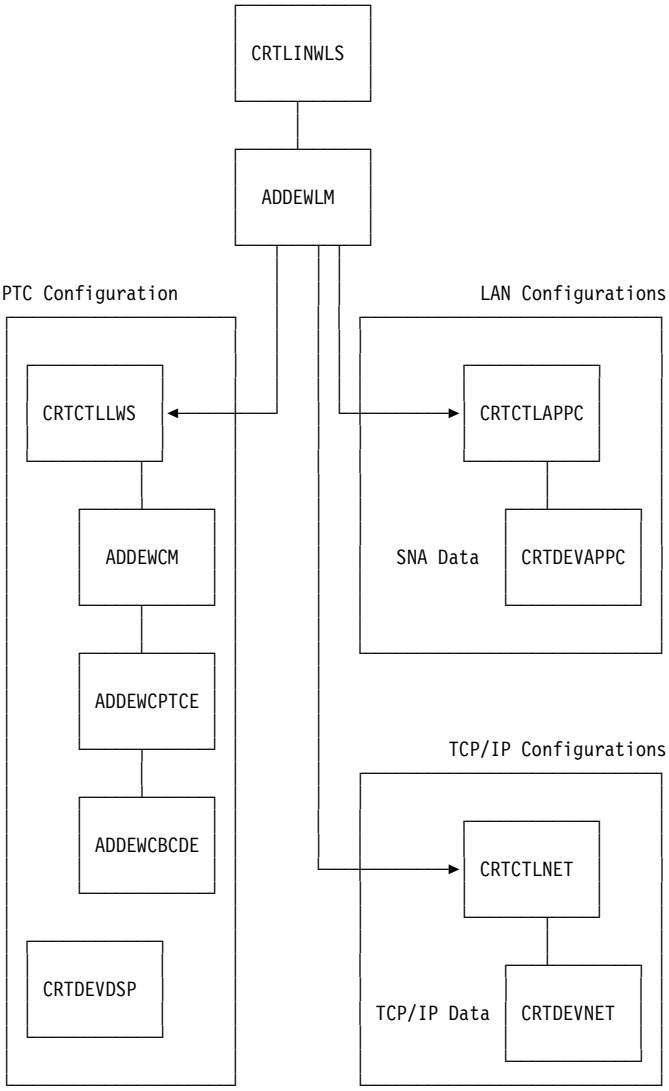


Figure 7. Wireless LAN Commands

The following is the list of the AS/400 wireless LAN adapter commands:

- ADDEWCBCDE - Add EWC Barcode Entry
- ADDEWCM - Add Wireless Ctl Member
- ADDEWCPTCE - Add EWC PTC Entry
- ADDEWLM - Add Wireless Line Member
- CHGCTLLWS - Change Ctl Desc (Local WS)
- CHGEWCBCDE - Change EWC Barcode Entry

- CHGEWCM - Change Wireless Ctl Member
- CHGEWCPTCE - Change EWC PTC Entry
- CHGEWLM - Change Wireless Line Member
- CHGLINWLS - Change Line Desc (Wireless)
- CRTCTLLWS - Create Ctl Desc (Local WS)
- CRTLINWLS - Create Line Desc (Wireless)
- DSPEWCM - Display Wireless Ctl Member
- DSPEWCBCDE - Display EWC Barcode Entry
- DSPEWCPTCE - Display EWC PTC Entry
- DSPEWLM - Display Wireless Line Member
- RMVEWCBCDE - Remove EWC Barcode Entry
- RMVEWCPTCE - Remove EWC PTC Entry

2.1.4 Wireless Matching Parameters

This section explains the parameters that should match between the AS/400 configurations and PCs and PTCs.

```
AS/400
Network Attributes
   SYSNAME..... SYSNM040
   LCLNETID.... ITSCNET  3
   LCLCPNAME... SYSNM040
   LCLLOCNAME.. SYSNM040  1


LIND.......... ITSOWLS
   ADPTADR....... 420000000018  2
   SSAP
     Source SAP.. 04
     Max.frame .. 1496  4
     SSAP type... *SNA

     INZMBR........ ITSOWLS
     INZFILE....... QEWLSRC
                  .   QGPL
     FREQUENCY..... *A2  5
     DATARATE...... 2M  6
     SYSID......... 000002  7


CTLD.......... CTLWLS
     INZMBR........ CTLWLS
     INZFILE....... QEWCSRC
                  . QGPL
     TXPADR........ 4001  9
     TXPPORT....... 00


EWCPTCE
     PTCGRP........ PTC2483
     INZMBR........ CTLWLS
     INZFILE....... QEWCSRC
                  . QGPL
     PTCRANGE...... 0001  8
                  . 0005
     BCDGRP........ BARC001

EWCBCDE
     BCDGRP........ BARC001
     INZMBR........ CTLWLS
     INZFILE....... QEWCSRC
                  . QGPL
     BCDTYPE....... *UPC
     LBLLEN........ 0
```

```
CA/400
CONFIG.PCS
    1  TRLI SYSNM040,420000000018 2
    3  RTLN ITSCNET.PS2
    4  TRMF 1496

PROTOCOL.INI
[ACWNDIS ]
    5  CHANNEL = 3
    6  DATARATE = 4
    7  SYSTEMID = 0x02
```

```
IBM 2483 PTC
  PTC
     8  PTC Id    : 2
  RF
     7  System Id : 000002
     9  Dest Id   : 4001
     5  Frequency : A2
     6  Bit Rate  : 2M
```

Figure 8. Wireless Matching Parameters, General Description

- **1** AS/400 Local Location Name

  The local location name is used in APPC communications.

- **2** AS/400 Wireless LAN Address

- **3** AS/400 Network Name

  The network name is used in APPC communications. The fully qualified APPN network name is the pair network name/control point name. This must be unique in an APPN network.

- **4** Wireless LAN Max. Frame Size

  This is the maximum frame size used by the wireless LAN. Because CA/400 and other LAN products are isolated from the hardware by IBM LAN Support Program, it is necessary to define explicitly the maximum frame size to use.

- **5** AS/400 Wireless LAN Adapter Central Frequency

  This is the central radio frequency used by the spread spectrum radio link.

- **6** AS/400 Wireless LAN Adapter Bit Rate

  AS/400 Wireless LAN implements two bit rates: 1 Mbps or 2 Mbps.

- **7** AS/400 Wireless LAN Adapter System ID

  The system identifier allows two wireless LANs to use the same frequency without logically interfering with each other. Each radio packet carries the system identifier. If the system identifier of the radio packet does not match the one defined, the packet is discarded.

- **8** Portable Transaction Computer ID

  Each Portable Transaction Computer has is own unique ID.

- **9** Transport Address

  The transport address defines the LWS controller in wireless LAN adapter you are using. All portable transaction computers that want to communicate to a certain AS/400 system must match this parameter with the one in the AS/400 Virtual Controller.

2.1.5 Client Access/400 LAN Address

The wireless LAN address follows the Ethernet standard. The address on the Client Access/400 is the bit reversed address. You do not have to worry about making the correct reversed address if you use the following formula. The formula to be used is similar to this:

```
XX YY ZZ AA BB CC     <--- 12 digit hexadecimal

   Possible values for XX: 42 or 66
   Possible values for YY: 00
   Possible values for ZZ: 00 or 42 or 81 or C3
   Possible values for AA: 00 or 18 or 5A or 99 or DB
   Possible values for BB: 00 or 24 or 66 or A5 or E7
   Possible values for CC: 00 or 3C or 7E or BD or FF
```

You may prefer to use the following formula instead:

```
XX 00 00 00 00 00
XX 00 42 18 24 3C
XX 00 81 5A 66 7E
XX 00 C3 99 A5 BD
XX 00 00 DB E7 FF

   Where XX can be either 42 or 66
```

For example, the following addresses are universal adapter addresses:

```
 Universal Adapter Address: 42 00 00 18 24 FF
                            42 00 00 00 00 00
                            66 00 C3 00 E7 5A
                            66 00 81 99 00 BD
```

2.2 Example 1: AS/400 Wireless LAN with Wireless Repeater Access Points

This configuration example consists of pure wireless devices. This example provides configuration examples for AS/400 wireless LAN adapter, repeater access points, and various PC configurations for wireless. You can use 2.2, “Example 1: AS/400 Wireless LAN with Wireless Repeater Access Points” as a configuration reference for these devices.

2.2.1 Scenario Diagram

Figure 9 shows the setup and the logical topology diagram of the RF network.

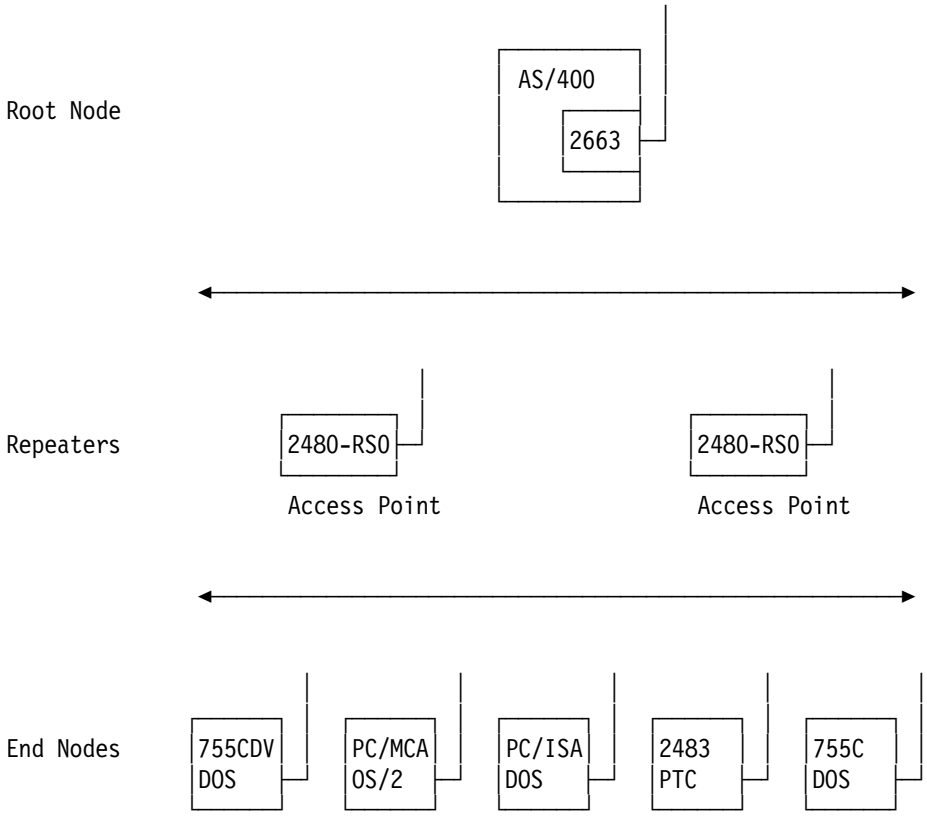


Figure 9. Example 1: RF Topology

2.2.2 Hardware and Software Specifications

The following are the hardware and software specifications we have used for our test.

- AS/400 E25 with AS/400 wireless LAN, OS/400 V3R1M0
- IBM PS/VP 433DX/D (6384-N70), PC DOS 6.3
- IBM PS/2 70/386 (8570-A16), OS/2 2.11
- IBM ThinkPad Pentium (755CDV), PC DOS 7.0
- IBM ThinkPad 486 (755C), PC DOS 7.0
- IBM 2480-RS0 Access Points

- IBM 2483 Portable Transaction Computer

Note: You can use any kind of Access Points models configured as repeaters such as 2480 E00, or EB0, or TR0.

2.2.3 AS/400 Configuration Objects

This section provides information on how to configure the AS/400 system for wireless.

2.2.3.1 Wireless LAN Line Description

1. Find the resource name of your AS/400 wireless LAN adapter, feature *2668*. Type:

   ```
   WRKHDWRSC *CMN
   ```

   Look for feature *2668*. In our environment, the AS/400 Wireless LAN Adapter resource name is *LIN081*.

   Note: For V3R6 users, the resource name is CMNXXX.

2. Now, create the line description, using the CRTLINWLS command.

   Use a locally-administered adapter address. The address you select must be in the range 020000000000 to FEFFFFFFFFFF and the second hexadecimal digit must be 2, 6, A or E.

   For example: E60000000000 is OK, 4B0000000000 is not OK because of the B used as the second digit.

   Note: Use a symmetrical address (universal address) table page 21.

```
                    Create Line Desc (Wireless) (CRTLINWLS)

Type choices, press Enter.

Line description . . . . . LIND         > WLSAP
Resource name  . . . . . . RSRCNAME     > LIN081
Online at IPL  . . . . . . ONLINE       > *NO
Vary on wait . . . . . . . VRYWAIT        *NOWAIT
Local adapter address  . . . . . ADPTADR > 420000000018
Exchange identifier  . . . . . . EXCHID   *SYSGEN
Ethernet standard  . . . . . . . ETHSTD   *ALL
SSAP list:                       SSAP
  Source service access point  .            *SYSGEN
  SSAP maximum frame . . . . . .
  SSAP type  . . . . . . . . . .
                         + for more values
Initialization source file . . . INZFILE  > QEWLSRC
  Library  . . . . . . . . . . .              *LIBL
Initialization source member . . INZMBR   > WLSAP

                                                                    More...
```

Figure 10. Example 1: CRTLINWLS (1/3)

Press the Page Down key and continue.

```
                    Create Line Desc (Wireless) (CRTLINWLS)

 Type choices, press Enter.

 Initialization program . . . . . > QZXCINZ       Name, *NONE
   Library  . . . . . .     *LIBL       Name, *LIBL, *CURLIB
 Text 'description' . . . . . . . > 'Wireless LAN'
```

Figure 11. Example 1: CRTLINWLS (2/3)

Now, press F10 (=Additional Parameters) and Page Down to change the "Autocreate controller" parameter to *YES. It is useful to have the controllers for PCs created automatically the first time they contact the AS/400 system.

```
                    Create Line Desc (Wireless) (CRTLINWLS)

 Type choices, press Enter.

 User-defined 1 . . . . . . . . . USRDFN1        128
 User-defined 2 . . . . . . . . . USRDFN2        128
 User-defined 3 . . . . . . . . . USRDFN3        128
 Autocreate controller  . . . . . AUTOCRTCTL   > *YES
 Autodelete controller  . . . . . AUTODLTCTL     1440
 Recovery limits:                 CMNRCYLMT
   Count limit  . . . . . .                      2
   Time interval  . . . . . .                    5
 Authority  . . . . . . . . . . . AUT            *LIBCRTAUT
```

Figure 12. Example 1: CRTLINWLS (3/3)

3. Now you are automatically prompted for the ADDEWLM (Add Extended Wireless Line Member) command. Press F10 for additional parameters.

```
                      Add Wireless Line Member (ADDEWLM)

 Type choices, press Enter.

 Initialization source member . . > WLSAP         Name

                           Additional Parameters

 Initialization source file . . . > QEWLSRC       Name, QEWLSRC
   Library  . . . . . .  >   QGPL       Name, *LIBL, *CURLIB
 Adapter configuration  . . . . . > *RADIO        *ALL, *RADIO, *WIRED
 Hop identifier . . . . . .   *ADPT         020000000000-FEFFFFFFFFFF...
 Root or repeater cell  . . . . .   *YES          *YES, *NO
 Frequency  . . . . . .  *A1           *A1, *A2, *A3, *B1, *B2
 Data rate  . . . . . .  > 1M           2M, 1M
 Radio system identifier  . . . . > 000004        000002-FFFFFE
 Text 'description' . . . . . . . > 'EWLM for Scenario 2'
```

Figure 13. Example 1: ADDEWLM

We have chosen to operate this wireless network using System ID=000004; Frequency=*A1 means the 2412 center frequency, and the data rate is 1 Mbps.

V3R2 and Future Releases

The values for the ″frequency″ keyword are different from V3R2 and future releases. The new values are 1, 2, 3, 4, and 5 respectively for *A1, *B1, *A2, *B2, and *A3. Frequency matching between versions of OS/400 and other radio devices are the same as the following. Please note that the values for Access Point used here are for the U.S. In other countries, these values can differ.

V3R1	V3R2 or future	PTC	PC	AP
*A1	1	1	1	1_2412_A1
*B1	2	2	2	2_2427_B1
*A2	3	3	3	3_2442_A2
*B2	4	4	4	4_2457_B2
*A3	5	5	5	5_2465_A3

Use the values not to overlap frequency ranges. For example, use the values 1 and 3 instead of 1 and 2.

4. You can now vary on this line description.

If You Do Not Use PTCs...

When you only plan to communicate with PCs, this is the only configuration object you need to create. In this example, we are also using portable transaction computers, so we also need to create a local workstation controller.

2.2.3.2 Wireless LAN Local Workstation Controller Description

1. After the line description was varied on successfully, the system creates a resource name for a local workstation controller of type *266A*. You can find this resource name by typing:

   ```
   WRKHDWRSC TYPE(*LWS).
   ```

   On our system this resource name is called *CTL03*.

2. We can now create the controller description.

```
                    Create Ctl Desc (Local WS) (CRTCTLLWS)

  Type choices, press Enter.

  Controller description . . . . . > CTLAP          Name
  Controller type  . . . . . . . . > 266A           2637, 2638, 2661, 6040...
  Controller model . . . . . . . . > 1              1, 0001
  Resource name  . . . . . . . . . > CTL03          Name
  Online at IPL  . . . . . . . . . > *NO            *YES, *NO
  Initialization source file . . . > QEWCSRC        Name, *NONE
    Library  . . . . . . . . . . .     *LIBL        Name, *LIBL, *CURLIB
  Initialization source member . . > CTLAP          Name, *NONE
  Initialization program . . . . . > QZXCINZ        Name, *NONE
    Library  . . . . . . . . . . .     *LIBL        Name, *LIBL, *CURLIB
  Text 'description' . . . . . . .   Local Work Station Controller for PTCs




                                                                        More..
```

Figure 14. Example 1: CRTCTLLWS (1/2)

Press the Page Down key to set the Auto-Configuration parameter to *YES. This parameter allows for the automatic creation of the display devices for the portable transaction computers.

```
                    Create Ctl Desc (Local WS) (CRTCTLLWS)

  Type choices, press Enter.


                             Additional Parameters

  Attached devices . . . . . . . .                Name
                + for more values
  Device wait timer  . . . . . . .   10           2-600 seconds
  Auto-configuration controller  . > *YES         *NO, *YES
  Authority  . . . . . . . . . . .   *LIBCRTAUT   Name, *LIBCRTAUT, *CHANGE...
```

Figure 15. Example 1: CRTCTLLWS (2/2)

3. After pressing the Enter key, we are automatically prompted for the Add Extended Controller Member (ADDEWCM) command. After also pressing F10, we get a display that is similar to Figure 16 on page 26.

```
                      Add Wireless Ctl Member (ADDEWCM)

Type choices, press Enter.

Initialization source member . . > CTLLWS        Name

                           Additional Parameters

Initialization source file . . . > QEWCSRC       Name, QEWCSRC
  Library  . . . . . . . . . . . >   QGPL        Name, *LIBL, *CURLIB
Transport address  . . . . . . . > 400A          4001-4FFE
Transport port . . . . . . . . .   0             0-15
Text 'description' . . . . . . . > 'EWCM for Scenario 2'
```

Figure 16. Example 1: ADDEWCM

We used the same name for the Extended Wireless Controller Member as the controller description, namely CTLAP. This member, in file QGPL/QEWCSRC, is also used to store the PTC entries and barcode entries.

Transport Port

This is the port on the gateway function of the IOP/IOA. It must be zero for 5250 emulation.

Transport Address Range

Depending on the version of OS/400 or PTF level, you might have a different range of the values for the ″Transport address″ keyword on the display, such as 0001-FFFF. Even so, you have to type in the value in the range of 4001-4FFE. Otherwise, your configuration does not work.

4. Next, we must make an entry for 2483 PTC. We designate PTC addresses 0001 to 0005 to this PTC group.

```
                        Add EWC PTC Entry (ADDEWCPTCE)

Type choices, press Enter.

PTC group  . . . . . . . . . . . > PTC2483
Initialization source member . . > CTLAP          Name

                             Additional Parameters

Initialization source file . . .   QEWCSRC       Name, QEWCSRC
  Library  . . . . . . . . . . .     *LIBL       Name, *LIBL
PTC address range:
  Begin address  . . . . . . . .   0001          0001-1022
  End address  . . . . . . . . . > 0005          0001-1022
Intensity  . . . . . . . . . . .   *NORMAL       *NORMAL, *INVERSE
Status line  . . . . . . . . . .   *YES          *YES, *NO
Cursor type  . . . . . . . . . .   *UNDERLINE    *UNDERLINE, *BLOCK
Inactivity timer . . . . . . . .   *DEV          0-9999, *DEV
Backlight timer  . . . . . . . .   *DEV          0-9999, *DEV
Backlight key  . . . . . . . . .   *ON           *ON, *OFF
                                                                    More..
```

Figure 17. Example 1: ADDEWCPTCE for PTC2483 Group (1/3)

Begin/End Address Range

Depending on the version of OS/400 or PTF level, you might have a different range of values for the ″Begin address″ and ″End address″ keywords on the display, such as 0001-FFFF.

```
                        Add EWC PTC Entry (ADDEWCPTCE)

Type choices, press Enter.

Bypass exit  . . . . . . . . . .   *YES          *YES, *NO
Automatic run  . . . . . . . . . > *NO           *YES, *NO
Printer  . . . . . . . . . . . .   *SYSTEM       *SYSTEM, *PTC
Wand type  . . . . . . . . . . . > *LASER        *NONE, *PENCIL, *LASER...
Wand pecking rate  . . . . . . .   *DEV          *DEV, 2, 4, 8, 16, 32, 48
Laser read timer . . . . . . . .   *DEV          *DEV, 1440, 2880, 4320, 5760
Barcode function keys  . . . . . > *OFF          *OFF, *ON
Cursor location  . . . . . . . .   *HOLD         *HOLD, *FIRST
Short scan . . . . . . . . . . .   *YES          *YES, *NO
Scan end of file . . . . . . . .   *YES          *YES, *NO
Fast poll interval . . . . . . .   *DEV          0-9999, *DEV
Fast poll delay  . . . . . . . .   *DEV          0-9999, *DEV
Fast poll decay  . . . . . . . .   *DEV          0-255, *DEV
Slow poll interval . . . . . . .   *DEV          0-99999, *DEV
                                                                    More..
```

Figure 18. Example 1: ADDEWCPTCE Command for PTC2483 Group (2/3)

New Parameter for Auto-Enter

Depending on the version of OS/400 or PTF level, you might have a new keyword for automatically entering scanned fields from PTCs. This new keyword, ″Auto-Enter″, is located between the ″Barcode function keys″ and the ″Cursor location″, and the possible values are ″*OFF″ or ″*ON″.

Pressing the Page Down key once more shows the ″Barcode group″ parameter. We specify the name of the ″Barcode group member″ here. We complete this information in the following step.

```
                        Add EWC PTC Entry (ADDEWCPTCE)

Type choices, press Enter.

Destination hop:
  Transport address  . . . . . .   *NONE          0001-FFFF, *NONE
  Frequency  . . . . . . . . . .                  *A1, *A2, *A3, *B1, *B2
  Data rate  . . . . . . . . . .                  2M, 1M
  Radio system identifier  . . .                  000002-FFFFFE
             + for more values
Barcode group  . . . . . . . . . > BARUPC
                                  > BAR39
                                  > BARUPCA
                                  > BARUPCE
             + for more values    > BARPLES
Text 'description' . . . . . . .
```

Figure 19. Example 1: ADDEWCPTCE Command for PTC2483 Group (3/3)

Note: A portable transaction computer can be configured with up to six bar codes at a given time. This configuration occurs during the portable transaction computer controller creation time.

North American Countries

For use where 900MHz ranges are supported, we have new values for a couple of the parameters. New values for the ″Frequency″ parameter include 1, 2, 3, 4, 5, 900, 901, and so on. Now we know that 1, 2, 3, 4, and 5 match with *A1, *B1, *A2, *B2, and *A3 respectively but 900 to 911 are for 900MHz only. For most of the countries, it is not relevant. Another parameter to note is the ″Data rate″. A new value for this is *NONE which matches with 900MHz frequency ranges. Again, it is not relevant for most of the countries where 900MHz ranges are not supported.

5. Now we have to add the barcode group entries that we previously specified by using the Add EWC Barcode Entry Command (ADDEWCBCDE).

```
                    Add EWC Barcode Entry (ADDEWCBCDE)

Type choices, press Enter.

Barcode group  . . . . . > BARUPC
Initialization source member . . > CTLAP         Name

                          Additional Parameters

Initialization source file . . .   QEWCSRC       Name, QEWCSRC
  Library  . . . . . .  . . . .     *LIBL       Name, *LIBL, *CURLIB
Barcode type . . . . . > *UPC
Label length . . . . . .  . . .   0             0-64
First check digit  . . . . . .    *NO           *NO, *YES
Second check digit . . . . . .    *NO           *NO, *YES
All zeros  . . . . . .  . . . .   *NO           *NO, *YES
Alpha display  . . . . . .  . .   *NO           *NO, *YES
Add on 2 . . . . . .  . . . . .   *NO           *NO, *YES
Add on 5 . . . . . .  . . . . .   *NO           *NO, *YES
System 1 UPC-E . . . . . .  . .   *NO           *NO, *YES
                                                                    More...
```

Figure 20. Example 1: ADDEWCBCDE (1/2)

```
                    Add EWC Barcode Entry (ADDEWCBCDE)

Type choices, press Enter.

System 0 UPC-E . . . . . .  . .   *NO           *NO, *YES
UPC-E  . . . . . .  . . . . . .   *NO           *NO, *YES
EAN 13 . . . . . .  . . . . . .   *NO           *NO, *YES
Add on . . . . . .  . . . . . .   *BIDIRECTIONAL
Drop begin . . . . . .  . . . .   0             0-64
Drop end . . . . . .  . . . . .   0             0-64
Text 'description' . . . . . .  > 'Bar code Entry for UPC'
```

Figure 21. Example 1: ADDEWCBCDE (2/2)

We repeated the command for the other barcode groups as well:

BAR39 is barcode type *CODE3OF9,

BARUPCA is barcode type *UPCA,

BARUPCE is barcode type *UPCE and

BARPLES is barcode type *PLESSEY.

6. Set the barcode 'label length' to 0. Zero indicates that the label length is variable, and scanning of labels 1 through 64 characters long is allowed.

Latest PTF for Label Length 0 US English Only

If **0** is not accepted by the LBLLEN field, check to make sure you have the latest CUM PTF pacakge. If your OS/400 is the NLV version, you have to manually edit the file QEWCSRC and change the label length to 00; see Appendix D, "Barcode Label Length Fix for Non-U.S. English System" on page 145

2.2.4 Access Point Configuration

This section provides the information on how to configure repeater access points.

2.2.4.1 First Access Point Configuration

1. After unpacking and attaching the antenna and the power pack, you must configure the access point. You can configure the access point in two ways: using an attached RS-232C ANSI terminal or through a TCP/IP TELNET session. The first configuration must be made using an ANSI terminal before placing the units in their final positions.

   The default settings for this connection are 9600 baud, no parity, eight data bits, and one stop bit (9600, N, 8, 1). The access point port is a DCE using a DB-9 (9-pin RS-232) connector.

   We used the Windows terminal emulator to configure the access point. After you start the ANSI terminal emulation, you get the Main Menu display. Choose **1 - Configuration**.

```
IBM 2480-RS0 V3.2N                Main Menu

    Option            Value       Description

1 - Configuration   [ menu  ] - General configuration
2 - Statistics      [ menu  ] - Display statistics
3 - Registration    [ menu  ] - Registration table maintenance
4 - Logs            [ menu  ] - Alarm and log control
5 - Diagnostics     [ menu  ] - Maintenance and testing commands
6 - Privilege       [ write ] - Set privilege level
7 - Help                      - Introduction

Enter an option number or name
> 1
```

Figure 22. Example 1: Configuring Access Point (1/21)

2. You get the display in Figure 23.

```
IBM 2480-RS0 V3.2N            Configuration Menu

    Option       Value      Description

1 - Radio       [ menu  ] - Radio network parameters
2 - RS-485      [ menu  ] - RS-485 configuration
3 - Ident       [ menu  ] - Identification information
4 - Console     [ menu  ] - Console set-up
5 - Snmp        [ menu  ] - Set snmp values
6 - Dump                  - Dump configuration to console


Enter an option number or name, "=" main menu, <ESC> previous menu
> 1
```

Figure 23. Example 1: Configuring Access Point (2/21)

3. On the Configuration Menu, choose **1 - Radio** for radio configuration.

```
IBM 2480-RS0 V3.2N          Configuration Radio Menu

    Option        Value      Description

1 - Sid         [     2     ] - System identifier
2 - Bitrate     [   2000    ] - Data bit rate in kilobits / second
3 - Frequency   [ 2442_(A2) ] - Center frequency in MHz
4 - Root        [    on     ] - Enable root mode
5 - Linktest    [   menu    ] - Run a link test
6 - Extended    [   menu    ] - Extended parameters

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 24. Example 1: Configuring Access Point (3/21)

4. Choose option **1**. We are now prompted for the system identifier. This parameter must match the SYSTEM ID in the AS/400 Extended wireless Line Member.

```
> sid
Enter a number in hex of ffffffh or less : 4
```

Figure 25. Example 1: Configuring Access Point (4/21)

5. Choose option **2** and enter the bit rate. This parameter must match the DATA RATE parameter in the AS/400 Extended wireless Line Member.

   Note: The AS/400 wireless LAN does not support 354 and 500 kb/s.

```
> bitrate
Enter rate in kb/s, one of [354, 500, 1000, 2000 ] : 1000
```

Figure 26. Example 1: Configuring Access Point (5/21)

6. Choose option **3** and enter the frequency. This parameter must match the FREQUENCY parameter in the AS/400 Extended wireless Line Member.

```
> frequency
Enter frequency in MHz, one of [2412_(A1), 2427_(B1), 2442_(A2),
             2457_(B2), 2465_(A3)] : 2412
```

Figure 27. Example 1: Configuring Access Point (6/21)

7. Choose option **4** and configure the ROOT option. The access point has to be configured as a repeater in this scenario. Enter **Y** and the parameter changes to OFF. This option works similar to a tumbler switch.

```
> root
Are you sure [y/n] ? Y
```

Figure 28. Example 1: Configuring Access Point (7/21)

8. After changing the ROOT parameter, the Configuration Radio Menu shows a new option as seen in Figure 29.

```
IBM 2480-RSO V3.2N          Configuration Radio Menu

    Option        Value      Description

1 - Sid         [     4     ] - System identifier
2 - Bitrate     [   1000    ] - Data bit rate in kilobits / second
3 - Frequency   [ 2412_(A1) ] - Center frequency in MHz
4 - Root        [    off    ] - Enable root mode
5 - Autoscan    [    on     ] - Enable auto scan mode
6 - Linktest    [   menu    ] - Run a link test
7 - Extended    [   menu    ] - Extended parameters

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 29. Example 1: Configuring Access Point (8/21)

9. Select option **5 - Autoscan**. It causes the access point to scan through all legal bit-rate and frequency combinations for a radio until a connection is found. In this scenario, we switched Autoscan off. Just enter 5. This option works the same as a tumbler switch.

```
IBM 2480-RSO V3.2N          Configuration Radio Menu

    Option        Value      Description

1 - Sid         [     4     ] - System identifier
2 - Bitrate     [   1000    ] - Data bit rate in kilobits / second
3 - Frequency   [ 2412_(A1) ] - Center frequency in MHz
4 - Root        [    off    ] - Enable root mode
5 - Autoscan    [    off    ] - Enable auto scan mode
6 - Linktest    [   menu    ] - Run a link test
7 - Extended    [   menu    ] - Extended parameters

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 30. Example 1: Configuring Access Point (9/21)

10. Up to here, we configured the mandatory parameters used in this scenario. Now we go back to the configuration menu.

```
IBM 2480-RSO V3.2N            Configuration Menu

    Option       Value      Description

1 - Radio       [ menu  ] - Radio network parameters
2 - RS-485      [ menu  ] - RS-485 configuration
3 - Ident       [ menu  ] - Identification information
4 - Console     [ menu  ] - Console set-up
5 - Snmp        [ menu  ] - Set snmp values
6 - Dump                  - Dump configuration to console


Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 31. Example 1: Configuring Access Point (10/21)

2.2.4.2 Optional Configuration - Strongly Recommended

1. To make the wireless LAN easy to manage, we should configure the *Identification Information*. The configuration information allows you to get an easier view of your wireless LAN. The network addresses should be meaningful to you. This is the first step in the network management strategy. Select option **2 - Ident** from the Configuration Menu. The Configuration Ident Menu is shown.

```
IBM 2480-RSO V3.2N          Configuration Ident Menu

    Option            Value            Description

1 - Name        [       ""        ] - Node name
2 - Nid         [  00409610350c   ] - Network address
3 - Inaddr      [ 000.000.000.000 ] - Internet address
4 - Inmask      [ 000.000.000.000 ] - Internet subnet mask
5 - Location    [       ""        ] - SNMP system location
6 - Contact     [       ""        ] - SNMP system contact name

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 32. Example 1: Configuring Access Point (11/21)

2. To configure the access point name, enter 1 and then fill in the *REPEATER-01*.

