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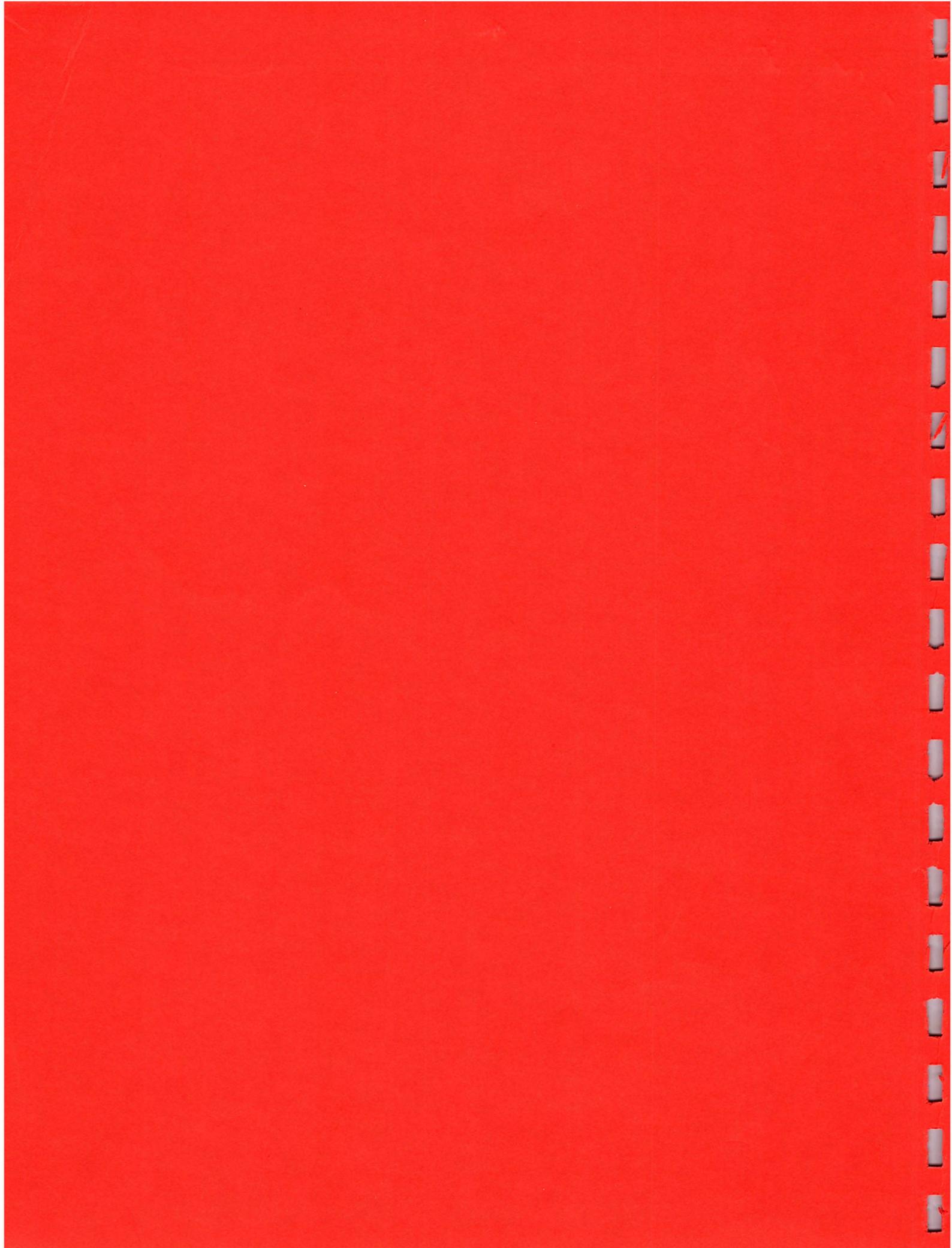
**Extended Services for OS/2 Communications
Manager**
(Course Code S7049)

Student Notebook

IBM Personal System Education
IBM Canada Ltd., Department 327
Markham, Ontario L3R 9Z7



Personal Systems Education



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Personal Systems Education

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This course was revised by **G. Schindler Associates**. Comments concerning this notebook and its usefulness for its intended purpose are welcome. You may send written comments to:

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Course Overview



Course Description

Purpose

is designed to develop skills in the configuration and customization of the Extended Services for OS/2 Communications Manager.

Some consideration will also be given to the implementation of Extended Services for OS/2 Communications Manager in the enterprise environment.

The class covers installation, configuration, and use of the Communications Manager lab sessions are included to reinforce the lectures.

Course Topics

- Lectures
 - Communications Manager Overview
 - Communications Manager Installation
 - 3270 Emulation
 - Communications Manager SNA Gateway
 - Communications Manager Workstation Profile and Local Node Characteristics
 - Advanced Configuration
 - SNA Data Link Controls
 - LAN Adapter and Protocol Support
 - APPC/APPN Overview
 - APPC Configuration
 - APPN End Node
 - APPN Network Node
 - 5250 Emulation
 - Asynchronous Communications/ASCII Emulation
 - Subsystem Management
 - Problem Determination
- LAB Exercises
 - Extended Services for OS/2 Communications Manager Installation
 - 3270 Emulation Configuration (Token-Ring)
 - Communications Manager SNA Gateway (Token-Ring)
 - Advanced Configuration
 - APPC/APPN
 - APPN End Node
 - APPN Network Node
 - 5250 Emulation (Token-Ring)
 - Subsystem Management
 - Problem Determination

Audience

This course is intended for technical support personnel responsible for planning, installation, user training and support for communicating workstations in a networked environment. Since Communications Manager has a significant amount of function supporting IBM hosts, communications systems programmers are encouraged to attend with the PS/2 technical representative from their organization.

Prerequisites

Before taking this course, you should have taken the following courses (or have equivalent experience):

- Fundamentals of SNA (S6593)
- Token Ring Network Implementation and Management (S6767)
- OS/2 2.0 Workstation Intermediate Workshop (S7048)

Objectives

After completing this course, you should be able to:

- Identify the emulations and services that are available in the Communications Manager
- Identify the communications media options available for specific Communications Manager features.
- Identify the problem determination tools available in the Communications Manager.
- Identify the subsystem management tools available in the Communications Manager.
- Given the proper reference materials, install the Extended Services for OS/2 Communications Manager.
- Given the proper reference materials, configure 3270.
- Given the proper reference materials, configure the Communications Manager SNA Gateway.
- Given the proper reference materials, configure the Communications Manager APPC service (Low Entry Networking).
- Given the proper reference materials, configure the Communications Manager APPN service to provide both End Node and Network Node capabilities to a system.
- Given the proper reference materials, perform minor problem determination and resolution tasks using the Communications Manager

- Identify possible IBM support services which pertain to the Extended Services for OS/2 Communications Manager

Curriculum Relationship

This course is part of the OS/2 curriculum. While this course is specific to Extended Services for OS/2 Communications Manager, there are also courses available for the following topics:

- Introduction to OS/2
- Database Manager for Extended Services for OS/2
- OS/2 LAN Services



Course Overview

Agenda

Day 1

Introduction and Administrative Information
Extended Services for OS/2 Communications Manager Introduction
Installation and Configuration Tools
Communications Manager Installation Lab
3270 Emulation
Using 3270 Emulation Lab
SNA Gateway
Communications Manager SNA Gateway Lab

Day 2

Workstation Profile and Auto-start Options
SNA Configuration
LAN Adapter and Protocol Support
Advanced Configuration Lab
Low Entry Networking
Communications Manager LEN Node Configuration and Use Lab

Day 3

Advanced Peer to Peer Networking (APPN)
Communications Manager APPN Configuration and Use Lab
Advanced APPN Topics
Advanced APPN Topics Lab
5250 Work Station Feature

Day 4

5250 Work Station Feature Lab
Asynchronous Communications
Subsystem Management
Subsystem Management Lab
Problem Determination
Problem Determination Lab

Materials Available to You

Manuals You Should Have

- *IBM Extended Services for OS/2 Start Here*, S04G-1000
- *IBM Extended Services for OS/2 Workstation Installation Guide*, S04G-1008
- *IBM Extended Services for OS/2 Hardware and Software Reference*, S04G-1014
- *IBM Extended Services for OS/2 Guide to User Profile Management*, S04G-1112
- *IBM Extended Services for OS/2 Glossary*, S04G-1019
- *IBM Extended Services for OS/2 Messages and Error Recovery Guide*, S04G-1017
- *IBM Extended Services for OS/2 Productivity Enhancement Utility*, 32G5668
- *IBM Extended Services for OS/2 Communications Manager User's Guide*, S04G-1015
- *IBM Extended Services for OS/2 Keyboard Layouts*, S04G-1018
- *IBM Extended Services IBM Personal Computer Enhanced Keyboard Template for Communications*, S04G-1117
- *IBM Extended Services for OS/2 Communications Manager Additional Functions Installation and Reference Guide.*, 32G-5667
- *IBM Extended Services for OS/2 Network Administration Guide*, S04G-1001
- * *IBM Extended Services for OS/2 Communications Manager Configuration Guide*, S04G-1001
- *IBM Extended Services for OS/2 Programmable Configuration Reference*, S04G-1003
- *IBM Extended Services for OS/2 LAN Adapter and Protocol Support Configuration Guide*, S046-1113
- *IBM Extended Services for OS/2 Communications Manager Host Connection Reference*, S04G-1004
- *IBM Extended Services for OS/2 Example Scenarios*, S04G-1005
- *IBM Extended Services for OS/2 Problem Determination Guide for the Service Coordinator*, S04G-1006
- *IBM Extended Services for OS/2 Programming Services and Advanced Problem Determination for Communications*, S04G-1007

- *Worksheets, S04G-1111*
- *IBM Extended Services for OS/2 ACDI redirection Guide and Information, S04G-1024*
- *IBM Extended Services Service Point Application Router and Remote Operations Service Guide, S04G-1021*
- *IBM Extended Services for OS/2 Communications Manager Sample Programs, S04G-1021*
- *IBM Extended Services Command Reference, S04G-1020*

Units

Unit 1. Extended Services for OS/2 Communications Manager Introduction

What This Unit is About

This unit will provide you with a brief introduction to the features that are available in Extended Services for OS/2 Communications Manager. It is presented here to prepare you for what will be covered during the remainder of the week.

What You Should Be Able to Do

After completing this unit, you should be able to list the features that are available in the Extended Services for OS/2 Communications Manager.

Communications Manager

"Communications Manager provides services that your workstation can use to communicate with a host computer or with another workstation in order to exchange information or use the resources of that host or other workstation."

OVERVIEW

Visual 1-1. Communications Manager

This rather broad description of Communications Manager really sums up the actual purpose of Communications Manager. What it doesn't do is show the true power that is available within Communications Manager.

Communications Manager Features

- Emulations
- Connectivity
- Services
- Management
- APIs

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Visual 1-2. Communications Manager Features

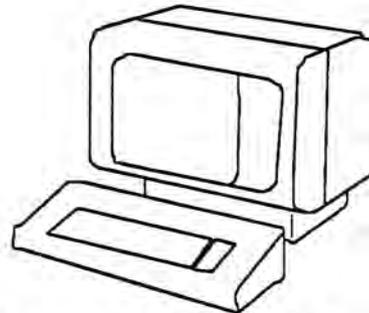
The *Extended Services for OS/2 Online Command Reference* is automatically installed and is available, online, whenever any component of Extended Services for OS/2 is installed. The command reference contains a brief description and the syntax for commands that you can use for the Communications Manager, Database Manager, and User Profile Management components as well as the common installation, configuration, and file compression utilities.

API: Application Programming Interface

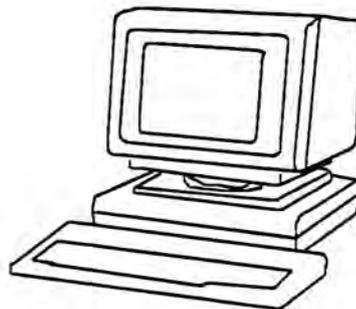
Emulations



3270 Terminals



5250 Terminals



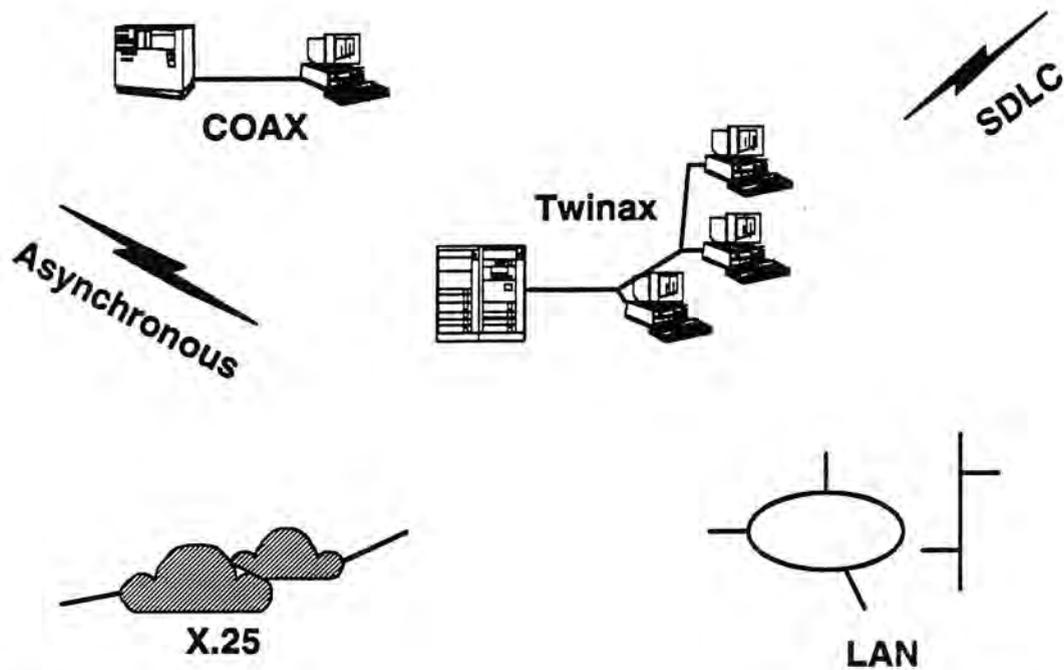
ASCII Terminals

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Visual 1-3. Emulations

- The Communications Manager allows our workstation to perform like (emulate) a 3270 display terminal, an ASCII terminal (such as a DEC VT100 or IBM 3101), and a 5250 Workstation.
- Your workstation attached printer can emulate host printers as well.
- All of this can be done at the same time. You do not need to stop one emulation in order to use another.
- Some goodies include:
 - File transfer
 - Host graphics
 - Clipboard support
 - Multiple font support
 - Keyboard remapping

Connectivity



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Visual 1-4. Connectivity

- Not all of the connectivity options are available to all of the features. For example, you cannot emulate a 3270 terminal over a Twinax connection.
- The supported LANS are:
 - Token-Ring
 - PC Network
 - Ethernet
 - IEEE 802.3
 - IBM 3174-Peer Communications Network

SDLC: Synchronous Data Link Control

Services

- **APPC/APPN**
- **SNA Gateway**
- **X.25 Network Support**
- **Asynchronous Communications**

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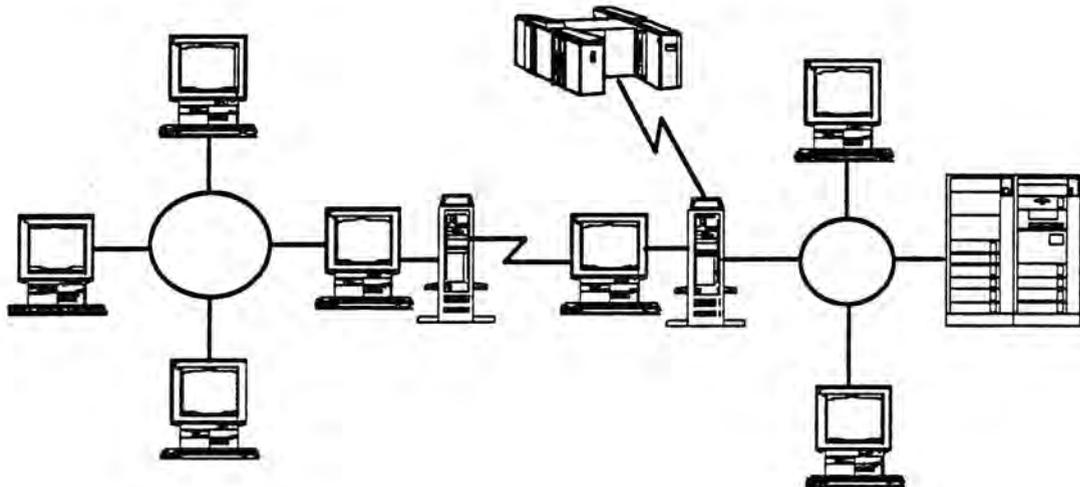
Visual 1-5. Services

Services differ from emulators in the way you interact with them. While an emulator is typically interacted with directly, a service provides the ability to perform a particular type of communications. Once the ability is there, an application can do whatever it wants. For example, in order to use the 5250 emulator application, you must have the APPC service running.