```
> name
Enter a name of at most 20 characters : REPEATER-01
```

Figure 33. Example 1: Configuring Access Point (12/21)

3. We changed the access point *Nid*, Network Address, to a locally administered address. Use option **2** and enter 000000248001.

```
> nid
Enter one of [default, our network address ] : 000000248001
```

Figure 34. Example 1: Configuring Access Point (13/21)

4. The *Inaddr* is the IP address of the access point. Use option **3** and enter 009.005.065.028.

```
> inaddr
Enter an IP address : 009.005.065.028
```

Figure 35. Example 1: Configuring Access Point (14/21)

5. The *Inmask* is the IP subnet mask of the access point. Use option **4** and enter 255.255.255.000.

```
> inmask
Enter an IP address : 255.255.255.000
```

Figure 36. Example 1: Configuring Access Point (15/21)

6. Fill in the access point location using option 5.

```
> Location
Enter a location of at most 20 characters : ITSO-LAB
```

Figure 37. Example 1: Configuring Access Point (16/21)

7. Fill in the access point contact name using option 6.

```
> Contact
Enter a location of at most 20 characters : YESSONG_JOHNG
```

Figure 38. Example 1: Configuring Access Point (17/21)

8. When you are finished, the access point Configuration Ident Menu should look the same as the display in Figure 39 on page 35.

```
IBM 2480-RSO V3.2N          Configuration Ident Menu

    Option            Value            Description

1 - Name        [  "REPEATER-01"  ] - Node name
2 - Nid         [  000000248001   ] - Network address
3 - Inaddr      [ 009.005.065.028 ] - Internet address
4 - Inmask      [ 255.255.255.000 ] - Internet subnet mask
5 - Location    [   "ITSO-LAB"    ] - SNMP system location
6 - Contact     [ "YESSONG_JOHNG" ] - SNMP system contact name

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 39. Example 1: Configuring Access Point (18/21)

9. Press the Esc key twice to go to the main menu. Choose option **5 Diagnostics**. You get the following display as shown in Figure 40.

```
IBM 2480-RSO V3.2N          Configuration Radio Menu

    Option        Value      Description

1 - Connect                          - Start a telnet session
2 - Linktest    [ menu ] - Run a link test
3 - Restart                          - Equivalent to power-up
4 - Defaults                         - Return to default
5 - Load        [ menu ] - Load new version of code

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 40. Example 1: Configuring Access Point (19/21)

10. Use option **3 Restart** to restart the access point and answer Y. This option works the same as a tumbler switch.

```
> restart
Are you sure [y/n ] ?
```

Figure 41. Example 1: Configuring Access Point (20/21)

11. After pressing the Enter key, the access point restarts and you receive the messages as shown in Figure 42.

```
Re-booting unit ...
Restoring the configuration
> Testing link to 000000248003 with 100 multicast packets of size 512
Completed. Quality is FAIR. (100 Sent, Tgt Rcvd 72, Src Rcvd 72, 28 % Lost)
Round trip times in msec : Avg 9, Max 21, Min 7
```

Figure 42. Example 1: Configuring Access Point (21/21)

12. After access point restarts, press the Esc key twice to return to the main menu. You have finished the access point configuration.

2.2.4.3 Second Access Point Configuration

The second access point was configured with the parameters in Figure 43 and in Figure 44.

1. Radio configuration

```
IBM 2480-RSO V3.2N          Configuration Radio Menu

    Option        Value      Description

1 - Sid         [     4     ] - System identifier
2 - Bitrate     [   1000    ] - Data bit rate in kilobits / second
3 - Frequency   [ 2412_(A1) ] - Center frequency in MHz
4 - Root        [    off    ] - Enable root mode
5 - Autoscan    [    off    ] - Enable auto scan mode
6 - Linktest    [   menu    ] - Run a link test
7 - Extended    [   menu    ] - Extended parameters
```

Figure 43. Example 1: Configuring Second Access Point (1/2)

2. Identification configuration

```
IBM 2480-RSO V3.2N          Configuration Ident Menu

    Option            Value            Description

1 - Name        [  "REPEATER-02"  ] - Node name
2 - Nid         [  000000248002   ] - Network address
3 - Inaddr      [ 009.005.065.030 ] - Internet address
4 - Inmask      [ 255.255.255.000 ] - Internet subnet mask
5 - Location    [   "ITSO-LAB"    ] - SNMP system location
6 - Contact     [ "YESSONG_JOHNG" ] - SNMP system contact name
```

Figure 44. Example 1: Configuring Second Access Point (2/2)

2.2.5 Portable Transaction Computer Configuration

Before we work with the actual configuration, a couple of reminders regarding to PTCs (Portable Transaction Computers):

- Each PTC connected is counted as one user for AS/400. Type WRKLICINF then take option 5 to check if you are not over the granted license usage limit. '*NOMAX' value is allowed.
- The value of 'QAUTOVRT' system value should be other than '0'.
- Finding the correct keys is quite a challenge for the fist time users of PTCs. For your convenience, the keyboard mapping reference is provided in A.1, "PTC Keyboard Layout" on page 135.

Now the actual steps of their configurations:

1. If this is the initial configuration, or you want to reset the portable transaction computer due to configuration problems, you need to do what is called a 3-key power on. This is equivalent to powering on and off your PC. Refer to A.4, "PTC Reset" on page 137 for information about how to do this.

2. Delete all of the files on the A drive. This step may be necessary only if there are configuration problems. The A drive holds configuration files that are re-created with the correct parameters after the configuration.

   ```
   C>DEL A:
   ```

3. Now re-boot the PTC. Re-booting is performed by entering a specific key sequence. Refer to A.2, “PTC Re-Boot” on page 135 for information about how to do this.

4. At the ′q - quit, Other key to continue′ prompt, press Enter.

5. On the Main Menu, choose option **1**:

```
  Main Menu
1.  Cfg/Emul
2.  RX
3.  Flash
4.  AS/400 Echo
X.  Exit
Choose Option 1
```

Figure 45. Example 1: Portable Transaction Computer Main Menu

6. We are now shown the ″Configure PTC″ menu.

```
Configure PTC
(1)  Emul
(2)  PTC
(3)  RF
(4)  Version
(5)  Display
(Q)  Quit
Choose Option 2
```

Figure 46. Example 1: Configure PTC Menu

   Choose option **2** to configure the PTC parameters.

7. We are now prompted for a PTC ID.

```
PTC Id
(1  -  1022)
[0000]: 0001
```

Figure 47. Example 1: Prompt for PTC ID

   The PTC ID must be in the range that was specified on the PTC entries on the AS/400 system.

8. On the ″Use Internal Keyboard Definition?″, just press Enter.

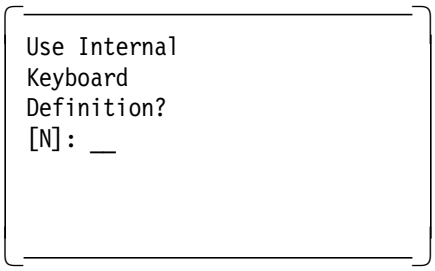


Figure 48. Example 1: Prompt for PTC Internal Keyboard

9. We are now back to the ″Configure PTC″ menu.

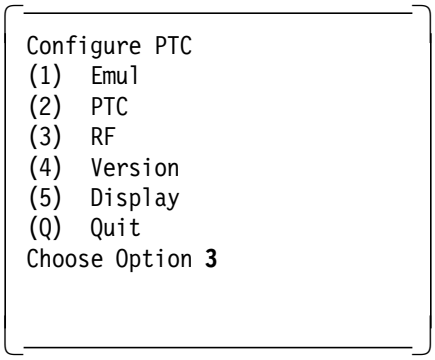


Figure 49. Example 1: Configure PTC Menu

Choose option **3** to configure the RF parameters.

10. Enter the system ID. This parameter must match the system ID in the AS/400 Extended Wireless Line Member.

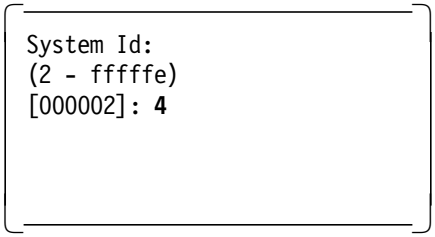


Figure 50. Example 1: Prompt for PTC System ID

11. Enter the Destination ID. This parameter must match the ″Transport Address″ in the Extended Wireless Controller Member.

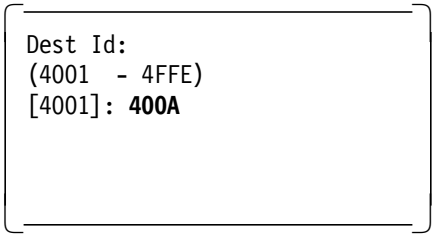


Figure 51. Example 1: Prompt for PTC Destination ID

12. Enter the frequency. This parameter must match the ″Frequency″ parameter on the Add Extended Wireless Line Member command.

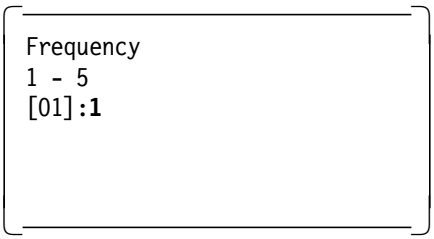


Figure 52. Example 1: Prompt for PTC Frequency

Note: The values you can specify here are country dependent. Check with your local IBM representative.

13. Enter the bit rate. This parameter must match the ″Data Rate″ parameter on the Add Extended Wireless Line Member command.

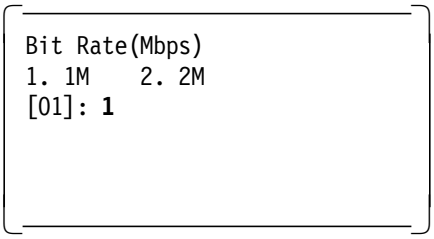


Figure 53. Example 1: Prompt for PTC Bit Rate

14. On the following prompts, press Enter to accept the default:
    - TXP Timeout(s) (6)
    - TXP Retries (5)
    - Find Router Size (0 - 1508bytes)
    - Ethernet (1 Ethernet)
15. We are now back on the ″Configure PTC″ menu. The configuration has been stored on the A drive of the Portable Transaction Computer.

Option 1 starts the emulation. With the line description and the local workstation controller varied on, you can start the emulation. Device descriptions are automatically created. Note that the configuration is the same for the Portable Transaction Computer type 2482 as for type 2483.

2.2.6 PC Configuration

In this scenario we used the following PCs:

PC	OS/Shell	Application
PS/VP	PC DOS 6.3	Client Access/400 Extended DOS Version
755CDV	PC DOS 7.0	Client Access/400 Ext.DOS - Telnet
755C	Windows for Workgroup	Client Access/400 for Win.- Telnet
PS/2	OS/2 2.11	CM/2 1.1 5250 Emulation

Note: 755CXX with DOS Card services Version 2.10 Revision 2.12

2.2.6.1 Install the Adapter

1. On a PS/2 with an MCA bus, we installed the adapter and used the automatic configuration to install the options file. The option file is called @71DD.ADF.

   Choose a free IRQ and RAM address based on your PC setup. We used IRQ5 and RAM address C000.

2. On an ISA-bus adapter, there is a series of DIP switches that sets the adapter interrupt level and address. The configuration we used was setting switch 7 on, all the others are off.

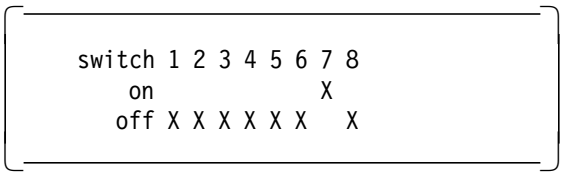


Figure 54. Example 1: Switch Settings on ISA Adapter

   This gave us interrupt level 2 and address C000. Switches 6, 7, and 8 make up the interrupt level. If your PC should have difficulties with this interrupt level, then also try interrupts 5 and 7.

3. The PCMCIA adapter consists of two components, a PCMCIA card and a Radio Pod with an attached tether cable.

   a. Mount the Radio Pod onto the computer.

   b. Attach the Radio Pod tether cable to the PCMCIA card.

   c. Insert the PCMCIA card into the computer's Type II slot.

   d. Power on your computer. If the ThinkPad does not boot after the PCMCIA card installation, a base memory or IRQ conflict might exist.

      Note: PCMCIA adapter and its SW configuration do not operate without the Radio Pod tether cable attached. For your reference, the following is the default values set from the factory.

      IRQ 5, Base Address D000

   e. After the boot, go to the ThinkPad directory and call EZPLAY.

   f. Check the status of your PCMCIA card. If the card is not ready, you might have conflicts on the base memory address or IRQ.

   g. If the ThinkPad boot was done properly but if you have an error message such as:

      Time out waiting for interrupt

      or

      LAN card RAM region test failed

      then, an extended memory manager may be using the requested region of memory. Ensure that the memory region selected for the PCMCIA adapter (for example, EMM386 X=D000-D1FFF) is excluded from use, and that the range of the memory region in the config.sys file is within the EMM386 eXclude such as the following:

      DEVICE=C:\THINKPAD\DICRMU01.SYS /MA=D000-D1FFF

   h. If you still have problems, REM out:

```
DEVICE=C:-THINKPAD-AUTODRV.SYS C:-THINKPAD-AUTODRV.INI
DEVICE=C:-THINKPAD-$ICPMDOS.SYS
```

2.2.6.2 PS/VP with DOS 6.3

1. Install the IBM LSP Version 1.35 using the driver diskette that comes with your adapter. The driver is called AWCNDIS.DOS. In this example, we used address 420000000018 on the AS/400 system, which is symmetric.

   Client Access/400

2. Install Client Access/400 as for LAN, specifying the correct NETID, System name, and LAN address.

In the CONFIG.SYS file, shown in Figure 55 you can see we are using driver AWCNDIS.DOS. The version we tested was 1.80.

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH
DEVICE=C:\DOS\SETVER.EXE
FILES=30
BUFFERS=10
DEVICE=C:\WINDOWS\SMARTDRV.EXE /DOUBLE_BUFFER
STACKS=9,256
DEVICE=C:\LSP\PROTMAN.DOS /I:C:\LSP
DEVICE=C:\LSP\AWCNDIS.DOS
DEVICE=C:\LSP\DXMA0MOD.SYS 001
DEVICE=C:\LSP\DXME0MOD.SYS
```

Figure 55. PS/VP with DOS 6.3: CONFIG.SYS File

In the AUTOEXEC.BAT file, Figure 56, there is only the NETBIND statement to be noticed here. It is added by the LSP install program (DXMAID).

```
\LSP\NETBIND
C:\WINDOWS\SMARTDRV.EXE
@ECHO OFF
PROMPT $p$g
PATH=C:\WINDOWS;C:\DOS
SET TEMP=C:\DOS
C:\DOS\MOUSE.COM
c:\DOS\DOSKEY
```

Figure 56. PS/VP with DOS 6.3: AUTOEXEC.BAT File

The PROTOCOL.INI file holds the parameters used by the AWCNDIS driver to configure the adapter. See Figure 57 on page 42. The important point here is that the parameters match those of the AS/400 wireless LAN adapter.

- CHANNEL = 1

  This corresponds to the *A1 frequency or 2412MHz (at least in U.S. and Canada). For other values, refer to C.3, “Wireless Center Frequency Mapping” on page 144.

- DATARATE = 3

  This means that we communicate at 1 Mbps. For other values, refer to C.2, “Wireless Data Rate Mapping” on page 143.

- SYSTEMID = 0x4

  This matches 000004 in the AS/400 Extended Line Member.

```
[PROTMAN_MOD]
        DriverName = PROTMAN$
[DXMAIDXCFG]
        DXME0_NIF = DXME0.NIF
        DXMJOMOD_NIF = DXMJOMOD.NIF
        IBMTOK_NIF = IBMTOK.NIF
        IBMTOK2_NIF = IBMTOK.NIF
[DXME0_NIF]
        DriverName = DXME0$
        Bindings = AWCDOS_NIF
[AWCDOS_NIF]
        DriverName = ARLAN$
        CHANNEL = 1
        DATARATE = 3
        SYSTEMID = 0X4
        PRESID = 0
        TMA = ON
        MAXDATAGRAMSIZE = 2048
```

Figure 57. PS/VP with DOC 6.3: PROTOCOL.INI File

```
SFLR 1,I,,SYSNM040
RTYP ITRN
TRMF 1496
RTLN ITSCNET.WLSPS2A
TRLI SYSNM040,420000000018
```

Figure 58. PS/VP with DOS 6.3: CONFIG.PCS File

2.2.6.3 ThinkPad with DOS 7.0

1. Install the IBM LSP Version 1.35 or later using the driver diskette that comes with your PCMCIA adapter. The driver is called AWCN690.DOS. In this example, we used address 420000000018 on the AS/400 system, which is symmetric.

   Client Access/400

2. Install Client Access/400 as for LAN, specifying the correct NETID, System name, and LAN address.

In the CONFIG.SYS file shown in Figure 55 on page 41, you can see we are using driver AWCN690.DOS. The version we tested was 2.36.

```
DOS=HIGH,UMB
FILES=40
BUFFERS=20
STACKS=9,256
SHELL=C:\DOS\COMMAND.COM /E:1024 /P

LASTDRIVE=H
DEVICEhigh=C:\CDROM\IBMTPCD.SYS /D:TPCD001 /P:170 /R
DEVICEhigh = C:\DOS\ANSI.SYS
DEVICE=C:\DOS\EMM386.EXE NOEMS I=B000-B7FF X=C800-CFFF
DEVICEHIGH=C:\THINKPAD\IBMDSS01.SYS /D
DEVICEHIGH=C:\THINKPAD\IBMDOSCS.SYS
DEVICEHIGH=C:\THINKPAD\DICRMU01.SYS /MA=C800-CFFF
REM DEVICEHIGH=C:\THINKPAD\$ICPMDOS.SYS
DEVICEHIGH=C:\DOS\POWER.EXE
REM DEVICEHIGH=C:\THINKPAD\AUTODRV.SYS C:\THINKPAD\AUTODRV.INI
DEVICEHIGH=C:\DOS\SETVER.EXE
DEVICEHIGH=C:\DOS\DISPLAY.SYS CON=(,,1)
COUNTRY=039,850,C:\DOS\COUNTRY.SYS

REM UN'REM' THE FOLLOWING LINE FOR PCMCIA ATA CARD SUPPORT
REM DEVICEHIGH=C:\THINKPAD\DISKDRV.SYS
REM UN'REM' THE FOLLOWING LINE FOR EXTERNAL KEYBOARD SUPPORT
REM DEVICEHIGH=C:\$IBMHIPD.SYS
DEVICE=C:\MWW\MANAGER\MWDP0400.EXE

[common]
devicehigh=C:\V7320\V7320MGR.EXE
devicehigh=C:\V7320\V7320APM.EXE
[COMMON]
DEVICEhigh=C:\LSP\PROTMAN.DOS /I:C:\LSP
DEVICEhigh=C:\TCPDOSS\BIN\DOSTCP.SYS
DEVICEhigh=C:\LSP\AWCN690.DOS
DEVICEhigh=C:\LSP\DXMA0MOD.SYS 001
DEVICEhigh=C:\LSP\DXME0MOD.SYS
```

Figure 59. ThinkPad with DOS 7.0: CONFIG.SYS File

In the AUTOEXEC.BAT file in Figure 60 on page 44, notice the NETBIND statement. It is added by the LSP install program (DXMAID).

```
C:\LSP\NETBIND
SET ETC=C:\TCPDOSS\ETC\
SET DOS16M=:4M
@ECHO OFF
C:\CDROM\MSCDEX.EXE /D:TPCD001 /M:15
PROMPT $p$g
manager;c:\mww\dll;
set path=c:\;c:\dos;c:\windows;c:\thinkpad\;c:\asympres;c:\ccmobile;c:\mwd\manag
er;c:\mww\dll;C:\TCPDOSS\BIN;
SET TEMP=C:\WINDOWS\TEMP
SET IBMAV=C:\DOS
SET IPF_PATH=C:\IPFWIN
SET COMSPEC=C:\DOS\COMMAND.COM

C:\DOS\MODE.COM CON CP PREP=((850) C:\DOS\EGA.CPI)
C:\DOS\MODE.COM CON CP SEL=850
C:\DOS\KEYB.COM IT,,C:\DOS\KEYBOARD.SYS /ID:141

C:\THINKPAD\PS2 HFILE C

c:\dos\mouse.com /y
REM To disable write-caching, remove '+' from the following line
rem C:\DOS\SMARTDRV.EXE C
C:\DOS\SMARTDRV.EXE C+
c:\dos\doskey.com
c:\dos\share.exe
c:\thinkpad\fueldos.com
CALL C:\DOS\IBMAVDR.BAT C:\DOS\
SET MWROOT=C:\MWD
SET LIBPATH=C:\MWD\MANAGER
SET MWPATH=C:\MWD\MANAGER;C:\MWD\MWGAMES
SET BLASTER=A220 I5 D1 T1
CALL MWGAMES OFF

CALL C:\PCS\STARTPCS
CALL C:\TCPDOSS\BIN\TCPSTART
CALL C:\SCREENS\SETDOS.BAT
rem WIN
```

Figure 60. ThinkPad with DOS 7.0: AUTOEXEC.BAT File

The PROTOCOL.INI file holds the parameters used by the AWCN690 driver to configure the adapter. The important point here is that the parameters match those of the AS/400 wireless LAN adapter.

- CHANNEL = 1

  This corresponds to the *A1 frequency or 2412MHz (at least in the U.S. and Canada). For other values, refer to C.3, “Wireless Center Frequency Mapping” on page 144.

- DATARATE = 4

  This means that we communicate at 2 Mbps. For other values, refer to C.2, “Wireless Data Rate Mapping” on page 143.

- SYSTEMID = 0x4

  This matches 000004 in the AS/400 Extended Line Member.

```
[PROTMAN_MOD]
        DriverName = PROTMAN$
[DXMAIDXCFG]
        DXME0_NIF = DXME0.NIF
        DXMJ0MOD_NIF = DXMJ0MOD.NIF
        AWC2N69O_NIF = AWC2N69O.NIF
        AWC2N69O2_NIF = AWC2N69O.NIF

[TCPIP_V21]
Drivername=DOSNDIS$
Bindings=AWC2N69O_NIF

[DXME0_NIF]
        DriverName = DXME0$
        Bindings = AWC2N69O_NIF

[AWC2N69O_NIF]
        DriverName = ARLAN$
        CHANNEL = 1
        DATARATE = 3
        SYSTEMID = 0X4
        TMA = "ON"
        MEMORY = 0XCE00
        IRQ=9
        socket = 0X1
```

Figure 61. ThinkPad with DOS 7.0: PROTOCOL.INI File

This parameter specifies the memory window used by the MAC PCMCIA driver, a non-entry allows Card & Socket services to select an available memory window.

```
MEMORY=0Xyyyy
IRQ=X
socket=XX
```

```
SFLR 1,I,,PRINAS4
UPDT I:\QIWSFL2,C:\PCS,S,,,Client Access/400
RTYP ITRN
RTLN CPNET.FABIOTIN
INTL 68
TRAN 0
TRSS 04
TRRL 3
TRAL 0
TRAS 0
TRMF 2048
CPDT NO
TRLI PRINAS4,420000000018
```

Figure 62. ThinkPad with DOS 7.0: CONFIG.PCS File

IBM TCP/IP for DOS Configuration

If you want to run your applications over IBM TCP/IP, the following are the steps for its configuration.

1. Type:

   ```
   c:\TCPDOS\Custom
   ```

2. Type:

   custom

3. Configure NDIS interfaces ND0 (*).
4. Enter your IP address.
5. Enter Subnet mask.
6. Boundadapt > select any kind of adapter from the list (see note).
7. Enable Interface (X).
8. Go to the Advanced Functions.
9. Options > select ARP (X).
10. Go to the Calculate Broadcast, press Enter.
11. Go back to the custom main menu.
12. Select Routing Information.
13. Route type > default.
14. Enter Router IP Address.
15. Hop count > 1.
16. Go back to the custom main menu.
17. Exit Save changes.
18. Edit manually CONFIG.SYS, AUTOEXEC.BAT, and PROTOCOL.INI (see note).
19. Re-boot your PC.

Note: For this configuration, we use Client Access/400 and TCPIP coexistence. You have to manually edit the CONFIG.SYS, AUTOEXEC.BAT, and PROTOCOL.INI files as the working files in the previous PC ThinkPad configurations.

2.2.6.4 ThinkPad Windows for Workgroup 3.11

This section provides the example files for Windows for Workgroup, CONFIG.SYS, AUTOEXEC.BAT, and PROTOCOL.INI.

```
DEVICE=C:\DOS\HIMEM.SYS
DOS=HIGH,UMB
FILES=40
BUFFERS=40
STACKS=9,256
DEVICE=C:\DOS\EMM386.EXE NOEMS X=C800-cfff x=d000-d800
DEVICE=C:\DOS\DISPLAY.SYS CON=(,,1)
DEVICE=C:\THINKPAD\IBMDSS01.SYS
DEVICE=C:\THINKPAD\IBMDOSCS.SYS
DEVICE=C:\THINKPAD\DICRMU01.SYS /MA=C800-D800
DEVICE=C:\THINKPAD\$ICPMDOS.SYS
DEVICEHIGH=C:\DOS\SETVER.EXE
COUNTRY=358,850,C:\DOS\COUNTRY.SYS
INSTALLHIGH=C:\DOS\NLSFUNC.EXE C:\DOS\COUNTRY.SYS
SHELL=C:\DOS\COMMAND.COM C:\DOS /P
devicehigh=c:\windows\ifshlp.sys
LASTDRIVE=Z
```

Figure 63. ThinkPad for Windows for Workgroup: CONFIG.SYS File

```
c:\windows\net initialize
C:\WINDOWS\msdlc.exe
C:\WINDOWS\net start
@ECHO OFF
PROMPT $p$g
path=C:\CAWIN;C:\DOS;c:\;c:\windows;c:\thinkpad;C:\USFW311;C:\RUMBACAW
REM PCM+ path added.
SET TEMP=C:\DOS
REM ===== PC DOS 7.0 - Update  ===== C:\DOS\KEYB SU,,C:\DOS\KEYBOARD.SYS
C:\DOS\KEYB SU,,C:\DOS\KEYBOARD.SYS /ID:153
C:\DOS\SMARTDRV.EXE
LOADHIGH C:\DOS\MOUSE.COM /Y
LOADHIGH C:\DOS\DOSKEY.COM
SET COMSPEC=C:\DOS\COMMAND.COM
REM ===== PC DOS 7.0 - Add     =====
SET WIN$=C:\WINDOWS
REM ===== PC DOS 7.0 - Add     =====
C:\DOS\MODE.COM CON CP PREP=((850) C:\DOS\EGA.CPI)
REM ===== PC DOS 7.0 - Add     =====
C:\DOS\MODE.COM CON CP SEL=850
REM ===== PC DOS 7.0 - Add     =====
C:\DOS\KEYB.COM SU,,C:\DOS\KEYBOARD.SYS /ID:153
REM ===== PC DOS 7.0 - Add     =====
SET IBMAV=C:\DOS
REM ===== PC DOS 7.0 - Add     =====
rem CALL C:\DOS\IBMAVDR.BAT C:\DOS\
SET LIB=C:\USFW311\LIB
SET INCLUDE=C:\USFW311\INCLUDE
```

Figure 64. ThinkPad for Windows for Workgroup: AUTOEXEC.BAT File

```
[network.setup]
version=0x3110
netcard=awc690-2400,1,AWC690-2400,1
transport=ms$ndishlp,MS$NDISHLP
transport=ms$netbeui,NETBEUI
transport=msdlc,MSDLC
transport=tcpip-32n,MSTCP32
lana0=awc690-2400,1,ms$netbeui
lana1=awc690-2400,1,ms$ndishlp
lana2=awc690-2400,1,msdlc
lana3=awc690-2400,1,tcpip-32n

[protman]
DriverName=PROTMAN$
PRIORITY=MS$NDISHLP

[AWC690-2400]
DriverName=ARLAN$
Channel=1
DataRate=3
SystemID=0x4
TMA=ON
PreSID=0
Config=ON
MaxDatagramSize=2048
Mem=0xD000
Socket=1
Int=5
netaddress="420000000018"
[MS$NDISHLP]
DriverName=ndishlp$
BINDINGS=AWC690-2400

[NETBEUI]
DriverName=netbeui$
SESSIONS=10
NCBS=12
BINDINGS=AWC690-2400
LANABASE=0
[MSDLC]
xstations1=0
xstations0=5
stations=20
saps=8
xsaps1=0
xsaps0=5
swap=1
usedix=0
DriverName=MSDLC$
BINDINGS=AWC690-2400

[MSTCP32]
BINDINGS=AWC690-2400
LANABASE=2
```

Figure 65. ThinkPad for Windows for Workgroup: PROTOCOL.INI File

2.2.6.5 PS/2 with OS/2

We include the configuration files for NTS/2 and CM/2, and PROTOCOL.INI and WLS.NDF.

```
[PROT_MAN]

   DRIVERNAME = PROTMAN$

[IBMLXCFG]

   AWCNDIS_nif = AWCNDIS.nif
   LANDD_nif = LANDD.NIF

[LANDD_nif]

   DriverName = LANDD$
   Bindings = AWCNDIS_nif
   ETHERAND_TYPE = "I"
   SYSTEM_KEY = 0x0
   OPEN_OPTIONS = 0x2000
   TRACE = 0x0
   LINKS = 8
   MAX_SAPS = 3
   MAX_G_SAPS = 0
   USERS = 3
   TI_TICK_G1 = 255
   T1_TICK_G1 = 15
   T2_TICK_G1 = 3
   TI_TICK_G2 = 255
   T1_TICK_G2 = 25
   T2_TICK_G2 = 10
   IPACKETS = 250
   UIPACKETS = 100
   MAXTRANSMITS = 6
   MINTRANSMITS = 2
   TCBS = 64
   GDTS = 30
   ELEMENTS = 800

[AWCNDIS_nif]

   DriverName = ARLAN$
   CONFIG = "ON"
   SYSTEMID = 0x000004
   CHANNEL = 1
   DATARATE = 3
   TMA = "ON"
   ROOT = "ON"
   PRESID = 0x00
   MEMORY = 0xD000
   NETADDRESS = "424200000018"
```

Figure 66. PS/2 with OS/2: PROTOCOL.INI File for NTS/2 Configuration

```
DEFINE_LOCAL_CP  FQ_CP_NAME(ITSCNET.WLSOS2   )
                 DESCRIPTION(PS/2 OS/2 & Wireless LAN)
                 CP_ALIAS(WLSOS2  )
                 NAU_ADDRESS(INDEPENDENT_LU)
                 NODE_TYPE(EN)
                 NODE_ID(X'05D00000')
                 NW_FP_SUPPORT(NONE)
                 HOST_FP_SUPPORT(YES)
                 MAX_COMP_LEVEL(NONE)
                 MAX_COMP_TOKENS(0);

DEFINE_LOGICAL_LINK  LINK_NAME(WLSLINK )
                     DESCRIPTION(Wireless Link to ROCHAS040)
                     ADJACENT_NODE_TYPE(NN)
                     PREFERRED_NN_SERVER(YES)
                     DLC_NAME(ETHERAND)
                     ADAPTER_NUMBER(0)
                     DESTINATION_ADDRESS(X'42000000001804')
                     ETHERNET_FORMAT(YES)
                     CP_CP_SESSION_SUPPORT(YES)
                     ACTIVATE_AT_STARTUP(YES)
                     LIMITED_RESOURCE(NO)
                     LINK_STATION_ROLE(USE_ADAPTER_DEFINITION)
                     SOLICIT_SSCP_SESSION(NO)
                     MAX_ACTIVATION_ATTEMPTS(USE_ADAPTER_DEFINITION)
                     USE_PUNAME_AS_CPNAME(NO)
                     EFFECTIVE_CAPACITY(USE_ADAPTER_DEFINITION)
                     COST_PER_CONNECT_TIME(USE_ADAPTER_DEFINITION)
                     COST_PER_BYTE(USE_ADAPTER_DEFINITION)
                     SECURITY(USE_ADAPTER_DEFINITION)
                     PROPAGATION_DELAY(USE_ADAPTER_DEFINITION)
                     USER_DEFINED_1(USE_ADAPTER_DEFINITION)
                     USER_DEFINED_2(USE_ADAPTER_DEFINITION)
                     USER_DEFINED_3(USE_ADAPTER_DEFINITION);

DEFINE_PARTNER_LU  FQ_PARTNER_LU_NAME(ITSCNET.SYSNM040 )
                   DESCRIPTION(AS/400 SYSNM040)
                   PARTNER_LU_ALIAS(SYSNM040)
                   PARTNER_LU_UNINTERPRETED_NAME(SYSNM040)
                   MAX_MC_LL_SEND_SIZE(32767)
                   CONV_SECURITY_VERIFICATION(NO)
                   PARALLEL_SESSION_SUPPORT(YES);

DEFINE_DEFAULTS  IMPLICIT_INBOUND_PLU_SUPPORT(YES)
                 DEFAULT_MODE_NAME(BLANK)
                 MAX_MC_LL_SEND_SIZE(32767)
                 DIRECTORY_FOR_INBOUND_ATTACHES(*)
                 DEFAULT_TP_OPERATION(NONQUEUED_AM_STARTED)
                 DEFAULT_TP_PROGRAM_TYPE(BACKGROUND)
                 DEFAULT_TP_CONV_SECURITY_RQD(NO)
                 MAX_HELD_ALERTS(10);

START_ATTACH_MANAGER;
```

Figure 67. PS/2 with OS/2: PROTOCOL.INI File for CM/2 Configuration

2.2.7 Matching Parameters

```
AS/400
Network Attributes
   SYSNAME..... SYSNM040
   LCLNETID.... ITSCNET  3
   LCLCPNAME... SYSNM040
   LCLLOCNAME.. SYSNM040  1


LIND.......... WLSAP
   ADPTADR....... 420000000018  2
   SSAP
     Source SAP.. 04
     Max.frame .. 1496  4
     SSAP type... *SNA

     INZMBR........ WLSAP
     INZFILE....... QEWLSRC
                  .   QGPL
3
     FREQUENCY..... *A1  5
     DATARATE...... 1M  6
     SYSID......... 000004  7



CTLD.......... CTLWLS
     INZMBR........ CTLWLS

     INZFILE....... QEWCSRC
                  . QGPL
     TXPADR........ 400A  9
     TXPPORT....... 00


EWCPTCE
     PTCGRP........ PTC2483
     INZMBR........ CTLWLS
     INZFILE....... QEWCSRC
                  . QGPL
     PTCRANGE...... 0001  8
                  . 0005
     BCDGRP........ BARUPC

EWCBCDE
     BCDGRP........ BARUPC
     INZMBR........ CTLWLS
     INZFILE....... QEWCSRC
                  . QGPL
     BCDTYPE....... *UPC
     LBLLEN........ 0
```

```
DOS
CONFIG.PCS for DOS
   1  TRLI SYSNM040,420000000018 2
   3  RTLN ITSCNET.PS2
   4  TRMF 1496

PROTOCOL.INI
[ACWNDIS ]
   5  CHANNEL = 1
   6  DATARATE = 3
   7  SYSTEMID = 0x04


OS/2
NTS/2
PROTOCOL.INI
[ACWNDIS_nif ]
   5  CHANNEL = 1

   6  DATARATE = 3
   7  SYSTEMID = 0x04

CM/2
WLS.NDF
      DEFINE_LOGICAL_LINK  LINK_NAME(WLSLINK )
   2 DESTINATION_ADDRESS(X'420000000001804')
   4 DLC_NAME(ETHERAND)

 WINDOWS
 NSD.INI
     [Configuration]
   3 LOCALLUNAME=ITSCNET.PS2
     [LAN]
   1 TRLI01=SYSNM40,420000000018,04,4,,,2,2,5,,

  IBM 2483 PTC
  PTC
    8  PTC Id    : 1
  RF
    7  System Id : 000004
    9  Dest Id   : 400A
    5  Frequency : A1
    6  Bit Rate  : 1M



  IBM 2480 RSO Access Point
    7  Sid        [ 4    ]
    6  Bitrate    [ 1000 ]
    5  Frequency  [ 2412 ]
```

Figure 68. Example 1: Matching Parameters

- **1** AS/400 Local Location Name
- **2** AS/400 wireless LAN Address

  The wireless LAN address follows the Ethernet standard.
- **3** AS/400 Network Name
- **4** Wireless LAN max. frame is 1496. CM/2 was configured for DLC Ethernet (ETHERAND) with I-frame equal to 1417.
- **5** Central Frequency
- **6** Bit Rate
- **7** System ID

- 8 Portable Transaction Computer ID
- 9 Transport Address

2.3 Example 2: Ethernet with Ethernet Bridge Access Points

This section provides the information on how to configure a bridged environment with Ethernet Bridge Access Points.