APPC: Advanced Program to Program Communications

APPN: Advanced Peer to Peer Networking

APPN Networking

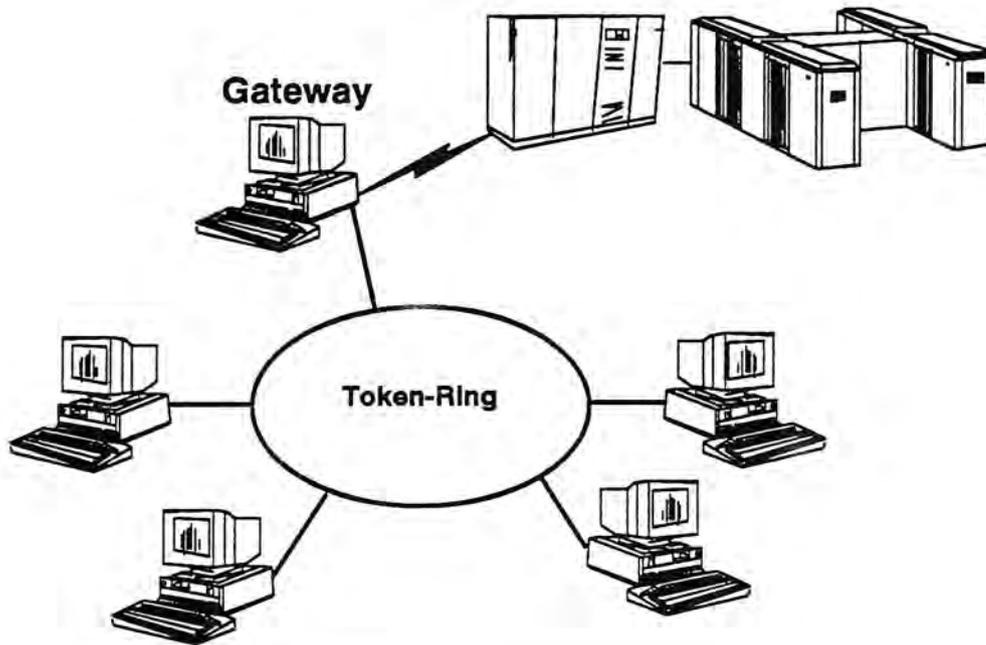


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Visual 1-6. APPN Networking

- APPN Networking allows a type 2.1 node to indirectly connect to another type 2.1 node. This is accomplished by routing the connection through an intermediate node called a Network Node. All of this can be done without host involvement.
- Once connected, the two nodes communicate using the LU 6.2 data stream.

SNA Gateway



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Visual 1-7. SNA Gateway

- The SNA Gateway allows multiple workstations to communicate with an SNA host. All of the workstation's data is be routed through another workstation that is configured as a gateway.

Management

- **Subsystem Management**
- **Problem Determination Tools**
- **Installation Tools**
- **Configuration Utilities**

OVPMANA

Visual 1-8, Management

- Subsystem management allows you to view and control your communications. You can start and stop individual sessions, links, etc.
- Several problem determination tools are available including:
 - Trace facility
 - Trace Formatter
 - Dump Facility
 - Error Logging
 - Message Logging
 - Management Services/NetView Alerts
 - FFST (First Failure Support Technology)
- Several tools are available to ease the installation task for the System Administrator and the user.
- There are also several interfaces to Communications Manager configuration. These range from easy menu driven interfaces to an application programming interface for programmers.

Application Programming Interfaces

- EHLLAPI
- APPC
- CPI-C
- NETBIOS
- IEEE 802.2
- Subsystem Management
- ACDI
- ACDI Redirection
- SRPI
- X.25
- LU Application
- Programmable Configuration

■ Common Services

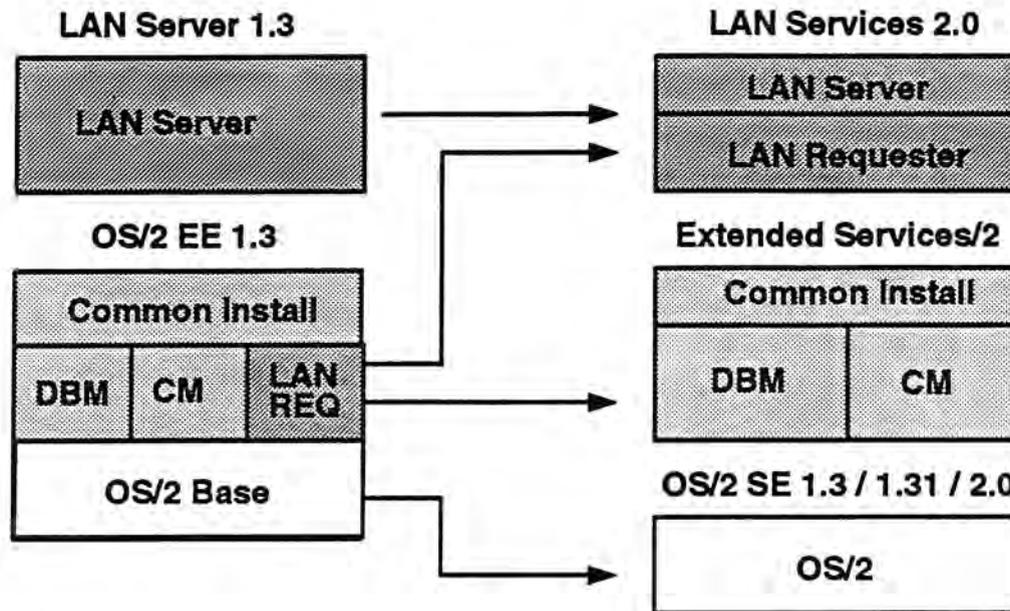
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Visual 1-9. Application Programming Interfaces

- APIs allow a programmer to write applications that will interface with Communications Manager. They are function calls that save the programmer the effort of reinventing the wheel.
- All of the Communications Manager APIs support C and Macro Assembler languages.
- In addition, the EHLLAPI, APPN, APPC, LU A, and SRPI APIs support COBOL.
- EHLLAPI also supports BASIC and REXX.
- Each API supports a different protocol, which means a variety of hardware links is supported and many needs can be filled.

EHLLAPI:	Emulated High Level Language API
APPC:	Advanced Program to Program Communications
CPI-C:	Common Programming Interface for Communications
NETBIOS:	Network Basic Input Output System
IEEE:	Institute of Electronic and Electrical Engineers
ACDI:	Asynchronous Communications Device Interface
SRPI:	Server Requester Programming Interface

Extended Services Re-Packaging



OVRPK001

Visual 1-10. Extended Services for OS/2 Re-Packaging

- The extended applications of OS/2 Extended Edition have been separated from the base operating system. The LAN Requester is now bundled with the LAN Server in a product called LAN Services. The Database Manager and Communications Manager have been bundled into a product called Extended Services for OS/2. Both of these products will run on either OS/2 Version 1.30.1 or OS/2 Version 2.0.

Extended Services Product Objectives

- **Enable OS/2 Communications and Database Manager to operate on selected IBM-Compatible systems**
- **Enhance the acceptance of IBM's SAA strategy by expanding the SAA workstation platform**
- **Help facilitate IBM's migration to a Client/Server Model for LAN offerings**
- **Provide IBM Service and Support for IBM code on non-IBM systems**

OVRPK02

Visual 1-11. Extended Services for OS/2 Product Objectives

Extended Services Platform Support

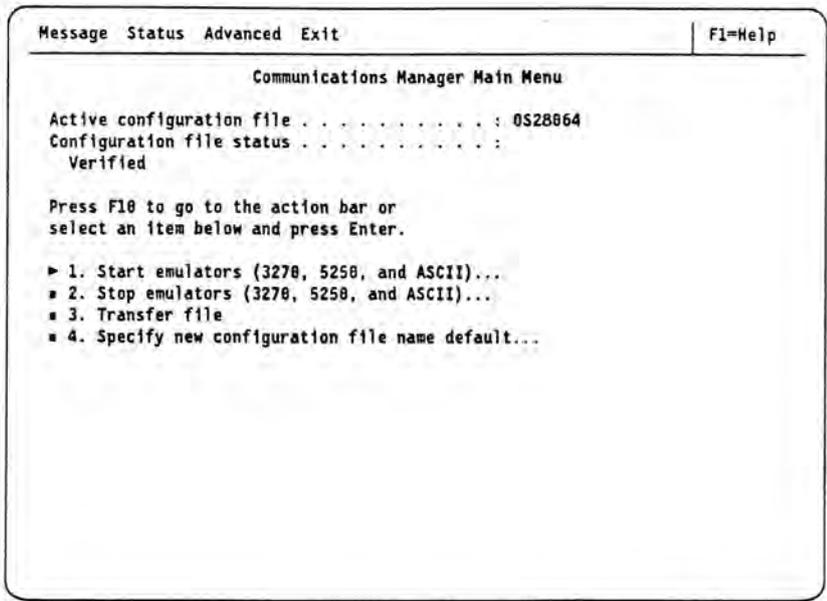
- **Support for OEM software and hardware platforms extends the scope of Extended Services**

- **Supported software**
 - OEM compatible Microsoft-based OS/2 Version 1.31
 - IBM OS/2 Version 1.30.1 and Version 2.0

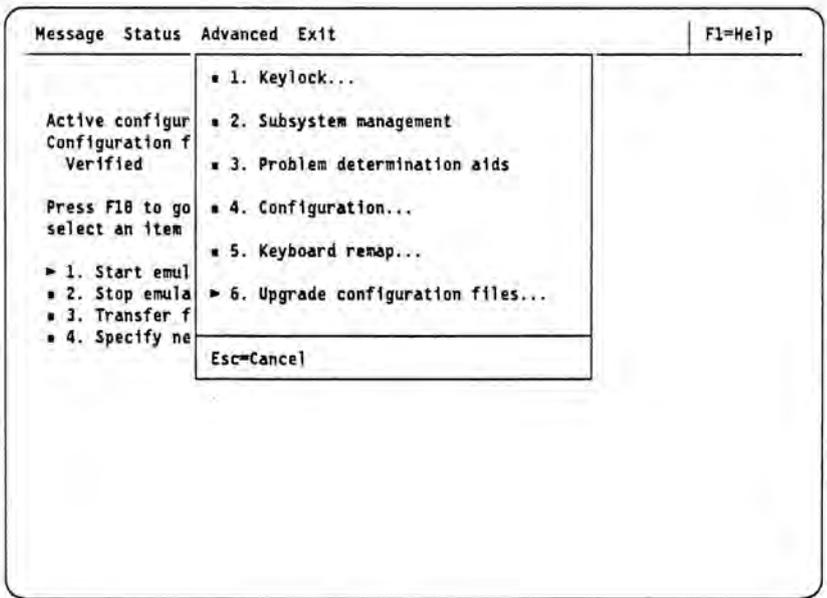
- **Supported hardware includes selected OEM PC hardware platforms running Microsoft's OS/2 Version 1.3**

OVRPKGCS

Visual 1-12. Extended Services for OS/2 Platform Support



Visual 1-13. Communications Manager Main Menu



Visual 1-14. Advanced Configuration

- These two panels show the Communications Manager Main Menu and the Advanced pull-down.
- Item four of the Advanced pull down (Configuration) is where we will be spending most of our time this week.

Unit 2. Installation and Configuration Tools

What This Unit is About

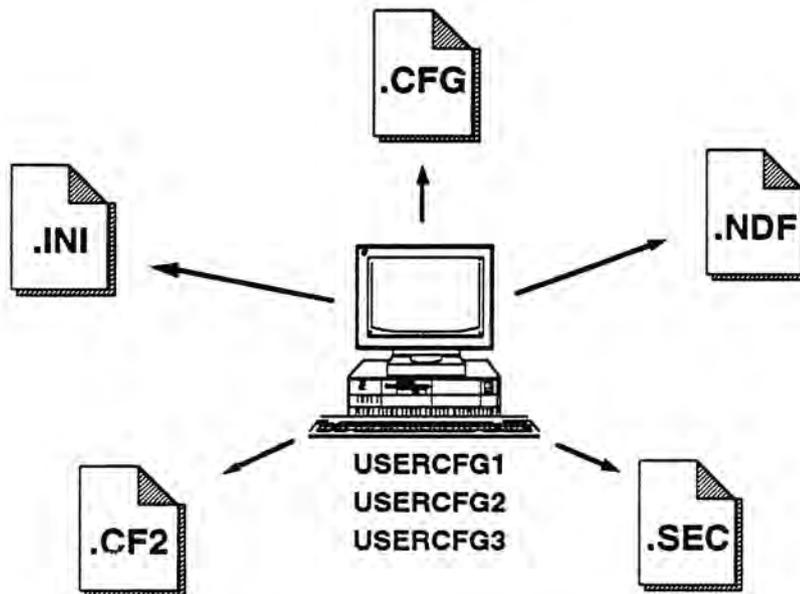
There are several tools available to both the system administrator and the end user to help with the tasks of installation and configuration. These two tasks are very closely related as you cannot install Communications Manager without first configuring it. This unit will present the different tools that are available and provide information as to when each one should be used.

What You Should Be Able to Do

After completing this unit, you should be able to

- List the tools available for installation of Communications Manager.
- Use Basic Configuration Services to install Communications Manager.
- Create a Custom Install Diskette.
- Reinstall a configuration file to add new features.
- Use a Programmable Configuration exec to modify a configuration file.
- Understand when reinstallation is necessary.
- Lock a Communications Manager configuration file.
- Print a report of configuration file profiles.

Configuration/Installation



INSOVR03

Visual 2-1. Installation/Configuration

- Communications Manager stores configuration information in five separate files. The files all have the same name but differ in their extension.
 - .CFG:** The main Communications Manager configuration file. It is stored in drive:\CMLIB\.
 - .CF2:** This is the file in which the SNA configuration information is stored. It is stored in drive:\CMLIB\APPN.
 - .NDF:** This is the ASCII text version of the .CF2 file. This file can be edited with an ASCII editor and then converted to the binary .CF2 file with verification. It is stored in drive:\CMLIB\APPN.
 - .SEC:** This is the file that stores SNA security information. It is stored in drive:\CMLIB\APPN.
 - .INI:** This file is used to store the LAN adapter and protocol information. The file you will actually use is called PROTOCOL.INI. It is a copy of your actual .INI in the same directory. These are ASCII text files that can be edited. It is stored in boot:\IBMCOM.
- The configuration files are used to determine what Communications Manager features will be **installed** and **used**. The Communications Manager must be configured before it can be installed.
- Only the configured features will be installed. This saves disk space.

Boot Drive Considerations

Make sure there is room on your boot drive for the following components:

- **The base operating system**
- **User Profile Management (UPM)**
- **LAN Adapter and Protocol Support**
- **First Failure Support Technology (FFST)**
- **Extended Services Installation Utilities**

INSOVR01

Visual 2-2. Boot Drive Considerations

- If you are using multi-boot capability of OS/2 Version 2.0 and plan to use Extended Services with more than one version of OS/2, you will need to install Extended Services twice.
- In general, if you plan to use Extended Services for OS/2, your boot partition should be at least 50 MB.
- You do not need to install the Communications Manager on the boot partition. These other components will be installed on the boot partition no matter where you install the Communications Manager.
- See *IBM Extended Services for OS/2 Hardware and Software Reference*, S04G-1014 for information on DASD requirements.

Base Operating System

- **Be sure to install the following base operating system options:**
 - **INSTAID** - The installation tool
 - **ATTRIB** - From the optional system utilities
 - **KEYBOARD.DCP** - The country information option
 - **REXX** - If you plan to use Programmable Configuration
 - **VIEW** - For viewing online documentation

- **These are all installed during a normal, default install.**

IN30VPC2

Visual 2-3. Base Operating System

- If **VIEW** is not listed as a separate option during the install process, then you just need to install one of the online documents in order to get it installed.

Installation

■ ESINST

- Basic Configuration Services (BCS)
- Custom Install Diskette
- Advanced Installation

■ REINST

- Advanced Installation

INSMETH

Visual 2-4. Installation

- ESINST is used for the first time installation. It resides on disk 1 of the Extended Services for OS/2 diskettes. To begin, type: **A:ESINST**
- If you run ESINST after the first time install, any previous copies of Extended Services for OS/2 on the selected drive will be removed, and a new installation will begin. You will be warned of this fact.
- REINST is used once the Extended Services for OS/2 has been installed to add and remove different features and components.
- The REINST program is really just like Advanced Installation.
- REINST can be invoked from the command line, or from within the Extended Services folder.
- If you are upgrading from a previous version, the upgrade will occur automatically during installation.
- Any previous versions of Communications Manager will be replaced during the upgrade.
- Previous configuration information will be preserved during the replacement, except when installation is done with a custom install diskette.

Basic Configuration Services

- **A prompted, menu driven interface to configuration file creation/modification**
- **Configures and installs the most common connections and features**
- **Uses default values to minimize the knowledge required to configure**
- **Use when:**
 - **You do not have an existing configuration file**
 - **You do not have a Custom Install Diskette**
 - * - **You want a starting point for more extensive configuration**
 - **You wish to modify an existing BCS created configuration file**

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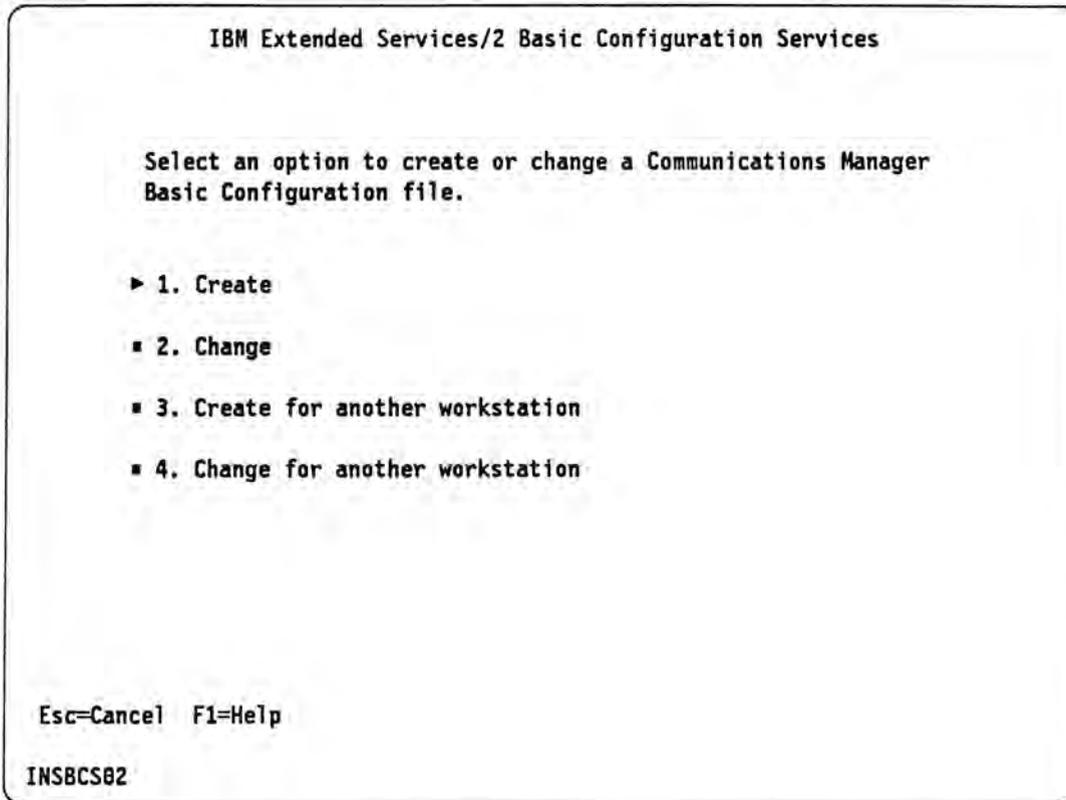
Visual 2-5. Basic Configuration Services

- Any values that do not have defaults will only need to be provided once, and only if the feature you are configuring needs the value.
- Some combinations of adapters/features are not allowed. For example:
 - No SNA Gateway configuration
 - No APPC configuration (except the APPC required for 5250)
 - No X.25 connections
 - Only one non-DFT adapter is supported. (LAN, SDLC, Twinax)
 - Only one 3270 or 5250 connection type is allowed
 - No ACDI redirection
 - Only one LAN type

APPC: Advanced Program to Program Communications

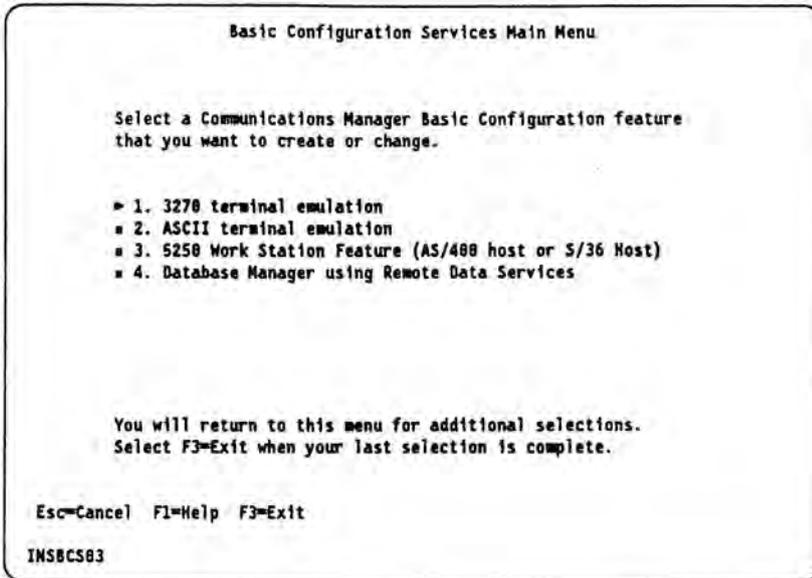
ACDI: Asynchronous Communications Device Interface

DFT: Distributed Function Terminal



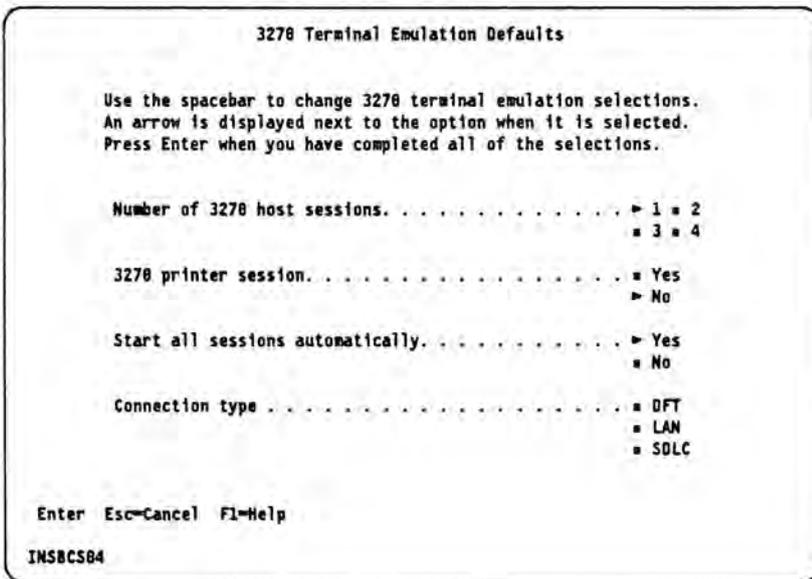
Visual 2-6. Basic Configuration Services

- This screen will not appear during the first time install with BCS. It will appear any time BCS is invoked after that.
- You cannot use BCS to change a configuration file if it has been modified with the advanced configuration function of Communications Manager. More on advanced configuration later.
- You will not get the option to install the created or modified BCS file if you choose to create or change for another workstation.



Visual 2-7. Basic Configuration Services

- Select the feature that you would like, one at a time.
- Press **F3 = Exit** to begin the install process.



Visual 2-8. Basic Configuration Services

- Fill out the parameters for the feature and press **Enter** to continue.

Advanced Installation

- **Install a user created configuration file**

- **Install one or more of the provided default configuration files**

- **Install one or more of the Communications Manager additional features**

- **Install Database Manager on the workstation**

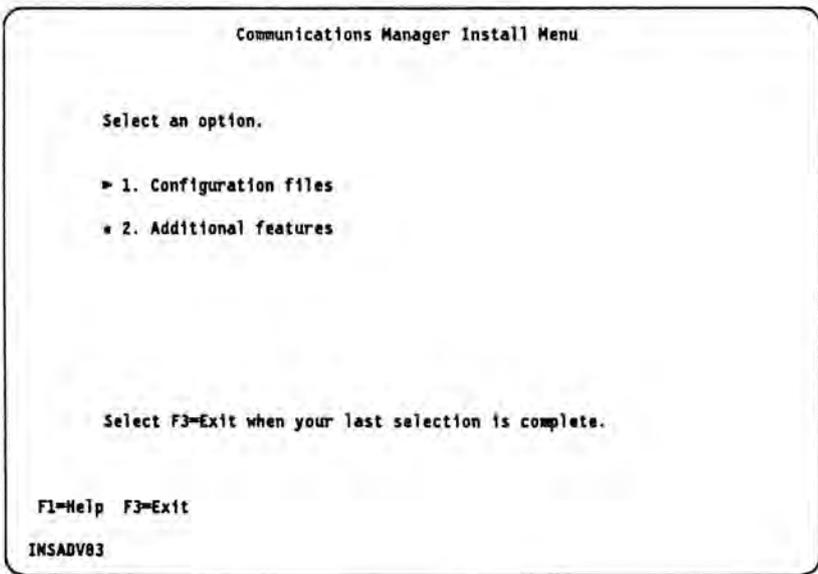
IN&ADV01

Visual 2-9. Advanced Installation



Visual 2-10. Advanced Installation Install/Remove Menu

- This is the main installation menu where you choose a particular component to install.
- Note that Extended Services components can be removed as well.
 - Communications Manager allows you to selectively remove features just like you can selectively add them.



Visual 2-11. Communications Manager Install Menu

We chose Communications Manager.



Visual 2-12. Communications Manager Configuration File Menu

There are two types of configuration file that can be installed:

User configuration files:

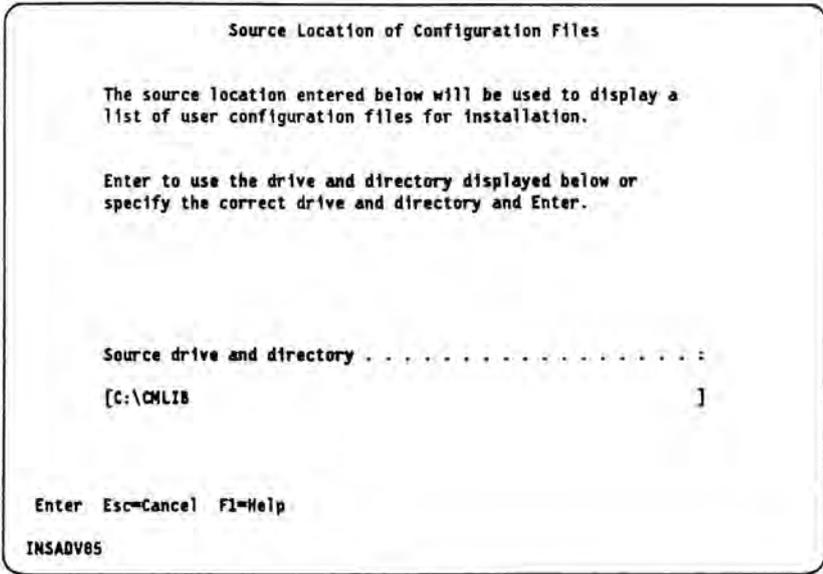
This is a file that has been previously created but has since had some new features added to it through the Communications Manager Advanced Configuration. It could also be a configuration file that was created at a different workstation. Installing a configuration file will also install any code necessary to support the features in the file.

Default configuration files:

There are two default configuration files provided with Communications Manager. They are used as models for the creation of your own user configuration files. They contain model profiles to assist in filling configuring.

ACSCFG.CFG: Contains keyboard profiles for all supported national languages.

ACSCFGUS.CFG: Contains keyboard profiles for the United States only.



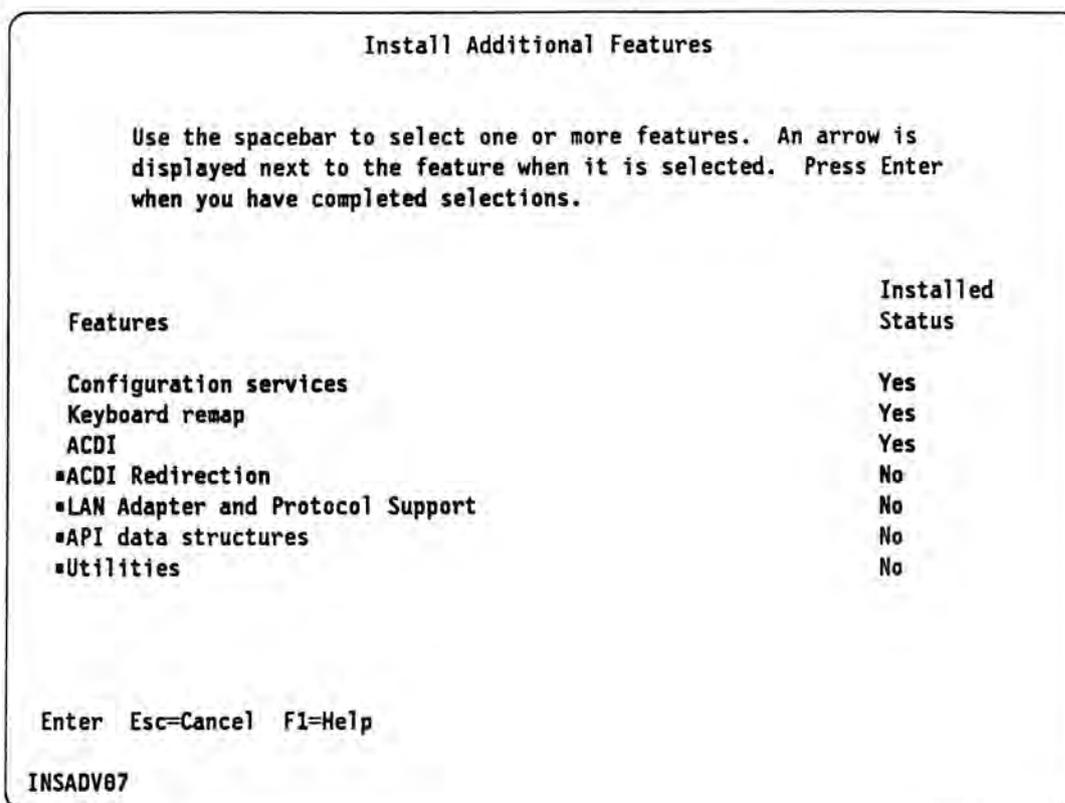
Visual 2-13. Source Location of Configuration Files

- Only the drive and directory of the configuration files is specified.



Visual 2-14. Select Configuration Files

- This is a list of all the configuration files in the above directory. You may select multiple files if you wish.



Visual 2-15. Install Additional Features

- This shows the available additional features and their installed status.
- You will not be able to select items that are already installed.
- API data structures only need to be installed on a programmer's system. They are the headers for the various programming languages.
- Utilities will install several tools that help with installation, configuration, problem determination, and system management. They are:

CMTRACE: Tool for tracing communications

FMTRACE: Trace formatter

COPYCFG: Gathers and copies all files for a given configuration file.

DISPLAY: Displays a workstation's SNA configuration. It can be used to display the configuration of a remote system if the remote system has installed the following tool.

RDSPSRVR: Allows the display of workstation SNA configuration remotely.

Programmable Configuration: REXXCUA configuration utility

Custom Install

- **Used to install a predetermined set of functionality onto a workstation.**
- **All an end user will need to do is insert the Custom Install Diskette when prompted.**
- **Any previously installed component will be completely removed before the custom install begins.**
- **If users share a Custom Install Diskette, they will need to modify some values to assure uniqueness.**
- **Custom Install Diskette is created, in advance, by a System Administrator.**

INACST01

Visual 2-16. Custom Installation

- Custom Install Diskettes must first be created by the system administrator with the Custom Build Utility.
- The custom install diskette contains the answers to all the questions that the user would normally have to answer.
- Now the user doesn't have to do anything except enter diskettes.
- When a custom install diskette is used, the following components will be installed automatically:
 - User Profile Management
 - First Failure Support Technology
 - Extended Services online reference
 - Extended Services install utilities
- All other components must be specified in the custom installation diskette.

Installation/Configuration Tools

- **Basic Configuration Services (BCS)**
- **Custom Build Utility**
- **Programmable Configuration**
- **Advanced Configuration**
- **Keylock Facility**
- **Configuration Upgrade**
- **Configuration File Manager**
- **Copy Profiles from one CFG file to another**
- **View Install Logs**

INSCP001

Visual 2-17. Installation/Configuration Tools

- You will be using advanced configuration all week.
PATH: Main Menu--> Advanced--> Configuration
- The configuration upgrade utility upgrades configuration files from previous Communications Manager versions.
PATH: Main Menu--> Advanced--> Upgrade Configuration Files
- Copy Profiles allows you to copy profiles from one configuration file into another. This is good for combining the functions of two configuration files into a single file.
PATH: Main Menu--> Advanced--> Configuration--> Configuration file Utilities
- You can use VIEWLOG program to view the the install logs to see what has been installed, or what errors occurred. Invoke from the command line or from the Extended Services folder.
- The Configuration File Manager is a tool that provides assistance in copying configuration information to new configuration files or to diskettes. The tool will gather up all of the files that are needed for a configuration (CFG, NDF, CF2, SEC, INI) to make sure that they are all copied. The same tool can be used to move the files from diskette to their proper places in the new system.

Programmable Configuration

- **Productivity aid for managing a large number of configuration files.**
- **Create and modify multiple configuration files using a single REXXSAA program.**
- **You can use existing configuration files and profiles as templates for new configuration files.**
- **A utility is provided to convert Extended Edition batch Configuration input files into Programmable Configuration REXXSAA programs.**

IN8PCF01

Visual 2-18. Programmable Configuration

- Just about the only thing you can't change with programmable configuration is keyboard remap.
- The Programmable Configuration API can be used in application programs written in other programming languages.
- The entire API is documented in *IBM Extended Services for OS/2 Programmable Configuration Reference*, S04G-1003

Programmable Configuration Example

```
/* Begin the job                */
rc = JOB (BEGIN, CFGFILE)

/* Add a 3270 non DFT session    */
rc = 3270SNA (ADD, SESSION EQ 2, SESN_ID EQ SNA2)

/* Add a 3270 DFT session       */
rc = 3270DFT (ADD, SESSION EQ 4, SESN_ID EQ DFT4)

/* Verify the file              */
rc = FILE (VERIFY, CFGFILE)

/* End the job                  */
rc = JOB (END)

INSPCF02
```

Visual 2-19. Programmable Configuration Example

- This rather simple REXX exec will add a new 3270 non-DFT session and a new 3270 DFT session to the configuration file called "CFGFILE".
- You can also use the power of REXX to prompt a user for values to be changed.
- Use the looping capabilities to change multiple configuration files.
- Notice that a file still has to be verified.