2.3.1 Scenario Diagram

The following picture shows the setup:

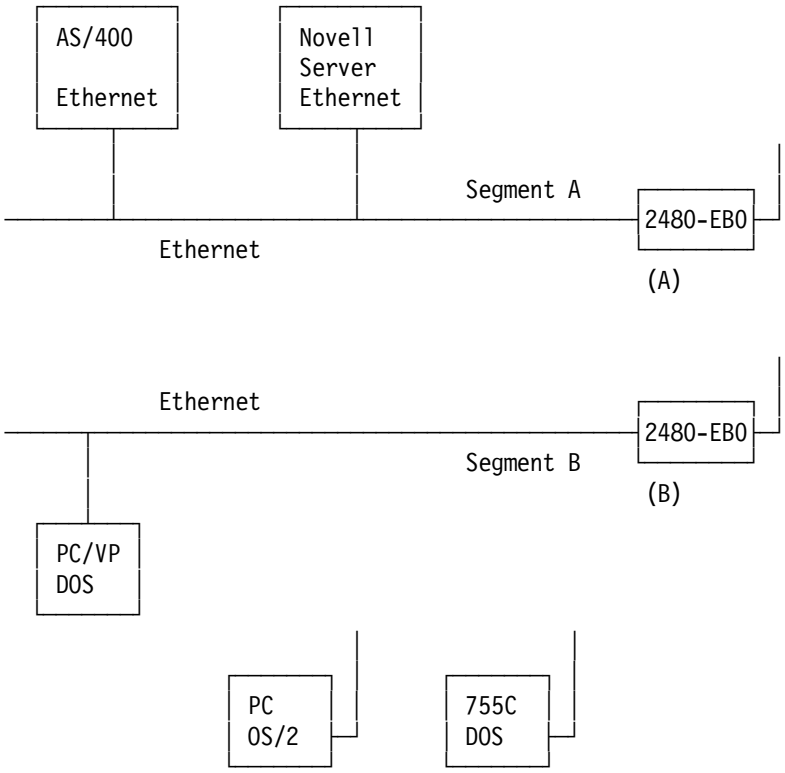


Figure 69. Example 2: Scenario View

Performance Reason

You might improve performance in this scenario by putting Ethernet access point on segment B. If you have this additional Ethernet access point on segment B, you can register all radios in segment B group to this Ethernet access point. They will have their own cell while EBAP-A and EBAP-B will have another cell.

2.3.2 Logical Topology of the RF Network

The following picture shows the logical topology diagram of the RF network:

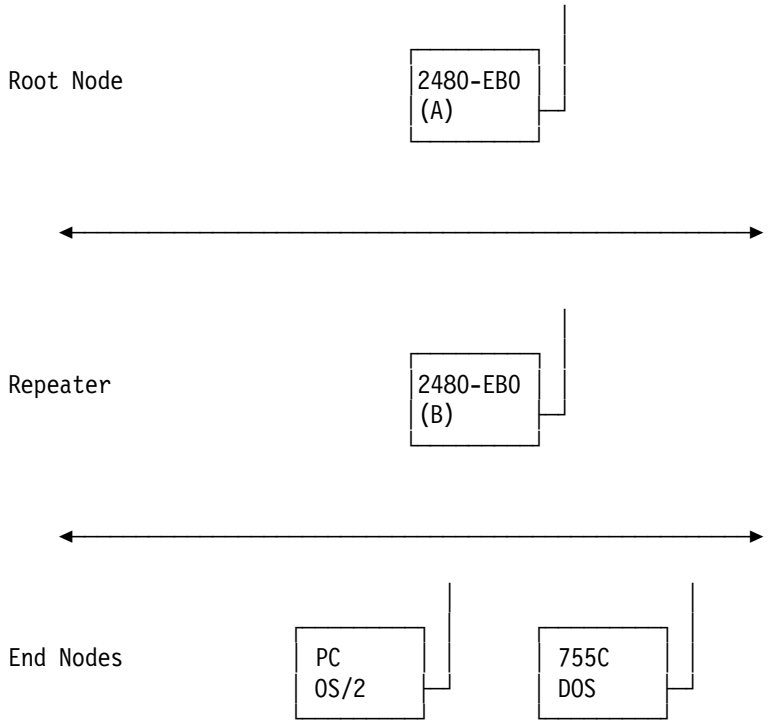


Figure 70. Example 2: RF Topology

2.3.3 Hardware and Software Specifications

- AS/400 with Ethernet Adapter, OS/400 V3R1M0 or later
- IBM PS/VP 433DX with ISA Ethernet adapter, PC DOS 6.3
- IBM ThinkPad (755C), PC DOS 7.0
- IBM PS/2 70/386 (8570-A16) with MCA wireless adapter, OS/2 2.1
- IBM 2480-EB0 access point

2.3.4 AS/400 Configuration Objects

Ethernet LAN Line Description

1. To find the resource name of AS/400 Ethernet adapter, type:

   ```
   WRKHDWRSC *CMN
   ```

   In our environment, the AS/400 wireless LAN adapter resource name is *LIN061*.

2. Use a locally administered adapter address. We used address 420000000018, which is symmetric, and does not change when the bit sequence is inverted.

3. Create a line description.

```
                    Create Line Desc (Ethernet) (CRTLINETH)

Type choices, press Enter.

Line description . . . . . > ETHLAN         Name
Resource name  . . . . . > LIN061        Name, *NWID, *NWSD
Online at IPL  . . . . . > *NO           *YES, *NO
Vary on wait . . . . . .   *NOWAIT       *NOWAIT, 15-180 (1 second)
Local adapter address  . . . . . > 420000000018  020000000000-7EFFFFFFFFFF...
Exchange identifier  . . . . . .   *SYSGEN       05600000-056FFFFF, *SYSGEN
Ethernet standard  . . . . . .   *ALL          *ETHV2, *IEEE8023, *ALL
SSAP list:
  Source service access point  .   *SYSGEN       02-FE, *SYSGEN
  SSAP maximum frame . . . . . .                 *MAXFRAME, 265-1496, 265...
  SSAP type  . . . . . .                         *CALC, *NONSNA, *SNA, *HPR
             + for more values
Text 'description' . . . . . > 'Ethernet Line Scenario 5'



                                                                       More...
F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
F13=How to use this display        F24=More keys
```

Figure 71. Example 2: CRTLINETH (1/2)

Press F10 (=Additional Parameters) and Page Down to change the "Auto Create Controller" parameter to *YES. This is useful to have the controllers for PCs created automatically.

```
                    Create Line Desc (Ethernet) (CRTLINETH)

Type choices, press Enter.

Autocreate controller  . . . . . > *YES          *YES, *NO
Autodelete controller  . . . . .   1440         1-10000 (minutes), *NON
Recovery limits:
  Count limit  . . . . . .   2             0-99, *SYSVAL
  Time interval  . . . . . .   5             0-120 (minutes)
Authority  . . . . . .   *LIBCRTAUT    Name, *LIBCRTAUT, *CHAN
```

Figure 72. Example 2: CRTLINETH (2/2)

4. You can now vary on this line description.

We are only able to communicate with PCs. In this example, we do not need to create any other AS/400 objects.

2.3.5 PC Configuration

In this scenario, we used the following PCs:

PC	OS / Shell	Application
PS/2 Wireless	OS/2 2.1	Communications Manager/2 1.1 IBM TCP/IP for OS/2
PS/VP 433DX Wired	DOS 6.3	Client Access/400 Extended DOS TELNET Novell IPX (NDIS implementation)
IBM Thinkpad Wireless	Windows for Workgroup	Client Access/400 for Windows TELNET Novell IPX (ODI implementation)

2.3.5.1 Install the Adapters

Installation of the adapters for this scenario is same as Scenario 1. Refer to 2.2.6.1, “Install the Adapter” on page 40 for detailed information.

2.3.5.2 PS/2 Wireless Configuration

You can configure this for DOS or for OS/2. Configuration with DOS is already covered in Example 1. If you need the information on how to do this, refer to 2.2.6.2, “PS/VP with DOS 6.3” on page 41. Here, we provide the information on how to configure a wireless PC with OS/2.

PS/2 is configured with OS/2 2.1 and CM/2 1.1 and TCP/IP for OS/2. We include the configuration files for NTS/2, CM/2, and TCP/IP: PROTOCOL.INI and WLS.NDF.

Note: Remember to pick ″Ethernet (ETHERAND) Network″ and ″5250 emulation″ on the CM/2 setup.

NTS/2 Configuration:

```
[PROT_MAN]

   DRIVERNAME = PROTMAN$

[IBMLXCFG]

   LANDD_nif = LANDD.NIF
   TCPIP_nif = TCPIP.nif
   AWCNDIS_nif = AWCNDIS.nif

[LANDD_nif]

   DriverName = LANDD$
   Bindings = AWCNDIS_nif
   ETHERAND_TYPE = "I"
   SYSTEM_KEY = 0x0
   OPEN_OPTIONS = 0x2000
   TRACE = 0x0
   LINKS = 8
   MAX_SAPS = 3
   MAX_G_SAPS = 0
   USERS = 3
   TI_TICK_G1 = 255
   T1_TICK_G1 = 15
   T2_TICK_G1 = 3
   TI_TICK_G2 = 255
   T1_TICK_G2 = 25
   T2_TICK_G2 = 10
   IPACKETS = 250
   UIPACKETS = 100
   MAXTRANSMITS = 6
   MINTRANSMITS = 2
   TCBS = 64
   GDTS = 30
   ELEMENTS = 800

[TCPIP_nif]

   DriverName = TCPIP$
   Bindings = AWCNDIS_nif


[AWCNDIS_nif]

   DriverName = ARLAN$
   CONFIG = "ON"
   SYSTEMID = 0x000006
   CHANNEL = 3
   DATARATE = 4
   TMA = "ON"
   ROOT = "ON"
   PRESID = 0x00
   MEMORY = 0xD000
   NETADDRESS = "420000000018"
```

Figure 73. Example 2: Configuring OS/2 - PROTOCOL.INI

CM/2 Configuration:

```
DEFINE_LOCAL_CP  FQ_CP_NAME(ITSCNET.WLSOS2B  )
                 DESCRIPTION(PS/2 OS/2 & Wireless LAN)
                 CP_ALIAS(WLSOS2B )
                 NAU_ADDRESS(INDEPENDENT_LU)
                 NODE_TYPE(EN)
                 NODE_ID(X'05D0000B')
                 NW_FP_SUPPORT(NONE)
                 HOST_FP_SUPPORT(YES)
                 MAX_COMP_LEVEL(NONE)
                 MAX_COMP_TOKENS(0);

DEFINE_LOGICAL_LINK  LINK_NAME(WLSLINK )
                     DESCRIPTION(Wireless Link to SYSNM040)
                     ADJACENT_NODE_TYPE(NN)
                     PREFERRED_NN_SERVER(YES)
                     DLC_NAME(ETHERAND)
                     ADAPTER_NUMBER(0)
                     DESTINATION_ADDRESS(X'42000000001804')
                     ETHERNET_FORMAT(YES)
                     CP_CP_SESSION_SUPPORT(YES)
                     ACTIVATE_AT_STARTUP(YES)
                     LIMITED_RESOURCE(NO)
                     LINK_STATION_ROLE(USE_ADAPTER_DEFINITION)
                     SOLICIT_SSCP_SESSION(NO)
                     MAX_ACTIVATION_ATTEMPTS(USE_ADAPTER_DEFINITION)
                     USE_PUNAME_AS_CPNAME(NO)
                     EFFECTIVE_CAPACITY(USE_ADAPTER_DEFINITION)
                     COST_PER_CONNECT_TIME(USE_ADAPTER_DEFINITION)
                     COST_PER_BYTE(USE_ADAPTER_DEFINITION)
                     SECURITY(USE_ADAPTER_DEFINITION)
                     PROPAGATION_DELAY(USE_ADAPTER_DEFINITION)
                     USER_DEFINED_1(USE_ADAPTER_DEFINITION)
                     USER_DEFINED_2(USE_ADAPTER_DEFINITION)
                     USER_DEFINED_3(USE_ADAPTER_DEFINITION);

DEFINE_PARTNER_LU  FQ_PARTNER_LU_NAME(ITSCNET.SYSNM040 )
                   DESCRIPTION(AS/400 SYSNM040)
                   PARTNER_LU_ALIAS(SYSNM040)
                   PARTNER_LU_UNINTERPRETED_NAME(SYSNM040)
                   MAX_MC_LL_SEND_SIZE(32767)
                   CONV_SECURITY_VERIFICATION(NO)
                   PARALLEL_SESSION_SUPPORT(YES);

DEFINE_DEFAULTS  IMPLICIT_INBOUND_PLU_SUPPORT(YES)
                 DEFAULT_MODE_NAME(BLANK)
                 MAX_MC_LL_SEND_SIZE(32767)
                 DIRECTORY_FOR_INBOUND_ATTACHES(*)
                 DEFAULT_TP_OPERATION(NONQUEUED_AM_STARTED)
                 DEFAULT_TP_PROGRAM_TYPE(BACKGROUND)
                 DEFAULT_TP_CONV_SECURITY_RQD(NO)
                 MAX_HELD_ALERTS(10);

START_ATTACH_MANAGER;
```

Figure 74. Example 2: Configuring OS/2 - WLS.NDF

TCP/IP Configuration:

```
route -fh
arp -f
ifconfig lan0 9.5.65.32 netmask 255.255.255.0
REM ifconfig lan1
REM ifconfig lan2
REM ifconfig lan3
REM ifconfig sl
route add default 9.5.65.105 1
```

Figure 75. Example 2: Configuring OS/2 - SETUP.CMD

2.3.5.3 PS/VP 433DX Wired Configuration

This configuration has nothing to do with wireless configuration but we added this information here because it carries the important information for the scenario we tested, that is, the coexistence of Client Access/400 Extended DOS, TELNET, and Novell IPX. This coexistence is done using the NDIS driver implementation.

```
DEVICE=D:\WINDOWS\HIMEM.SYS
DOS=HIGH,UMB
DEVICEhigh=C:\DOS\SETVER.EXE
DEVICEHIGH=C:\DOS\ANSI.SYS
FILES=50
BUFFERS=50
STACKS=9,512
SHELL=C:\COMMAND.COM /E:1024 /P
DEVICE=D:\WINDOWS\EMM386.EXE NOEMS x=D400-D5FF
rem LASTRIVE=Z
DEVICE=D:\WINDOWS\SMARTDRV.EXE /DOUBLE_BUFFER
DEVICE=D:\WINDOWS\IFSHLP.SYS

DEVICEhigh=C:\LSP\PROTMAN.DOS /I:C:\LSP
DEVICEhigh=C:\LSP\IBMENI.DOS
DEVICEhigh=C:\LSP\DXMA0MOD.SYS 001
DEVICEhigh=C:\LSP\DXME0MOD.SYS
DEVICEhigh=C:\LSP\DXMT0MOD.SYS  0=N
DEVICEhigh = D:\TCPDOS\BIN\DOSTCP.SYS
```

Figure 76. Example 2: CONFIG.SYS File

```
C:\LSP\NETBIND
C:\LSP\OLDSTAT2.exe
D:\WINDOWS\SMARTDRV.EXE
SET TEMP=C:\DOS
SET ETC=D:\TCPDOS\ETC
SET DOS16M=:4M
@ECHO OFF
SEt COMSPEC=C:\COMMAND.COM
PROMPT $e[25;1H$p$g
lh C:\DOS\MOUSE.COM
SET IBMAV=C:\DOS\
CALL C:\DOS\IBMAVDR.BAT C:\DOS\
path=D:\WINDOWS;c:\windows;c:\dos;d:\lsp;d:\netware;d:\bat;d:\tl;d:\fu;
cd d:\netware
lh lsl
lh lansup
lh ipxodi
lh netx /PS=OSCAR
```

Figure 77. Example 2: AUTOEXEC.BAT File

```
[PROTMAN_MOD]
        DriverName = PROTMAN$
[DXMAIDXCFG]
        DXME0_NIF = DXME0.NIF
        DXMJ0MOD_NIF = DXMJ0MOD.NIF
        IBMENI_NIF = IBMENI.NIF
        IBMENI2_NIF = IBMENI.NIF
        SMCDOSJP_NIF = SMCDOSJP.NIF
        SMCDOSJP2_NIF = SMCDOSJP.NIF
        SMCDOSAT_NIF = SMCDOSAT.NIF
        SMCDOSAT2_NIF = SMCDOSAT.NIF
        SMCDOSMC_NIF = SMCDOSMC.NIF
        SMCDOSMC2_NIF = SMCDOSMC.NIF
    [TCPIP_V21]
    DriverName=DOSNDIS$
    Bindings=IBMENI_NIF

    [DXME0_NIF]
            DriverName = DXME0$
            Bindings = IBMENI_NIF
    [IBMENI_NIF]
            DriverName = IBMENI$
            IOBASE = 0X340
            INTERRUPT = 3
```

Figure 78. Example 2: PROTOCOL.INI File

```
SFLR 1,I,,PRINAS4
UPDT I:\QIWSFL2,C:\PCS,S,,,Client Access/400
RTYP ITRN
RTLN CPNET.RED
TRLI PRINAS4,420000000018
```

Figure 79. Example 2: CONFIG.PCS File

2.3.5.4 Thinkpad Wireless Configuration

This ThinkPad is configured to work for Windows for Workgroup with Client Access/400 TCPIP and IPX. This coexistence is done using the ODI driver implementation. Everything else but PROTOCOL.INI and NET.CFG files are the same as in Example 1. Refer to 2.2.6.4, “ThinkPad Windows for Workgroup 3.11” on page 46. We provide PROTOCOL.INI and NET.CFG for your reference. For details on Windows for Workgroup ODI coexistence, refer to Appendix E, “ODI Implementation for Windows for Workgroup” on page 147.

```
[network.setup]
version=0x3110
netcard=awc690-2400,1,AWC690-2400,1
transport=ms$ndishlp,MS$NDISHLP
transport=tcpip-32n,MSTCP32
transport=msdlc,MSDLC
transport=ms$nwlink,NWLINK
lana0=awc690-2400,1,tcpip-32n
lana1=awc690-2400,1,ms$ndishlp
lana2=awc690-2400,1,msdlc
lana3=awc690-2400,1,ms$nwlink

[protman]
DriverName=PROTMAN$
PRIORITY=MS$NDISHLP
[AWC690-2400]
DriverName=ARLAN$
Channel=3
DataRate=4
SystemID=0x6
TMA=ON
PreSID=0
Config=ON
MaxDatagramSize=2048
Mem=0xD000
Socket=1
Int=5
netaddress="420000000018"

[MS$NDISHLP]
DriverName=ndishlp$
BINDINGS=AWC690-2400
[MSTCP32]
BINDINGS=AWC690-2400
LANABASE=0

[MSDLC]
xstations1=0
xstations0=5
stations=20
saps=8
xsaps1=0
xsaps0=5
swap=1
usedix=0
DriverName=MSDLC$
BINDINGS=AWC690-2400
[NWLINK]
BINDINGS=AWC690-2400
```

Figure 80. Example 2: PROTOCOL.INI File

```
;; Arlan ODI driver NET.CFG file
;; Last updated 02/01/95

file handles=60
show dots=on
search dir first=on

protocol ODINSUP
        bind AWC0690
        buffered

Link Driver AWC0690
   SystemId  00000A
   Channel   5
   DataRate  4
;   Mem       #1 D0000

   Mem       #1 D4000
   Int       #1 5
   Socket    1
;   ***
   Frame ETHERNET_802.2
   Frame ETHERNET_II
   Frame ETHERNET_802.3
   Frame ETHERNET_SNAP

   CONFIG ON
```

Figure 81. Example 2: NET.CFG File

2.3.6 Ethernet Bridge Access Point Configuration

The sequence of configuring the Ethernet Bridge Access Points does not matter. For example, you can configure the root node first and then repeater, or the other way around. In this example, we provide EBAP-B (that is, Ethernet Bridge Access Point for Segment B), first simply because that is the sequence we followed.

2.3.6.1 First Ethernet Bridge Access Point Configuration (Segment B)

In this section, we provide the information on how to configure the Ethernet Bridge Access Point repeater for Example 2.

1. After unpacking, attach the antenna and the power pack. Then you must configure the access point. You can configure the access point in two ways:

   - Using an attached RS-232C ANSI terminal.
   - Through a TCP/IP TELNET session.

   The first configuration should be made before placing the units in their final positions using an ANSI terminal.

   The default settings for this connection are 9600 baud, no parity, 8 data bits, and 1 stop bit (9600, N, 8, 1). The access point port is a DCE using a DB-9 (9 pin RS-232) connector.

   We used the Windows Terminal emulator to configure the access point. After you start the ANSI terminal emulation, you get the Main Menu display.

```
IBM 2480-EB0 V3.2N       Main Menu

    Option            Value       Description

1 - Configuration    [ menu  ]   - General configuration
2 - Statistics       [ menu  ]   - Display statistics
3 - Registration     [ menu  ]   - Registration table maintenance
4 - Filter           [ menu  ]   - Control packet filtering
5 - Logs             [ menu  ]   - Alarm and log control
6 - Diagnostics      [ menu  ]   - Maintenance and testing commands
7 - Privilege        [ write ]   - Set privilege level
8 - Help                         - Introduction
Enter an option number or name >
```

Figure 82. Example 2: Ethernet Bridge Access Point Main Menu

2. Choose **1 - Configuration**:

```
IBM 2480-EB0 V3.2N             Configuration

    Option       Value      Description

1 - Radio       [ menu ]   - Radio network parameters
2 - Ethernet    [ menu ]   - Ethernet configuration
3 - Ident       [ menu ]   - Identification information
4 - Console     [ menu ]   - Console set-up
5 - Snmp        [ menu ]   - Set snmp values
6 - Stp         [ menu ]   - Spanning Tree Protocol
7 - Dump                   - Dump configuration to console

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 83. Example 2: Ethernet Bridge Access Point Configuration Menu

3. Choose **1 - Radio**:

```
IBM 2480-EB0 V3.2N          Configuration - Radio

    Option         Value        Description

1 - Sid            [    6    ]   - System identifier
2 - Bitrate        [  2000   ]   - Data bit rate in kilobits / second
3 - Frequency      [ 2442_A2 ]   - Center frequency in MHz
4 - Root           [   off   ]   - Enable root mode
5 - Autoscan       [   on    ]   - Enable auto scan mode
6 - Linktest       [  menu   ]   - Run a link test
7 - Extended       [  menu   ]   - Extended parameters

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 84. Example 2: Ethernet Bridge Access Point Radio Configuration Menu

4. Enter the correct values. Then press <ESC> to go back to "Configuration Menu" where you take option **2 - Ethernet** for Ethernet configuration. This leads you to Figure 85 on page 64.

```
IBM 2480-EB0 V3.2N         Configuration Ethernet

   Option        Value        Description

 - Active     [   on    ]   - Connection active
 - Size       [  1518   ]   - Maximum frame size
 - Port       [ 10base2 ]   - Port selection
 - Fallback   [   off   ]   - Become repeater on LAN cable fault

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 85. Example 2: Ethernet Bridge Access Point Ethernet Configuration Menu

5. Enter the correct values. Then press <ESC> to go back to "Configuration Menu" where you take option **3 - Ident**. This leads you to Figure 86.

```
IBM 2480-EB0 V3.2N         Configuration - Ident

    Option              Value             Description

1 - Name         [ "2480-EB0_100e3f" ]   - Node name
2 - Nid          [   004096100e3f    ]   - Network address
3 - Inaddr       [  009.163.004.155  ]   - Internet address
4 - Inmask       [  255.255.255.000  ]   - Internet subnet mask
5 - Ingateway    [  000.000.000.000  ]   - Internet default gateway
6 - Location     [        ""         ]   - SNMP system location
7 - Contact      [        ""         ]   - SNMP system contact name

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 86. Example 2: Ethernet Bridge Access Point Ident Configuration Menu

6. Enter the correct values. Then press <ESC> twice to go back to "Main Menu", where you take option **4 - Filter**. This leads you to Figure 87.

```
IBM 2480-EB0 V3.2N                Filter Menu                2480-EB0_1

    Option        Value      Description

1 - Multicast    [ menu ]   - Multicast address filtering
2 - Node         [ menu ]   - Node address filtering
3 - Protocols    [ menu ]   - Protocol filters

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 87. Example 2: Ethernet Bridge Access Point Filter Menu

7. Select **1 - Multicast**. This leads you to Figure 88 on page 65.

```
IBM 2480-EB0 V3.2N            Filter Multicast Menu            2480-EB0_1

    Option       Value        Description

1 - Default   [ forward ]   - Default multicast action
2 - Show                   - Display the multicast filters
3 - Add                    - Add a multicast address filter
4 - Remove                 - Remove a multicast address filter

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 88. Example 2: Ethernet Bridge Access Point Filter Multicast Menu

If you do not intend to work with Ethernet filtering, you do not have to change anything on the "Filter Menu". In fact, we recommend that you not change anything unless you are very comfortable with filtering. The following displays are related to filtering and are provided here just for your reference purpose.

8. Check if the value for "Default" is **forward**. It should be because it is a default value. If not, change the value to "forward". Press <ESC> to go back to "Filter Menu" where you select **2 - Node**. This leads you to Figure 89.

```
IBM 2480-EB0 V3.2N          Filter Node

    Option       Value        Description

1 - Ethdst    [ forward ]   - Destination address from ethernet
2 - Raddst    [ forward ]   - Destination address from radio
3 - Source    [ forward ]   - Source addresses
4 - Display                 - Display the node address filters
5 - Add                     - Add a node address filter
6 - Remove                  - Remove a node address filter

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 89. Example 2: Ethernet Bridge Access Point Filter Node Menu

9. Check to see if the values are the same as in Figure 89. Press <ESC> to go back to "Filter Menu" where you select **3 - Protocols**. This leads you to Figure 90 on page 66.

```
IBM 2480-EB0 V3.2N            Filter Protocol

    Option     Value      Description

1 - Default   [ off ]   - Default action
2 - Display             - Display the protocol filters
3 - Add                 - Add a protocol filter
4 - Remove              - Remove a protocol filter
5 - Length    [ 22  ]   - Length of packet data to log
6 - Monitor   [ off ]   - Protocol monitoring enabled
7 - Show                - Show forwarded protocol list
8 - Clear               - Clear forwarded protocol list

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 90. Example 2: Ethernet Bridge Access Point Filter Node Menu

10. Check to see if the values are the same as in Figure 89 on page 65. Press <ESC> to go back to "Filter Menu" where you select **3 - Protocols**. This completes the steps of configuring the Ethernet Bridge Access Point repeater.

2.3.6.2 Second Ethernet Bridge Access Point Configuration (Segment A)

In this section, we provide the information on how to configure Ethernet Bridge Access Point root node for Example 2. Many of the displays are the same as for the repeater configuration. We provide only those that are unique for the root node configuration.

1. From the "Main Menu", select **1 - Configuration**.
2. From the "Configuration Menu", select **1 - Radio**. From the "Configuration Menu", select **4 - Root** and set it on. The result should look the same as Figure 91.

```
IBM 2480-EB0 V3.2N           Configuration - Radio

    Option         Value        Description

1 - Sid         [    6    ]   - System identifier
2 - Bitrate     [  2000   ]   - Data bit rate in kilobits / second
3 - Frequency   [ 2442_A2 ]   - Center frequency in MHz
4 - Root        [   on    ]   - Enable root mode
5 - Autoscan    [   on    ]   - Enable auto scan mode
6 - Linktest    [  menu   ]   - Run a link test
7 - Extended    [  menu   ]   - Extended parameters

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 91. Example 2: Ethernet Bridge Access Point Root Configuration Menu

3. Press <ESC> to go back to the "Configuration Menu" where you select **3 - Ident**. This leads you to Figure 92 on page 67.

```
                  IBM 2480-EB0 V3.2N          Configuration

    Option              Value             Description

1 - Name          [ "2480-EB0_103656" ]   - Node name
2 - Nid           [   004096103656    ]   - Network address
3 - Inaddr        [  009.163.004.150  ]   - Internet address
4 - Inmask        [  255.255.255.000  ]   - Internet subnet mask
5 - Ingateway     [  009.163.004.150  ]   - Internet default gateway
6 - Location      [   "Main_Bridge"   ]   - SNMP system location
7 - Contact       [        ""         ]   - SNMP system contact name

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 92. Example 2: Ethernet Bridge Access Point Root Configuration Menu

4. Press <ESC> to go back to the "Configuration Menu" where you select **6 - Stp**. This leads you to Figure 93.

```
 IBM 2480-EB0 V3.2N            Configuration Stp Menu            2480-EB0

    Option        Value          Description

1 - Active    [    on     ]   - Protocol enabled
2 - Bridge    [   menu    ]   - Bridge parameters
3 - Port      [   menu    ]   - Port parameters
4 - Display                   - Protocol status
5 - State     [ "Forward" ]   - Local ethernet port state

Enter an option number or name, "=" main menu, <ESC> previous menu
>                                                                  ption
```

Figure 93. Example 2: Ethernet Bridge Access Point STP Menu

5. Select **2 - Bridge**. This leads you to Figure 94.

```
 IBM 2480-EB0 V3.2N        Configuration Stp Bridge Menu        2480-EB0_

    Option              Value      Description

1 - Priority          [ 8000 ]   - Bridge priority
2 - Hello_time        [  2   ]   - Hello message interval
3 - Forward_delay     [  15  ]   - Forwarding delay
4 - Msg_age_timeout   [  20  ]   - Receive hello message timeout

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 94. Example 2: Ethernet Bridge Access Point Bridge Menu

6. Press <ESC> to go back to the "Stp Menu" where you select **3 - Port**. This leads you to Figure 95 on page 68.