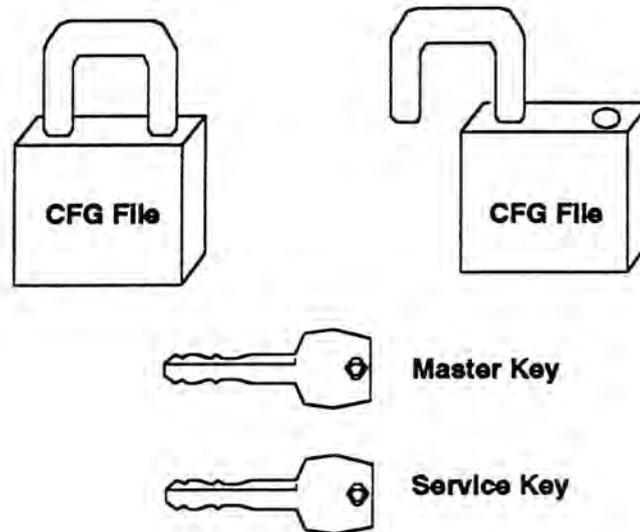
Custom Build Utility

- **Used to create Custom Install Diskettes**
- **Very easy to use, looks just like Advanced Installation**
- **Writes Installation information to diskette instead of installing**
- **Actually stores configuration files onto the diskette along with the installation info.**

INSCAT02

Visual 2-20. Custom Build Utility

Keylock



INBLOCK

Visual 2-21. Keylock Facility

- The keylock facility allows you to protect a configuration file by locking it.
- Each configuration file is locked separately.
- If a file is locked, no changes can be made to the contents. The file contents can still be displayed, however. Passwords never display.
- If a file is unlocked, it can be changed.
- Keyboard remapping and color changes are not affected by the keylock.
- Both keys will lock and unlock the file. The master key holder can change the master key or the service key, but the service key holder can only change the service key. Other than that, their powers are the same.

PATH: Main Menu--> Advanced--> Keylock

Unit 3. 3270 Emulation

What This Unit is About

3270 emulation allows a workstation to behave as if it were a real 3270 device. This allows a workstation to access a host system for 3270 services. The emulation is handled through the software in the Extended Services for OS/2 Communications Manager. This unit will give an overview of the 3270 emulation features in the first topic. In the second topic, configurations concerns will be addressed.

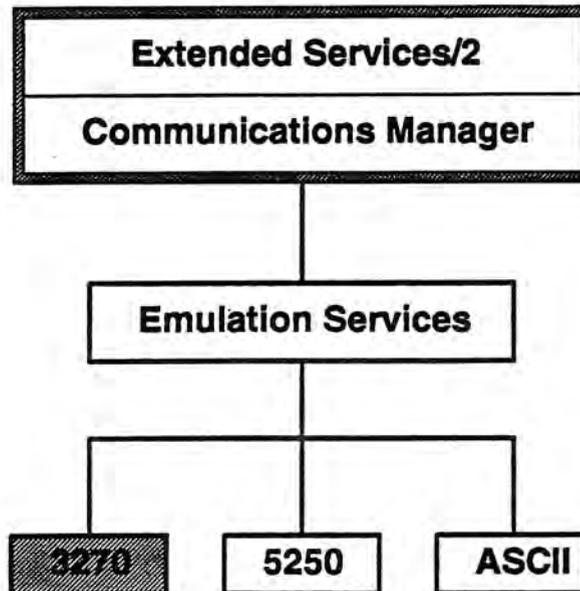
What You Should Be Able to Do

After completing this unit, you should be able to

- Describe the features of the 3270 emulation service.
- List the different connectivity options for 3270 emulation.
- Use the 3270 emulation feature.
- Perform 3270 file transfer.
- Perform 3270 keyboard remapping.
- Configure 3270 emulation.
- Install 3270 graphics support.
- Use the clipboard for 3270 emulation.

Topic 3.1. 3270 Emulation Features

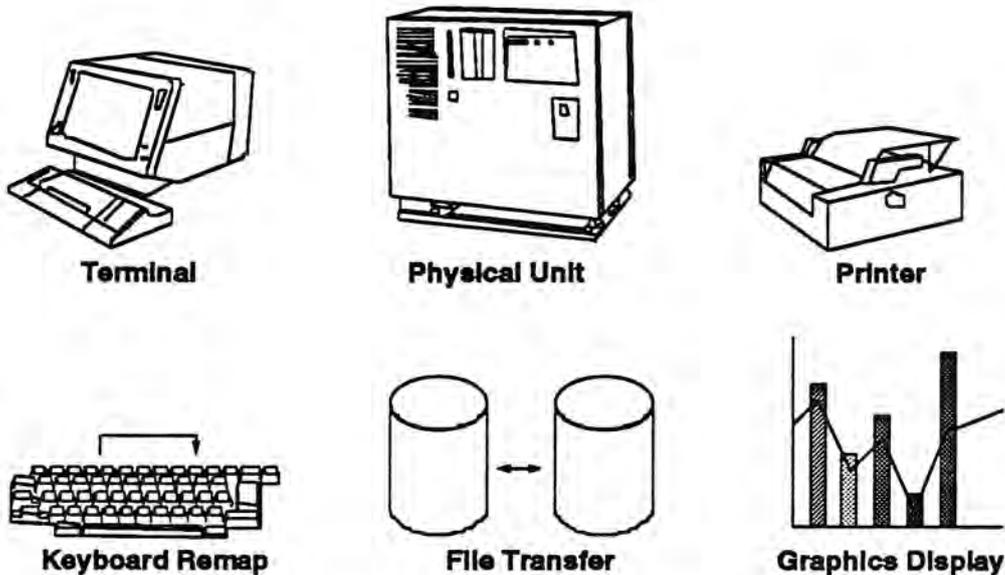
3270 Emulation



3270V901

Visual 3-1. 3270 Emulation

3270 Emulation Functions

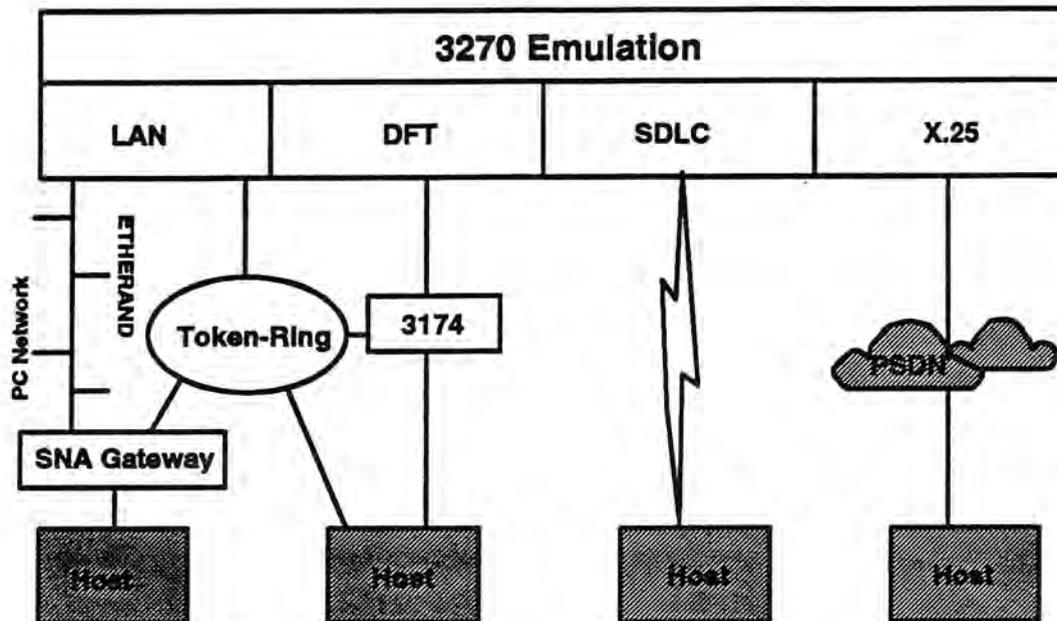


3270VR02

Visual 3-2. 3270 functions

- Support is provided for up to ten 3270 sessions. A 3270 session can be either a terminal or a printer. The following devices are emulated:
 - Terminals
 - IBM 3178 Model C2
 - IBM 3278 Model 2 - 5
 - IBM 3279 Model S2B and S2B
 - Printers
 - IBM 3287
- The physical unit functionality of a 3174 control unit is provided by the Extended Services for OS/2.
- The EHLLAPI API provides an interface between mainframes and personal computers with 3270 terminal emulation or 5250 WSF. An application written to this interface can read from and write to the terminal sessions just as if an operator was performing the function.
- The SRPI API is used to create SRPI clients (programs that request host servers to perform tasks). The SRPI server and requester operate in pairs, through a 3270 terminal session. The requester resides in a workstation and the server resides in a host system.

3270 Emulation Connectivity



3270V902

Visual 3-3. 3270 Connectivity

- Up to five 3270 sessions can come from a COAX cable that supports DFT terminals.
- Up to five 3270 sessions can come from another, NON-COAX, connection.

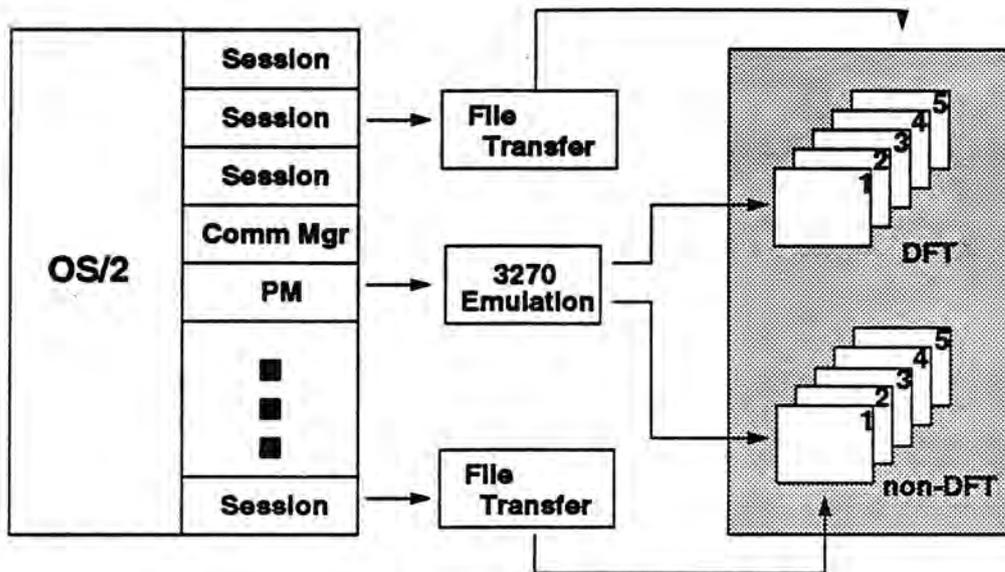
Note: All of the NON-DFT (NON-COAX) 3270 sessions must come from the same connection type.

The following connections are supported:

- Through coaxial cable to a 3174 or 3274 terminal controller in DFT mode. The controller may be SNA or non-SNA, local or remote.
- Through coaxial cable to the 9370 workstation controller in DFT mode.
- Over an SDLC line to a 3705, 3720, 3725, or 3745 Communications Controller or to the integrated controller on the 9370 workstation controller.
- Through an IBM Token-Ring Adapter of a 3174, 3720, 3725, or 3745 controller or a 9370 departmental system that acts as a gateway for OS/2 workstations.
- Through an OS/2 workstation that serves as an SNA gateway to the host.
- Over an X.25 connection to an appropriately programmed 9370 workstation controller or to a 37xx controller running on NPSI software.

CUT Control Unit Terminal
DFT Distributed Function Terminal
NPSI NCP Packet Switching Interface
NCP Network Control Program

3270 Sessions vs PM Sessions

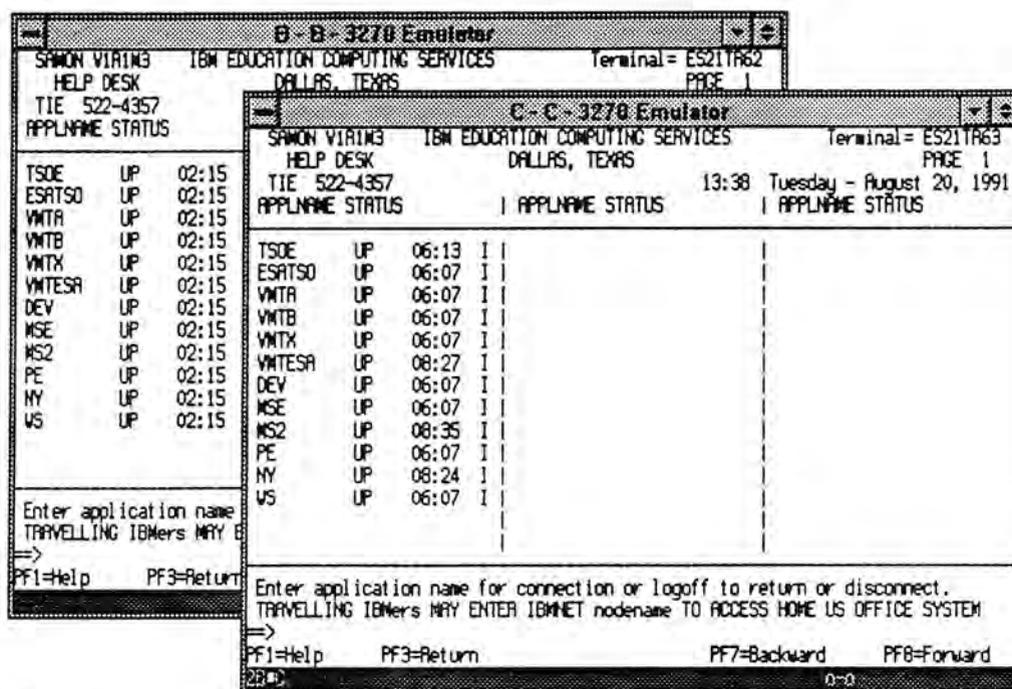


3270V904

Visual 3-4. 3270 Sessions vs. OS/2 sessions

- Communications Manager operates as an OS/2 full screen application.
- 3270 emulation runs as a single AVIO application in the Presentation Manager group.
- All ten sessions actually belong to a single application. Thus you only lose one of your AVIO applications.
- Each file transfer that is occurring, uses a separate OS/2 session. The session can be a PM AVIO windowed session or an OS/2 full screen session.

3270 Terminal Emulation



327TR601

Visual 3-5. 3270 Terminal Emulation

- 3270 terminal emulation sessions reside within the Presentation Manager group. This allows them to:
 - Size, scroll, minimize and maximize the window.
 - Access the PM clipboard for data transfer.
 - Make use of the various AVIO font sizes.
- The terminals all support the display of GDDM host graphics.
- A screen print capability known as Presentation Space Print is available.
- All terminal keyboards and colors can be remapped. Each can have its own unique mapping.
- Two APIs are available to interface with a 3270 terminal: SRPI, and EHLLAPI.
- File transfer capability allows you to transfer files between the workstation and the host.

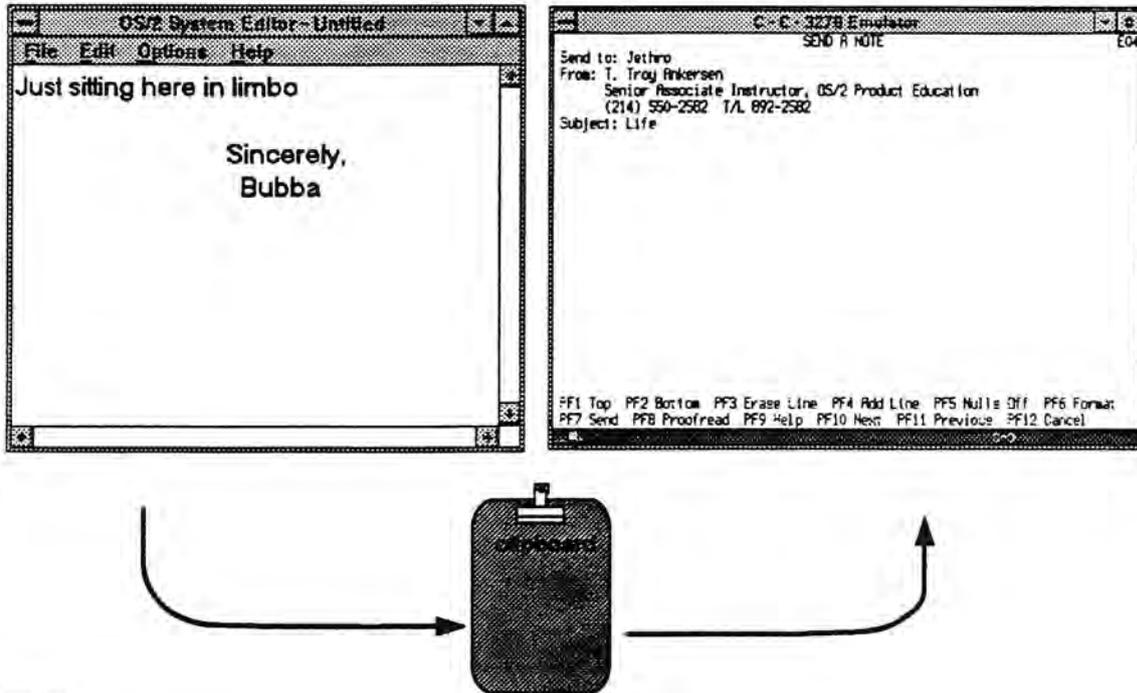
AVIO Advanced Video Input Output

API Application Programming Interface

SRPI Server Requester Programming Interface

EHLLAPI Emulated High Level Language API

PM Clipboard



3270/3602

Visual 3-6. PM Clipboard

The clipboard allows a user to transfer data from one application to another. The clipboard is built in to the Presentation Manager. 3270 terminals can use the clipboard just like any other program. For example, you can compose a PROFS note in the OS/2 System Editor, copy the data to the clipboard, and then paste it into the 3270 session.

3270 terminals store data in the clipboard in three formats, the application that is being pasted into will determine which format to use. The formats are:

Simple text Plain text and nothing else.

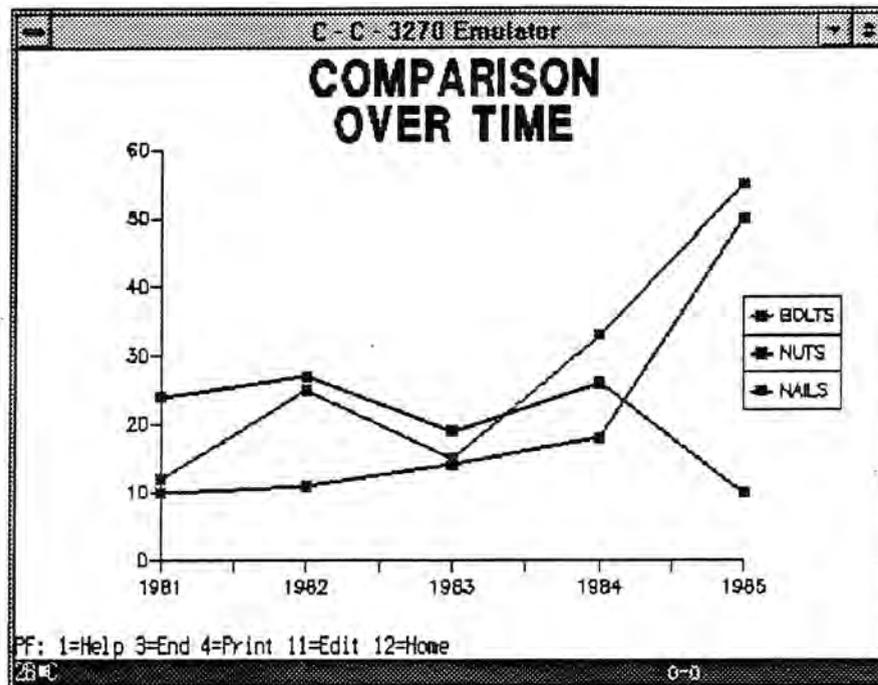
AVIO Text and associated character attributes (ie. color)

Bitmap Graphics images

There are some restrictions:

- You cannot CUT 3270 protected text. It can be copied though.
- You cannot PASTE onto a 3270 protected area. A message will pop up warning you of the problem.
- You can COPY host graphics to the clipboard (they are stored as bitmaps), but you cannot paste a bitmap into a 3270 session.

GDDM - OS/2 Link: Graphics Support



32779803

Visual 3-7. GDDM-OS/2 Link: Graphics Support

3270 terminal emulation supports GDDM host graphics. This support is provided by a separate product called **GDDM-OS/2 Link**. The following functions are supported:

- View host graphics in all of your 3270 terminal sessions.
- Print host graphics on workstation plotters and graphics printers.
- Store host graphics files on the workstation as PIF files or PM metafiles.

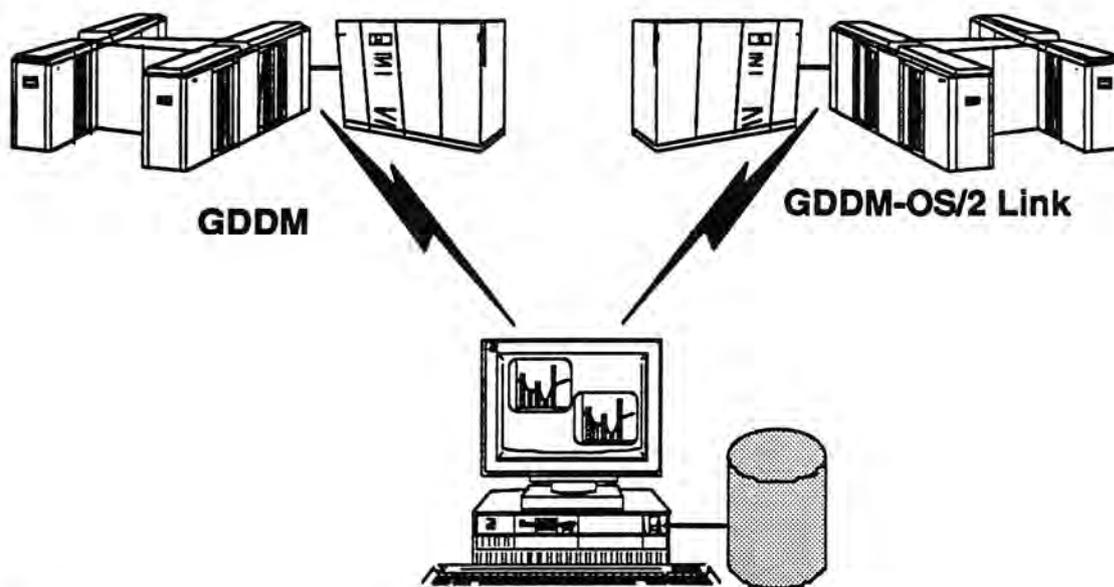
Each terminal can be customized for how graphics should be handled. Any changes made are stored in the OS2.INI file. You can control the following items:

Retained Graphics: You can toggle this on or off. ON will cause a copy of the picture to be stored in the workstation so that refresh can be done quickly. This uses a significant amount of memory however. OFF will not save a copy of the picture on the workstation. The host will need to send a new copy of the picture if a refresh is required. This saves memory but slow host links will cause a lot of time delay as the picture is refreshed.

Automatic naming of print jobs: This allows you to control the naming of print jobs. ON will automatically name them. You can control what the automatic name will be. OFF will prompt the user for a name each time a job is printed.

PIF Picture Interchange Format.

Graphics: Installation vs. Operation

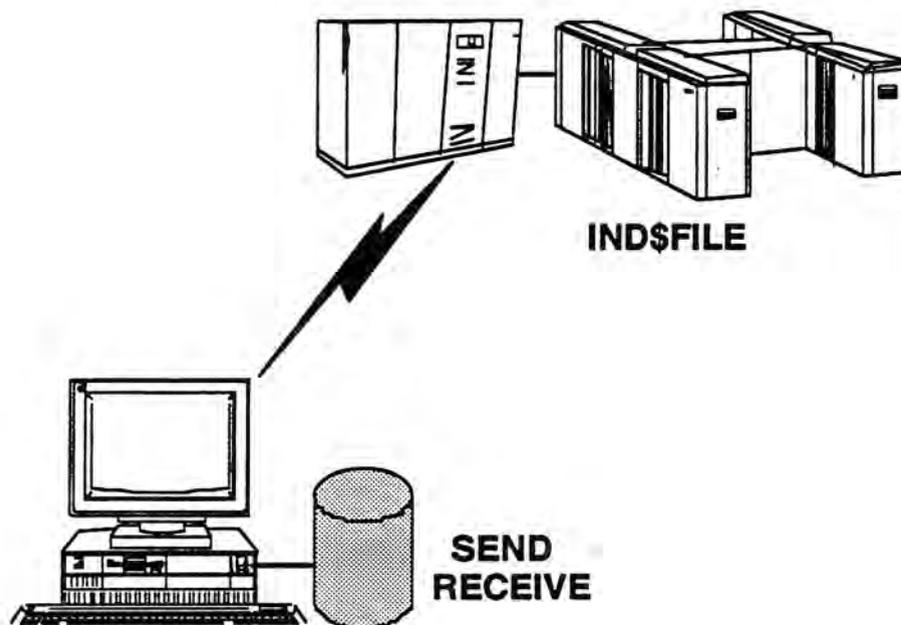


327TRM04

Visual 3-8. Graphics: Installation vs. Operation

- The GDDM-OS/2 Link product is sold as a host tape. The tape is installed on the host and users will download it into the workstation to use. Once the code is installed on the workstation, the user can use host graphics on any host system with GDDM installed. The host does not need to have GDDM-OS/2 Link.
- There is a fee for EACH workstation that installs the code.
- The code is downloaded through a program in the workstation called **HGINST**. Before running HGINST, make sure you have logged on to the host system that has the GDDM-OS2 Link product.
- When there are updates to the GDDM-OS/2 Link product, the updates are automatically sent to the workstation when a user tries to access GDDM on the host. This update can be canceled.
- If you plan to print to workstation devices, you need to modify the host GDDM ADMDEFS PROFILE. Instructions are in the *IBM Extended Services for OS/2 Communications Manager Configuration Guide*, S04G-1001.
- GDDM needs to be at V2.2 or greater and must have the following APARS:
 - MVS - PTF UL85607
 - VM/SP - PTF UL85608
 - XM/SP XA - PTF UL85609
 - VSE/ESA - PTF UL85610

3270 File Transfer



32778A08

Visual 3-9. 3270 File Transfer

There are two methods available:

- Menu mode
- Command prompt mode

The menu mode uses a file transfer profile to hold the file transfer parameters. Several profiles can be created to address different file transfer situations (ie. Text vs. Binary). Profiles can also be temporarily changed for a unique situation. The change will not be saved in this case.

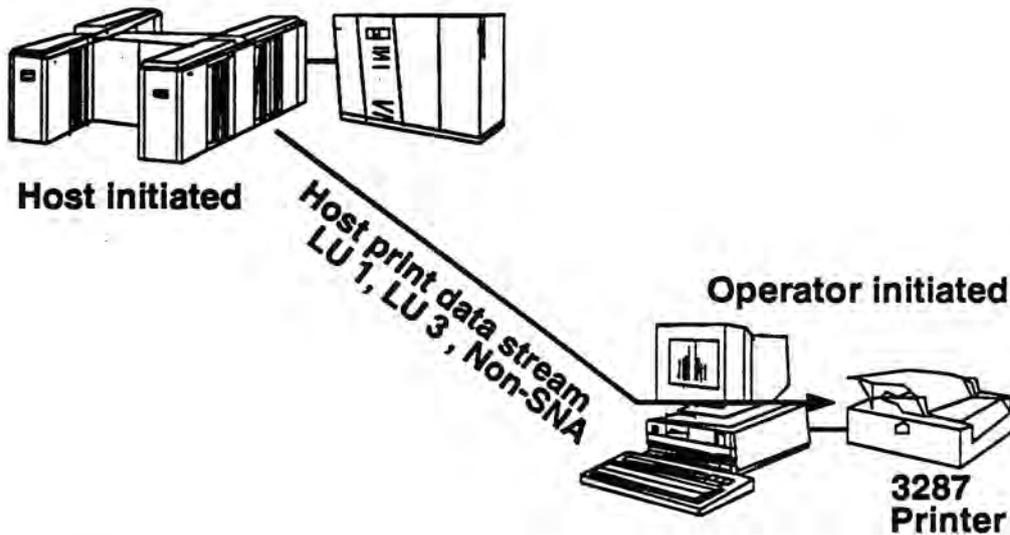
Examples of Command prompt mode:

```
C:\] SEND C:\DOC\MYFILE.TXT A:MYFILE SCRIPT A (ASCII CRLF
```

```
C:\] RECEIVE C:\DOC\MYFILE.BIN D:MYFILE EXEBIN A
```

Note: VSE/ESA file transfers must be done from the command line.

3270 Printer Emulation



327PWN01

Visual 3-10. 3270 Printer Emulation

- Host directed print is the continuous printing of a data stream from a remote host to a local printer. This differs from the terminal presentation space print in that it will print more than a single screen full of data.
- Printing can be host initiated or operator initiated.
- Host directed printing requires a NAU to be configured at the host. This is an LU of type 1 or 3 associated with a PU.

3270 Print Control Panel

Short Session ID	Session ID	Type	Queue Name	Print Status
A	A	Terminal	PSCRIPT2	Available
B	B	Terminal	PSCRIPT2	Available

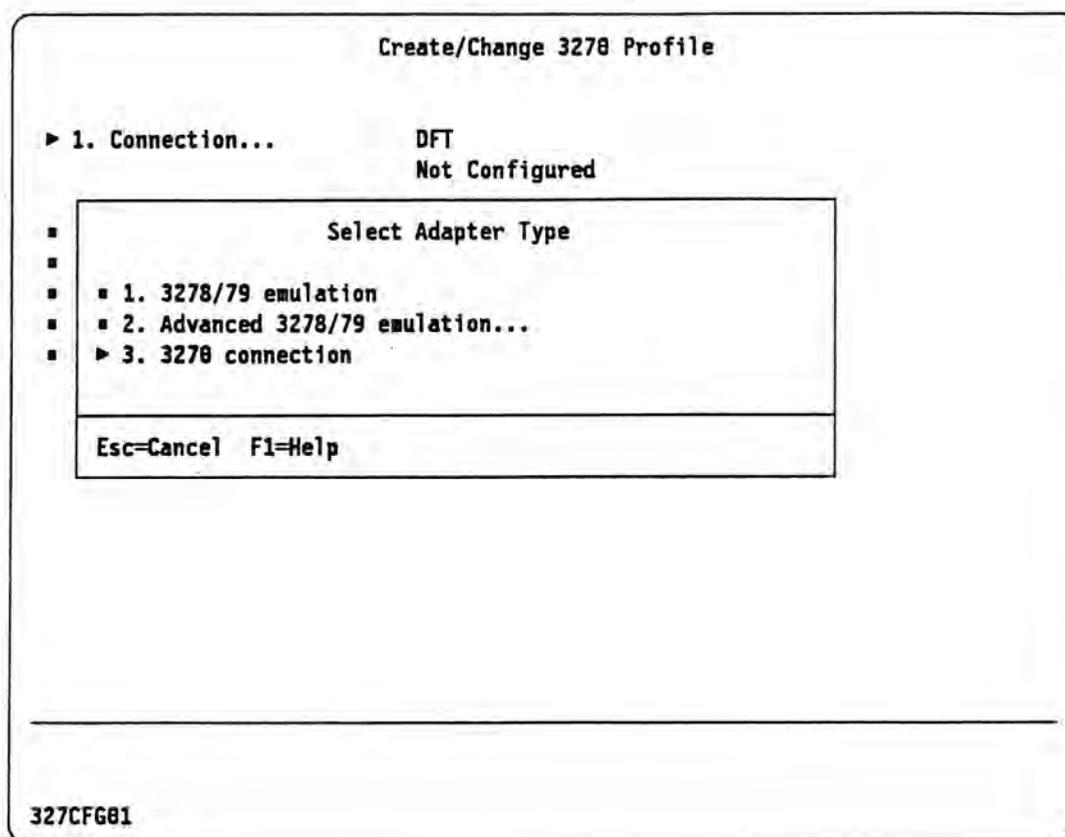
327PRN02

Visual 3-11. 3270 Print Control Panel

The print control panel keeps you informed of the status of all printable items. This panel will appear whenever you have one or more printer sessions configured, or one or more terminals with presentation space print active. It provides the following:

- Information on the print status of any print jobs
 - Job started
 - Available
 - System error
 - Error
 - PA1/PA2 pending
- Configuration of print style and print options
- Ability to cancel print jobs
- Emulation of a 3287's PA1 and PA2 keys

Topic 3.2. 3270 Emulation Configuration



Visual 3-12. 3270 DFT Connection

Communications Manager only supports one DFT (COAX) adapter.

There are three different adapter choices for the DFT connection:

3278/79 emulation: Used in a PC/AT bus workstation. The memory address cannot be changed and is fixed at hex 'CE000'.

Advanced 3278/79 emulation: Just like the 3278/79 emulation adapter, only you can change the address. Choose from the following:

- CE000
- D0000
- D2000
- D4000

3270 connection: The Microchannel adapter. The memory address is not changeable.