```
IBM 2480-EB0 V3.2N      Configuration Stp Port Menu         2480-EB0_10

   Option       Value      Description

 - Port        [ on  ]   - Protocol enabled for ethernet port
 - Priority    [ 80  ]   - Local ethernet port priority
 - Cost        [ 100 ]   - Local ethernet port cost
 - Rport                 - Protocol enabled for remote port
 - Rpriority             - Remote port priority
 - Rcost                 - Remote port cost

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 95. Example 2: Ethernet Bridge Access Point Bridge Menu

This completes the Ethernet Bridge Access Point root node configuration.

2.3.7 Matching Parameters

```
AS/400
Network Attributes
   SYSNAME..... SYSNM040
   LCLNETID.... ITSCNET  3
   LCLCPNAME... SYSNM040
   LCLLOCNAME.. SYSNM040  1


LIND.......... ETHLAN
   ADPTADR....... 420000000018  2
   SSAP
     Source SAP.. 04
     Max.frame .. 1496  4
     SSAP type... *SNA
```

```
CA/400
Config.pcs
    1  TRLI SYSNM040,420000000018 2
    3  RTLN ITSCNET.PS2
    4  TRMF 1496

Protocol.ini
[ACWNDIS ]
    5  CHANNEL = 3
    6  DATARATE = 4
    7  SYSTEMID = 0x06


OS/2
NTS/2
Protocol.ini
[ACWNDIS_nif ]
    5  CHANNEL = 3
    6  DATARATE = 4
    7  SYSTEMID = 0x06

CM/2
Wls.ndf
DEFINE_LOGICAL_LINK  LINK_NAME(WLSLINK )
    2 DESTINATION_ADDRESS(X'42000000001804')
    4 DLC_NAME(ETHERAND)


IBM 2480 EBO access point
    7  Sid        [ 6    ]
    6  Bitrate    [ 2000 ]
    5  Frequency  [ 2442 ]
```

Figure 96. Example 2: Matching Parameters

- 1 AS/400 Local Location Name
- 2 AS/400 wireless LAN address

  The wireless LAN address follows the Ethernet standard.
- 3 AS/400 Network Name
- 4 Wireless LAN Max. Frame is 1496. CM/2 was configured for DLC Ethernet (ETHERAND) with I-frame equals to 1417
- 5 Central Frequency
- 6 Bit Rate
- 7 System ID
- 8 Transport Address
- 9 portable transaction computer ID

2.3.7.1 Other Ethernet Bridge Scenarios

The Ethernet bridge access points provide the capability to bridge two or more Ethernet LAN segments wirelessly.

- If 2480-EB0, the Ethernet bridge access point, is configured as bridge, it has to have another Ethernet bridge access point which is also configured as a bridge for its parent.
- If two or more Ethernet bridge access points bridges are in the same radio node, (that is, use the same frequency and network id), one of them must be assigned as Root and all the others as repeaters.
- Each radio node can only have one root.
- The other access points, such as 2480-E00 or 2480-RS0 can have any other access points as its parent.

There are many other possible configurations with Ethernet bridge access points than the one we already discussed. Here we provide a couple of them.

Workstation Accessing Two AS/400 Hosts on Different LANs: The following picture shows the setup:

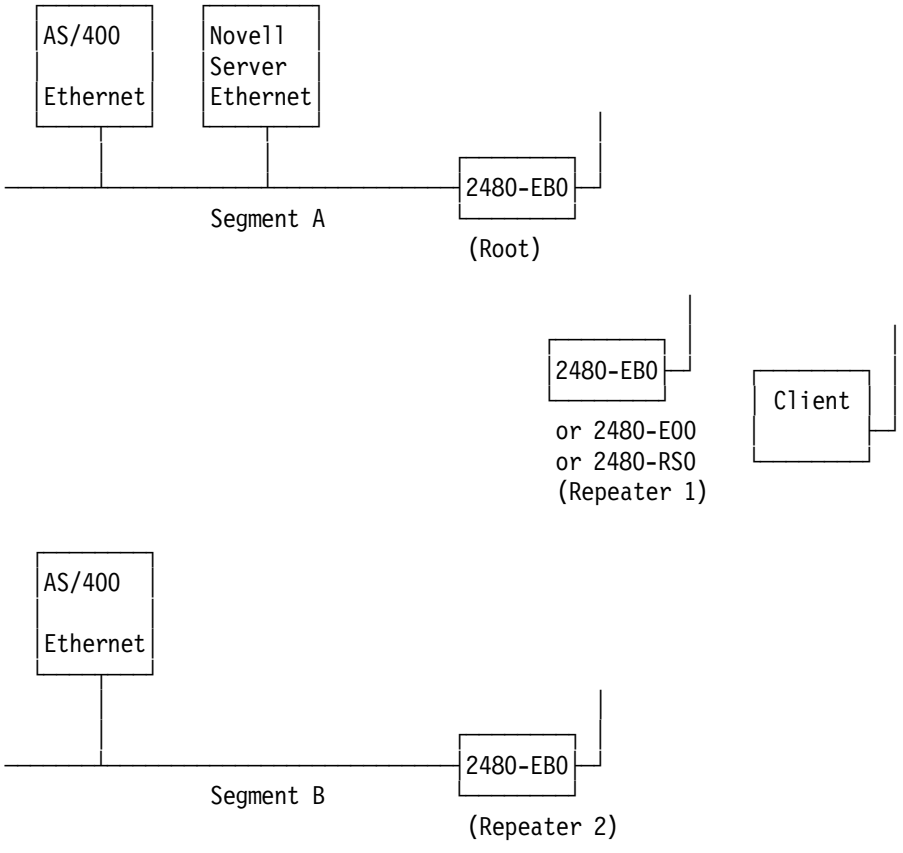


Figure 97. Example 2: Workstation to Two AS/400 Hosts

Four LAN Segments Example with One AS/400 Host: The following picture shows the setup:

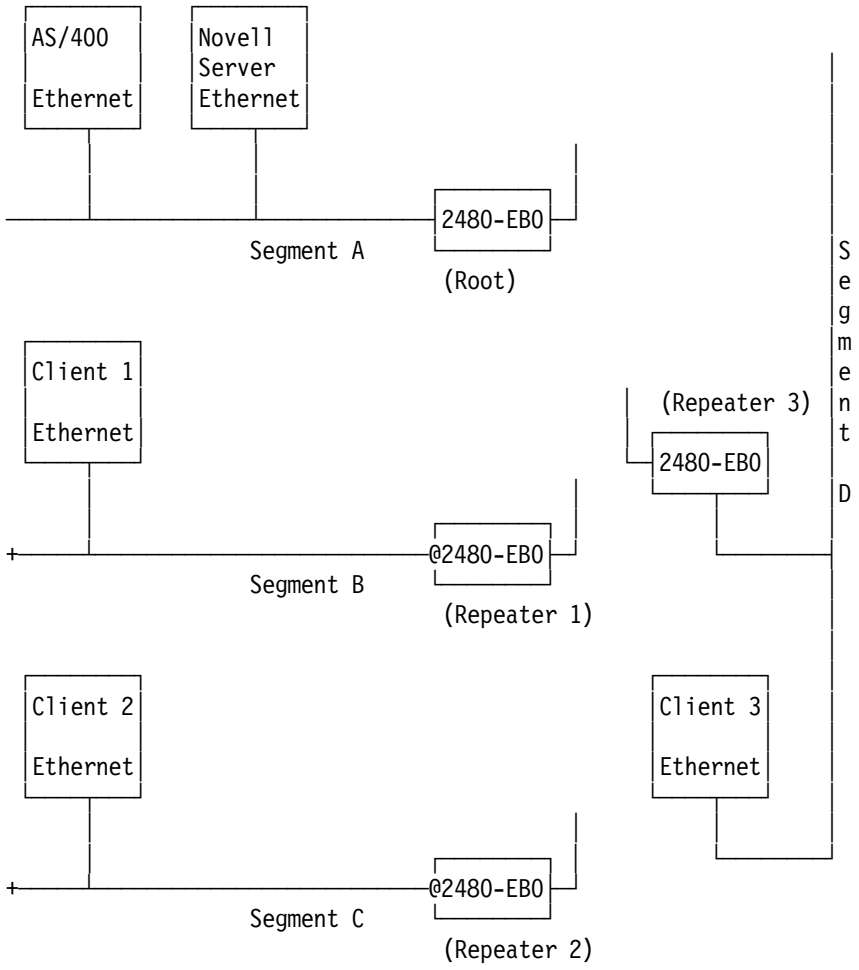


Figure 98. Example 2: Workstation to Two AS/400 Hosts

2.4 Example 3: AS/400 Wireless LAN with Ethernet Access Point

You can use Ethernet LAN as a backbone for your wireless network. This section provides the information of how to do that. There is no particular configuration requirement other than AS/400 configuration difference.

2.4.1 Scenario Diagram

Figure 99 on page 72 shows the setup.

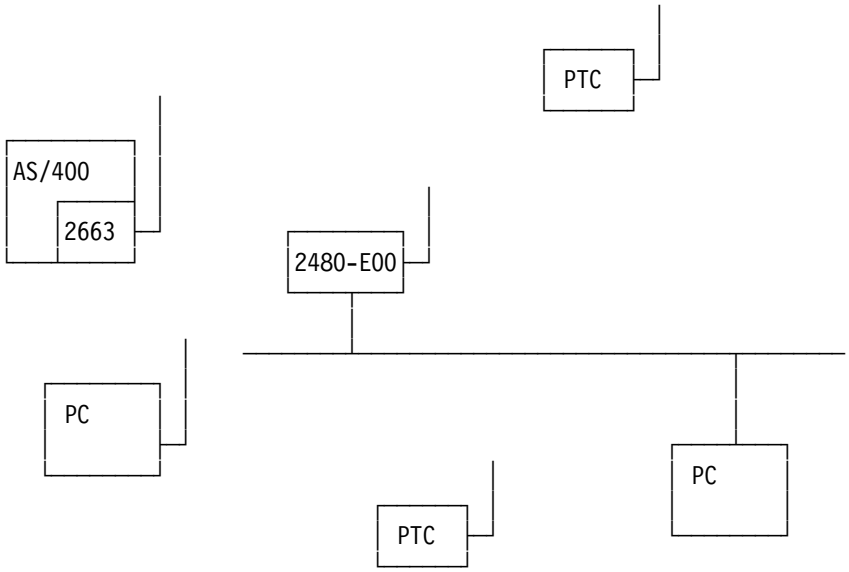


Figure 99. Example 3: Scenario View

2.4.2 Logical Topology of the RF Network

Figure 100 on page 73 shows the logical topology diagram of the RF network.

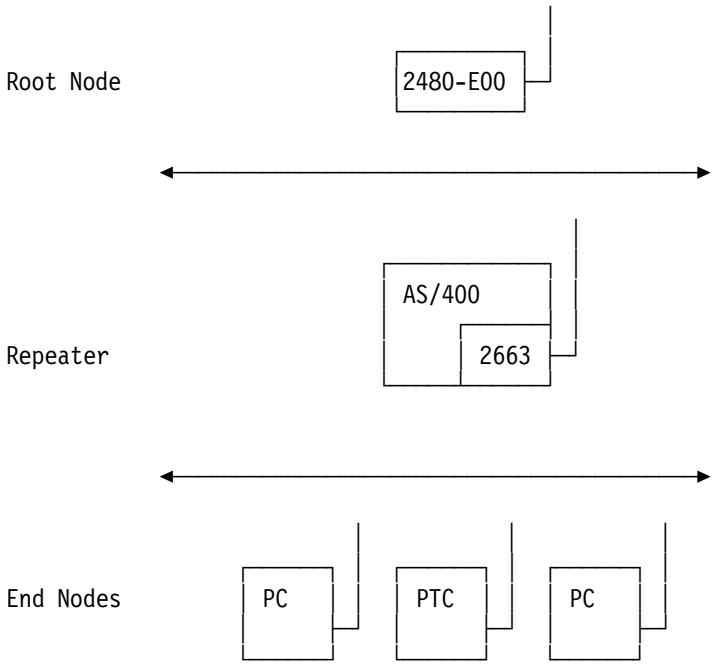


Figure 100. Example 3: RF Topology

2.4.3 AS/400 Configuration Objects

As far as AS/400 configuration is concerned, you have to specify ***NO** on the ″Root or repeater″ parameter and ***RADIO** on the ″Adapter configuration″ parameter for the Extended Wireless Line Member and its source file, QEWLSRC. You can do this in Figure 101. If you are not sure how to reach to this display, refer to the AS/400 wireless configuration steps provided in 2.4.3, “AS/400 Configuration Objects.”

```
                      Add Wireless Line Member (ADDEWLM)

Type choices, press Enter.

Initialization source member . . > WLSRS         Name

                           Additional Parameters

Initialization source file . . . > QEWLSRC       Name, QEWLSRC
  Library  . . . . . . . . . . . >   QGPL        Name, *LIBL, *CURLIB
Adapter configuration  . . . . . > *RADIO        *ALL, *RADIO, *WIRED
Hop identifier . . . . . . . . .   *ADPT         020000000000-FEFFFFFFFFFF...
Root or repeater cell  . . . . . > *NO           *YES, *NO
Frequency  . . . . . . . . . . . > *A2           *A1, *A2, *A3, *B1, *B2
Data rate  . . . . . . . . . . .   2M            2M, 1M
Radio system identifier  . . . . > 000006        000002-FFFFFE
Text 'description' . . . . . . . > 'EWLM for Scenario 4'
```

Figure 101. Example 4: ADDEWLM

2.4.4 Access Point Configuration

There is no particular configuration requirement for this scenario. For general Access Point configuration, refer to 2.2.4, “Access Point Configuration” on page 30.

2.4.5 Portable Transaction Computer Configuration

There is no particular configuration requirement for this scenario. For general PTC configuration, refer to 2.2.5, “Portable Transaction Computer Configuration” on page 36.

2.4.6 Portable Transaction Computer Configuration

There is no particular configuration requirement for this scenario. For general PTC configuration, refer to 2.2.5, “Portable Transaction Computer Configuration” on page 36.

2.4.7 PC Configuration

There is no particular configuration requirement for this scenario. For general PC configuration, refer to 2.2.6, “PC Configuration” on page 39.

2.5 Example 4: AS/400 Wireless LAN with RS-485 Access Points

You can use the RS-485 backbone for your wireless network. This section provides the information on how to do that.

2.5.1 Scenario Diagram

Figure 102 shows the setup.

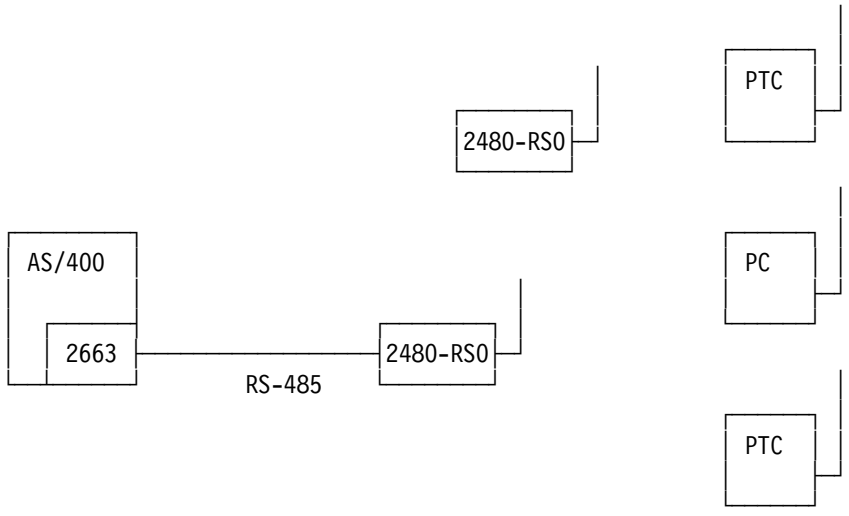


Figure 102. Example 4: Scenario View

2.5.2 Logical Topology of the RF Network

Figure 103 shows the logical topology diagram of the RF network.

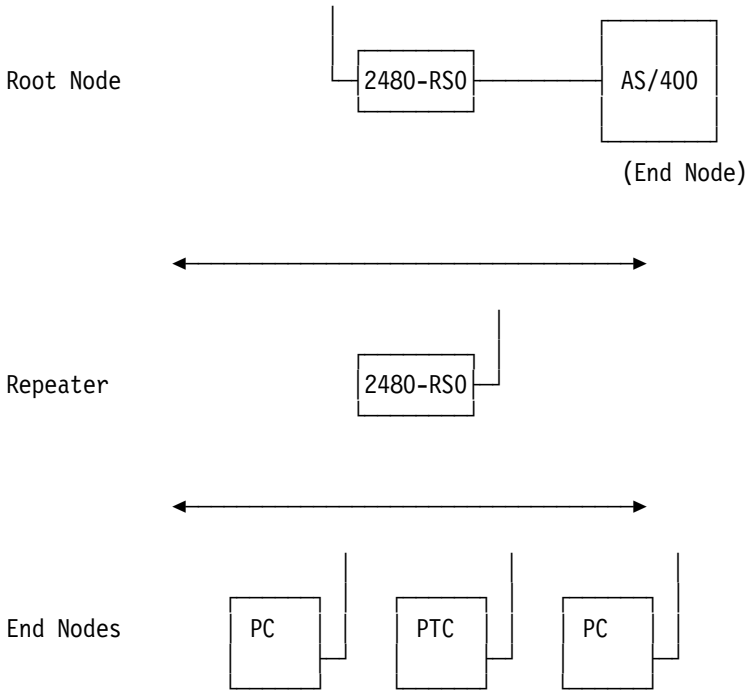


Figure 103. Example 4: RF Topology

2.5.3 AS/400 Configuration

As far as AS/400 configuration is concerned, you have to specify ***WIRED** on the ″Adapter configuration″ parameter for the Extended Wireless Line Member and its source file, QEWLSRC. You can do this in Figure 104 on page 76. If you are not sure how to reach to this display, refer to the AS/400 wireless configuration steps provided in 2.2.3, “AS/400 Configuration Objects” on page 22.

```
                    Add Wireless Line Member (ADDEWLM)

Type choices, press Enter.

Initialization source member . . > WLSRS         Name

                           Additional Parameters

Initialization source file . . . > QEWLSRC       Name, QEWLSRC
  Library  . . . . . . . . . . . >   QGPL        Name, *LIBL, *CURLIB
Adapter configuration  . . . . . > *WIRED        *ALL, *RADIO, *WIRED
Hop identifier . . . . . . . . .   *ADPT         020000000000-FEFFFFFFFFFF...
Root or repeater cell  . . . . . > *NO           *YES, *NO
Frequency  . . . . . . . . . . . > *A2           *A1, *A2, *A3, *B1, *B2
Data rate  . . . . . . . . . . .   2M            2M, 1M
Radio system identifier  . . . . > 000006        000002-FFFFFE
Text 'description' . . . . . . . > 'EWLM for Scenario 4'
```

Figure 104. Example 4: ADDEWLM

2.5.4 Access Point Configuration

2.5.4.1 First Access Point Configuration

1. After unpacking and attaching the antenna and the power pack, you must configure the access point. You can configure the access point in two ways: using an attached RS-232C ANSI terminal or through a TCP/IP TELNET session. The first configuration should be made using an ANSI terminal before placing the units in their final positions.

   The default settings for this connection are 9600 baud, no parity, 8 data bits, and 1 stop bit (9600, N, 8, 1). The access point port is a DCE using a DB-9 (9 pin RS-232) connector.

   We used the Windows Terminal emulator to configure the access point. After you start the ANSI terminal emulation, you get the Main Menu display. Choose **1 - Configuration**.

```
IBM 2480-RS0 V3.2N                Main Menu

    Option            Value       Description

1 - Configuration   [ menu  ] - General configuration
2 - Statistics      [ menu  ] - Display statistics
3 - Registration    [ menu  ] - Registration table maintenance
4 - Logs            [ menu  ] - Alarm and log control
5 - Diagnostics     [ menu  ] - Maintenance and testing commands
6 - Privilege       [ write ] - Set privilege level
7 - Help                      - Introduction

Enter an option number or name
> 1
```

Figure 105. Example 4: Configuring Access Point (1/24)

2. You get the display in Figure 106 on page 77.

```
IBM 2480-RS0 V3.2N            Configuration Menu

    Option       Value      Description

1 - Radio       [ menu  ] - Radio network parameters
2 - RS-485      [ menu  ] - RS-485 configuration
3 - Ident       [ menu  ] - Identification information
4 - Console     [ menu  ] - Console set-up
5 - Snmp        [ menu  ] - Set snmp values
6 - Dump                  - Dump configuration to console


Enter an option number or name, "=" main menu, <ESC> previous menu
> 1
```

Figure 106. Example 4: Configuring Access Point (2/24)

3. On the Configuration Menu, choose **1 - Radio** for radio configuration.

```
IBM 2480-RS0 V3.2N          Configuration Radio Menu

    Option        Value      Description

1 - Sid         [     4     ] - System identifier
2 - Bitrate     [   1000    ] - Data bit rate in kilobits / second
3 - Frequency   [ 2412_(A1) ] - Center frequency in MHz
4 - Root        [    off    ] - Enable root mode
5 - Autoscan    [    on     ] - Enable auto scan mode
6 - Linktest    [   menu    ] - Run a link test
7 - Extended    [   menu    ] - Extended parameters

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 107. Example 4: Configuring Access Point (3/24)

4. Choose option **1**. We are now prompted for the Sid. This parameter must match the system ID in the AS/400 Extended wireless Line Member. Enter Sid 6.

```
> sid
Enter a number in hex of ffffffh or less : 6
```

Figure 108. Example 4: Configuring Access Point (4/24)

5. Choose option **2** and enter the bit rate. This parameter must match the "Data Rate" parameter in the AS/400 Extended wireless Line Member. Enter 2000.

```
> bitrate
Enter rate in kb/s, one of [354, 500, 1000, 2000 ] : 2000
```

Figure 109. Example 4: Configuring Access Point (5/24)

6. Choose option **3** and enter the frequency. This parameter must match the ″Frequency′ parameter in the AS/400 Extended wireless Line Member.

```
> frequency
Enter frequency in MHz, one of [2412_(A1), 2427_(B1), 2442_(A2),
             2457_(B2), 2465_(A3)] : 2442
```

Figure 110. Example 4: Configuring Access Point (6/24)

7. Choose option **4** and configure the Root option. The access point has to be configured as a Root in this scenario. Enter Y and the parameter changes to ON. This option works the same as a tumbler switch.

```
> root
Are you sure [y/n] ? Y
```

Figure 111. Example 4: Configuring Access Point (7/24)

After changing the Root parameter, the Configuration Radio Menu does not show the Autoscan option. This option is only used when the access point is configured as a repeater.

```
IBM 2480-RSO V3.2N          Configuration Radio Menu

    Option        Value      Description

1 - Sid         [     6     ] - System identifier
2 - Bitrate     [   2000    ] - Data bit rate in kilobits / second
3 - Frequency   [ 2442_(A2) ] - Center frequency in MHz
4 - Root        [    on     ] - Enable root mode
5 - Linktest    [   menu    ] - Run a link test
6 - Extended    [   menu    ] - Extended parameters

Enter an option number or name, ″=″ main menu, <ESC> previous menu
>
```

Figure 112. Example 4: Configuring Access Point (8/24)

8. These are the parameters used in this scenario. Now we go back to the Configuration Menu.

```
IBM 2480-RSO V3.2N            Configuration Menu

    Option       Value      Description

1 - Radio       [ menu  ] - Radio network parameters
2 - RS-485      [ menu  ] - RS-485 configuration
3 - Ident       [ menu  ] - Identification information
4 - Console     [ menu  ] - Console set-up
5 - Snmp        [ menu  ] - Set snmp values
6 - Dump                  - Dump configuration to console


Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 113. Example 4: Configuring Access Point (9/24)

9. Option *RS-485* allows you to enable or disable the RS-485 port and assign an RS-485 address to it. Choose option **2**.

```
IBM 2480-RSO V3.2N          Configuration RS-485 Menu

    Option            Value            Description

1 - Active     [     ON          ] - RS-485 connection active
2 - Address    [  dynamic        ] - Network address

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 114. Example 4: Configuring Access Point (10/24)

10. Because you configured the access point as a *Root* option 1, *Active*, should be *ON* If not, choose **1** and enter Y. This option works the same as a tumbler switch.

```
> active
Are you sure [y/n ] ? Y
```

Figure 115. Example 4: Configuring Access Point (11/24)

11. You may want to configure the RS-485 address. Enter **2** and enter a value from 1 to 127. In our example, we used a dynamic address.

```
> address
Enter one of [dynamic, a address between 1 and 127 ] dynamic
```

Figure 116. Example 4: Configuring Access Point (12/24)

12. After verifying that the RS-485 connection status is active, go back to the Configuration Menu.

```
IBM 2480-RS0 V1.21             Configuration Menu

    Option       Value      Description

1 - Radio       [ menu  ] - Radio network parameters
2 - RS-485      [ menu  ] - RS-485 configuration
3 - Ident       [ menu  ] - Identification information
4 - Console     [ menu  ] - Console set-up
5 - Snmp        [ menu  ] - Set snmp values
6 - Dump                    - Dump configuration to console


Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 117. Example 4: Configuring Access Point (13/24)

2.5.4.2 Optional Configuration - Strongly Recommended

1. To make the wireless LAN easy to manage, we need to configure the *Identification information*. The configuration information allows you to get an easier view of your wireless LAN. The network addresses should be meaningful to you. This is the first step in a network management strategy. Use option **2 - Ident** on the Configuration Menu. The following configuration menu comes up.

```
IBM 2480-RS0 V3.2N          Configuration Ident Menu

    Option            Value            Description

1 - Name       [       ""        ] - Node name
2 - Nid        [  00409610350c   ] - Network address
3 - Inaddr     [ 000.000.000.000 ] - Internet address
4 - Inmask     [ 000.000.000.000 ] - Internet subnet mask
5 - Location   [       ""        ] - SNMP system location
6 - Contact    [       ""        ] - SNMP system contact name

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 118. Example 4: Configuring Access Point (14/24)

2. To configure the access point name, enter 1 and then the name. Fill in the *ROOT-01*.

```


> name
Enter a name of at most 20 characters : ROOT-01
```

Figure 119. Example 4: Configuring Access Point (15/24)

3. We changed the access point *Nid*, Network Address, to a locally administered address. Use option **2** and enter 000000248001.

```
> nid
Enter one of [default, our network address ] : 000000248001
```

Figure 120. Example 4: Configuring Access Point (16/24)

4. The *Inaddr* is the IP Address of the access point. Use option **3** and enter 009.005.065.028.

```
> inaddr
Enter an IP address : 009.005.065.028
```

Figure 121. Example 4: Configuring Access Point (17/24)

5. The *Inmask* is the IP subnet mask the access point. Use option **4** and enter 255.255.255.000.

```
> inmask
Enter an IP address : 255.255.255.000
```

Figure 122. Example 4: Configuring Access Point (18/24)

6. Fill in the access point location using option 5.

```
> Location
Enter a location of at most 20 characters : ITSO-LAB
```

Figure 123. Example 4: Configuring Access Point (19/24)

7. Fill in the access point contact name using option 6.

```
> Contact
Enter a location of at most 20 characters : YESSONG_JOHNG
```

Figure 124. Example 4: Configuring Access Point (20/24)

8. We have finished the access point configuration. The Configuration Ident Menu should look the same as the display in Figure 125 on page 82.

```
IBM 2480-RS0 V3.2N          Configuration Ident Menu

    Option            Value            Description

1 - Name       [    "ROOT-01"    ] - Node name
2 - Nid        [  000000248001   ] - Network address
3 - Inaddr     [ 009.005.065.028 ] - Internet address
4 - Inmask     [ 255.255.255.000 ] - Internet subnet mask
5 - Location   [   "ITSO-LAB"    ] - SNMP system location
6 - Contact    [ "YESSONG_JOHNG" ] - SNMP system contact name

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 125. Example 4: Configuring Access Point (21/24)

9. Press Esc twice to go to the main menu. Choose option **5 Diagnostics** and then option **3** to *Restart* the access point.

```
IBM 2480-RS0 V3.2N          Configuration Radio Menu

    Option        Value      Description

1 - Connect                          - Start a telnet session
2 - Linktest    [ menu ] - Run a link test
3 - Restart                          - Equivalent to power-up
4 - Defaults                         - Return to default
5 - Load        [ menu ] - Load new version of code

Enter an option number or name, "=" main menu, <ESC> previous menu
>
```

Figure 126. Example 4: Configuring Access Point (22/24)

10. Use option **3** to *Restart* the access point and answer Y.

```
> restart
Are you sure [y/n ] ?
```

Figure 127. Example 4: Configuring Access Point (23/24)

11. After pressing Enter, the access point restarts and you get the following messages:

```
Rebooting unit ...
Restoring the configuration
```

Figure 128. Example 4: Configuring Access Point (24/24)

12. After access point restarts, press *Esc* twice to return to the main menu. You have finished the access point configuration.

2.5.4.3 Second Access Point Configuration

The second access point was configured with the parameters in Figure 129 and inFigure 130.

1. Radio configuration

```
IBM 2480-RS0 V3.2N          Configuration Radio Menu

    Option        Value      Description

1 - Sid         [     4     ] - System identifier
2 - Bitrate     [   1000    ] - Data bit rate in kilobits / second
3 - Frequency   [ 2412_(A1) ] - Center frequency in MHz
4 - Root        [    off    ] - Enable root mode
5 - Autoscan    [    off    ] - Enable auto scan mode
6 - Linktest    [   menu    ] - Run a link test
7 - Extended    [   menu    ] - Extended parameters
```

Figure 129. Example 4: Configuring Second Access Point (1/2)

2. Identification configuration

```
IBM 2480-RS0 V1.21          Configuration Ident Menu

    Option            Value            Description

1 - Name        [  "REPEATER-02"  ] - Node name
2 - Nid         [  000000248002   ] - Network address
3 - Inaddr      [ 009.005.065.030 ] - Internet address
4 - Inmask      [ 255.255.255.000 ] - Internet subnet mask
5 - Location    [   "ITSO-LAB"    ] - SNMP system location
6 - Contact     [ "YESSONG_JOHNG" ] - SNMP system contact name
```

Figure 130. Example 4: Configuring Second Access Point (2/2)

2.5.5 Portable Transaction Computer Configuration

There is no particular configuration requirement for this scenario. For general PTC configuration, refer to 2.2.5, “Portable Transaction Computer Configuration” on page 36.

2.5.6 Portable Transaction Computer Configuration

There is no particular configuration requirement for this scenario. For general PTC configuration, refer to 2.2.5, “Portable Transaction Computer Configuration” on page 36.

2.5.7 PC Configuration

There is no particular configuration requirement for this scenario. For general PC configuration, refer to 2.2.6, “PC Configuration” on page 39.

2.6 Example 5: AS/400 Wireless with Token-Ring Access Points

You can build a wireless network with this newly introduced device of 2480-TR0, token-ring access point. On your AS/400 system's side, you need a token-ring adapter.

2.6.1 AS/400 Configuration Objects

There is no wireless LAN particular configuration requirements for AS/400 configuration objects for this scenario. This sectionis provided just in case you are not familiar with how to configure TokenRing for As/400. If you are, skip to 2.6.2, "Access Point Configuration" on page 87.

Note: For general wireless LAN configuration on the AS/400 system. you do not need to use reversed addresses. Refer to 2.2.3, "AS/400 Configuration Objects" on page 22.

2.6.1.1 How to Create Token-Ring Line Description

You can create a token-ring line-to-token-ring line card (in this example, type 6034 resource lin021) or to FSIOP (in this example, type CC06 resource lin071) or both.

- Type the command WRKHDWRSC *CMN.
- Find out your resource name.
- Type the command CRTLINTRN and press the F4 key.

1. First configuration display

```
                    Create Line Desc (Token-Ring) (CRTLINTRN)

Type choices, press Enter.

Line description . . . . . LIND         > TRN021
Resource name  . . . . . . RSRCNAME     > LIN021
Online at IPL  . . . . . . ONLINE         *YES
Vary on wait . . . . . . . VRYWAIT        *NOWAIT
Maximum controllers  . . . . . MAXCTL     40
Line speed . . . . . . . . . . LINESPEED  4M
Maximum frame size . . . . . . MAXFRAME   1994
Local adapter address  . . . . . ADPTADR  > 400020202020
Exchange identifier  . . . . . EXCHID     *SYSGEN
SSAP list:                     SSAP
  Source service access point  .          *SYSGEN
  SSAP maximum frame . . . . . .
  SSAP type  . . . . . .
                         + for more values
Text 'description' . . . . . . TEXT       Tokenring RSC lin021
```

Figure 131. Example 5: How to Create Token-Ring Line

Add the required information.

Note: Use LAA range 400000000000 - 4FFFFFFFFFFF. This is our recommendation. The other addresses might be used for future purposes.

Press the F10 key to get more parameters.