Note: Connections over COAX must be as DFT (Distributed Function Terminal) devices. CUT (Control Unit Terminal) mode is not supported.

```

Create/Change 3270 DFT Logical Terminal Session Profile

Use the spacebar to select.

Session number. . . . . : 1
Session ID. . . . . [      ]
Comment . . . . .
[
Short session ID. . . . . [0]
AT keyboard profile name. . . . . [ACS3ATUS]
Enhanced keyboard profile name. . . . . [ACS3ENUS]
Presentation space size . . . . .
  ▶ 25 x 80 (3278/79 mod 2)      ■ 44 x 80 (3278/79 mod 4)
  ■ 33 x 80 (3278/79 mod 3)      ■ 28 x 132 (3278/79 mod 5)
  ■ Other...
Data transfer buffer size override (Kb) . . . . . [0 ]
Unsupported control codes . . . . .
  ▶ Display hyphens              ■ Error codes
Activate presentation space print . . . . .
  ▶ Yes                          ■ No

```

```

Enter Esc=Cancel F1=Help F4=List

327CFG02

```

Visual 3-13. 3270 DFT Terminal

- Session ID/LU name:** Must be unique among all other LU names in the workstation. The first four characters will be placed in the sessions OIA (Operator Information Area). Can be used for file transfer.
- Short Session ID:** Identifies the logical terminal. Must be unique among all session IDs, short session IDs, and all ASCII terminal emulation profile names. Can also be used for file transfer.
- Keyboard profile names:** There is one for PC/AT keyboards and one for enhanced keyboards. If you do keyboard remapping, replace this with the name of your keyboard profile.
- Presentation space size:** This is where you choose to be a model 2 or a model 3 etc... Other allows you to customize. However, many host applications do not work with customized values.
- Date transfer buffer size override:** Range is 0 to 32 K. The value 0 causes Communications Manager to calculate the value at runtime. It will use 12K for SNA devices and 7K for non SNA devices. Use 2K for CICS, back level IND\$FILE, or if file transfer is not working. Large values improve file transfer times at the expense of overall system performance.
- Activate presentation space print:** Set this to Yes if you want to do print screens. Turn this off in all sessions and you can get rid of the 3270 print control panel.

```

Create/Change 3270 DFT Logical Printer Session Profile

Session number. . . . . : 1
Session ID. . . . . [      ]
Comment . . . . . [      ]
Short session ID. . . . . [0]
Print buffer size . . . . . [1920 ]

Enter Esc=Cancel F1=Help

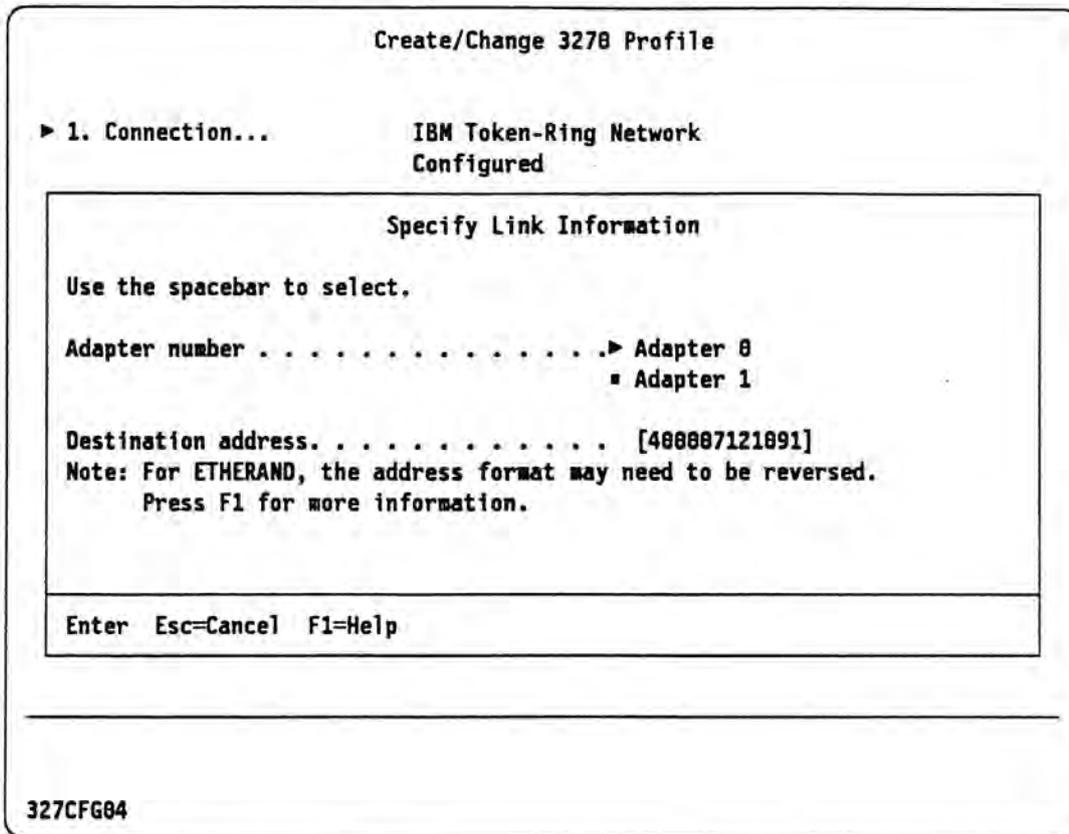
327CFG03

```

Visual 3-14. 3270 DFT Printer

Session ID and Short session ID mean the same thing for printers as they do for terminals.

The **Print buffer size** specifies the buffer size for data that is transferred between the host and the workstation. The range is 1920 through 15300. Use the default of 1920 unless you have special requirements. Make sure that the value is at least as large as the host mode table RUSIZES parameter or a bind failure can occur.



Visual 3-15. 3270 LAN Connection

Adapter number If you only have one adapter, it will be adapter 0, not 1. Adapter 0 is the primary adapter.

Destination address This is the address of the system you will be connecting to. It is your gateway to the host. This value is obtained from the person who configured the gateway device.

The 3270 LAN connection is the same regardless of the LAN type. The only concern is when using an ETHERAND network to communicate with non IBM equipment or use universal addresses on you ETHERAND network. In this case, the address format may need to be reversed.

Create/Change 3278 Profile

► 1. Connection... SDLC
 Not Configured

Select SDLC Adapter

► 1. Adapter 8
■ 2. Adapter 1

Esc=Cancel F1=Help

327CF605

Visual 3-16. 3270 SDLC Connection

- SDLC adapter number means the same thing as LAN adapter number.

Create/Change 3278 Profile

► 1. Connection... X.25
 Configured

■ 2. Session 1... A Terminal
■ 3. Session 2... B Terminal
■ 4. Session 3... C Terminal
■ 5. Session 4... Not Configured
■ 6. Session 5... Not Configured

Specify X.25 Information

Directory entry name [TEST]

Enter Esc=Cancel F1=Help F4=List

327CF606

Visual 3-17. 3270 X.25 Connection

- **X.25 Directory entry name** specifies the name of the X.25 directory entry that is associated with the host (remote DTE) with which you want to communicate. The remote directory entry must be configured in the X.25 feature profiles as well. More on this later.

```

Create/Change 3270 Logical Terminal Session Profile

Use the spacebar to select.

Session number. . . . . : 1
Session ID/LU Name. . . . . [ A ]
Comment . . . . .
[
Short session ID. . . . . [A]
AT keyboard profile name. . . . . [ACS3ATUS]
Enhanced keyboard profile name. . . . . [ACS3ENUS]
Presentation space size . . . . .
  # 25 x 80 (3278/79 mod 2)          # 44 x 80 (3278/79 mod 4)
  # 33 x 80 (3278/79 mod 3)          # 28 x 132 (3278/79 mod 5)
  # Other...
Data transfer buffer size override (Kb) . . . . . [32]
LU local address (NAU hex address). . . . . [82]
Unsupported control codes . . . . .
  # Display hyphens                  # Error codes
Activate presentation space print . . . . .
  # Yes                               # No
-----
Enter Esc=Cancel F1=Help F4=List
327CFG07
    
```

Visual 3-18. 3270 Non-DFT Terminal

```

Create/Change 3270 Logical Printer Session Profile

Session number. . . . . : 4
Session ID/LU Name. . . . . [ ]
Comment . . . . .
[
Short session ID. . . . . [0]
Print buffer size . . . . . [1920 ]
LU local address (NAU hex address). . . . . [ ]
-----
Enter Esc=Cancel F1=Help
327CFG08
    
```

Visual 3-19. 3270 Non-DFT Printer

The only difference between the DFT and non-DFT terminals and printers is the addition of the **LU local address (NAU hex address)** field. This will need to match up with a VTAM LOCADDR parameter of an LU that is configured on your PU in VTAM. You cannot use the same value anywhere else in the workstation.

NAU Network Addressable Unit

Color Reset Alarm Exit		F1=Help
3270 Color and Alarm		
Select an item, then press F10 to select color.		
Field Attributes	Color	
▶ Normal, Unprotected	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Intensified, Unprotected	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Normal, Protected	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Intensified, Protected	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Blue	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Green	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Pink	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Red	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Turquoise	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ White	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Yellow	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Blink	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Default Highlight	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Default No Highlight	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
▪ Operator Information Area	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	
327CFG14		

Visual 3-20. 3270 Color and Alarm

This panel allows you to change the visual and audible cues for a terminal session. This panel will only apply to one particular terminal session. You will need to configure this panel for each terminal you wish to modify. There are three type of alarms:

Host alarm: Toggles a beep for when the host sends an alarm.

Protect field alarm: Toggles a beep for when a user types into a protected text area.

Screen update: Toggle a beep for when something changes in the terminal session and it is not the currently active OS/2 session. Just to let you know something happened in the terminal session.

```

                                Create/Change VM Profile

Use the spacebar to select.

Profile name. . . . . : VMTEXT

Comment . . . . .
  [MODEL PROFILE 3270 FILE TRANSFER  IBM HOST(VM)  TEXT FILES ]
ASCII to/from EBCDIC translation. . . . . ▶ Yes      ▣ No
Use CR/LF as record separator . . . . . ▶ Yes      ▣ No
PC file code page . . . . . [437 ]
Host file code page . . . . . [037 ]
IBM host file transfer command
  name. . . . . [IND$FILE]
Append to target file . . . . . ▣ Yes      ▶ No
Modify host file characteristics
  options . . . . . ▣ Yes      ▶ No
One-to-one character mapping. . . . . ▶ Yes      ▣ No

-----
Enter Esc=Cancel F1=Help F4=List

327CFG09
    
```

Visual 3-21. 3270 File Transfer

- ASCII to/from EBCDIC translation:** Set this to No for BINARY file transfers and Yes (default) for text.
- Use CR/LF as record separator:** Set this to no for BINARY file transfers and Yes (default) for text.
- PC file code page:** Defines the ASCII code page to be used in ASCII to/from EBCDIC translation. It must reside in the CMLIB directory.
- Host file code page:** Defines the EBCDIC code page to be used in ASCII to/from EBCDIC translation. It must reside in the CMLIB directory.
- Modify host file characteristics options:** Setting this to Yes will bring up the following panel to allow changes to the host file characteristics.
- One-to-one character mapping:** Each unmatched code page character sent is mapped to a unique character. This way, the file will transfer back in its original form. If you select No, the unmatched code page characters are all mapped to a specific set of characters. Two characters sent may map to the same character on the receiving end. This file may not transfer back in its original form.

Create/Change VM Profile

U
P
C
A
U
P
H
I
A

Specify VM File Characteristics

Use the spacebar to select.

Logical record length [0]

Record format of host file.

▶ Default ■ Variable

■ Fixed

Enter Esc=Cancel F1=Help

Modify host file characteristics

options ▶ Yes ■ No

One-to-one character mapping. ▶ Yes ■ No

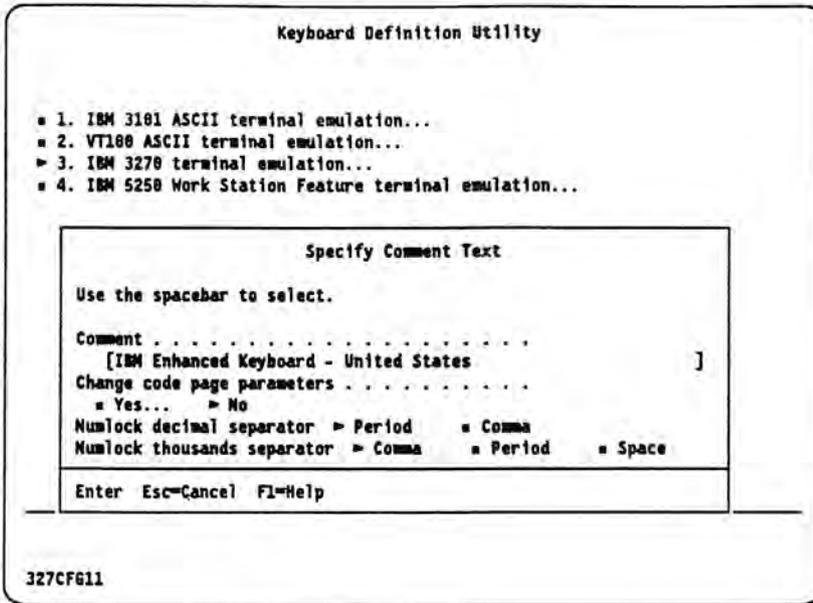
327CFG18

Visual 3-22. 3270 File Transfer

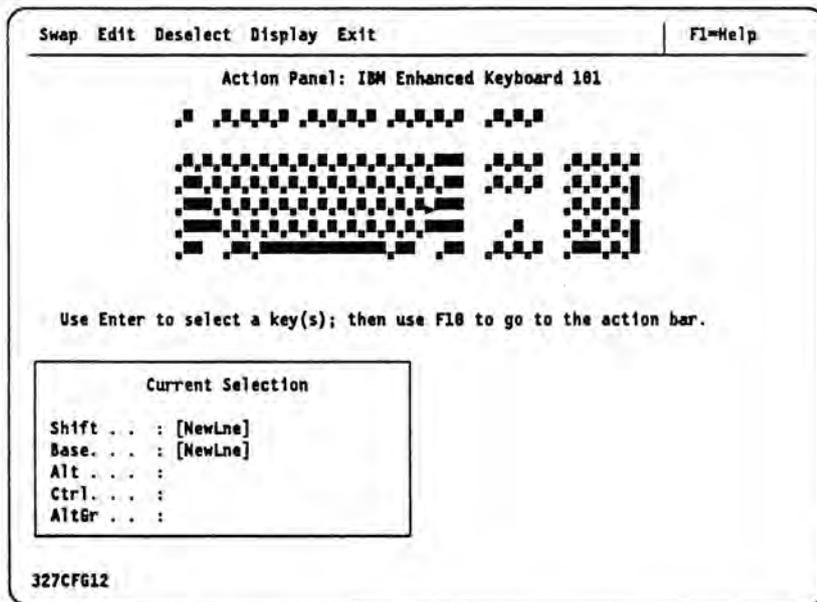
Logical record length: This entry specifies the logical record length, in characters, of the host file. When file transfer replaces or appends a file, the logical record length of the existing file is used. When you create a file with variable length records, the logical record length is the longest record in the file. The value 0 means to use the default value for host file record lengths (set at the host).

Record format of host file: There are three ways to send the file:

- Default - use the host default format (this is the default)
- Fixed - If you choose fixed, the records in the file will all have the same length.
- Variable - If you choose variable, the records in the host file will have variable lengths.



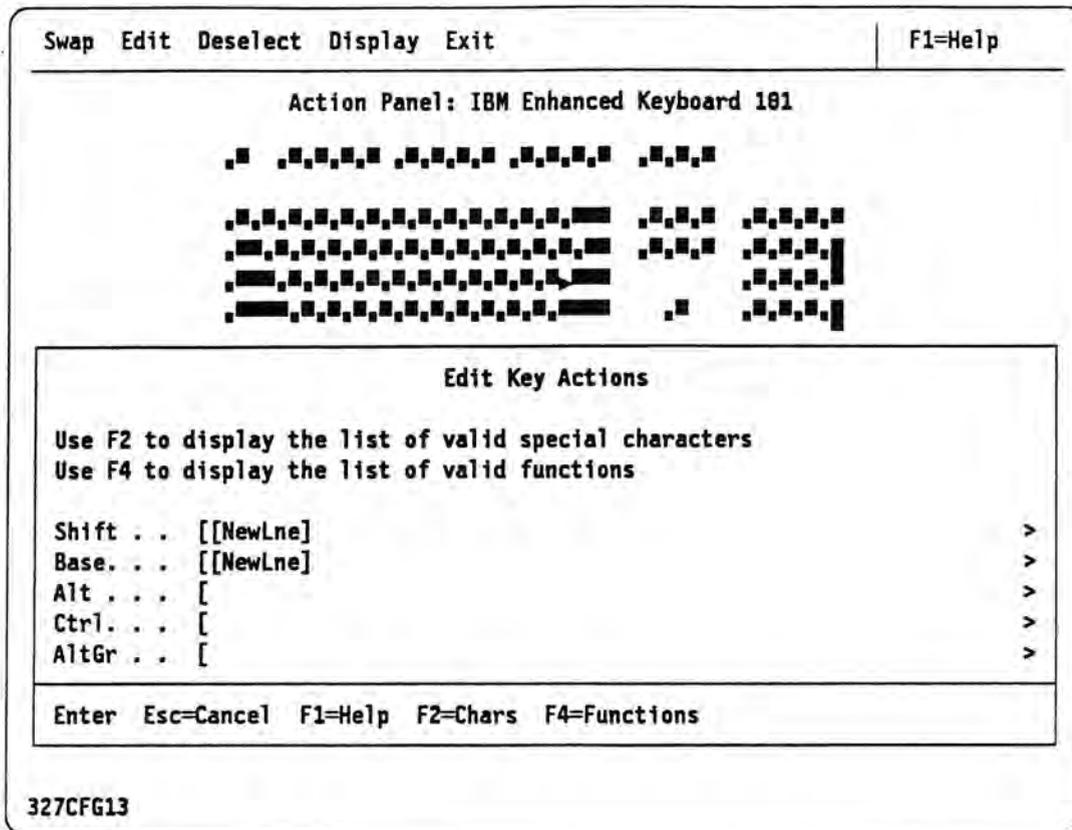
Visual 3-23. 3270 Keyboard Remap



Visual 3-24. 3270 Keyboard Remap

Canadian users shouldn't have any need to change the first panel.

The first thing you need to do is select a key to edit. Click on a key with the mouse or use the cursor keys. If you use the cursor keys, don't forget to use the space bar to select the key.



Visual 3-25. 3270 Keyboard Remap

There are five states of a key that can be mapped. If an area is greyed out, it means that the key combination is reserved and cannot be remapped. A total of 255 characters can be assigned to a key. A grand total of 1024 characters can be assigned to a keyboard profile. A function counts as one character. You can mix functions and characters on the same key combination.

- To assign a function to a key, enclose the function in square brackets. for example: [Enter].
- You can also use the F4=list function to choose among the available functions. The square brackets will be added automatically in this case.
- To assign a string to a key, enclose the string in double quotes. (for example: "This is a string")
- To assign a special character to a key, use the F2 key to list the special characters and then select the correct one.

Note: Don't forget to assign the new keyboard to your terminal sessions or it won't be used.



Unit 4. SNA Gateway

What This Unit is About

A gateway permits communications between two networks that use different network architectures. Specifically, the OS/2 Systems Network Architecture (SNA) gateway allows supported workstations to communicate with an SNA host. The Extended Services for OS/2 gateway is implemented by software that runs on any workstation supported by the Extended Services for OS/2 product. The SNA gateway is an efficient way to connect multiple workstations to an IBM System/370 host through a shared host link.

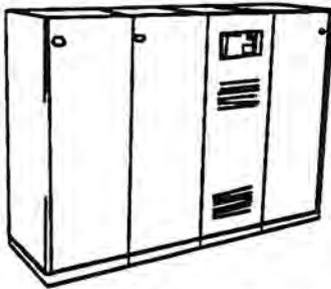
What You Should Be Able to Do

After completing this unit, you should be able to

- describe the capabilities of the Extended Services for OS/2 gateway.
- describe the connections that are supported by the Extended Services for OS/2 gateway.
- configure a gateway host connection profile.
- configure a workstation connection profile.

Topic 4.1. SNA Gateway Features

SNA Gateways



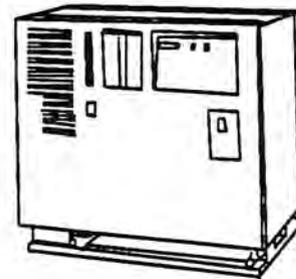
Communications Controller



**Extended Services/2
Communications Manager**



Personal Communications 3270



3174 Control Unit

0.017W4Y01

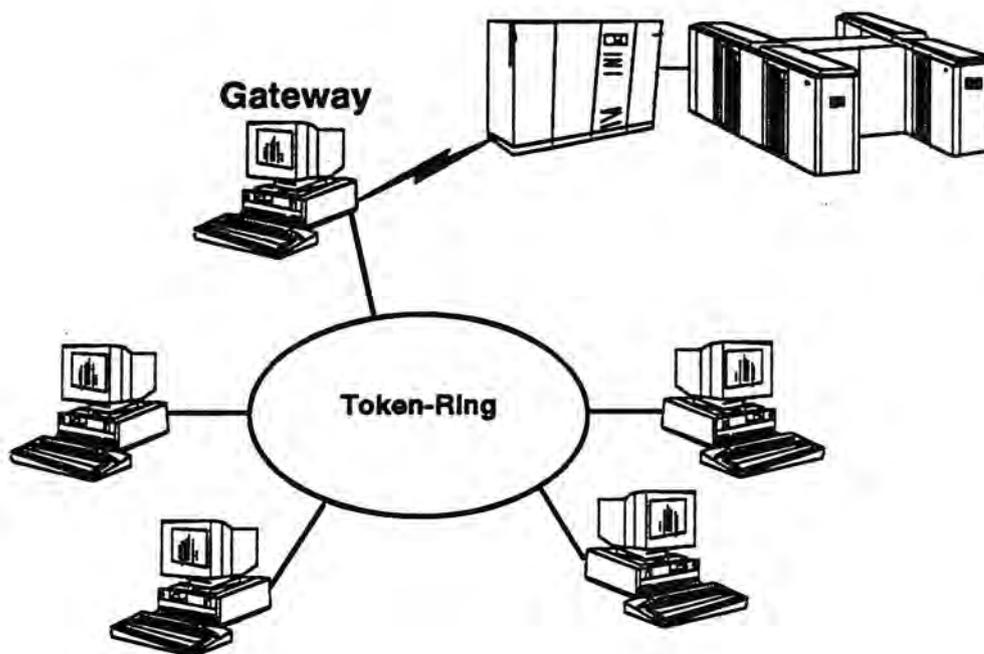
Visual 4-1. SNA gateways

The Extended Services for OS/2 SNA gateway is not meant to be a replacement for other IBM gateway products, only an alternative. Each gateway has its own advantages and disadvantages.

Several factors effect the performance of gateways. These include:

- The gateway's configuration
- The gateway's connection to the host
- Overall demand on the host.
- The gateway's connections to the workstations.
- The configuration of the workstation.
- The number of downstream workstations configured.

Extended Services Gateway Example



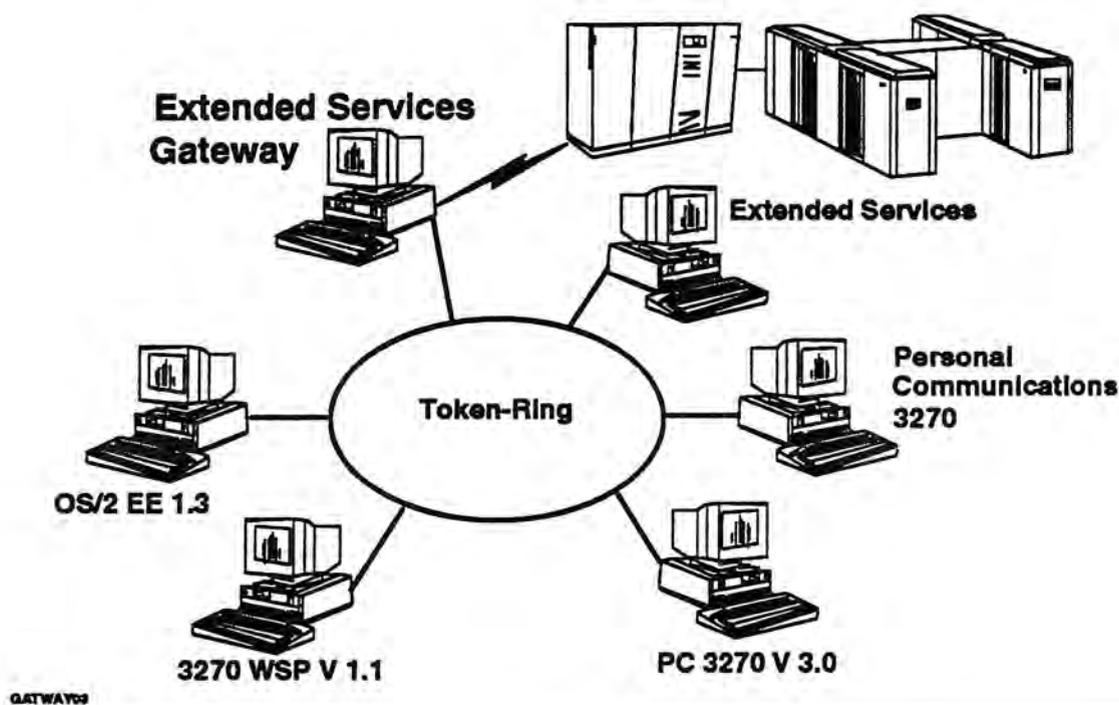
GATWAY02

Visual 4-2. EXTD/2 Gateway Example

- SNA LU types 1, 2, 3, and 6.2 are supported to a S/370 host. The LU 6.2 support is dependant LU 6.2 only (more on this later).
- SNA LU types 1, 2, and 3 are supported to an AS/400 host, which can then act on the data or pass it on to an S/370 host.
- The gateway is configured as a PU type 2.0 at the host side.
- The downstream workstations think they are connected to a PU type 4 communications controller.
- When a downstream workstation is inactive, the gateway will implement the LU function.
- When a downstream workstation comes online, the gateway gives control of the LU to the workstation. At this point, the workstation is doing all the work, and the gateway just passes data through.
- The gateway does not perform any segmentation on the data; be aware of the following:
 - The primary (host) send maximum RU size should not be greater than the gateways maximum RU size for the downstream workstation link (DLC).
 - The secondary (downstream workstation) send maximum RU size should not be greater than the gateways maximum RU size for the host link (DLC).

Note: While you can connect to an AS/400, independent LU 6.2 is not supported so you cannot use the gateway for 5250 emulation.

Supported Workstations

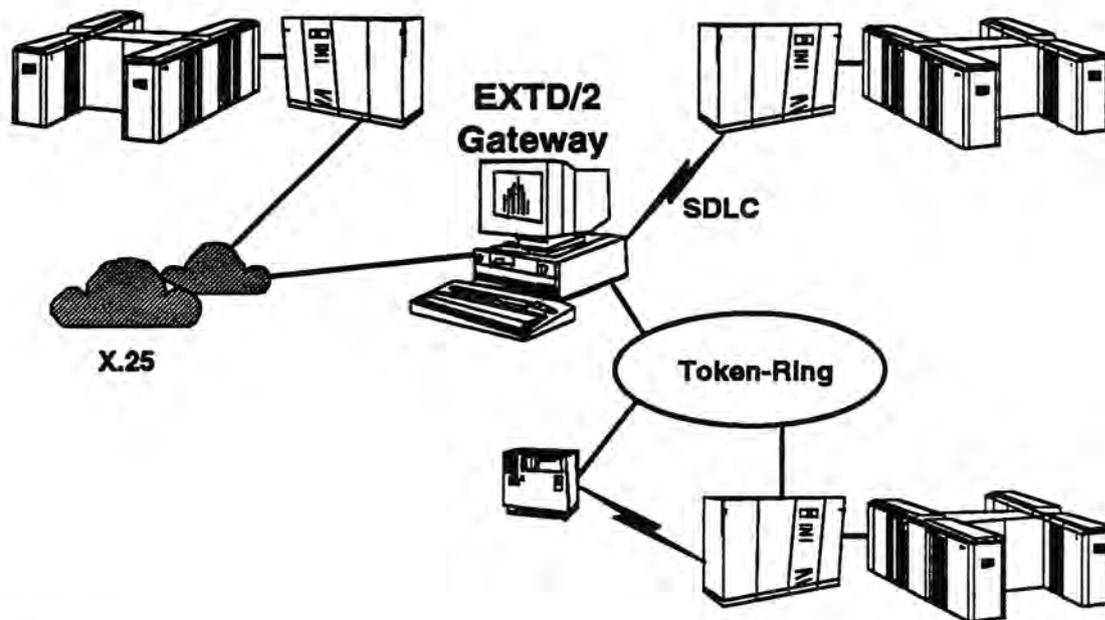


Visual 4-3. Supported Workstations

The following downstream workstations are supported:

- PC DOS workstations running the PC 3270 Emulation Program, Version 3.0, connected over an IBM Token-Ring Network.
- PC DOS workstations running the 3270 Workstation Program Version 1.1, connected over an IBM Token-Ring Network.
- Workstations running the IBM OS/2 Extended Edition 1.0 (over a switched SDLC connection to the SNA gateway), 1.1, 1.2, 1.3 or Extended Services for OS/2.
Note: IBM OS/2 Extended Edition Version 1.2, 1.3 or Extended Services for OS/2 is required for connection over an ETHERAND network.
- PC DOS workstations running the Personal Communications/3270 program.
Note: Personal Communications/3270 Version 1.01 and the IBM LAN Support Program Version 1.2 or later are required for connection to an SNA gateway over an ETHERAND Network.
- PC DOS workstations running APPC/PC, Version 1.1, connected over an IBM Token-Ring Network, an IBM PC Network, or an SDLC switched connection.

Upstream Connections



GATWAY04

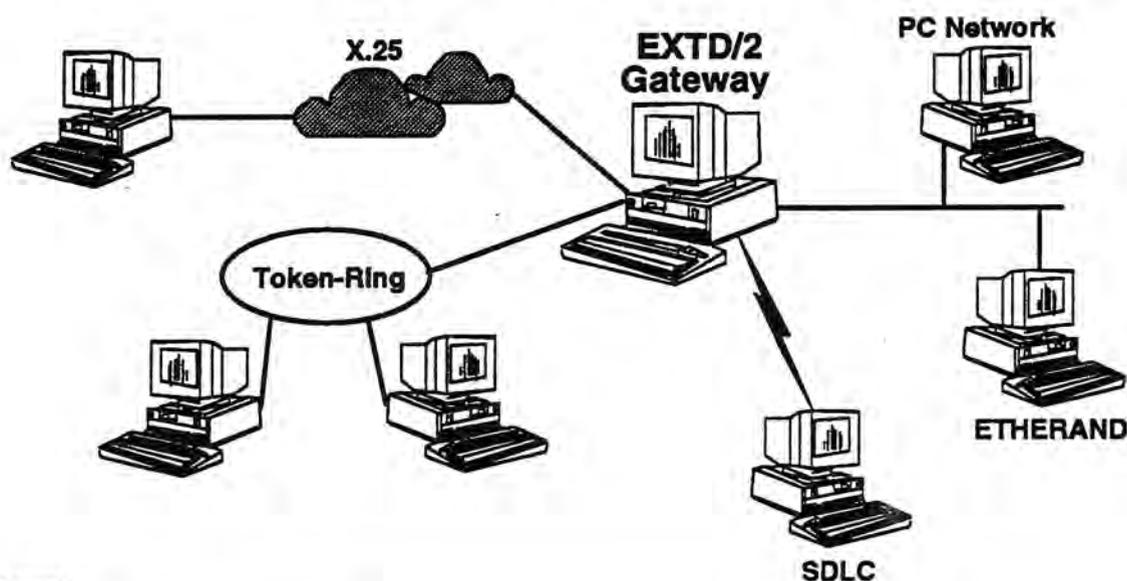
Visual 4-4. Upstream Connections

- Token-Ring
- SDLC
- X.25 (PSDN)

While any one of the upstream connection type may be used, only one may used at a time. If you wish to have more than one host destination, you will need to have multiple configuration files. You will then need to start Communications Manager with the correct configuration file.

Don't forget the appropriate SNA DLC profile as well.

Downstream Connections



GATWAY08

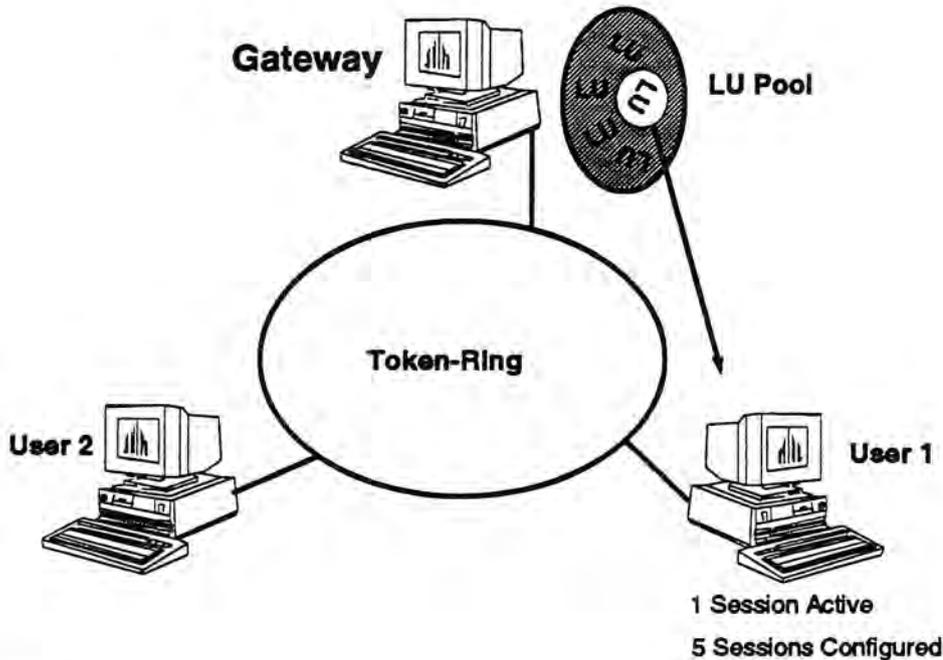
Visual 4-5. Downstream Connections

- Token-Ring
- PC Network
- ETHERAND
- SDLC
- X.25 (PSDN)
- The gateway can have a maximum of 254 LUs to distribute among its workstations. This is the maximum that can be defined for a PU at the host.
- LAN connections support up to 256 workstations per adapter.
- SDLC supports only switched connections to downstream workstations. One workstation at a time, per adapter. Configure all SDLC workstations the same.
- X.25 supports 128 workstations. All 128 can use the gateway at the same time.

Don't forget the appropriate SNA DLC profile as well.

Note: PC Network and ETHERAND are mutually exclusive in a workstation. Therefore, a gateway cannot support workstations on both networks concurrently.

Pooled LUs



GATWAY06

Visual 4-6. Pooled LUs

- The gateway supports both pooled and dedicated LUs.
- A dedicated LU is always reserved for a particular workstation.
- Pooled LUs are shared among several workstations.
- A workstation can have some of its LUs dedicated and some of them pooled.
- The gateway can activate the link for a workstation with dedicated LUs, but not for a workstation with pooled LUs only.
- When a workstation requests an LU from a pool and none are available, the workstation's request is queued.
- Pooled LUs are put into pool classes. Pool classes reserve LUs for certain workstations. Workstations can only get LUs from the pools they are assigned to.
- Pooling allows you to define more LUs to workstations than are actually available at the host.
- The gateway will map an LU ID at a workstation to a real LU address at the host.