2. Press the Page Down key.

```
                          Additional Parameters

Network controller . . . . . NETCTL
TRLAN manager logging level  . . TRNLOGLVL      *OFF
TRLAN manager mode . . . . . TRNMGRMODE     *OBSERVING
Log configuration changes  . . . LOGCFGCHG      *LOG
Token-ring inform of beacon  . . TRNINFBCN      *YES
Functional address . . . . . FCNADR         *NONE
                         + for more values
Early token release  . . . . . ELYTKNRLS      *LINESPEED
Error threshold level  . . . . . THRESHOLD      *OFF
Link speed . . . . . LINKSPEED      4M
Cost/connect time  . . . . . COSTCNN        0
Cost/byte  . . . . . COSTBYTE       0
Security for line  . . . . . SECURITY       *NONSECURE
                                                                    More
```

Figure 132. Example 5: Create Token-Ring Line

3. Press the Page Down key.

```
Type choices, press Enter.

Propagation delay  . . . . . PRPDLY         *LAN
User-defined 1 . . . . . USRDFN1        128
User-defined 2 . . . . . USRDFN2        128
User-defined 3 . . . . . USRDFN3        128
Autocreate controller  . . . . . AUTOCRTCTL     *YES
Autodelete controller  . . . . . AUTODLTCTL     1440
Recovery limits:                CMNRCYLMT
  Count limit  . . . . . .                  2
  Time interval  . . . . . .                5
Authority  . . . . . AUT            *LIBCRTAUT
```

Figure 133. Example 5: Create Token-Ring Line

4. Change Autocreate controller to ″YES″ if you do not want to create it by hand.

For Familiar User!

CRTLINTRN LIND(TRN021) RSRCNAME(LIN021) ADPTADR(400020202020) TEXT(Token ring RSC lin021′) AUTOCRTCTL(*YES)

If you are a familiar user, type this command on the command line.

1. This describes how to create a token-ring line for FSIOP. Type the command WRKHDWRSC. Find out what your line resource is. Type the command CRTLINTRN.

```
                  Create Line Desc (Token-Ring) (CRTLINTRN)

Type choices, press Enter.

Line description . . . . . LIND          >TRN071
Resource name  . . . . . . RSRCNAME      >*NWSD
Vary on wait . . . . . . . VRYWAIT        *NOWAIT
Maximum controllers  . . . . . MAXCTL     40
Network server description:      NWS
                                          >SERVER1
  Port number  . . . . . .                >2
Line speed . . . . . . . . LINESPEED     >16M
Maximum frame size . . . . . MAXFRAME     1994
Local adapter address  . . . . . ADPTADR  400020202020
Exchange identifier  . . . . . EXCHID     *SYSGEN
SSAP list:                       SSAP
  Source service access point  .          *SYSGEN
  SSAP maximum frame . . . . . .
  SSAP type  . . . . . .
                        + for more values
                                                              More
```

Figure 134. Example 5: FSIOP Token-Ring Description

Use LAA between the range 400000000000 - 4FFFFFFFFFFF.

Port 2 is the upper port if you have a two-port FSIOP.

2. Press the Page Down key.

```
Type choices, press Enter.

Text 'description' . . . . . TEXT         > 'FSIOP TRN P2'


                          Additional Parameters

Network controller . . . . . NETCTL
TRLAN manager logging level  . . TRNLOGLVL     *MIN
TRLAN manager mode . . . . . TRNMGRMODE     *OBSERVING
Log configuration changes  . . . LOGCFGCHG      *LOG
Token-ring inform of beacon  . . TRNINFBCN      *YES
Functional address . . . . . FCNADR         *NONE
                         + for more values
Early token release  . . . . . ELYTKNRLS      *LINESPEED
Error threshold level  . . . . . THRESHOLD      *OFF
Link speed . . . . . LINKSPEED      4M
Cost/connect time  . . . . . COSTCNN        0
                                                              More
```

Figure 135. Example 5: FSIOP Token-Ring Line

Sometimes it is useful to change parameter TRNLOGLVL to ″MIN″.

3. Press the Page Down key.

```
Type choices, press Enter.

Cost/byte  . . . . . . . . . . . COSTBYTE       0
Security for line  . . . . . . . SECURITY       *NONSECURE
Propagation delay  . . . . . . . PRPDLY         *LAN
User-defined 1 . . . . . . . . . USRDFN1        128
User-defined 2 . . . . . . . . . USRDFN2        128
User-defined 3 . . . . . . . . . USRDFN3        128
Autocreate controller  . . . . . AUTOCRTCTL     *YES
Autodelete controller  . . . . . AUTODLTCTL     1440
Recovery limits:                 CMNRCYLMT
  Count limit  . . . . . . . . .                2
  Time interval  . . . . . . . .                5
Authority  . . . . . . . . . . . AUT            *LIBCRTAUT
```

Figure 136. Example 5: FSIOP Token-Ring Line

Change AUTOCRTCTL to ″YES″ if you do not want to create the controller description by hand. Press Enter.

Remember: If your line description is on FSIOP, you have to vary on the server description. This function varies on your token-ring line.

For Familiar User!

```
CRTLINTRN LIND(TRN071) RSRCNAME(*NWSD) NWS(SERVER1 2)
LINESPEED(16M) ADPT ADR(400020202020) TEXT('FSIOP TRN P2')
AUTOCRTCTL(*YES)
```

If you are a familiar user, use the command line command.

2.6.2 Access Point Configuration

In this section, we provide a token-ring specific configuration. We used the Windows terminal emulator to configure the access point. The default values to the windows connection are 9600 baud, no parity, 8 data bits, and 1 stop bit (9600, N, 8, 1). The access point port is a DCE using a DB-9 (9 pin RS-232) connector.

1. First configuration display

```
                              Main Menu


1 - Configuration   [ menu  ]    - General configuration
2 - Statistics      [ menu  ]    - Display statistics
3 - Registration    [ menu  ]    - Registration table maintenance
4 - Filter          [ menu  ]    - Control packet filtering
5 - Logs            [ menu  ]    - Alarm and log control
6 - Diagnostics     [ menu  ]    - Maintenance and testing commands
7 - Privilege       [ write ]    - Set privilege level
8 - Help                        - Introduction
```

Figure 137. Example 5: Access Point Main Menu

2. On the Main Menu, choose 1-Configuration.

```
IBM 2480 TRO V3.2N              Configuration Menu

    Option        Value      Description

1 - Radio       [ menu ]   - Radio network parameters
2 - Tokenring   [ menu ]   - Token ring configuration
3 - Ident       [ menu ]   - Identification information
4 - Console     [ menu ]   - Console set-up
5 - Snmp        [ menu ]   - Set snmp values
6 - Dump                   - Dump configuration to console
```

Figure 138. Example 5: Access Point Configuration Menu

3. Select 1-Radio.

```
IBM 2480 TRO V3.2N           Configuration Radio Menu

    Option        Value      Description

1 - Sid         [  6   ]   - System identifier
2 - Bitrate     [ 2000 ]   - Data bit rate in kilobits / second
3 - Frequency   [ 2412 ]   - Center frequency in MHz
4 - Root        [  on  ]   - Enable root mode
5 - Autoscan    [  on  ]   - Enable auto scan mode
6 - Linktest    [ menu ]   - Run a link test
7 - Extended    [ menu ]   - Extended parameters
```

Figure 139. Example 5: Access Point Configuration Radio Menu

Be reminded that the values you are now entering should match with the values on the PROTOCOL.INI file for ThinkPad. Pay special attention to the following values.

```
Keywords on              PROTOCOL.INI on
Access Point             ThinkPad Configuration

SID          6      =    SystemID=0x5
Bitrate      2000   =    DataRate=4
Frequency    2412   =    Channel=1
```

Another reminder on this display is that you have to choose option 4 -"Root" and set the value on.

4. Press the <ESC> key to go back to the previous menu which is the Configuration Menu. Take option **2**.

```
IBM 2480 TRO V3.2N          Configuration Tokenring Menu

    Option            Value           Description

1 - Active      [       on      ]   - Connection active
2 - Speed       [       16      ]   - Ring speed
3 - Method      [ source_route  ]   - Routing method
4 - Fallback    [      off      ]   - Become repeater on LAN cable fault
```

Figure 140. Example 5: Access Point Configuration Token-Ring Menu

One important point here is to choose the correct ring speed. Choose the right speed for option 2 -"Speed". We chose **16**.

5. Press the <ESC> key to go back to the previous menu which is the Configuration Menu. Take option **3**.

```
IBM 2480 TRO V3.2N            Configuration Ident Menu

    Option              Value             Description

1 - Name          [  "631_111131"   ]   - Node name
2 - Nid           [  004096111131   ]   - Network address
3 - Inaddr        [ 000.000.000.000 ]   - Internet address
4 - Inmask        [ 000.000.000.000 ]   - Internet subnet mask
5 - Ingateway     [ 000.000.000.000 ]   - Internet default gateway
6 - Location      [       ""        ]   - SNMP system location
7 - Contact       [       ""        ]   - SNMP system contact name
```

Figure 141. Example 5: Access Point Configuration Ident Menu

Give IP information if you use TCP/IP network. Change Nid if you use locally administered addresses.

6. Press the <ESC> key to go back to the previous menu which is the Configuration Menu. Take option **4**.

```
IBM 2480 TRO V3.2N           Configuration Console Menu

    Option           Value         Description

1 - Type          [ teletype ]   - Terminal type
2 - Port          [   menu   ]   - Port set-up
3 - Dtr           [   off    ]   - Lost DTR causes logout
4 - Rpassword                    - Set readonly privilege password
5 - Wpassword                    - Set write privilege password
6 - Linemode      [   off    ]   - Console expects complete lines
7 - Telnet        [    on    ]   - Allow telnet connections
```

Figure 142. Example 5: Access Point Configuration Console Menu

Put option 7-Telnet on if you make connection through TCP/IP.

7. Press the <ECS> key twice to go back to the previous menu which is the "Main Menu". Take option **3**

```
IBM 2480 TRO V3.2N              Registration Menu

    Option       Value        Description

1 - Display                  - Display the table
2 - Summary                  - Display the table summary
3 - Autoreg   [   off   ]    - Allow automatic table additions
4 - Add                      - Control node registration
5 - Remove                   - Remove registration control
6 - Niddisp   [ numeric ]    - Node Ids display mode
```

Figure 143. Example 5: Access Point Registration Menu

8. Remember to turn off Autoreg, otherwise you get all of the addresses from token-ring. Add the client addresses here if you keep Autoreg -off.
9. Press the <ESC> key to go back to the Main Menu. Take option 6 ″Diagnostics″.

```
IBM 2480 TRO V3.2N               Diagnostics Menu

    Option         Value        Description

1 - Connect                   - Start telnet session
2 - Escape     [ ″ûXûYûZ″ ]   - Connection escape sequence
3 - Linktest   [   menu   ]   - Run a link test
4 - Restart                   - Equivalent to power-up
5 - Defaults                  - Return to default configuration
6 - Ping                      - Send an IP PING packet
7 - Load       [   menu   ]   - Load new version of firmware
```

Figure 144. Example 5: Diagnostics Menu

Choose option **4-Restart**. Press **Enter**. You are prompted to restart the access point. Press **y** After restart, press the <ESC> key twice. You have finished the access point configuration.

2.6.3 PC Configuration

You can have all wireless LAN PC adapters, namely for ISA, MCA, or PCMCIA with any relevant PC hardwares.

In this scenario, we used the following PC but this does not mean to imply that this is the only working solution.

PC	OS	Application
ThinkPad 755	DOS 7.0	Client Access/400 For Windows 3.1
		Microsoft TCP/IP-32 3.11
		Microsoft NetBeui
		Microsoft DLC
		IPX/SPX Compatible Transport

2.6.3.1 Install Adapter

The following is the procedure for installing a PCMCIA card.

Note: In some cases, you have to REM these lines from config.sys.

- DICRMU01.SYS
- $ICPMDOS.SYS
- AUTODRV.SYS

1. Install the card in slot.
2. Put PC Adapter Diskette in the diskette drive.
3. Find the ″Network″ group.
4. Click the ″Network Setup″ icon.
5. Choose ″Drivers″.
6. Click ″Add Adapter″.
7. Choose ″Unlisted or Updated Network Adapter″. Press Enter.
8. Select ″Aironet 690-2400 PCMCIA Adapter″.
9. Click ″Setup″.
10. Select right values. These values should match with those we gave on the token-ring configuration in 2.6.2, “Access Point Configuration” on page 87.
11. Select ″Add Protocol″. Choose the protocols you need. The following protocols are available to choose from, for example:
    - NetBEUI for LAN Requester
    - TCP/IP-32 3.11 for TELNET or other sockets.

      Note: Use the network facility of WFWG and TCP/IP by Microsoft. For terminal emulation, use either TCP/IP for Windows (TCP/IP for DOS may cause router errors), or PCOM3270 or PCOM5250.

      Make sure that you use the correct PROTOCOL.INI. You have to configure at a minimum, your IP address and Subnet Mask.
    - IPX/SPX for NetWare requester
    - DLC for CA/400 Windows 3.1

      Be Careful with DLC

      It is our understanding that this protocol only works with the following parameters if you want to use CA/400 for Windows 3.1.

      Set up DLC for CA/400 for Windows 3.1

      ```
      SAPs = 8
      xsaps0 = 5
      xstations = 5
      ```

2.6.3.2 ThinkPad with DOS 7.0 and WFWG

```
REM  ************************************************************
REM  *  DO NOT SPECIFY THE MEMORY RANGE WITHIN C000:0-C0FF:F OR  *
REM  *  D000:0-D0FF:F FOR PC CARDS.                              *
REM  ************************************************************
device=C:\DOS\HIMEM.SYS
device=c:\dos\emm386.exe noems ram x=a000-b1ff i=b200-b7ff x=b800-bfff i=
i=c000-cfff x=d000-d1ff x=e000-f7ff h=64 a=7 d=64 x=d400-dfff 1
dos=high
FILES=40
BUFFERS=40
STACKS=9,256
DEVICE=C:\DOS\DISPLAY.SYS CON=(,,1)
DEVICE=C:\THINKPAD\IBMDSS01.SYS
DEVICE=C:\THINKPAD\IBMDOSCS.SYS
DEVICE=C:\THINKPAD\DICRMU01.SYS /MA=C800-D800
DEVICE=C:\THINKPAD\$ICPMDOS.SYS
DEVICE=C:\DOS\SETVER.EXE
COUNTRY=358,850,C:\DOS\COUNTRY.SYS
INSTALLHIGH=C:\DOS\NLSFUNC.EXE C:\DOS\COUNTRY.SYS
SHELL=C:\DOS\COMMAND.COM C:\DOS /P
device=c:\windows\ifshlp.sys
LASTDRIVE=Z
```

Figure 145. Example 5: CONFIG.SYS File

```
c:\windows\net initialize:
C:\WINDOWS\msdlc.exe
C:\WINDOWS\net start
@ECHO OFF
PROMPT $p$g
path=C:\CAWIN;C:\DOS;c:\;c:\windows;c:\thinkpad;C:\WSFW311;C:\RUMBACAW
SET TEMP=C:\DOS
C:\DOS\KEYB SU,,C:\DOS\KEYBOARD.SYS /ID:153
C:\DOS\SMARTDRV.EXE
c:\dos\mouse.com /y
c:\dos\doskey.com
SET COMSPEC=C:\DOS\COMMAND.COM
SET WIN$=C:\WINDOWS
C:\DOS\MODE.COM CON CP PREP=((850) C:\DOS\EGA.CPI)
C:\DOS\MODE.COM CON CP SEL=850
C:\DOS\KEYB.COM SU,,C:\DOS\KEYBOARD.SYS /ID:153
SET IBMAV=C:\DOS
SET LIB=C:\USFW311\LIB
SET INCLUDE=C:\USFW311\INCLUDE
```

Figure 146. Example 5: AUTOEXEC.BAT File

```
[network.setup]
version=0x3110
netcard=awc690-2400,1,AWC690-2400,1
transport=ms$ndishlp,MS$NDISHLP
transport=msdlc,MSDLC
transport=tcpip-32n,MSTCP32
transport=ms$netbeui,NETBEUI
lana0=awc690-2400,1,ms$netbeui
lana1=awc690-2400,1,ms$ndishlp
lana2=awc690-2400,1,msdlc
lana3=awc690-2400,1,tcpip-32n
[protman]
DriverName=PROTMAN$
PRIORITY=MS$NDISHLP

[AWC690-2400]
DriverName=ARLAN$
Channel=1
DataRate=4
SystemID=0x5
TMA=ON
PreSID=0
Config=ON
MaxDatagramSize=2048
Mem=0xD000  1
Socket=1
Int=5
netaddress="4200000000ee"

[MS$NDISHLP]
DriverName=ndishlp$
BINDINGS=AWC690-2400

[MSDLC]
xstations1=0
xstations0=5
stations=20
saps=8
xsaps1=0
xsaps0=5
swap=1
usedix=0
DriverName=MSDLC$
BINDINGS=AWC690-2400 2

[MSTCP32]
BINDINGS=AWC690-2400 2
LANABASE=2

[NETBEUI]
DriverName=netbeui$
SESSIONS=10
NCBS=12
BINDINGS=AWC690-2400 2
LANABASE=0
```

Figure 147. Example 5: PROTOCOL.INI File

```
:{386Enh:}
device=MonoUMB.386
device=C:\CAWIN\VD802.386
device=C:\CAWIN\VREFLECT.386
device=C:\CAWIN\VNSWUTIL.386
device=C:\CAWIN\VNCD.386
device=*vpd
mouse=*vmd
ebios=*ebios
woafont=app850.fon
display=*vddvga
CGA40WOA.FON=CGA40850.FON
keyboard=*vkd
network=*vnetbios,*vwc,vnetsup.386,vredir.386,vserver.386
local=CON
;COM3Irq=4
;COM3Base=03E8
;COM4Irq=3
;COM4Base=02E8
PagingFile=C:\WINDOWS\WIN386.SWP
MaxPagingFileSize=77824
EMMExclude=c800-cfff
EMMExclude=d000-d800 1
netmisc=ndis.386,ndis2sup.386,wsock.386,wstcp.386
transport=vip.386,vdhcp.386,vtdi.386,vtcp.386,vnbt.386,netbeui.386
InDOSPolling=FALSE
RouterInterrupt=68
VD802HEAPSIZE=31
VD802POOLSIZE=13

[Network]
reconnect=yes
winnet=wfwnet/00025100
multinet=nonet
SessTimeout=240
LogonDisconnected=yes
EnableSharing=no
UserName=raimo
Workgroup=WORKGROUP
ComputerName=RAMI
Comment=rami
logonvalidated=no

[network drivers]
devdir=C:\WINDOWS
LoadRMDrivers=Yes
netcard=awcn690.dos
transport=ndishlp.sys,*netbeui

[MSTCP]
EnableRouting=0
Interfaces=awc690-24000
deadgwdetect=1
pmtudiscovery=1

[awc690-24000]
IPMask=255.255.255.0
IPAddress=9.163.4.98
Description=ARLAN 690-2400 PCMCIA Adapter
Binding=awc690-2400 2
```

Figure 148. Example 5: SYSTEM.INI File

```
[Configuration]
LANGUAGE=2924
DIRECTORY=C:\CAWIN
COMMONUSERID=RAIMO
LOCALLUNAME=CPNET.FSRAMITR 5
DLCTYPE=LAN
RTMS=CPAS50 4
RTDN=CPAS50 4
STARTPROGRAMLAUNCHER=TRUE

[MODES]
QPCSUPP=*, 7, 32, 16
QSERVER=*, 7, 32, 16
SNASVCMG=256, 1, 2, 1
BLANK=,2, 8, 4
#BATCH=256, 3, 8, 4
#INTER=, 7, 8, 4

[REMOTE]
SDDI=66

[DEFINETP]
FZZMC400.EXE=C:\USFW311\FZZMC400.EXE,30,30,AM_STARTED,

[LAN]
TRLI01=CPAS50,400020202020,04,4,,,2,2,5,,5, 3
TRAN=0
TRSS=04
TRRL=3
TRAL=2
TRAS=5
TRMF=2048

[SIDEINFO]
CPAS50=CPNET.CPAS50,QPCSUPP,*,SAME,,,CPAS50,1
```

Figure 149. Example 5: NSD.INI File

```
[PCS/400]
LAN=INS
INITCFG=NO
GROUP=INS
groupname=Client Access/400 for Windows
Startup=INS
UPDT=INS
ErrorLog=INS
ADMN=INS
DTAQ=INS
APIS=INS
MAPI=INS
WTFR=INS
Database=INS
ODBC=INS
DTFR=INS
RMTC=INS
UserGuide=INS
VPRT=INS
Printer=INS
SCSPrinter=INS
USF=INS
PC5250=INS
RUMBA=INS

[Startup Options]
System Connection=Y
Shared Folders=Y
Virtual Print=N
Update Function=N
5250 Emulation=Y
5250 Emulation Pgm=C:\RUMBACAW\RUMBAWSF.EXE
Emulation Type=RUMBA
Emulation Session 1=C:\RUMBACAW\SES1AS50.WSF

[BASIC]
ExtraFunction=No

[ADVANCED]
ExtraFunction=No

[Shared Folders]
SFLR01=1,I

[UPDT]
UPDT01=\\%MANAGING_SYSTEM%\QPWXCWN,C:\CAWIN,,,,P,Client Access/400
UPDT02=\\%MANAGING_SYSTEM%\QPWXCUM,C:\USFW311,S,,,B,Ultimedia System Faci
UPDT03=\\%MANAGING_SYSTEM%\QPWXCPC\,C:\PCOMWIN\,,,,B,Client Access/400 PC
UPDT04=\\%MANAGING_SYSTEM%\QPWXCRB\,C:\RUMBACAW,,,,P,RUMBA/400
```

Figure 150. Example 5: PCS.INI File

2.6.4 Matching Parameters

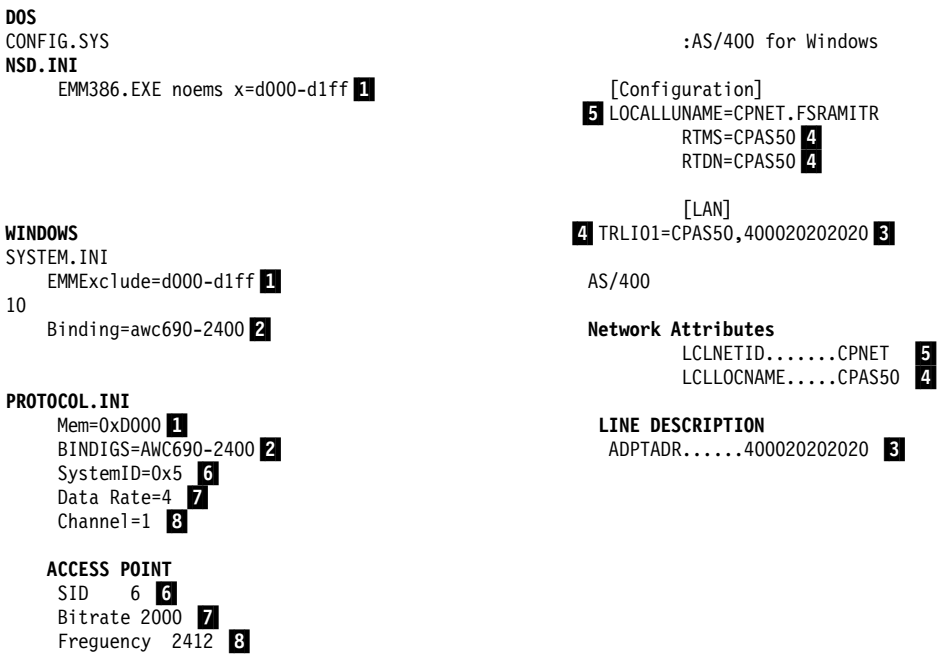


Figure 151. Example 5: Matching Parameters

- Memory area in your PC that your PCMCIA card uses. 1
- Card binding name 2
- Token Ring Adapter Address 3
- Default Local Location Name 4
- Local Network ID 5
- System ID 6
- Bitrate 7
- Freguency 8

2.7 Example 6: Ethernet with Wireless Access Points

If you do not need to have an AS/400 wireless LAN adapter on your AS/400 system, you can build a wireless network using Ethernet access point. Your AS/400 system is connected to the wireless network through an Ethernet Adapter and an Ethernet backbone.

Note: Since you do not have an AS/400 wireless LAN adapter on your AS/400 system, no PTCs are allowed in this configuration.

2.7.1 Scenario Diagram

Figure 152 shows the setup.

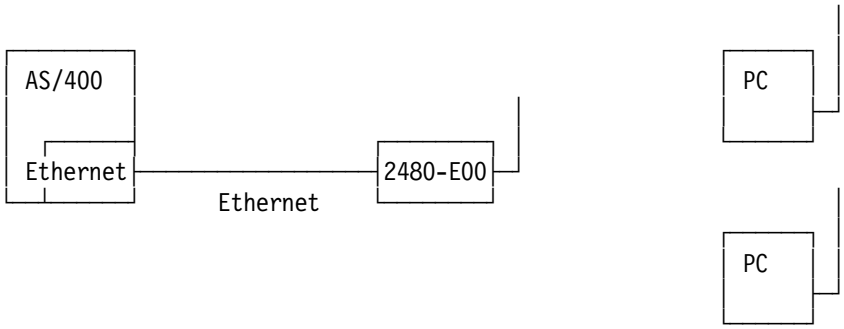


Figure 152. Example 6: Scenario View

2.7.2 Logical Topology of the RF Network

Figure 153 shows the logical topology diagram of the RF network.

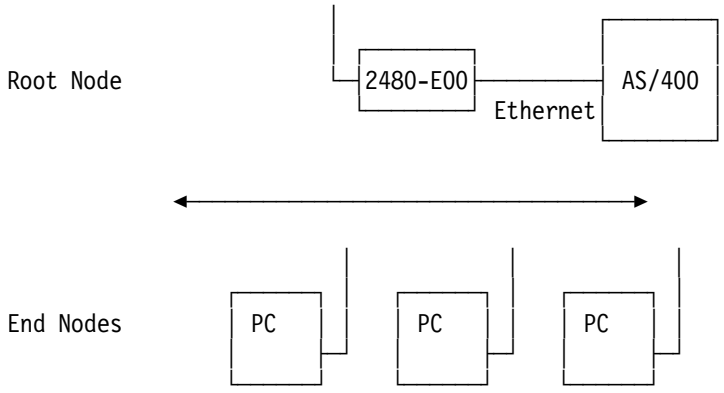


Figure 153. Example 6: RF Topology

2.7.3 AS/400 Configuration

As far as the AS/400 system is concerned, it is a regular Ethernet configuration and has nothing to do with wireless LAN. For general AS/400 Ethernet configuration, refer to 2.3.4, “AS/400 Configuration Objects” on page 53.

2.7.4 Access Point Configuration

Refer to the first access point configuration in Example 2 on 2.3.6, “Ethernet Bridge Access Point Configuration” on page 62. The label on top left corner should read ″IBM 2480-*E00* V3.2N″ instead of ″IBM 2480-*EB0* V3.2N″, otherwise, the steps should be identical.

2.7.5 PC Configuration

There is no particular configuration requirement for this scenario. For general PC configuration, refer to 2.3.5, “PC Configuration” on page 55.

Chapter 3. Tips and Techniques

This chapter provides various information about the AS/400 wireless LAN product family.

3.1 Network Management

A wireless LAN, by its nature, is a very dynamic LAN. Portable transaction computers and laptops are moving constantly, environments may also change, and users may move out of radio range without noticing. With such a dynamic scenario, the system administrator needs tools to verify if the wireless LAN is working as designed or if some problems are surfacing. There are two useful tools for this matter:

- Wireless Network Management Utility
- Using TCP/IP to manage Access Points

3.1.1 Wireless Network Management Utility

The Wireless Network Management Utility allows you to monitor a wireless network attached to your AS/400 system. Wireless Network Management Utility provides the following capabilities:

- Displays active network topology.
- Collects and displays statistics (including frames sent and received) for any wireless node.
- Ping tests between wireless nodes.

Wireless Network Management Utility was developed as a service tool but proved to be quite a reliable utility in everyday wireless management.

3.1.1.1 Running Wireless Network Management Utility

1. Wireless Network Management Utility can be invoked in two ways.

   a. To use the Verify Communications menus, type:

      ```
      VFYCMN
      ```

      The display in Figure 154 on page 102 is shown.

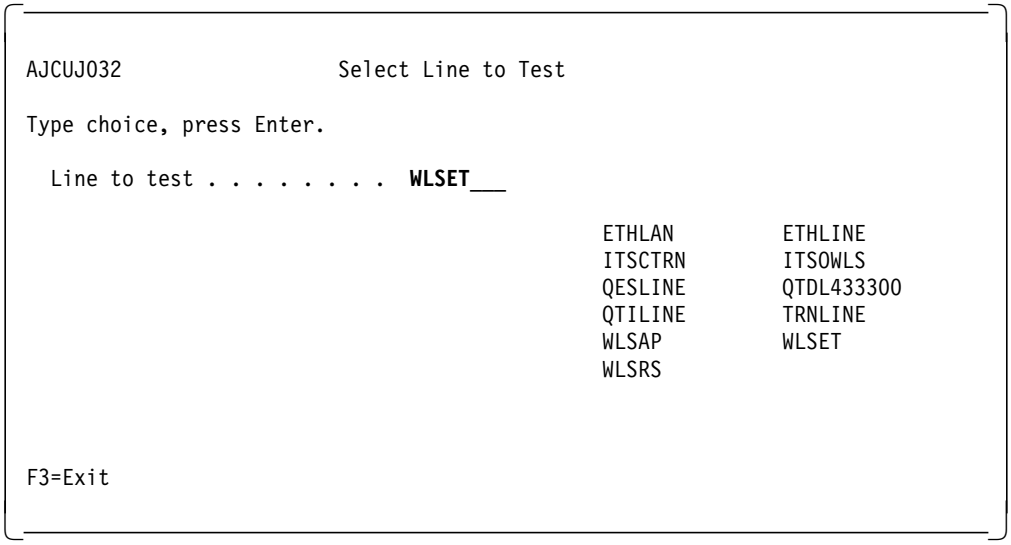


Figure 154. Running Wireless Network Management Utility (1/6)

On the display in Figure 155, take option **7**. The display in Figure 156 on page 103 is shown.

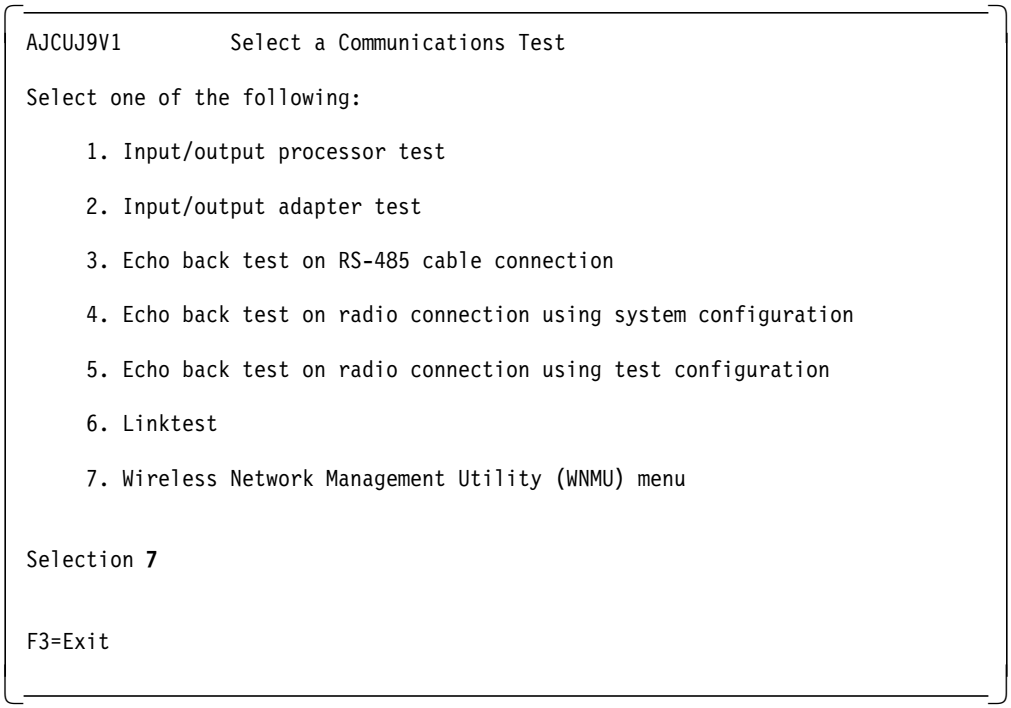


Figure 155. Running Wireless Network Management Utility (2/6)

b. You can get the same display as in Figure 156 on page 103 by directly calling the following program from the command line. Type:

   CALL PGM(QPDJYNM1) PARM(WLSET LIN081)

Notes:

1) The system security level should be less than 40 to call QPDJYNM1 from the command line. If this is not the case in your installation, use VFYCMN to get access to Wireless Network Management Utility.
2) WLSET is the line name for AS/400 wireless LAN.
3) LIN081 is the resource name for AS/400 wireless LAN.

2. On the first Wireless Network Management Utility menu, select option **1** to start the data collection.

```
                    Wireless Network Management Utility (WNMU)


Type option, press Enter.
  1 = Start network tools / data collection
  2 = End network tools / data collection
  3 = Work with network tools / data

Opt  Line              Topology      Statistics      Data available

1    WLSET             Ended         Ended           No



WARNING:  Network data will continue to be collected, if you exit this
          program without ending network tools / data collection.
          Continuing to collect data will affect system
          performance and require system storage.




  F1=Help        F3=Exit        F5=Refresh
```

Figure 156. Running Wireless Network Management Utility (3/6)

3. You are now prompted for the interval parameter for the topology and statistics collection. You are also warned that this has an impact on your system performance. Wireless Network Management Utility automatically submits a batch job, attached dynamically to a *net device of the TCP/IP net controller of your wireless line.

```
                    Wireless Network Management Utility (WNMU)

Line name . . . . . . . . . . . . . . . : WLSET

Topology collection interval. . . . . . : 10          (Minutes)
Keep old statistics data. . . . . . . . : *NO         (*YES, *NO)
Statistics collection interval. . . . . : 10          (Minutes)
Maximum time to collect statistics. . . : 01 : 00     (Hours, Minutes)



WARNING:  Selecting a small data collection interval affects system
          performance.  Selecting a long maximum data collection time
          or keeping old network data requires system storage.




 F1=Help           F3=Exit           F12=Cancel
```

Figure 157. Running Wireless Network Management Utility (4/6)

Notes:

a. Topology versus Statistics Intervals

There are two intervals to set for collecting data: topology and statistics. The topology interval is the frequency in which the network topology is collected while the statistics interval determines the frequency in which statistics are collected for devices in the network.

For example, if the primary purpose of running the Wireless Network Management Utility is to check the quality of a link, collecting statistics may not be important. The topology interval can be set to 01 minutes while the statistics interval may be set to 20 minutes. The statistics interval can be set to 00 minutes to turn off the statistics data collection, reducing the amount of collected data.

The amount of data collected is dependant upon both intervals, length of time to collect data, and size of the network. For example, if the Wireless Network Management Utility is run with a topology collection interval of 05 minutes, statistics collection interval of 10 minutes, length of time to collect statistics of 2 hours, and a network with 10 devices, statistics data is collected every 10 minutes for each device in the network for two hours. This results in 120 sets of all statistics.

Selecting small intervals and long collection times may affect the system performance and system storage on the AS/400 system.

b. Devices in Power Saving Mode

Devices in the power saving mode cannot have statistics collected or be a source or destination node for a ping operation. These devices include Portable Transaction Computers and any future devices running Power Saving Polling.

c. No Wrap Feature on Files

When exiting Wireless Network Management Utility, the user is given the opportunity to delete the files created. If the files are not deleted,

running Wireless Network Management Utility again appends information to the existing files. The files do not wrap at some maximum size.

4. After you start the data collection, the Wireless Network Management Utility display looks similar to the display in Figure 158.

```
                    Wireless Network Management Utility (WNMU)

Type option, press Enter.
  1 = Start network tools / data collection
  2 = End network tools / data collection
  3 = Work with network tools / data

Opt  Line              Topology      Statistics      Data available

_    WLSET             Active        Active          No


WARNING:  Network data will continue to be collected, if you exit this
          program without ending network tools / data collection.
          Continuing to collect data will affect system
          performance and require system storage.



  F1=Help        F3=Exit        F5=Refresh
```

Figure 158. Running Wireless Network Management Utility (5/6)

Pressing the **F5** key for refresh or taking option **3** changes the status of the *Data available* indicator to *Yes*.

Note: If the Data available indicator never toggles to Yes, that means Wireless Network Management Utility cannot collect any data (for example, there is no real network).

5. If you look at the *Work with Configuration Status* of your wireless line, you see the Wireless Network Management Utility job.

```
                        Work with Configuration Status              SYSNM040
                                                                 02/09/95  17:47:19
Position to  . . . . .               Starting characters

Type options, press Enter.
  1=Vary on   2=Vary off   5=Work with job   8=Work with description
  9=Display mode status ...

Opt  Description       Status               -------------Job--------------
     WLSET            ACTIVE
       WLSETNET       ACTIVE
         WLSETTCP     VARIED ON
         WLSETUSR     ACTIVE               WLSET       QSECOFR     001995



                                                                        Bottom
Parameters or command
===>
F3=Exit   F4=Prompt   F12=Cancel   F23=More options   F24=More keys
```

Figure 159. Running Wireless Network Management Utility (6/6)

3.1.1.2 Wireless Network Management Utility Topology Information

1. Let's get back to the Wireless Network Management Utility menu and look for the topology information. After collecting information, press the F5 key or select option 3 to refresh the *Data Available* indicator to show *Yes*.

```
                    Wireless Network Management Utility (WNMU)


Type option, press Enter.
  1 = Start network tools / data collection
  2 = End network tools / data collection
  3 = Work with network tools / data

Opt  Line             Topology      Statistics      Data available

3    WLSET            Active        Active          Yes



WARNING:  Network data will continue to be collected, if you exit this
          program without ending network tools / data collection.
          Continuing to collect data will affect system
          performance and require system storage.



  F1=Help        F3=Exit        F5=Refresh
```

Figure 160. Wireless Network Management Utility: Topology (1/2)

2. The next display is the *Topology* menu as shown in Figure 161 on page 107. Topology information shows two columns, *Type* and *Level - Node address*:

- Type

  The type field provides a description of each wireless network node. For a product description of each type, refer to C.1, “Wireless LAN Product Numbers” on page 143.

- Level - Node Address

  The Level Node Address field shows both the adapter addresses of each node and the hierarchical arrangement of the node within the network. Network hierarchy is shown using indentation on the topology display. Node addresses are indented under various levels to show their relationship to the other nodes within the network. Node *2668 - 0049096801900.5A00300BD00* is our AS/400 system. The first part represents the HOPID and the second the wireless LAN address.

  The line containing an inactive node is always preceded with a minus (-) sign (as type ISA and MCA in Figure 161). If equal signs (=) appear across the entire line, the topology location where the node was last active is unknown (as type MCA in Figure 161). If one or two equal signs (=) appear on either side of an inactive node, its location is the location where it was last reported active (as type ISA in Figure 161).

  If the node is a root node, all nodes in the network are shown. If the node is not a root node, the parent node is shown first, then the local machine displayed next, followed by the subordinate nodes attached to the local machine. The only way to see the entire network is to run the Wireless Network Management Utility program on an AS/400 system that is the root node.

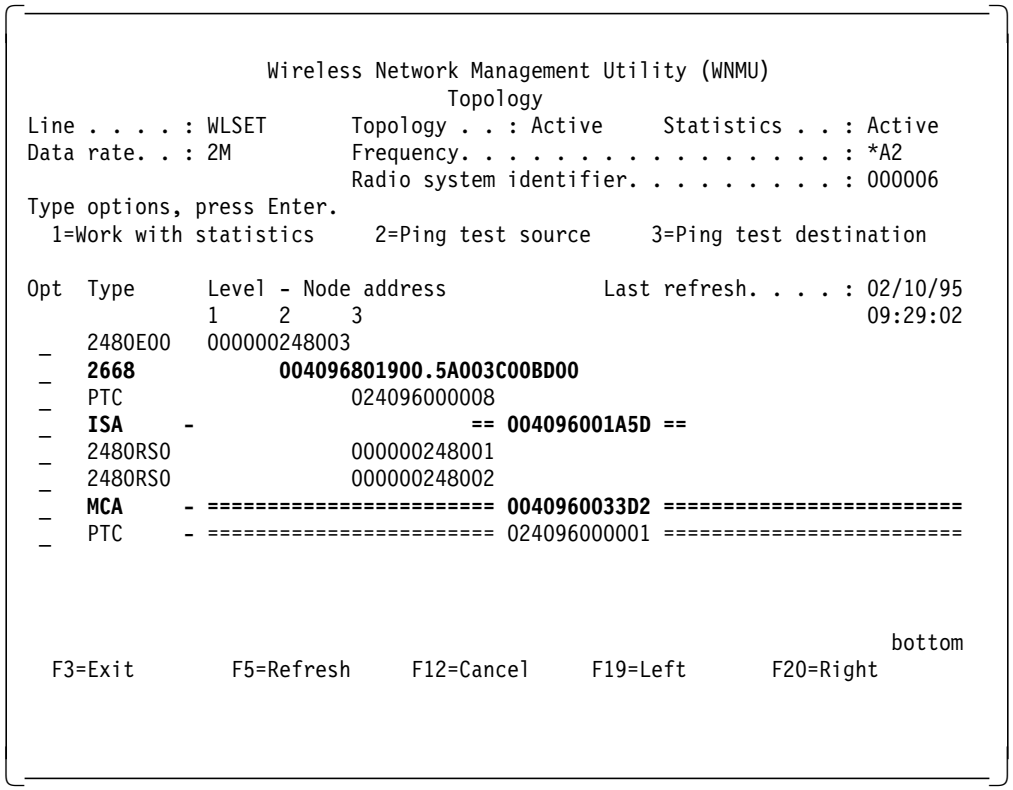


Figure 161. Wireless Network Management Utility: Topology (2/2)

3.1.1.3 Wireless Network Management Utility Statistics Information

Statistics information is the statistics on devices. There are four statistics displays.

1. Take option **1**, Work with statistics, on the *Topology* display for the wireless node you want to work with. In this example, we used a *2480E00* Access Point. See Figure 162.

```
                  Wireless Network Management Utility (WNMU)
                                  Topology
Line . . . . : WLSET       Topology . . : Active     Statistics . . : Active
Data rate. . : 2M          Frequency. . . . . . . . . . . . . . . : *A2
                           Radio system identifier. . . . . . . . . : 000006
Type options, press Enter.
  1=Work with statistics     2=Ping test source     3=Ping test destination

Opt  Type      Level - Node address              Last refresh. . . . : 02/10/95
               1     2     3                                           09:29:02
 1   2480E00   000000248003
 _   2668            004096801900.5A003C00BD00
 _   PTC               024096000008
 _   ISA               004096001A5D
 _   2480RS0           000000248001
 _   2480RS0           000000248002
 _   MCA     - ======================== 0040960033D2 ========================
 _   PTC     - ======================== 024096000001 ========================



                                                                        bottom
  F3=Exit        F5=Refresh     F12=Cancel     F19=Left       F20=Right
```

Figure 162. Wireless Network Management Utility: Statistics (1/7)

2. The Wireless Network Management Utility Statistics display provides data that can be used to access the performance of the wireless LAN. Statistical data is shown for each period of the collection interval selected. Use the *F19* and *F20* to view data from earlier or later collection times.

```
                  Wireless Network Management Utility (WNMU)
                                Statistics
Line . . . . . : WLSET                          Type . . . . : 2480E00
Node address . . . : 000000248003    Node program version . . . . :  2    32

Type options, press Enter
  5=Display graph
                            Interval:         1         2         3         4
                                Date:  02/09/95  02/09/95  02/09/95  02/09/95
Opt                             Time:  17:50:47  17:59:52  18:09:52  18:19:53

_ Total frames transmitted                  621      1844      2060      1937
_ Total frames received                     219       638       697       693
_ Total frames retransmitted                 34        98       120       109
_ Duplicate frames received                   0         0         1         0
_ Maximum retries before success              0         0         0         0
_ Registered router frames sent               0         0         0         0
_ Registered router frames received           0         0         0         0
_ Registered router retransmissions           0         0         0         0
_ Registered router duplicates                0         0         1         0
_ Backbone frames sent                        0         0         0         0
                                                                       More...
 F3=Exit        F12=Cancel     F19=Left       F20=Right
```

Figure 163. Wireless Network Management Utility: Statistics (2/7)

Note: The *Node program version* on the top-right portion of the display tells you the version of firmware. It is *2.32* in our example.

3. You have three additional displays with statistical information.

   Pressing the Page Down key gets you more information.

```
                  Wireless Network Management Utility (WNMU)
                                Statistics
Line . . . . . : WLSET                          Type . . . . : 2480E00
Node address . . . : 000000248003    Node program version . . . . :  2    32

Type options, press Enter
  5=Display graph
                            Interval:         1         2         3         4
                                Date:  02/09/95  02/09/95  02/09/95  02/09/95
Opt                             Time:  17:50:47  17:59:52  18:09:52  18:19:53

_ Backbone frames received                   35       109       122       123
_ Backbone frames retransmitted              35       109       122       123
_ Backbone CRC errors                         0         0         0         0
_ Backbone length errors                      0         0         0         0
_ Backbone transmit errors                    0         0         0         0
_ Backbone receive errors                     0         0         0         0
_ Backbone receive buffer overflows           0         0         0         0
_ Hold offs                                 509      1582      1860       881
_ Receive overruns                            0         0         0         0
_ Transmit underruns                          0         0         0         0
                                                                       More...
  F3=Exit        F12=Cancel     F19=Left       F20=Right
```

Figure 164. Wireless Network Management Utility: Statistics (3/7)

4. Press the Page Down key to get the next display.

```
                    Wireless Network Management Utility (WNMU)
                                    Statistics
Line . . . . . : WLSET                              Type . . . . : 2480E00
Node address . . . : 000000248003    Node program version . . . . :  2    32

Type options, press Enter
  5=Display graph
                              Interval:         1         2         3         4
                                  Date:  02/09/95  02/09/95  02/09/95  02/09/95
Opt                               Time:  17:50:47  17:59:52  18:09:52  18:19:53

_ Abort errors                                  26        29        23        26
_ Length errors                                  0         0         0         0
_ CRC errors                                    20        20        25        22
_ Clients registered to node                     1         1         1         1
_ Access points registered to node               0         0         0         0
_ Hops to root node                              1         1         1         1
_ Discarded frames, no buffer                    0         0         0         0
_ Mailbox overflows                              0         0         0         0
_ Discarded frames, address mismatch             0         0         0         0
_ Discarded frames, SID mismatch               576       377       374       378
                                                                          More...
  F3=Exit        F12=Cancel     F19=Left       F20=Right
```

Figure 165. Wireless Network Management Utility: Statistics (4/7)

5. Pressing the Page Down key to get the last display.

```
                    Wireless Network Management Utility (WNMU)
                                    Statistics
Line . . . . . : WLSET                              Type . . . . : 2480E00
Node address . . . : 000000248003    Node program version . . . . :  2    32

Type options, press Enter
  5=Display graph
                              Interval:         1         2         3         4
                                  Date:  02/09/95  02/09/95  02/09/95  02/09/95
Opt                               Time:  17:50:47  17:59:52  18:09:52  18:19:53

_ Discarded frames, protocol error               0         0         0         0
_ Polls transmitted                              0         0         0         0
_ Polls acknowledged                             0         0         0         0




                                                                          Bottom
  F3=Exit        F12=Cancel     F19=Left       F20=Right
```

Figure 166. Wireless Network Management Utility: Statistics (5/7)

6. You can use option **5**, Display graph, to see the statistical information in graphical format.

```
                  Wireless Network Management Utility (WNMU)
                                  Statistics
Line . . . . . : WLSET                          Type . . . . : 2480E00
Node address . . . : 000000248003    Node program version . . . . :  2    32

Type options, press Enter
  5=Display graph
                            Interval:         1         2         3         4
                                Date:  02/09/95  02/09/95  02/09/95  02/09/95
Opt                             Time:  17:50:47  17:59:52  18:09:52  18:19:53

5 Total frames transmitted                  621      1844      2060      1937
_ Total frames received                     219       638       697       693
_ Total frames retransmitted                 34        98       120       109
_ Duplicate frames received                   0         0         1         0
_ Maximum retries before success              0         0         0         0
_ Registered router frames sent               0         0         0         0
_ Registered router frames received           0         0         0         0
_ Registered router retransmissions           0         0         0         0
_ Registered router duplicates                0         0         1         0
_ Backbone frames sent                        0         0         0         0
                                                                       More...
 F3=Exit        F12=Cancel     F19=Left       F20=Right
```

Figure 167. Wireless Network Management Utility: Statistics (6/7)

Taking option **5** gives you the display in Figure 168.

```
                  Wireless Network Management Utility (WNMU)

              line . . . . : WLSET        Node address . . . : 000000248003
    10000  ----
       8000  --
       6000  --
       4000  --
       2000  --  |||||||||||||||
       1000  ----  ||||||||||||||||
        800  --  ||||||||||||||||
        600  -- ||||||||||||||||
        400  -- ||||||||||||||||
        200  -- ||||||||||||||||||
        100  ---- ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
          >0  -- ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
           0  -- ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
              |         |         |         |         |         |         |
              1        11        21        31        41        51        61
Date . : 02/09/95  02/09/95  02/09/95  02/09/95  02/10/95  02/10/95  02/10/95
Time . : 17:50:47  19:29:49  21:09:45  22:49:42  00:29:38  02:09:35  03:49:32

  F3=Exit        F12=Cancel     F19=Left       F20=Right
```

Figure 168. Wireless Network Management Utility: Statistics (7/7)

7. If you forget the name of the statistic that is being graphed, press F3 to return the main statistic display. The original **5** remains and identifies the statistic. Pressing the Enter key returns you to the graph.

3.1.1.4 Wireless Network Management Utility Ping Test

From the Wireless Network Management Utility Topology display, you can test your RF links using option **2**, Ping test source, and option **3**, Ping test destination. The Ping Test checks the connection between the logical control layers of any two wireless nodes. Currently, Portable Transaction Computers do not support the Ping Test. This test is very important because it allows you to check your wireless LAN anytime you want to.

1. To test the wireless connection, you choose a source node and a destination node. We chose the *2480E00* for source and the *ISA* card for destination. See Figure 169.

```
                    Wireless Network Management Utility (WNMU)
                                    Topology
Line . . . . : WLSET       Topology . . : Active     Statistics . . : Active
Data rate. . : 2M          Frequency. . . . . . . . . . . . . . . . : *A2
                           Radio system identifier. . . . . . . . . : 000006
Type options, press Enter.
  1=Work with statistics     2=Ping test source     3=Ping test destination

Opt  Type      Level - Node address             Last refresh. . . . : 02/10/95
               1     2     3                                          09:29:02
 2   2480E00   000000248003
 _   2668            004096801900.5A003C00BD00
 _   PTC               024096000008
 3   ISA               004096001A5D
 _   2480RS0           000000248001
 _   2480RS0           000000248002
 _   MCA     - ======================== 0040960033D2 ========================
 _   PTC     - ======================== 024096000001 ========================



                                                                        bottom
  F3=Exit        F5=Refresh     F12=Cancel     F19=Left       F20=Right
```

Figure 169. Wireless Network Management Utility: Ping Test (1/3)

2. You are shown a display where you define the packet size for the test and the number of times to Ping. See Figure 170 on page 113.

```
                    Wireless Network Management Utility (WNMU)
                                    Ping Menu

 Source address . . . . . . . . . . : 000000248003
 Destination address  . . . . . . . : 004096001A5D
 Packet size  . . . . . . . . . . . : 000000000010  1 to 1496
 Number of times to Ping  . . . . . : 000000000500  100 to 100,000









  F1=Help           F3=Exit           F12=Cancel
```

Figure 170. Wireless Network Management Utility: Ping Test (2/3)

3. When you press the Enter key, the Ping Test starts and after a few seconds, you see the following display:

```
                    Wireless Network Management Utility (WNMU)
                                    Ping Test

 Source address. . . . . . . . . : 000000248003
 Destination address . . . . . . : 004096001A5D
 Packet size . . . . . . . . . . : 10
 Successful Pings. . . . . . . . : 450
 Attempted Pings . . . . . . . . : 500


   Last 100 Ping Results
   @@@@@@@@@@                      50. %
   | | | | | | | | | | |
   0   20  40  60  80  100    Percent Successful
   | | | | | | | | | | |
   @@@@@@@@@@@@@@@@@@@@            90. %
   Total Ping Results


  F1=Help           F3=Return         F12=Cancel
```

Figure 171. Wireless Network Management Utility: Ping Test (3/3)

Pings are performed in multiples of 100. If more than one multiple of 100 is specified, you get a real time automatically updated display that can be used to verify RF coverage.

You should be aware that a wireless link is considered good if more than 75% of the Pings are successful. A link is considered fair if between 25% and 50% of the Pings are successful. Otherwise, the link is considered poor.

In our example, note that there are two different percent figures: 50% and 90%. 50% is the Ping results of the last 100 Ping Tests (which means 50 successful Pings out of 100) while 90% is the Ping results of the entire number of attempted Pings (which means 450 successful Pings out of 500).

During your tests, you should not be surprised if the wireless LAN changed their topology. Wireless LANsare dynamic networks and Portable Transaction Computers are roaming.

3.1.1.5 Ending Wireless Network Management Utility

To exit the Wireless Network Management Utility display, press F3 twice and you see the display in Figure 172 where you specify if you want to end or continue the data collection and whether or not you want to keep data already collected. We used option **3** to Exit and keep the network data. This keeps all of the data collected but may impact performance.

```
                    Wireless Network Management Utility (WNMU)


Type option, press Enter
  1 = Exit, delete network data (end data collection)
  2 = Exit, keep network data   (end data collection)
  3 = Exit, keep network data   (continue data collection)

Opt  Line

 3   WLSET

WARNING:  Keeping network data (option 2) requires system
          storage.  Exiting with data collection active
          (option 3) will affect system performance.


 F1=Help           F12=Cancel
```

Figure 172. Ending Wireless Network Management Utility

3.1.2 Using Wireless Network Management Utility Data in Another AS/400 System

It is useful when the AS/400 system you are connected to is not the one that has the wireless LAN adapter. You can copy the wireless data and work with it on your local system. This capability allows you to gather data from the AS/400 system that uses wireless LAN and manage the performance data at a central site.

3.1.2.1 Saving the Network Data to View on Another System

Wireless Network Management Utility uses three files per line. They are located in the QPFRDATA library. These objects can be saved to tape using the SAVOBJ and RSTOBJ commands. The data must be restored to the QPFRDATA library on the receiving system. The three files have the following naming conventions:

QAPDJYIxxx WNMU background job status information

QAPDJYTxxx WNMU network topology information

QAPDJYSxxx WNMU node statistics information

Note: xxx represents the last three characters of the PORT resource name.

These files will not exist until Wireless Network Management Utility has been run on that resource of interest. After Wireless Network Management Utility has been run, it must be exited with an option that does not delete the network data. Otherwise, the files are erased.

QAPDJYIxxx and QAPDJYTxxx are the minimum number of files required to get any useful information. With these two files, the network topology can be displayed. These files exist when the Wireless Network Management Utility indicator flag for *Data available* is *Yes*.

Additionally, QAPDJYSxxx contains the statistics for the network nodes. This file is the last file to be created. Two statistics collection intervals must elapse before statistics data is available. The reason for this is that the statistics are kept as differences, and it takes two intervals to get the first difference. This interval can be specified on the Start Network Tools/Data Collection menu.

3.1.2.2 Displaying the Network Data on Another System

The Wireless Network Management Utility data can be displayed on another AS/400 system, even if it does not have a wireless adapter installed in it. To display the data, the following CL command must be entered on the command line:

```
CALL PGM(QPDJYNM1) PARM(zzzzzzzzzz yyyyyyyyyy)
```

Notes:

1. zzzzzzzzzz is the line description name. You can make one up, and it is not necessary to create it on the system.
2. yyyyyyyyyy is the PORT resource name used on the system where you retrieved the data. This name must match exactly.

After you press Enter, Wireless Network Management Utility functions just the same as it does on the customer′s system, except that you are not able to run the Ping test, and the extended configuration data for the line is not displayed.

3.1.3 Using AS/400 TCP/IP To Manage Access Point

All networks need maintenance and management. The wireless LAN is no exception. There are some important functions you should be able to perform from your 5250 terminal. Three of these functions are:

- Checking the status of network devices.
- Changing the configuration of network devices.
- Updating code of network devices.

The first function is fulfilled by Wireless Network Management Utility. This tool allows you to check wireless topology, test link between nodes, and gather statistical data.

Regarding the second and third functions,we only look at the important part of our wireless: the Access Point. They are the backbone of wireless LAN. It is vital to your network that Access Points are configured and maintained correctly with the latest firmware code. If a problem shows up in your Access Points, you should be able to reach them from your desk.

The Access Point supports TELNET and FTP and are SNMP capable, and with TCP/IP installed on your AS/400 system, you can manage them from your 5250 terminal. To achieve this goal, you need:

1. 5763-TC1 IBM TCP/IP Connectivity Utility loaded on your AS/400 system:

This licensed program allows you to use TELNET and FTP on your AS/400 system. As of OS/400 V3R1, this utility is free of charge.

2. Access Point configured with an IP address:

   In our examples, we already configured the IP address as well as the Subnetmask.

3. AS/400 TCP/IP configured and running:

   You need to configure TCP/IP for your wireless LAN and start the TCP/IP interface. Refer to 3.1.3.1, “Configuring TCP/IP for Wireless LAN.”

4. TELNET to your Access Point.

   As an AS/400 TELNET user, you should be aware of the physical and operational differences between VT100 and 5250 terminals. The 5250 is a block mode terminal. Data typed on a 5250 is accumulated in a buffer and only sent to the AS/400 system when an *Attention identifier (AID)* key is pressed. The following are the *AIDs* on the 5250 keyboard:

   - Clear
   - Command Functions 1 through 24 (F1 through F24 or Cmd1 to Cmd24)
   - Enter/Rec Adv
   - Help
   - Print
   - Record Backspace Function
   - Roll Down (Page Up)
   - Roll Up (Page Down)

   VT100 terminals operate in a character mode. Characters are sent immediately to the host when the key is pressed.

   Another difference is the way data arrives on the display. Data is written to a VT100 terminal one character at a time, and you see the data arrive as a stream of characters. With the 5250, the data is written in blocks, and all parts of the display change at once.

   AS/400 TELNET VT100 emulation mapped some 5250 command keys to VT100 terminal control sequence. This feature simplifies the use of the VT100 emulation. In our example, to TELNET to an Access Point, you only need to use two control sequences:

Function Key	**VT100 Control Sequence**
F11	Send without Carriage Return
F5	Esc Key

   Note: If you have any questions about the keyboard operation when using TELNET, press the ATTN key and you get the *send TELNET Control Functions* where you are able to view the keyboard map.

3.1.3.1 Configuring TCP/IP for Wireless LAN

1. After loading the 5763-TC1, you have to configure the TCP/IP interfaces for your wireless LAN. Type:

   ```
   CFGTCP
   ```

```
CFGTCP                          Configure TCP/IP
                                                          System:   SYSNM040
Select one of the following:

     1. Work with TCP/IP interfaces
     2. Work with TCP/IP routes
     3. Change TCP/IP attributes
     4. Work with TCP/IP port restrictions
     5. Work with TCP/IP remote system information

    10. Work with TCP/IP host table entries
    11. Merge TCP/IP host table
    12. Change local domain and host names
    13. Change remote name server

    20. Configure TCP/IP applications
    21. Configure related tables


Selection or command
===>

F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel
```

Figure 173. Configuring TCP/IP for Wireless LAN (1/3)

2. Select **1. Work with TCP/IP interfaces**. Then add the new wireless LAN interface.

```
                         Work with TCP/IP Interfaces
                                                          System:   SY
Type options, press Enter.
  1=Add   2=Change   4=Remove   5=Display   9=Start   10=End

     Internet         Subnet              Line      Line
Opt  Address          Mask             Description  Type
 1   9.5.65.104
 _   127.0.0.1        255.0.0.0        *LOOPBACK    *NONE




F3=Exit      F5=Refresh   F6=Print list   F11=Display interface status
F12=Cancel   F17=Top      F18=Bottom
```

Figure 174. Configuring TCP/IP for Wireless LAN (2/3)

3. A new display is shown. Fill in the *Line description*, the *Subnet mask*, and press Enter.

```
                      Add TCP/IP Interface (ADDTCPIFC)

Type choices, press Enter.

Internet address . . . . . > '9.5.65.104'
Line description . . . . . .   wlset      Name, *LOOPBACK
Subnet mask  . . . . . .   .   255.255.255.0
Type of service  . . . . . .   *NORMAL       *MINDELAY, *MAXTHRPUT..
Maximum transmission unit  . . .   *LIND         576-16388, *LIND
Autostart  . . . . . .   .   .   *YES          *YES, *NO
PVC logical channel identifier                  001-FFF
              + for more values
X.25 idle circuit timeout  . . .   60           1-600
X.25 maximum virtual circuits  .   64           0-64
X.25 DDN interface . . . . . .   *NO           *YES, *NO
TRLAN bit sequencing . . . . . .   *MSB          *MSB, *LSB




F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Figure 175. Configuring TCP/IP for Wireless LAN (2/3)

4. If TCP/IP is not started, this is the time to do it. On the command line, type:

   STRTCP

3.1.3.2 TELNET to the Wireless Access Point

Let's TELNET to an access point. We use Access Point *ROUTHER-ETH*, whose IP address is 9.5.65.104.

```
                        Start TCP/IP TELNET (TELNET)

Type choices, press Enter.

Remote system  . . . . . .   9.5.65.104









F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cance
F13=How to use this display        F24=More keys
```

Figure 176. TELNETing to an Access Point (1/5)

1. You get the first Access Point display saying CONNECTED. Press Enter. This is the only time you press Enter. From this point on, you use *F11 (Send without a Carriage Return)* to go forward and *F5 (Esc Key)* to go back.

   Note: If you have any question about the keyboard operation when using TELNET, press the ATTN key and you get the *send TELNET Control Functions* where you are able to view the keyboard map.

Let's look at the registration data. Type a *3* followed by pressing *F11*.

```
IBM 2480-E00 V2.32                Main Menu                        ROUTHER-ETH

    Option            Value       Description

1 - Configuration   [ menu  ]   - General configuration
2 - Statistics      [ menu  ]   - Display statistics
3 - Registration    [ menu  ]   - Registration table maintenance
4 - Logs            [ menu  ]   - Alarm and log control
5 - Diagnostics     [ menu  ]   - Maintenance and testing commands
6 - Privilege       [ write ]   - Set privilege level
7 - Close                       - Close the TELNET session
8 - Help                        - Introduction

Enter an option number or name
> 3
```

Figure 177. TELNETing to an Access Point (2/5)

2. On the Registration Menu, type a *1* followed by pressing *F11* to display the registration table.

```
IBM 2480-E00 V2.32                Main Menu                        ROUTHER-ETH

    Option            Value       Description

1 - Display                   - Display the table
2 - Summary                   - Display the table summary
3 - Entries                   - Display non-volatile entries
4 - Add                       - Add a non-volatile entry
5 - Remove                    - Delete non-volatile entries
6 - Autoreg    [   on    ]    - Allow automatic table additions
7 - Save                      - Save current table to non-volatile
8 - Bbnmcst    [ forward ]    - Backbone LAN multicast action
9 - Radmcst    [ forward &rbkr.   - Radio multicast action

Enter an option number or name
> 1
```

Figure 178. TELNETing to an Access Point (3/5)

3. You get the Access Point registration table. Because this access point is a router, you also get the other repeaters' registration tables. To go back, type a **q** followed by pressing *F11*.

```
IBM 2480-E00 V2.32         REGISTRATION TABLE ENTRIES              ROUTH

     Address    Device  Type    Parent    Name            EDst RDst
  ------------ -------- ---- ------------ --------------  ---- ----
  000000248001 2480-RS0  Rep 000000248002 REPEATER-01
  000000248002 2480-RS0  Rep        Local ROUTER-01
  000000248003 2480-E00   Me              ROUTHER-ETH
  0040960033d2      670            Local A670
  004096801900      672  Rep 000000248002 A672
  024096000005      PTC  Psp 000000248001 A650
  5a003c00bd00     672N      004096801900 A672

Enter space to redisplay, q[uit] : q
```

Figure 179. TELNETing to an Access Point (4/5)

4. To close the TELNET session, press *F5* until you get the *Main Menu*. Then type a 7 - Close followed by pressing *F11*.

```
IBM 2480-E00 V2.32                Main Menu                       ROUTHE

    Option            Value       Description

1 - Configuration   [ menu  ]   - General configuration
2 - Statistics      [ menu  ]   - Display statistics
3 - Registration    [ menu  ]   - Registration table maintenance
4 - Logs            [ menu  ]   - Alarm and log control
5 - Diagnostics     [ menu  ]   - Maintenance and testing commands
6 - Privilege       [ write ]   - Set privilege level
7 - Close                       - Close the TELNET session
8 - Help                        - Introduction

Enter an option number or name
> close
Are you sure [y/n] ? Y
```

Figure 180. TELNETing to an Access Point (5/5)

5. Answer Y followed by pressing *F11* and you are back at the AS/400 display.

3.2 Portable Transaction Computer Device Description Creation

To allow users to sign on to the AS/400 system and start an interactive job, the Portable Transaction Computers behave the same as a 5250 workstation. The 248x Portable Transaction Computer runs a 5250 emulation program.

On the AS/400 system side, every Portable Transaction Computer is represented by a device description (*DEVD) object. The device descriptions can be created automatically by the system or manually using the CRTDEVDSP command.

3.2.1 Manual Configuration of Device Descriptions

You can decide to manually create your device descriptions for the PTCs. This is the decision to make if you want tighter control over the configuration objects on your AS/400 system.

You may prefer to create all device descriptions yourself, for example, to keep a precise track of the name of the object, the port number/switch setting used, or the access authority to the object.

When creating the local workstation controller description, set the AUTOCFG parameter to *NO.

Next, create your device descriptions using the CRTDEVDSP command.

```
                    Create Device Desc (Display) (CRTDEVDSP)

  Type choices, press Enter.

  Device description . . . . . > PTC09         Name
  Device class . . . . . > *LCL          *LCL, *RMT, *VRT, *SNPT
  Device type  . . . . . > 3476          3101, 3151, 3161, 3162...
  Device model . . . . . > EA            0, 1, 2, 4, 11, 12, 23...
  Port number  . . . . . > 0             0-17
  Switch setting . . . . . > 6           0, 1, 2, 3, 4, 5, 6
  Online at IPL  . . . . . *YES          *YES, *NO
  Attached controller  . . . . . > CTL03         Name
  Keyboard language type . . . . .  *SYSVAL      *SYSVAL, AGB, AGI, ALI...
  Allow blinking cursor  . . . . .  *YES         *YES, *NO
  Text 'description' . . . . . > 'Device for PTC'
```

Figure 181. CRTDEVDSP Command to Manually Create PTC Device Descriptions

The device descriptions are of type 3476 Model EA; the device class is *LCL. The port number and switch setting are derived from the PTC ID. When you create your device descriptions manually, it is your responsibility to set these values to a unique combination for every device description. The port number can be a value between 0 and 7 for twinax types of displays. The switch setting is set to a value between 0 and 6 (0 is not used by the Portable Transaction Computers if the port setting is 0).

3.2.2 Automatic Configuration of Device Descriptions

We suggest that you have the system create your device description automatically unless you have a good reason not to. Auto-configuration gives you ease of use and flexibility. Device descriptions created automatically can afterwards be changed and renamed, and can have their authorities changed.

When the AUTOCFG parameter is set to *YES in the local workstation controller, these devices are created automatically.

Devices that are created automatically follow the naming convention fixed by the system value QDEVNAMING. When this system value is set to *NORMAL, the device descriptions are named DSPxx. If it is set to *DEVADR, the device description name is composed as follows:

```
DSP 03 00 01
    .  .  switch setting
    .  port number
    controller number
```

System Value QAUTOCFG

The system value QAUTOCFG is important in this environment. If QAUTOCFG is set to 0 (=OFF), no device descriptions are created even when the local workstation controller has its AUTOCFG parameter set to *YES.

To allow for automatic creation of your PTC device descriptions, set the system value QAUTOCFG to 1 (=ON).

The following are the rules for mapping PTC IDs to port or station addresses:

- PTC ID valid values are 1-1022 (decimal).
- The AS/400 workstation controllers and device configuration commands address devices by a port and station (also called switch) number. Valid port numbers are 0-7. Valid station numbers are 0-6.
- Only the last two digits of the PTC ID are used to determine the port or station address of the workstation.
  - The last digit of the PTC ID is used to determine the station number.
  - The next to last digit of the PTC ID is used to determine the port number.
- If the last two digits are a valid port or station value, then that value is used to request a session.
- If the last digit is 7,8,9, that maps to a station address of 0,1,2 respectively. If the next to last digit is 8,9, that maps to a port address of 0,1 respectively. If the result is a port or station address of 0/0, then that maps to 7/6.
- Addresses 7/2 through 7/6 are reserved for possible future printer support. These addresses are mapped to 6/2 through 6/6.
- A request for a session may be rejected because another PTC is already using that address. This may be due to mapping of 7,8,9 or ignoring the high order digits in the PTC ID. The user sees a 531 error on the PTC display of the second PTC using the same ID. Because PTCs with duplicate IDs appear identical to the system, both PTCs must exit and restart emulation.

You Might Need PTF

If Portable Transaction Computer ID mapping does not work as described, check if you have the latest CUM PTF package.

3.3 Creating a Subsystem for PTCs: Customized Signon Display

On the AS/400 system, all jobs run in subsystems. These subsystems determine a lot of factors in the AS/400 multi-user environment.

By default, the interactive jobs that are started on the PTCs run in the interactive subsystem QINTER, or in the base subsystem QBASE, depending on the setting of the system value QCTLSBSD.

A reason to change this is the fact that the subsystem to which a terminal is allocated determines the display file to be used as a *Sign On* display.

The standard display file is called QDSIGNON in library QSYS. The DDS source of this display file is found in the file QDDSSRC in library QGPL.

We used this source to create our own display file that fits the PTC display. The source code is shown in Figure 182.

```
1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
    A*%%EC
    A*
    A          R SIGNON
    A*%%TS  SD  19950124  101902  JOHAN       REL-V3R1M0  5763-PW1
    A                                        CLEAR
    A                                        BLINK
    A                                    1  3'          Sign On                '
    A                                        DSPATR(HI)
    A            SYSNAME        8A  O  2 10
    A            SBSNAME       10A  O  3 10
    A            DEVNAME       10A  O  4 10
    A            USERID        10A  B  6 10
    A  01        PASSWRD       10A  I  7 10DSPATR(ND)
    A            PROGRAM       10A  B  8 10CHECK(LC)
    A            MENU          10A  B  9 10CHECK(LC)
    A            CURLIB        10A  B 10 10CHECK(LC)
    A  02        QSNERROR      80A  O 24  1DSPATR(HI)
    A            COPYRIGHT     40A  O 24 40DSPATR(HI)
    A            UBUFFER      128A  H
    A                                    2  3'System'
    A                                    3  3'SBS'
    A                                    4  3'DSP'
    A                                    6  3'User'
    A                                    7  3'Pwd'
    A                                    8  3'PGM'
    A                                    9  3'MENU'
    A                                   10  3'CURLIB'
```

Figure 182. DDS Source for a PTC Specific Signon Display File

We compiled this source using the following command:

```
CRTDSPF FILE(QGPL/PTCSIGNON)
        SRCFILE(QGPL/QDDSSRC)
        TEXT('PTC Specific signon display')
```

On a PTC, the sign on display using this display file looks similar to Figure 183 on page 124.

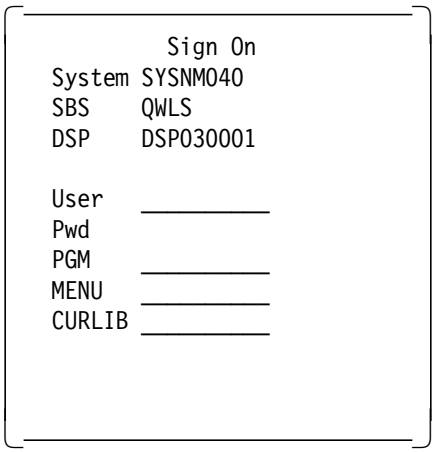


Figure 183. Customized Signon Display for PTCs: PTCSIGNON

Furthermore, we created a new subsystem description, called QWLS, only for the interactive PTC jobs:

```
CRTSBSD SBSD(QWLS)
        POOLS((1 *BASE))
        TEXT('PTC Subsystem')
        SGNDSPF(QGPL/PTCSIGNON)
```

Next, we added workstation entries to this subsystem to have the PTCs device descriptions allocated to this subsystem when it starts:

```
ADDWSE SBSD(QWLS)
       WRKSTN(DSP03*)
```

In this example, we have all display device descriptions beginning with DSP03 allocated to our subsystem. If you are using the *DEVADR value in the QDEVNAMING system value, this is the easiest method because the local workstation is identified by the first two digits following DSP. In this example, it is CTL03, hence 03.

To make sure that these devices are not allocated in the default interactive subsystem, you should make named entries (ADDWSE) in that subsystem also.

3.4 Wireless Line and Controller Descriptions

This section gives tips on managing the configuration objects on the AS/400 system related to the wireless network. If you are not familiar with the configuration objects created for AS/400 wireless LAN, refer to Chapter 2, “Configuration” on page 11.

There are two environments supported by the AS/400 wireless LAN adapter: the LAN environment and the PTC environment.

These environments are managed separately on the AS/400 system. The LAN environment is represented by the line description (*LIND) object on the AS/400 system under which you can create controller descriptions for communication with PCs or even other AS/400 systems. Often these controller description objects are automatically created.

Automatic Creation of Controller Descriptions

To allow for automatic creation of the controllers on the wireless LAN line description, set the AUTOCRTCTL parameter to *YES. This can be done using the CRTLINWLS or CHGLINWLS command.

The LAN controllers show up on the WRKCFGSTS display when they are active. They behave exactly the same as controllers on an Ethernet or token-ring line. See Figure 184 for an example of the WRKCFGSTS display.

```
                        Work with Configuration Status
                                                              System:   SYSNM040
Position to  . . . . .                Starting characters
Opt  Description       Status                 -------------Job--------------
     WLSET             ACTIVE
       WLSPS2A         ACTIVE
         WLSPS2A       ACTIVE
           QPCSUPP     ACTIVE/TARGET          WLSPS2A     WLAN         002027
           QPCSUPP     ACTIVE/TARGET          QPWFSERV    WLAN         002026
           QPCSUPP     ACTIVE/TARGET          WLSPS2A     WLAN         002022
       WLSPSVP         ACTIVE
         WLSPSVP       ACTIVE
           QPCSUPP     ACTIVE/TARGET          WLSPSVP     WLAN         002030
           QPCSUPP     ACTIVE/TARGET          QPWFSERV    WLAN         002024
       WLSETNET        ACTIVE
         WLSETTCP      ACTIVE                 QTCPIP      QTCP         002039
         WLSETUSR      ACTIVE                 WLSET       QSECOFR      001995



                                                                        Bottom
```

Figure 184. Wireless Line Work with Configuration Display

The local workstation controller description we created to accommodate PTCs does not show up on this display. This controller is different from the LAN controllers because it is a local workstation controller (type *LWS). It also differs from twinax local workstation controllers also. The resource that it uses is located on the same adapter card as the AS/400 wireless LAN adapter.

Wireless Line - Workstation Controller

The wireless line description and the PTC local workstation controller are related. You cannot vary off the line description as long as the local workstation controller description is still varied on.

To vary off the wireless line description, first vary off the PTC workstation controller description, and then vary off the line description. This relation is not made clear on the WRKCFGSTS command. You should use descriptive names to help recognize this relationship.

3.5 Problem Determination

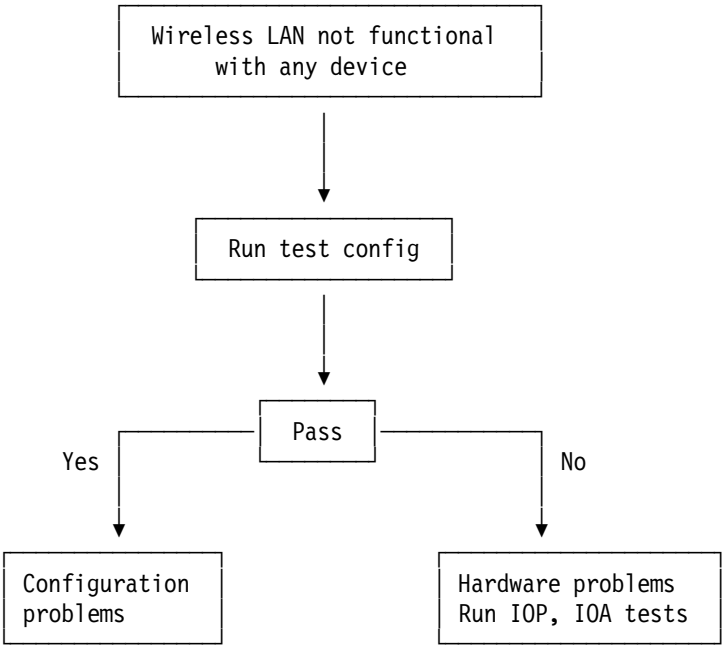
This section provides some tips for problem determination.

3.5.1 Echo Back Test for Wireless Devices

Several diagnostics are shipped with the AS/400 system to help with problem determination. They can all be accessed through the VFYCMN command as described in 3.1.1, “Wireless Network Management Utility” on page 101. One test that can quickly determine if there are configuration errors or hardware problems is the echo back test on the radio connection using test configuration. This test places the AS/400 Wireless LAN adapter into a known test configuration and asks the user to place a Portable Transaction Computer into the AS/400 test configuration.

There is an option on the Portable Transaction Computer main menu for the test configuration. The AS/400 system then performs the echo back test and shows the number that passed or shows a display indicating the test failed. If the test passes, the AS/400 Wireless LAN adapter and Portable Transaction Computer are good, indicating a configuration problem. If the test fails, the hardware may have a problem and can be checked with other tests through VFYCMN.

Refer to the following diagram.



The following displays from Figure 185 on page 127 to Figure 190 on page 129 show the display flow of the echo back test on a radio connection using test configuration.

```
AJCUJ9V1         Select a Communications Test

Select one of the following:

     1. Input/output processor test

     2. Input/output adapter test

     3. Echo back test on RS-485 cable connection

     4. Echo back test on radio connection using system configuration

     5. Echo back test on radio connection using test configuration

     6. Linktest

     7. Wireless Network Management Utility (WNMU) menu


Selection
5

F3=Exit
```

Figure 185. Echo Back Test Display Example (1/6)

```
AJCUJOMA              Communications Problem Analysis

You may be directed to check, connect, or disconnect
cables or connectors. Please read these notices before
you continue.

DANGER

To prevent a possible electrical shock during an electrical storm,
do not connect or disconnect cables or station protectors for
communications lines, display stations, printers, or telephones.

DANGER

To prevent a possible electrical shock from touching two surfaces
with different electrical grounds, use one hand, when possible, to
connect or disconnect signal cables.

Press Enter to continue.



F3=Exit
```

Figure 186. Echo Back Test Display Example (2/6)

```
AJCUJ9W1              Communications Problem Analysis

Line . . . . . . . . . . . . . . :   RADIO
Protocol . . . . . . . . . . . . :   WLS
Hardware resource  . . . . . . . :   LIN021
Card address . . . . . . . . . . :   0230 E0FF

This is a sample wireless network
  ________________   ___   _________       ___
 |     |          |  \ /          /_______  \ /
 |     | Wireless |   |           (radio)   |    ______________
 | IOP |   IOA    |___|                     |____| Access Point |
 |     |          |               ______________ | or device    |
 |     |          |______________| Access Point | |______________|
 |_____|__________|   (wired)    |______________|

Before you will be allowed to start testing, all jobs running on this
hardware resource must be ended. Ensure network devices are powered on.
Ensure cables attached to this resource are secure and not damaged.

Press Enter to continue.

F3=Exit
```

Figure 187. Echo Back Test Display Example (3/6)

```
AJCUJ922            Communications Problem Analysis

This test requires a network device to be configured to a standard
wireless network configuration.

 Do the following:

     1. Select a wireless network device that is located or can be moved
        near the antenna connected to the I/O adapter on the AS/400.

     2. Please refer to the selected network device's users manual for
        AS/400 test configuration instructions.

     3. Configure the selected wireless network device following the
        AS/400 test configuration instructions.

     4. Press Enter to start the test.

F3=Exit
```

Figure 188. Echo Back Test Display Example (4/6)

```
AJCUJ933            Communications Problem Analysis

The test has completed.

Do the following:

     1. Refer to the network device's users manual for AS/400 test
        configuration instructions.

     2. Follow the instructions to restore the previous
        network configuration.

     3. If the network device was moved, return it to its
        original location.

     4. Press Enter to continue.




F3=Exit
```

Figure 189. Echo Back Test Display Example (5/6)

```
AJCUJ9SF          Communications Problem Analysis
                       Echo back test status

Line . . . . . . . . . . . . . . :   RADIO
Protocol . . . . . . . . . . . . :   WLS
Hardware resource  . . . . . . . :   LIN021
Card address . . . . . . . . . . :   0230  E0FF

Number Successful Pings . .  092
Total Pings . . . . . . . .  100









F3=Exit
```

Figure 190. Echo Back Test Display Example (6/6)

3.5.2 Problem Determination Checklists

During our tests, we had a few configuration problems that we solved easily, but we spent a lot of time with them.

This is a checklist of the problems we found.

3.5.2.1 AS/400 Wireless LAN Checklist

Table 1. AS/400 Wireless Configuration Problems

Symptom	Checklist
No LAN connection	Verify the EWLM of your *WLS line.
No LAN connection	Verify Autocreate Controller = *ON on your line.
No PTC connection	Verify the EWCM of your *WSL. controller.
No PTC connection	Verify Auto-configuration controller = *YES.
No PTC connection	Verify EWCPTCE on your EWCM member.
No PTC connection	Verify PTC address range your EWCPTCE.
No Radio connection	Top LED on IOP is blinking. Check EWLM and Access Point/user radio configurations.

3.5.2.2 Portable Transaction Computer Checklist

Table 2. Portable Transaction Computer Configuration Problems

Symptom	Checklist
No scanning	Wrong PTC ID / Wrong PTC Group.
No scanning	Verify Wand Type Configuration = *LASER, *PENCIL... - EWCPTCE.
No scanning	No barcode entry in the PTC group - EWCPTCE.
No scanning	Verify LBLLEN = 00 in the PTC group - EWCBCDE.
No scanning	Vary Off and On the virtual controller.
No scanning	Reset Portable Transaction Computer
No scanning	Vary Off and On line and controller using RESET = *YES.

3.5.2.3 Access Point Checklist

Table 3. Access Point Configuration Problems

Symptom	Checklist
No wireless connection	Verify System ID / Frequency / Bitrate.
No wireless connection	Verify root parameter.
No wireless connection	Restart the Access Point.
No TELNET	Verify Inaddr and Inmask.

3.5.2.4 LAN - DOS Checklist for ISA/MCA Adapters

Table 4. LAN Configuration Problems - DOS Checklist

Symptom	Checklist
Driver does not load	ISA - Invalid IRQ - check and try unused IRQ.
Driver does not load	ISA - Try another ISA slot.
Driver does not load	Verify Protocol.ini.
Driver does not load	Verify TMA = ON (NDIS V1.80) in Protocol.ini. Parameter must be caps.
No host connection	Verify System ID / Channel / Data rate.
No host connection	Verify network address. Use the reverse address. For the matching addresses, refer to 2.1.5, “Client Access/400 LAN Address” on page 20.
Hanging accessing host	Verify MAXFRAME = 1496.

3.5.2.5 LAN - OS/2 Checklist for ISA/MCA Adapters

Table 5. LAN Configuration Problems - OS/2 Checklist

Symptom	Checklist
Driver does not load	Invalid IRQ - check and try unused IRQ.
Driver does not load	Wrong Memory Location - Verify Protocol.ini.
No host connection	Verify System ID / Channel / Data rate.

3.5.2.6 PTC Common Errors

These are common errors that are reported on the PTC for various conditions.

- Connect to Host Failed - Error Number 1415

  This error indicates that the PTC cannot make radio contact with another radio. Correct the radio configuration on the PTC. Parameters to check are:

  - System ID
  - Destination ID
  - Frequency/channel
  - Data rate
  - Ethernet (must be set to 1)

    This parameter indicates that the PTC should use an Ethernet *ARP* procedure to find the correct destination ID.

- Connect to Host Failed - Error Number 7

  This error usually indicates that the PTC has made radio contact but that the workstation controller is not varied on. Vary the workstation controller on.

- Connect to Host Failed - Error Number 400

  This error usually occurs if the PTC has been previously operational with AUTORUN=*YES specified in the CHGEWCPTCE command and then the radio configuration has changed. See the previously described case of error number 1415 to check and change.

- Power On Failure - Error Number 531

This error usually indicates that the PTC has the same PTC ID as another PTC in the network. Because both devices appear at the same address, synchronization is lost for both and exact results are not always predictable. Both PTCs must exit emulation and restart to regain synchronization. The PTC ID must be changed on one of the devices.

3.6 Client Access/400 Considerations

This section provides some considerations when you are using Client Access/400.

3.6.1 Timeout Values

When you use Client Access/400 in a mobile wireless environment, you must compensate for the possibility that the radio is out-of-range from the host for limited amounts of time in order to maintain your session.

In the CONFIG.PCS file, you have a TRLI statement that must be modified to increase the time out values. See the Client Access manual for specific limitations and value ranges. The following example yields a 15 minute time out on the client.

```
If you use CA/400 DOS ext:
C\PCS\CONFIG.PCS
TRLI systemid,mac-address,,,,,10,,10,255,255,255

If you use CA/400 for windows:
C:\WINDOWS\NSD.INI [LAN]
TRLI systemid,mac-address,04,255,255,,2,2,10,,10,255
```

On the AS/400 system side, you must modify the wireless APPC controller values. The following example contains settings to extend the timeout of a session to a certain degree. This particular example extends it to 10 minutes plus. Use the CHGCTLAPPC command to change the values.

```
LAN frame retry  (N2 timer). . . . :   200
LAN connection retry (CN2 timer) . :   200
LAN response timer . (T1 timer). . :   30
LAN connection timer .(CT1 timer). :   30
LAN acknowledgement timer  .(T2) . :   1
LAN inactivity timer .(Ti timer) . :   200
LAN acknowledgement frequency  (N3):   13
LAN max outstanding frames .(K). . :   13
LAN access priority  . . . . . :   0
LAN window step . . . . . .  1
```

When you change these values, you need to change the value of the ″Control owner″ parameter to be ***USER**.

You can roughly calculate the session wait time using the following formula:

```
Session Wait = (Frame Retry x Response Timer) + Inactivity Timer
               + Connection Timer
```

For example, if you change the Response Timer and Connection Timer to 15, then the AS/400 system waits 5 minutes or so before dropping the connection.

Another tip: Our experiments have shown that by letting the AS/400 system drop the session first makes for a cleaner recovery. It turns out that no matter what

the client Client Access/400 parameters are set at, once the AS/400 system drops the session, the client drops approximately 25 seconds after the AS/400 system. On the client, run STOPRTR and then STARTPCS to recover.

When you increase the timeout of a session, you are making a trade-off between having the ability to be out of radio range but having your session active and the ability of the system to close your connection because of no radio contact. For example, if your session on the AS/400 system disconnects, your Client Access/400 workstation is not able to tell the difference between the AS/400 radio being out of range or the AS/400 system actually disconnecting the session until at the end of the time period set from Client Access/400 through the TRLI parameters.

3.6.2 Performance Increase

In a wireless environment, changes to following values might increase performance. Use the CHGCTLAPPC command to change the values:

```
LAN acknowledgement frequency  (N3):   16
LAN max outstanding frames .(K). . :   16
```

3.7 AS/400 Connectivity through RF

When directly attaching three or more AS/400 systems through RF, an access point is recommended. The access point should be configured as a Root and the AS/400 wireless cards should be configured as a Repeater.

Appendix A. PTC Tips

Finding correct keys on the PTCs can be quite confusing. This chapter is very helpful in that matter. Besides keyboard mapping information for the PTCs, this appendix also provides how to reset and re-boot the PTC and other PTC related tips.

A.1 PTC Keyboard Layout

This section presents a mapping of the keyboard on the PTCs for certain special characters when the PTC is in DOS mode. This can be helpful when resetting or reconfiguring the PTCs, since the keyboard changes layout when switching between DOS mode and 5250 emulation mode.

If you re-boot the PTC, the keyboard is mapped to a DOS-like keyboard that tries to take advantage of the keys displayed on the emulation keypad. Some important characters, however, do not map to the same key. Characters such as period (.), colon (:), backslash (), and asterisk (*) are very useful, for example, if you want to delete the files on the A drive before starting the MENU program or re-booting the PTC.

We have mapped these important keys for you in Table 6.

Table 6. PTC Keyboard Mapping in DOS Mode

Character	IBM 2482	IBM 2483	IBM 2484
. (period)	<Enter> + <W>	<Enter> + <W>	<PGLT> + <W>
: (colon)	<Enter> + <N>	<Enter> + <N>	<PGLT> + <N>
(backslash)	<Enter> + <C>	<Enter> + <C>	<PGLT> + <C>
* (asterisk)	Yellow <FUNC> + <8>	Yellow <FUNC> + <8>	<–> + <8>
_ (underscore)	<Enter> + <F>	<Enter> + <L>	<PGLT> + <F>

A.2 PTC Re-Boot

Re-booting the PTC is the same as Alt-Ctrl-Del on a PC. With this function, you clear the memory of the PTC and execute the AUTOEXEC.BAT. The AUTOEXEC.BAT is on the C drive of the PTC. It mainly executes the MENU program (which is on the B-drive), using the configurations files, if any exist, on the A drive.

To re-boot the PTC, execute the following key sequence as shown in Table 7 on page 136.

Table 7. PTC Re-Boot Key Sequence			
Environment	**IBM 2482**	**IBM 2483**	**IBM 2484**
If you have used 3-key power on	<–> + Green <FUNC> + <DEL>	<–> + Green <FUNC> + <ENTER> + Green <FUNC>	<PG UP> + Green <FUNC> + <PG DN>
If you have exited from 5250 Emulation	Green <FUNC> + Yellow <FUNC> + Green <FUNC> + < B >	Green <FUNC> + Yellow <FUNC> + Green <FUNC> + < B >	Green <FUNC> + Yellow <FUNC> + Green <FUNC> + < B >

The keys must not be held down all at the same time. They just need to be pressed in the right sequence.

The main difference between resetting the PTC by 3-keying and re-booting using these key sequences is that the AUTOEXEC.BAT gets executed when re-booting, and, thus, if you have enabled Autorun, the emulation program starts automatically with the existing profiles.

A.3 PTC General Tips

- If your laser scanner does not work, you may have not changed the label length to 0.
- If you do not have the PTC display for the OS/400 signon but the status line is present, you may have to change the auto config controller to *YES on your CTLLWS.
- If you have an error message on the PTC display such as power on failure, check to see if you have a connection with AS/400 system.
- Assure no other clients are working with the wireless LAN.
- Look at the green upper LED on the 2663. If it is blinking, it means that you are not registered/connected to the AS/400 system.
- Check that the following parameters match the AS/400 parameters:

  ```
  Frequency
  Destination id      (transport Address for AS/400)
  data rate
  system id
  ```

- There is a couple of AS/400 configuration items related to proper operation of PTCs:
  - Each PTC connected is counted as one user for AS/400. Type WRKLICINF then take option 5 to check if you are not over the granted license usage limit. '*NOMAX' value is allowed.
  - The value of 'QAUTOVRT' system value should be other than '0'.

A.4 PTC Reset

This procedure, referred to as 3-key power on, has the equivalent effect as power switch off and on.

1. Make sure the PTC is powered off.
2. Press and hold the bottom-left **<** – > key and the bottom-right **<TAB>** key.
3. Press and release the top-left **<ON/OFF>** key, still holding the two other keys until you see the cursor appear in the top left corner of the display. This usually takes five seconds.
4. Release the two lower keys.
5. You are prompted for a new date and time.

A.5 Exit Sequence if AUTORUN *YES on AS/400 System

This procedure refers to the situation where the AUTORUN set is *YES on the AS/400 EWCPTCE configuration member and you need to force PTC off the Autorun loop:

1. Press green function.
2. Press Exit.
3. Press Q before ″Auto Run Enabled Msg″ when you are prompted for a password.
4. Press Enter when prompted for password.

You are back at the PTC Main Menu.

A.6 Recovery of ″PktDrvrNotFound″ PTC Error Message

If you receive the message ″PktDrvrNotFound″ when starting your PTC application, perform the following steps:

Note: Performing these steps erases configuration data for this PTC and requires you to re-enter it.

1. Exit your application and insure that a DOS prompt is displayed.
2. Type ′edisk 2′ at the DOS prompt and press the Enter key.
3. Type ″Y″ when asked ″Are you sure?″ and press the Enter key.
4. Press a key other then ″Q″ when prompted for ″Other″ key to continue (second time).
5. Press a key other then ″Q″ when prompted for ″Other″ key to continue.
6. Return to the configuration instruction for your application and re-enter the PTC configuration data.

A.7 IBM 2482 DOS Keyboard Layout

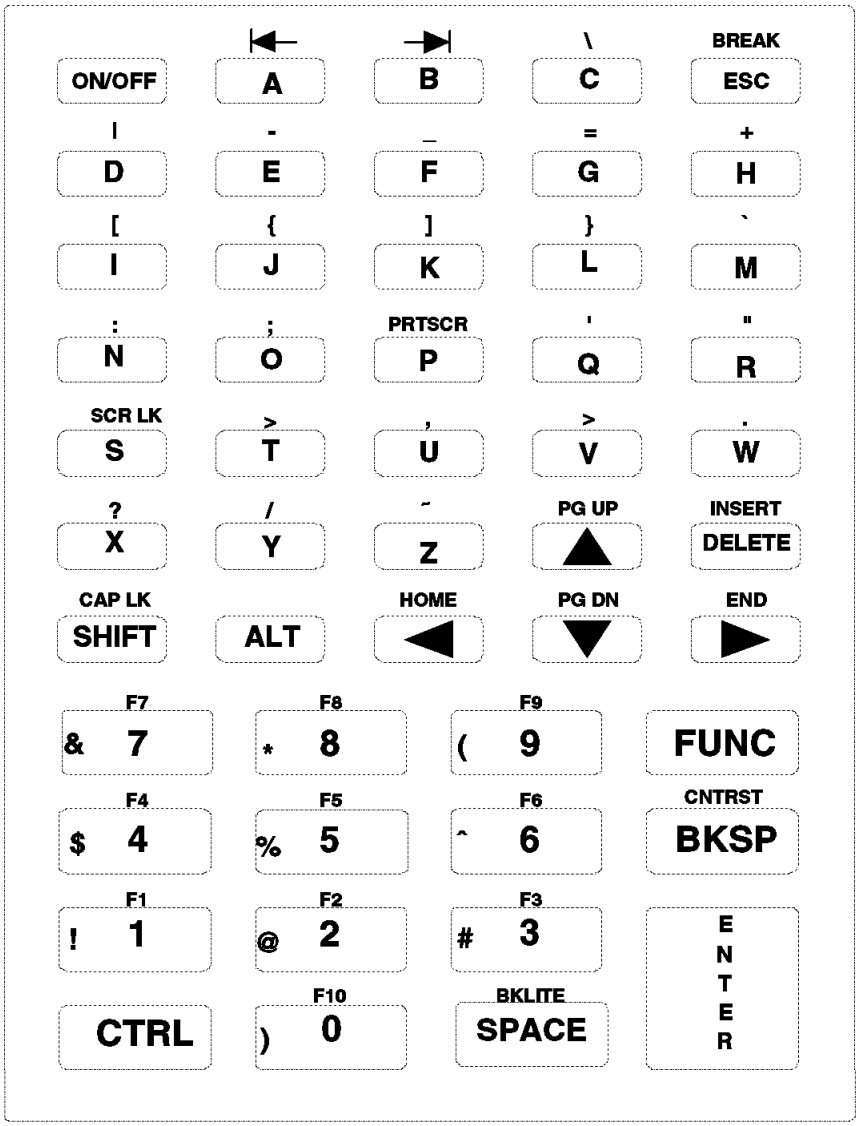


Figure 191. IBM 2482 DOS Keyboard Layout

A.8 IBM 2483 DOS Keyboard Layout

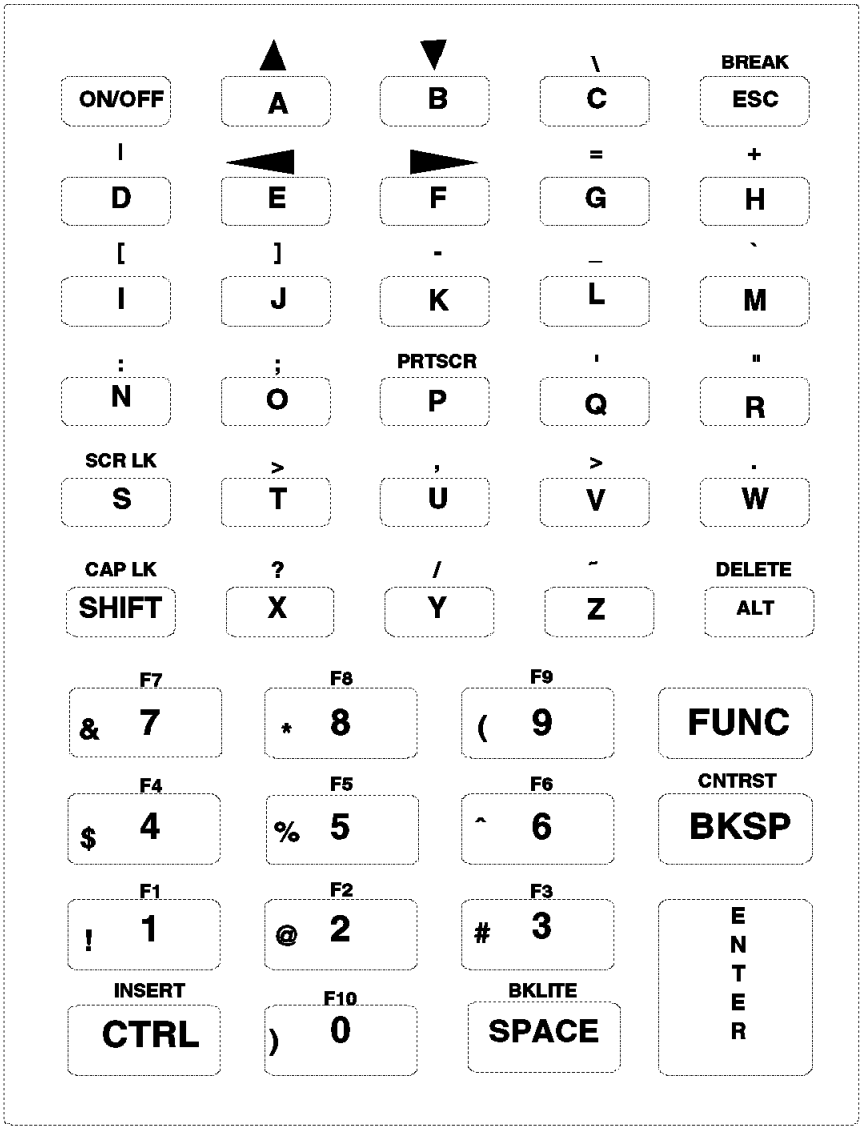


Figure 192. IBM 2483 DOS Keyboard Layout

A.9 IBM 2484 DOS Keyboard Layout

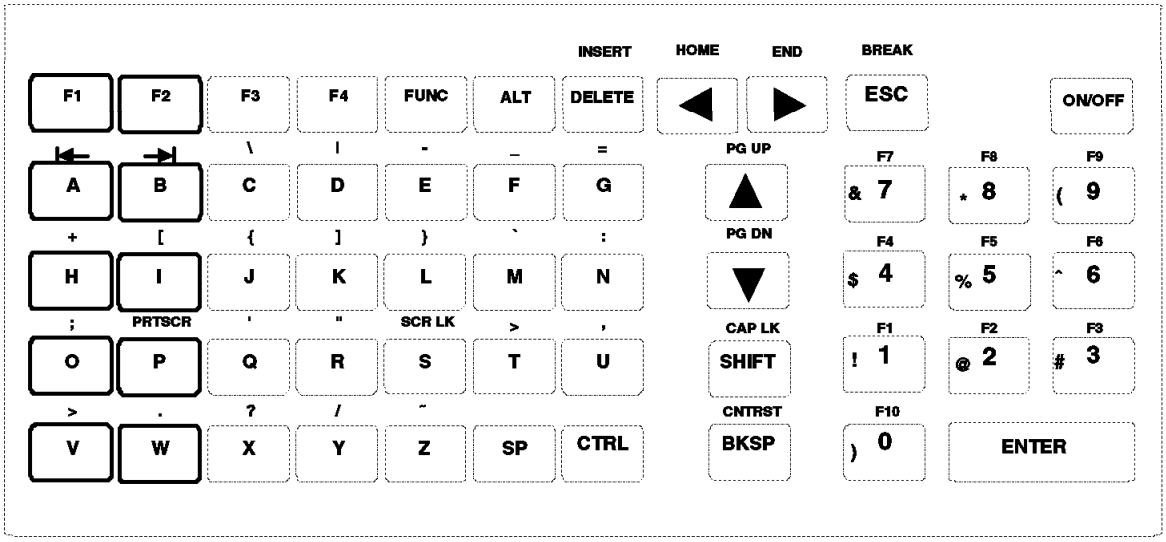


Figure 193. IBM 2484 DOS Keyboard Layout

A.10 PTC Screen Intensity Control

When the PTC is in DOS mode, the screen intensity can be altered by repeatedly depressing the ENTER and the SHIFT key. When the PTC is in 5250 mode the screen intensity can be altered by repeatedly depressing the FUNC and LCD key.

Appendix B. Wireless LAN Driver Errors

This appendix presents a list of startup errors you get when loading the AWCNDIS LAN driver.

The driver startup failure codes are grouped in two categories. The first code is a startup reason code, and the second code is an ARLAN diagnostic reason code.

B.1 Startup Reason Codes

Code	Description
0x80 - Reset timeout	This error is generally hardware related. The co-processor could not be reset.
0x81 - Reset error	This error is generally hardware related. The co-processor could not be properly reset.
0x82 - Nop command failed	Sending nop command to co-processor failed. Generally caused by faulty hardware or co-processor firmware.
0x83 - Config failed	Sending the config command to the co-processor failed. Generally caused by faulty hardware or co-processor firmware.
0x84 - Config timeout	The config command timed out waiting to complete. This is generally caused by faulty hardware or co-processor firmware.
0x85 - Config error	The data in the configuration file was invalid for this co-processor type. Verify correct default information exists in the config file for the co-processor in question.
0x86 - Address timeout	The co-processor was unable to formulate a valid MAC address for itself. Usually indicates faulty co-processor hardware or firmware.
0x87 - COP timeout	The co-processor timed out waiting for a command to complete. Usually indicates faulty co-processor hardware or firmware.
0x88 - Nop did not complete	The nop command failed to complete. This is generally caused by faulty co-processor firmware or hardware.
0x89 - Nop com. interrupt failure	The nop command failed to generate the appropriate hardware interrupt. This usually indicates faulty co-processor hardware.

B.2 Diagnostic Reason Codes

Code	Description
0xEC	EEPROM error on radio module.
0xED	Too many Txenable commands.
0xEE	T410 chip failure.
0xEF	On chip failure.
0xF0	Invalid parameter found in command.
0xF1	Invalid command received by co-processor.
0xF2	Reserved
0xF3	Load code error
0xF4	Invalid spreading code/channel
0xF5	Reserved
0xF6	Invalid config format
0xF7	Missing SS code
0xF8	Checksum error
0xF9	No more address space
0xFA	Transceiver not found
0xFB	Backbone failure
0xFC	SCC failure
0xFD	Local ram test failed
0xFE	EPROM checksum failed
0xFF	OK

A diagnostic offset description has been added to the driver to assist in determining which byte in the configuration structure the Dataspan card had trouble with. The offset points to a byte field in the configuration structure if a configuration error occurs. This byte is only valid for startup code 0x85.

Appendix C. Product Numbers, Names, and Terminology Mapping

This appendix provides the information of product numbers, names, and terminology mapping between IBM and Telxon.

C.1 Wireless LAN Product Numbers

Table 8. Access Point IBM - Telxon Product Mapping

IBM Product	**TELXON Product**
AS/400 Wireless LAN Adapter (FC 2668)	NA
AS/400 I/O Attachment Processor (FC 2663)	NA
2482 Portable Transaction Computer (PTC)	860 DS
2483 Integrated Laser PTC	960 DS
2484 Industrial PTC	860IM DS
2480-E00 Ethernet LAN Access Point	630
2480-RS0 RS-485 LAN Access Point	632
FC 5254 ISA Adapter	655
FC 5256 MCA Adapter	670
FC 5250 PCMCIA (SOD)	690

C.2 Wireless Data Rate Mapping

Table 9. Wireless Data Rate Mapping

On AS/400 Configuration: ADDEWLM	**On PC Configuration: PROTOCOL.INI**
1M (DATARATE keyword)	DATARATE = 3
2M (DATARATE keyword)	DATARATE = 4

C.3 Wireless Center Frequency Mapping

This table is true at least in the U.S. and Canada. These values are country dependent. Use this table as a general reference. Check with your local IBM office for actual implementations in your country.

Table 10. Wireless Center Frequency Mapping

On AS/400 Configuration: ADDEWLM	**On PC Configuration: PROTOCOL.INI**	**Actual Value**
*A1 (FREQUENCY keyword)	CHANNEL = 1	2412MHz
*B1 (FREQUENCY keyword)	CHANNEL = 2	2427MHz
*A2 (FREQUENCY keyword)	CHANNEL = 3	2442MHz
*B2 (FREQUENCY keyword)	CHANNEL = 4	2457MHz
*A3 (FREQUENCY keyword)	CHANNEL = 5	2465MHz

Appendix D. Barcode Label Length Fix for Non-U.S. English System

While you are configuring controller descriptions for your PTCs, you need to set the barcode ″label length″ to 0. Zero indicates that the label length is free, and scanning of labels 1 through 64 characters long is allowed. You can do this by entering **0** for the ″Label length″ parameter on the ″Add EWC Barcode Entry (ADDEWCBCDE)″ menu. Unfortunately, this is only allowed for the U.S. English version.

If the primary language of your system is not U.S. English, you have to manually edit the QEWCSRC source file and the extended wireless controller member. Your PTC laser scanner does not work if this value is not 0.

The following is the steps to edit this manually:

1. On the command line, type:

   `STRSEU SRCFILE(QGPL/QEWCSRC) SRCMBR(XXXX)`

   where XXXX is the name of your source file member for the PTC LWS controller.

2. Edit the line:

   `labellenght=64  to  labellenght=00`

3. Save the file.
4. Disconnect the PTCs from the 5250 emulation and power off.
5. Vary off and on the PTC LWS.
6. Power on the PTCs and start the emulation.

Appendix E. ODI Implementation for Windows for Workgroup

- When you use WFWG and Novell, you have to choose IPX/SPX protocol from the Work Group Network.
- For a Novell server connection, you need to configure your net.cfg file.
- You have to remember to exclude the memory area (D400, in this case) from config.sys and system.ini.
- All of the files that you need (lsl.com, awco690.com, ipxodi.com, netx.com net.bat net24.cfg) are in the driver diskette shipped with the adapter. These files are located in the A:\ODI subdirectory.
- Copy these files to your C:\NWCLIENT subdirectory.
- Rename NET24.CFG to NET.CFG.
- If the default values do not work, read the READODI.TXT file.
- Edit the needed parameters.
- There are no special Wireless LAN configuration requirements for Novell NetWare environment.

The following is an example of NET.CFG.

```
;; Arlan ODI driver NET.CFG file
;; Last updated 02/01/95
file handles=60
show dots=on
search dir first=on
protocol ODINSUP
        bind AWC0690
        buffered

Link Driver AWC0690
   SystemId  00000A
   Channel   5
   DataRate  4
;   *** The following three lines were uncommented  02/15/96  Jim Bauman
   Mem       #1 D4000
   Int       #1 5
   Socket    1
   Frame ETHERNET_802.2
   Frame ETHERNET_II
   Frame ETHERNET_802.3
   Frame ETHERNET_SNAP
;   *** The following line was added  02/15/96  Jim Bauman   ***
   CONFIG ON
```

Figure 194. Example NET.CFG to IBM ThinkPad 755 with WFWG

Appendix F. PTC Remote Connection Through 2210

If you need to attach PTCs remotely to your AS/400 system, this can be one of the possible solutions.

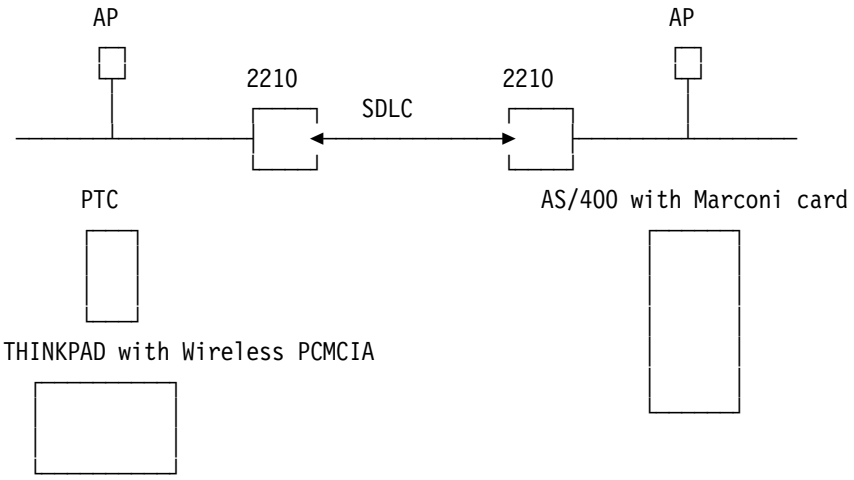
Not Fully Tested

We have not tested this scenario thoroughly nor is this the officially supported configuration by IBM. This is just a simple suggestion that might satisfy your particular requirement.

Here are some points regarding to this example.

- The same 2210 configuration as this example is in redbook SG24-4446-01, scenario 1.
- The modem configuration is a typical point-to-point SDLC configuration.
- We used IBM 7861-047 modems in this test.
- The bridge configuration is transparent for Client Access/400 and Telnet connections.
  - You can access the 2210 using windows ASCII terminal emulator attached directly to the 2210 service port (No parity, 8-bit, 1-stop, 2400).
  - Cable ThinkPad - (9pin to 25pin) - null modem - (25pin to 9pin) - 2210 service port.

F.1.1 Scenario Diagram



F.1.2 Remote End 2210 Configuration

```
*talk 6

Config>network 0
Ethernet interface configuration
ETH config>list
Connector type:            AUTO-CONFIG
No IPX interface configuration
IP Encapsulation:          ETHER
ETH config>exit
Config>network 1
```

Figure 195. 2210 Configuration: Remote End (1/60

```
Point-to-Point user configuration
PPP Config>list all

Maximum frame size in bytes = 2048
Encoding: NRZ
Idle State: Flag
Clocking: External
Cable type: RS-232 DTE
Internal Clock Speed: 0
Transmit Delay Counter: 0

LCP Parameters
--------------
Config Request Tries:          20   Config Nak Tries:             10
Terminate Tries:               10   Retry Timer:                3000

LCP Options
-----------
Max Receive Unit:            2048   Magic Number:                 Yes

NCP Parameters
---------------
Config Request Tries:          20   Config Nak Tries:             10
Terminate Tries:               10   Retry Timer:                3000

IPCP Options
------------
IPCP Compression:                 None
IP Address:      Don't Send or Request

CCP Options
-----------
Data Compression disabled
Algorithm list: Stacker-LZS BSD-LZW Predictor1
BSD: code bits 13
Stac: histories 1
Stac: check_mode SEQ
```

Figure 196. 2210 Configuration: Remote End (2/6)

```
PPP Config>exit
Config>list devices
Ifc 0 (Ethernet):   CSR  81600, CSR2  80C00, vector 94
Ifc 1 (WAN PPP):    CSR  81620, CSR2  80D00, vector 93
Ifc 2 (WAN PPP):    CSR  81640, CSR2  80E00, vector 92
Ifc 3 (WAN PPP):    CSR 381620, CSR2 380D00, vector 125
Ifc 4 (WAN PPP):    CSR 381640, CSR2 380E00, vector 124
Ifc 5 (Token Ring): CSR 6000000, vector 95
```

Figure 197. 2210 Configuration: Remote End (3/6)

```
Config>protocol asrt
Adaptive Source Routing Transparent Bridge user configuration
ASRT config>list bridge
                Source Routing Transparent Bridge Configuration
                ===============================================

Bridge:                 Enabled                 Bridge Behaviour: SRT
                  +---------------------------+
------------------| SOURCE ROUTING INFORMATION |------------------------
                  +---------------------------+
Bridge Number:          0B                      Segments:          1
Max ARE Hop Cnt:        14                      Max STE Hop cnt:   14
1:N SRB:                Not Active              Internal Segment:  0x000
LF-bit interpret:       Extended
                  +-------------------+
------------------| SR-TB INFORMATION |---------------------------------
                  +-------------------+
SR-TB Conversion:       Disabled
TB-Virtual Segment:     0x000           MTU of TB-Domain:  0
                  +-----------------------------------+
------------------| SPANNING TREE PROTOCOL INFORMATION |----------------
                  +-----------------------------------+
Bridge Address:         Default         Bridge Priority:   32768/0x8000

STP Participation:      IEEE802.1d on all ports
                  +-------------------------+
------------------| TRANSLATION INFORMATION |---------------------------
                  +-------------------------+
FA<=>GA Conversion:     Enabled          UB-Encapsulation:  Disabled
DLS for the bridge:     Enabled
                  +------------------+
------------------| PORT INFORMATION |---------------------------------
                  +------------------+
Number of ports added: 2
Port:   1      Interface:  0  Behaviour:    STB & SRB   STP:  Enabled
Port:   2      Interface:  1  Behaviour:    STB Only    STP:  Enabled

ASRT config>
```

Figure 198. 2210 Configuration: Remote End (4/6)

```
ASRT config>exit
Config>protocol hst
TCP/IP-Host Services user configuration
TCP/IP-Host config>list all
No IP-Host address currently configured.

No Default Gateway address currently configured.

TCP/IP-Host Services Enabled.

RIP-LISTENING Disabled.

Router Discovery Enabled.
```

Figure 199. 2210 Configuration: Remote End (5/6)

```
P-Host config>

*talk 5:

+protocol asrt
ASRT>list bridge
Bridge ID (prio/add):  32768/00-20-35-72-FD-30
Bridge state:          Enabled
UB-Encapsulation:      Disabled
Bridge type:           STB
Bridge capability:     ASRT
Number of ports:       2
STP Participation:     IEEE802.1d
**Bridge is enabled for Data Link Switching**

                                                          Maximum
Port  Interface State  MAC Address  Modes MSDU Segment   Flags
   1  Eth/0   Up   00-20-35-72-FD-30   T    1514           RD
   2  PPP/0  Up   00-00-00-00-00-00    T    2052           RD

Flags:RE = IBMRT PC behaviour Enabled,RD = IBMRT PC behaviour Disabled

SR bridge number:      B
SR virtual segment:    000
Adaptive segment:      000
ASRT>
```

Figure 200. 2210 Configuration: Remote End (6/6)

F.1.3 AS/400 End 2210 Configuration

```
ETH config>list
Connector type:            AUTO-CONFIG
No IPX interface configuration
IP Encapsulation:          ETHER
ETH config>exit
Config>network 1
```

Figure 201. 2210 Configuration: AS/400 End (1/6)

```
Point-to-Point user configuration
PPP Config>list all
Maximum frame size in bytes = 2048
Encoding: NRZ
Idle State: Flag
Clocking: External
Cable type: RS-232 DTE
Clock Speed: 0

Transmit Delay Counter: 0
LCP Parameters
--------------
Config Request Tries:          20   Config Nak Tries:             10
Terminate Tries:               10   Retry Timer:                3000

LCP Options
-----------
Max Receive Unit:            2048   Magic Number:                Yes


NCP Parameters
---------------
Config Request Tries:          20   Config Nak Tries:             10
Terminate Tries:               10   Retry Timer:                3000

IPCP Options
------------
IPCP Compression:                 None
IP Address:      Don't Send or Request

CCP Options
-----------
Data Compression disabled
Algorithm list: Deflate
Deflate: transmit window 12, receive window 15
```

Figure 202. 2210 Configuration: AS/400 End (2/6)

```
PPP Config>exit
Config>list devices
Ifc 0 (Ethernet): CSR  81600, CSR2  80C00, vector 94
Ifc 1 (WAN PPP):  CSR  81620, CSR2  80D00, vector 93
Ifc 2 (WAN PPP):  CSR  81640, CSR2  80E00, vector 92
Ifc 3 (WAN PPP):  CSR 381620, CSR2 380D00, vector 125
Ifc 4 (WAN PPP):  CSR 381640, CSR2 380E00, vector 124
Ifc 5 (Ethernet): CSR 381600, CSR2 380C00, vector 126
```

Figure 203. 2210 Configuration: AS/400 End (3/6)

```
Config>protocol.asrt
Protocol name or number ·IP‘? asrt
Adaptive Source Routing Transparent Bridge user configuration
ASRT config>list bridge

               Source Routing Transparent Bridge Configuration
               ===============================================

Bridge:                 Enabled                 Bridge Behaviour: STB
                  +-----------------------------+
------------------| SOURCE ROUTING INFORMATION |-----------------------
                  +-----------------------------+
Bridge Number:          0A                      Segments:          0
Max ARE Hop Cnt:        14                      Max STE Hop cnt:   14
1:N SRB:                Not Active              Internal Segment:  0x000
LF-bit interpret:       Extended
                  +-------------------+
------------------| SR-TB INFORMATION |---------------------------------
                  +-------------------+
SR-TB Conversion:       Disabled
TB-Virtual Segment:     0x000                   MTU of TB-Domain:  0
                  +-----------------------------------+
------------------| SPANNING TREE PROTOCOL INFORMATION |----------------
                  +-----------------------------------+
Bridge Address:         Default           Bridge Priority:   32768/0x8000

STP Participation:      IEEE802.1d
                  +-------------------------+
------------------| TRANSLATION INFORMATION |--------------------------
                  +-------------------------+
FA<=>GA Conversion:     Enabled          UB-Encapsulation:  Disabled
DLS for the bridge:     Disabled
                  +------------------+
------------------| PORT INFORMATION |---------------------------------
                  +------------------+
Number of ports added: 2
Port:   1      Interface:  0 Behaviour:    STB Only   STP:  Enabled
Port:   2      Interface:  1 Behaviour:    STB Only   STP:  Enabled

ASRT config>
```

Figure 204. 2210 Configuration: AS/400 End (4/6)

```
ASRT config>exit
Config>protocol hst
TCP/IP-Host Services user configuration
TCP/IP-Host config>list all

No IP-Host address currently configured.

No Default Gateway address currently configured.

TCP/IP-Host Services Enabled.

RIP-LISTENING Disabled.

Router Discovery Enabled.
```

Figure 205. 2210 Configuration: AS/400 End (5/6)

```
Config>
*talk 5

CGW Operator Console
+protocol asrt
ASRT>list bridge
Bridge ID (prio/add):  32768/00-20-35-72-AB-10
Bridge state:          Enabled
UB-Encapsulation:      Disabled
Bridge type:           STB
Bridge capability:     ASRT
Number of ports:       2
STP Participation:     IEEE802.1d

                                                    Maximum
Port  Interface State   MAC Address         Modes  MSDU  Segment   Flags
   1  Eth/0      Up    00-20-35-72-AB-10       T    1514            RD
   2  PPP/0      Up    00-00-00-00-00-00       T    2052            RD

Flags: RE = IBMRT PC behaviour Enabled, RD = IBMRT PC behaviour Disabled
SR bridge number:      A
SR virtual segment:    000
Adaptive segment:      000
ASRT>exit
```

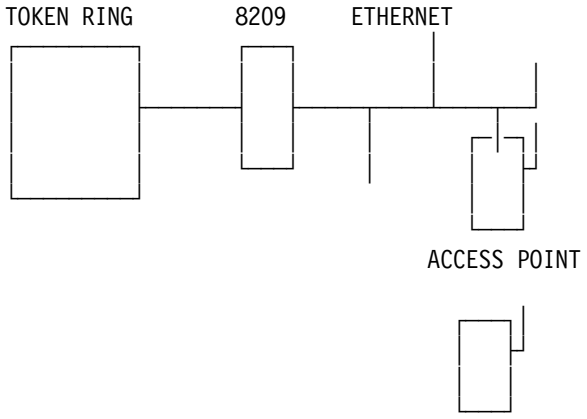
Figure 206. 2210 Configuration: AS/400 End (6/6)

Appendix G. Ethernet Access Points Over 8209 Bridges

You can use 8209 to bridge the Token-Ring and Ethernet LANs and you can combine them with your wireless LAN access points. This appendix shows one way of doing it.

G.1 8209 and Token-Ring and Ethernet

This is one possible connection. Configuring PTCs and PCs are the same as in a normal Ethernet environment.



G.1.1 Bridge Configuration

```
Bridge version information        : 020101E844551
Bridge Number                     : 0

Bridge port Information
LAN segment number                : 001            FF0
Segment Type                      : T-R 4 mbps     Ethernet 10 Mbps
Adapter address                   : 10005A4D93C0   1000A5A4D93C1
Early Token release               : 1
Hop count limit                   : 7
Enabled unction Address
Parameters Server                 : 1
Error Monitor                     : 1
Configuration report server       : 1


Bridge Forwarding Parameters
Automatic mode selection          : 1
Mode Priority                     : 1
Forward LLC Traffic (mode 1)      : 1
Enabled SAPs for LLC Traffic      : 00 04 08 f0 f4

TC/IP address conversion          : 1
Dual mode multicast conversion    : 1
Use general broadcast frames      : 0
```

```
Broadcast address conversion      : 1
IPX Support                       : 1

Bridge forwarding parameters
Filter definition
LAN segment number                : 001           FF0
Filter offset                     : 000           000
Range 1 low                       : 0000          0000
Range 1 high                      : FFFF          FFFF
Range 2 low                       : 0000          0000
Range 2 high                      : FFFF          FFFF

Bridge Forwarding Parameters
LAN segment number                : 001           FF0
Filter Definition
Source address                    : 00000000000   00000000000
Source address high               : 00000000000   00000000000
Destination address low           : 00000000000   00000000000
Destination address high          : 00000000000   00000000000

Spanning Tree Parameters
Bridge maximum age                : 20
Bridge hello time                 : 02
Bridge forward delay              : 15
Bridge priority                   : 32678

LAN segment number                : 001           FF0
Port path cost                    : 00250         00100
Port priority                     : 128           128

Aging time                        : 00300
Maximum transit time              : 1

Ethernet counters
Ethernet collisions               : 0000
Ethernet late collisions          : 0000
Ethernet CRC errors               : 0000
Ethernet framing errors           : 0000
```

Appendix H. Command-Line AS/400 Configuration Examples

For those who prefer to use a command-line interface with minimal prompting, this section provides several examples.

All commands are given with command-line parameter values so that minimal prompting is required.

H.1 AS/400 Wireless LAN IOP with PTCs Only

The following steps create the AS/400 configurations necessary to use a single AS/400 Wireless LAN IOP with a 2483 PTC with the laser scanner configured for UPC and code 3-of-9 barcodes.

For configuring with access points instead of the IOP radio or when setting up multiple IOPs for use with PTCs, see section H.3, “Special Instructions” on page 161 for changes.

1. Find the AS/400 system assigned resource name for the wireless line (type 2668). In V3R1, it is in the form of LINxxx, in V3R6 it is CMNxx, where x is the numerical value. Type:

   ```
   wrkhdwrsc *cmn
   ```

   and then scroll up or down to find the 2668.

2. Create the line description.

   ```
   crtlinwls lind(wlslin) rsrcname(LINxxx)
   inzfile(qewlsrc) inzmbr(wlslin) inzpgm(qzxcinz)
   ```

   The value for LINxxx is from the previous step (substitute CMNxx for V3R6).

   Press Enter on the Add Wireless Line Member (ADDEWLM) command display to accept the defaults for the radio configuration or press F10 to change the radio parameters. Changing the radio configuration is highly recommended for security reasons. Since this is a PTC configuration, a data rate of 1M is recommended. If radio parameters are changed, the changed values must be used in step 10.

3. Vary the line on (the workstation controller resource name is not assigned until the line has been varied on at least once).

   ```
   vrycfg cfgobj(wlslin) cfgtype(*lin) status(*on)
   ```

4. Find the AS/400 system assigned name for the wireless PTC workstation controller (type 266A). It is in the form of CTLxx.

   ```
   wrkhdwrsc *lws
   ```

   and then scroll up or down to find the 266A.

5. Create the controller description.

   ```
   crtctllws ctld(wlsptc) rsrcname(CTLxx) type(266A) model(1)
   autocfg(*yes) inzfile(qewcsrc) inzmbr(wlsptc) inzpgm(qzxcinz)
   ```

   The value for CTLxx is from the previous step.

   Press Enter on the Add Wireless Ctl Member (ADDEWCM) command display to accept the default controller transport/destination parameters.

6. Add the PTC group configuration information.

```
addewcptce ptcgrp(ptc) inzmbr(wlsptc) csrtype(*block)
wandtype(*laser) bcdgrp(upc code3of9)
```

7. Add the barcode group configuration information.

   ```
   addewcbcde bcdgrp(upc) inzmbr(wlsptc) bcdtype(*upc)

   addewcbcde bcdgrp(code3of9) inzmbr(wlsptc) bcdtype(*code3of9)
   dropbegin(1) dropend(1)
   ```

   To use other barcode types, substitute the keyword for that type in the bcdtype parameter. Keywords are found in the help text by pressing F4 instead of Enter to prompt on the command and pressing F1 for help with the cursor in the barcode type field.

8. Ensure that *QSYSAUTOCFG is on. This is to allow automatic display device configuration.

   ```
   chgsysval sysval(qautocfg) value('1')
   ```

   If automatic device configuration is not used, then each PTC must be configured manually with the following command (for each PTC).

   ```
   crtdevdsp devd(ptcps) devcls(*lcl) type(3476) model(ea)
   port(p) swtset(s) ctl(wlsptc)
   ```

   The value for ″ptcps″ is user-dependent. We recommend that it be the characters ″PTC″ followed by the PTC ID used in step 10. The PTC ID (represented by the ″ps″) is used to determine the port (″p″) and switch (″s″) settings for the device configuration.

   The value for ″p″ is the next to last digit (tens position) of the PTC ID that is used in step 10 (use 0 for the first PTC). The value for ″s″ is the last digit (units position) of the PTC ID that is used in step 10 (use 1 for the first PTC).

9. Vary the controller on.

   ```
   vrycfg cfgobj(wlsptc) cfgtype(*ctl) status(*on)
   ```

10. Turn the PTC on and configure it (from Configure PTC menu) with the following values. All of the values (except PTC ID) should be the default as shipped. If the PTC is at a DOS prompt rather than the main menu or Configure PTC menu, see Appendix A, “PTC Tips” on page 135.

    ```
    option 2:   PTC Id = 1
                Use Internal Keyboard Definition = n
    option 3:   system id      = 2
                destination id = 4001
                frequency      = 1
                bit rate       = 2
                TXP timeout    = 6
                TXP retries    = 5
                Find Rtr size  = 0
                Ethernet       = 1
    ```

11. Start Emulation on the PTC.

    Option 1 on the configure PTC menu

H.2 AS/400 Wireless LAN IOP with Client Access/400

The following steps create the AS/400 configurations necessary to use a single AS/400 Wireless LAN IOP with Client Access/400.

For configuring with access points instead of the IOP radio, see section H.3, “Special Instructions” for changes.

1. Find the AS/400 system assigned resource name for the wireless line (type 2668). In V3R1, it is in the form of LINxxx, in V3R6 it is CMNxx, where x is the numerical value.

   ```
   wrkhdwrsc *cmn
   ```

   and then scroll up or down to find the 2668.

2. Create the line description.

   ```
   crtlinwls lind(wlslin) rsrcname(LINxxx)
   inzfile(qewlsrc) inzmbr(wlslin) inzpgm(qzxcinz)
   adptadr(42000000005A) autocrtctl(*yes)
   ```

   The value for LINxxx is from the previous step (substitute CMNxx for V3R6).

   The adapter address is specified as a symmetrical address (for example, 42000000005A) and autocreate controllers are allowed.

   Press Enter on the Add Wireless Line Member (ADDEWLM) command display to accept the default radio configuration or press F10 to change radio parameters. Changing radio configuration is highly recommended for security reasons.

3. Vary the line on.

   ```
   vrycfg cfgobj(wlslin) cfgtype(*lin) status(*on)
   ```

4. Configure the end-user device (or devices) as shown in prior configuration example sections.

H.3 Special Instructions

1. RS-485 Wired Backbone and Access Points

   If an RS-485 wired backbone is being used and the IOP antenna is not needed, then press F10 on the ADDEWLM command display in step 2 and change the ″adapter configuration″ parameter from *ALL to *WIRED.

2. Ethernet wired backbone and access points:

   If an Ethernet wired backbone is being used, an additional access point on the Ethernet LAN is required to provide the radio link between the IOP and the Ethernet backbone.

   Press F10 on the ADDEWLM command display in step 2 and change the ″root or repeater″ parameter from *YES to *NO and change the ″adapter configuration″ parameter from *ALL to *RADIO.

   For performance reasons, other access points and end-user devices (PTCs or PCs) should be set to frequencies that do not overlap with the IOP radio and the access point that provides the backbone connection. Frequency 2 overlaps 1 and 3, and frequency 4 overlaps 3 and 5.

3. Multiple IOPs with PTCs:

If multiple IOPs are being set up for use with PTCs, the PTCs must be assigned to specific IOPs. A wired backbone common to all IOPs and access points is assumed, so the radio-unique parameters are the same for all PTCs. The PTCs are then assigned to specific IOPs through the used of the destination id parameter.

Press F10 for additional data in step 5 to set the destination ID for the workstation controller. The destination ID must also be set on the PTC in the Configure PTC menu.

Do not duplicate PTC IDs. They should still remain unique so that destination hopping may be used. Higher order digits should be used to make PTC IDs unique between multiple IOPs (see steps 8 and 10 previously shown in this section on configuring a Wireless LAN IOP for PTCs).

The controllers are matched to a given IOP (2663) by the same CMBxx number in the WRKHDWRSC *CMN and WRKHDWRSC *LWS commands.

If an Ethernet backbone is used with multiple IOPs, a single access point may be used to provide the backbone connection to the IOPs.

List of Abbreviations

AP	Access Point
BER	Bit Error Rate
FC	Feature Code
IBM	International Business Machines Corporation
ISA	Industry Stadard Architecture
ITSO	International Technical Support Organization
LAN	Local Area Network
LAPS	LAN Adapter and Protocol Support
LSP	LAN Support Program
MCA	Micro Channel Architecture
MSDLC	MicroSoft Data Link Control
NDIS	Network Driver Interface Specification
ODI	Open Data Link Interface
PC	Personal Computer
PCMCIA	Personal Computer Memory Card International Association
PSK	Phase Shift Keyed
PTC	Portable Transaction Computer
SID or Sid	System Identifier
SOD	Statement Of Direction
SYSTEMID	System Identifier
TMA	Telesystems Micro-cellular Architecture
WNMU	Wireless Network Management Utility

Index

Numerics

A

B

C

D

E

G

I

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AS/400 Wireless LAN Products Family:
Configuration Examples,
Tips and Techniques
March 1996

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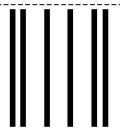

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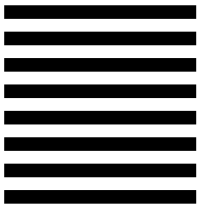

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