Topic 4.2. SNA Gateway Configuration

```

Create/Change SNA Gateway Host Connection Profile (1 of 2)

Use the spacebar to select.

DLC type . . . . .
  ▶ SDLC...
    ■ IBM Token-Ring Network...
    ■ X.25...

Permanent connection . . . . . ■ Yes    ▶ No

Auto-logoff timeout
(minutes). . . . . [999]

-----
Enter Esc=Cancel F1=Help F8=Forward

GATCF681
    
```

Visual 4-7. Host Connection Profile part 1

- Only one host connection profile can exist.
- The connection type refers to the gateways connection to the host.
- A permanent connection is not subject to congestion control.
- The auto logoff time specifies the amount of time, in minutes, that an LU session can be idle before it will be logged off.
- A pooled LU that is logged off by auto logoff will be returned to the pool.


```

                                Create/Change SNA Gateway Workstation LU Profile

Use the spacebar to select.

LU name at workstation . . . . . : POOLED

Comment. . . . .
  [Pooled LU for workstation PU ES21TR6 LU address 02      ]

PU name of workstation . . . . . [ES21TR6 ]

LU pooling . . . . .
  ▀ Dedicated...
  ▶ Pooled...

LU local address
  at workstation (hex) . . . . . [02]

DLC type . . . . .
  ▀ SDLC...           ▶ IBM Token-Ring Network...
  ▀ X.25...           ▀ IBM PC Network...
  ▀ ETHERAND Network...

Enter Esc=Cancel F1=Help

GATCFG03

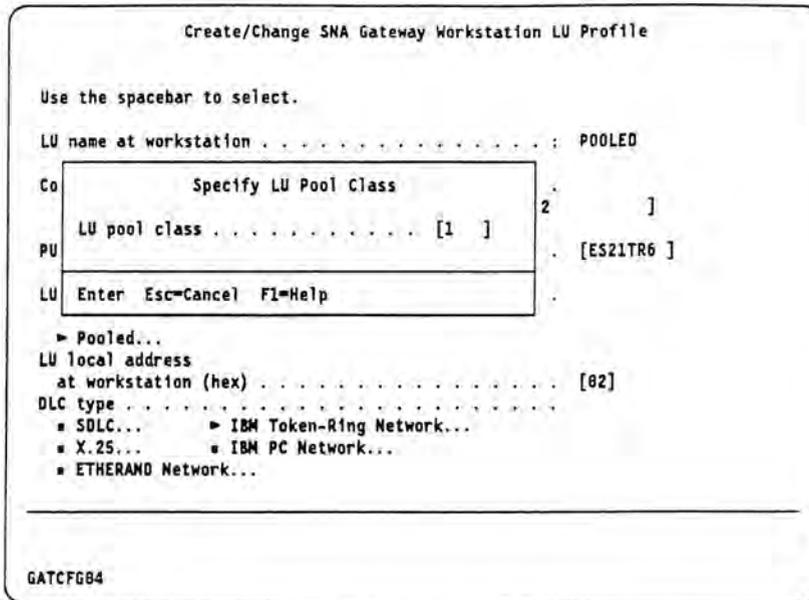
```

Visual 4-9. Workstation Connection Profile part 1

- A workstation connection profile must be created for each LU in each workstation that will be using the gateway. If a workstation will have five 3270 sessions, then five workstation connection profiles will need to be created in the gateway.
- The workstation itself doesn't need to do anything special to use the gateway. It is just like any other NON-DFT connection.
- All workstation connection profiles must have unique names. In addition, the name must be unique among all other LU names in the gateway system. Some possible conflicts are:
 - APPC LUs
 - The gateway's own 3270 logical terminals
 - SNA LUAs (LU 0)

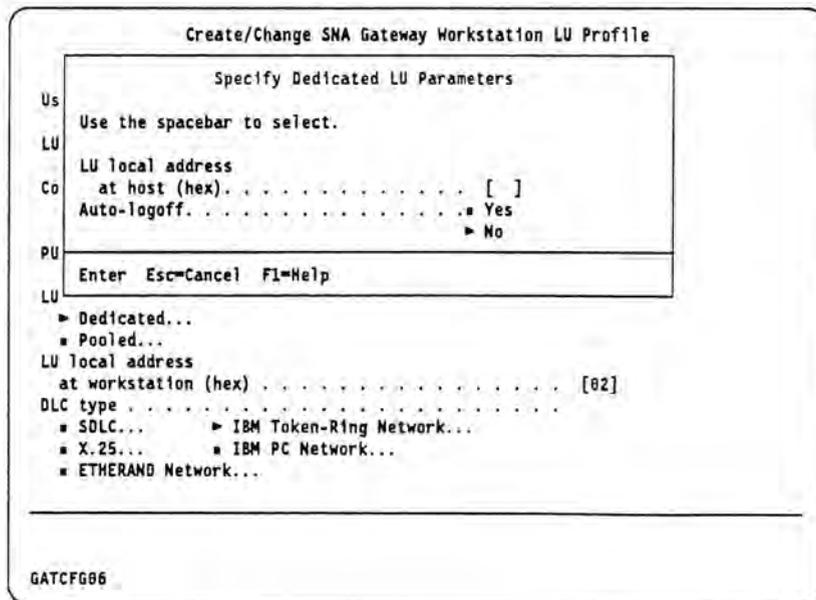
PU name of workstation: This parameter should contain the CP name of the downstream workstation. This is not required, but recommended. This value will be included in NMVT alerts sent to the host.

The LU local address: This is the address of an LU session that has been, or will be, configured at the downstream workstation. This value does not need to match any host LU values. The gateway will provide translation of this LU address to a real host LU address.



Visual 4-10. Workstation Connection Profile part 2(pooled LU)

- For a pooled LU, all you do is specify which pool class to get the LU from. An LU can only belong to one pool class.



Visual 4-11. Workstation Connection Profile part 2 (dedicated LU)

- For dedicated LUs, you need to explicitly identify a host LU address. This must be unique among all LU addresses in the gateway system.
- Dedicated LUs also have their own auto logoff parameter.

Unit 5. Workstation Profile and Auto-start Options

What This Unit is About

This unit will cover the workstation profile and auto-start options of Communications Manager. The workstation profile and auto-start options contain global information about a user's workstation. This information will be covered up front so that all other topics that reference this information will not need to repeat it.

What You Should Be Able to Do

After completing this unit, you should be able to

- Define the purpose of the workstation profile and auto-start options.
- Configure the workstation profile and auto-start options for a user.

```

Change Workstation Profile

Use the spacebar to select.

Comment. . . . .
[BASIC CONFIGURATION FILE ]
Machine type-model number. . . . . [8570]-[000]
Plant of manufacture-
  machine sequence number. . . . . [00]-[0000000]
Translation table file name. . . . . [ ]
Error log file name. . . . .
[ERROR.DAT ]
Error log size . . . . . [16 ] K
Error log overflow option. . . . . ▶ Wrap
                                   ■ Extend

Message log file name. . . . .
[MESSAGE.DAT ]
Message log size . . . . . [500 ] messages
Message log overflow option. . . . . ▶ Wrap
                                   ■ Extend

Display message pop-ups. . . . . ▶ Yes   ■ No
Enable auto-start options. . . . . ▶ Yes   ■ No
-----
Enter Esc=Cancel F1=Help

WKSCFG01
    
```

Visual 5-1. Workstation Profile

- The machine type - model number, and plant of manufacture are used by Communications & System Management (C & SM) alerts to identify individual workstations on the network. These items are required, but you can accept the defaults if you are not concerned with identifying workstations. Use the defaults for non-IBM computers.
- Make sure that **Enable auto-start options** is set to **yes** if you wish to automatically start any services or emulators.

Note: Services must be auto-started in order to be used.

```

                                Select Auto-Start Options

Use the spacebar to select.

Services to load. . . . .
  ▶ All configured services
  ▪ Select desired services...

Emulators to auto-start (one or more) . . . . .
  ▪ 3270 terminal emulation (DFT)...
  ▶ 3270 terminal emulation (non-DFT)...
  ▪ ASCII terminal emulation
  ▪ 5250 Work Station Feature...

Display this screen first . . . . .
  ▪ Communications Manager main menu
  ▪ 3270 terminal emulation (DFT)...
  ▶ 3270 terminal emulation (non-DFT)...
  ▪ ASCII terminal emulation
  ▪ 5250 Work Station Feature...

-----
Enter  Esc=Cancel  F1=Help

WKSCFG02

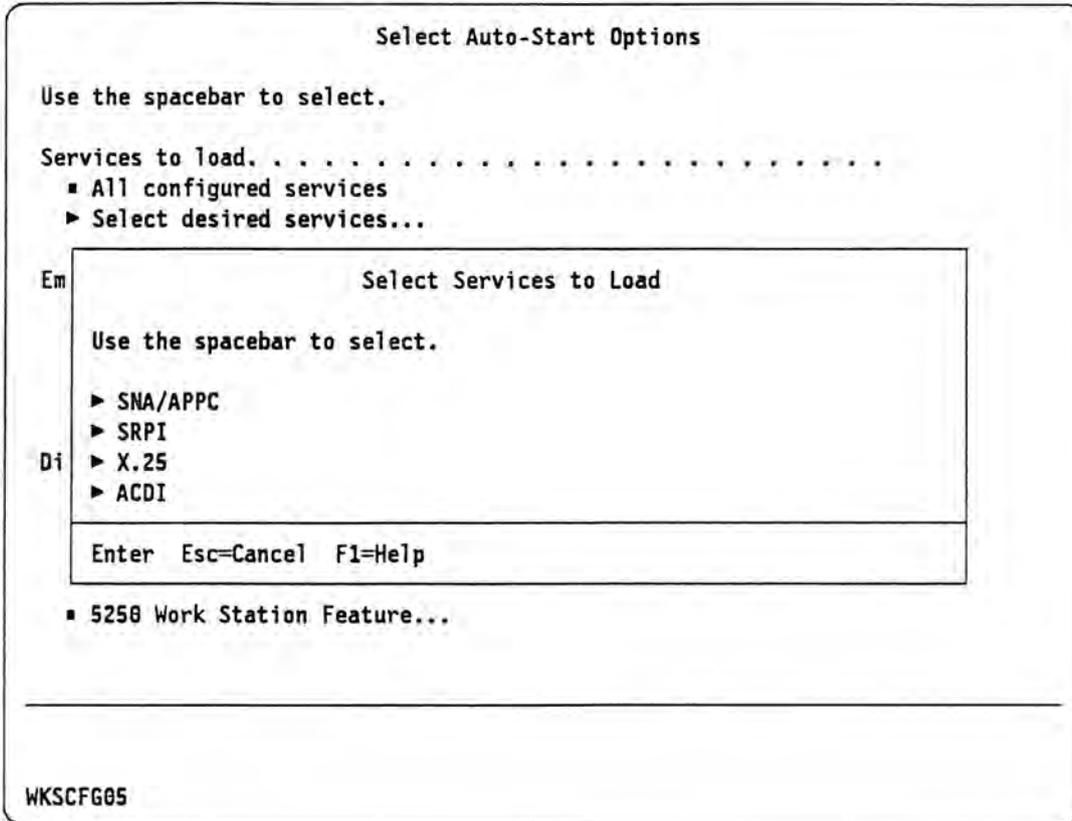
```

Visual 5-2. Auto-start Options

- It is best to load **All configured services**. Then, if they are configured, they will load. Otherwise, you can select the specific services you wish to load with **Select desired services**.

Note: A service must be auto-started in order to be used.

- You can select multiple emulators to auto-start (ie. both 3270 DFT and 5250 emulation). You will specify the particular sessions to start in a follow-on panel.



Visual 5-3. Selecting Services to Load

- This is how you would selectively load services. Just select the services you wish to load.
- You will get an error when Communications Manager is started if you try to load a service that is not configured.

Select Auto-Start Options

Select 3270 Terminal Emulation (non-DFT) Sessions to Auto-Start

Use the spacebar to select one or more.

Session	Comment
■ --ALL--	
▶ A	
▶ B	
■ C	

Enter Esc=Cancel F1=Help

■ 5250 Work Station Feature...

WKSCFG03

Visual 5-4. Selecting Sessions to Start

- In this panel, you specify the specific sessions that you wish to have auto-started.
- You do not have to start all of the sessions for a particular emulator.
- If you plan to select specific sessions rather than all of them, make sure that you turn the "ALL" selection off or they will still all start.
- You will have one of these panels for each of the emulators that you choose to auto-start.

Select Auto-Start Options

Select 3270 Terminal Emulation (non-DFT) Session to Display First

Session	Comment
▶--ANY--	
■A	
■B	

Esc=Cancel F1=Help

■ 5250 Work Station Feature...

WKSCFG04

Visual 5-5. Selecting Session to Display First

- In this panel, you specify the specific session that you want to be displayed first.
- If you select "ANY", Communications Manager will decide which session to display first.
- You will have one of these panels for each of the emulators that you choose to auto-start.

Unit 6. SNA Configuration

What This Unit is About

This unit will deal with configuration of a workstation that will be doing SNA communications. Because several features of Communications Manager will require that these items be configured, we will look at them now so that the information will not need to be constantly repeated.

who you are (Team)

The first topic will discuss the SNA Local Node Characteristics. The SNA local node characteristics contain the parameters needed to identify your workstation to the SNA network.

How am I connected

The second topic will deal with SNA data link controls. SNA data link controls must be configured for any adapter you plan to use for SNA communications. If you are not using the adapter for SNA communications, you do not need a DLC profile. The DLC profile provides an interface between the adapter in your workstation and another system in an SNA network.

The possible DLC profiles are.

- SDLC
- Token-Ring
- PC-Network
- ETHERAND
- Twinax
- X.25

SNA communications includes:

- 3270 Emulation
- 5250 Emulation
- APPC communications
- APPN networking

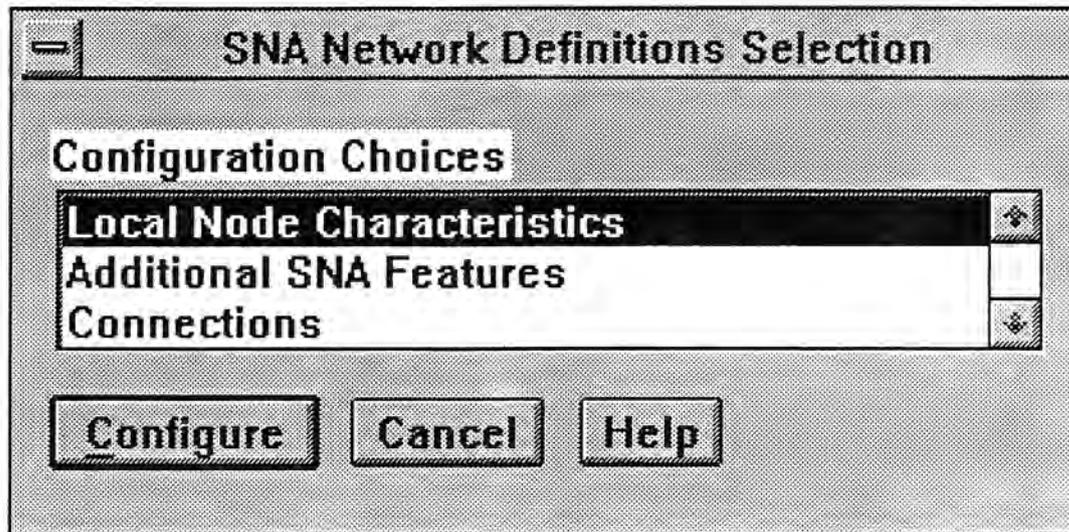
What You Should Be Able to Do

After completing this unit, you should be able to

- Configure the SNA Local Node Definitions for a workstation.
- Configure each of the SNA Data Link Control types available to Extended Services for OS/2. You will also know where to go to get the matching partner parameters, when they are required.

Topic 6.1. SNA Local Node Characteristics

Local Node Characteristics



SNALOC01

Visual 6-1. SNA Local Node Characteristics

This will be the first panel you receive when you choose to update your SNA network. We are interested right now in the Local Node Characteristics. The key item to note here is that the SNA network configuration is a PM application, not the typical Communications Manager full screen.

Local Node Characteristics

The screenshot shows a dialog box titled "Local Node Characteristics - TANKERS". It is divided into "Required Features" and "Optional Features" sections. Handwritten annotations in black ink point to various fields:

- "CAALCB#1" points to the "Network ID" field containing "USIBMES".
- "VTAM PU" points to the "Local node name" field containing "OS28064".
- "VTAM DEF" points to the "Local node ID" field containing "05D FA606 (Hex)".
- "IRRELEVANT FOR 3270" points to the "Local node alias name" field containing "OS28064".
- "ID BLOCK - IDNUM" points to the "Local node ID" field.

The "Required Features" section includes:

- Network ID: USIBMES
- Local node name: OS28064
- Node type:
 - End Node to Network Node Server
 - End Node - No Network Node Server
 - Network Node
- Your network node server address: [Empty field]

The "Optional Features" section includes:

- Local node ID: 05D FA606 (Hex)
- Local node alias name: OS28064
- Comment: [Empty field]
- Activate Attach Manager at start up

Buttons at the bottom are "OK", "Cancel", and "Help".

SNALOC02

Visual 6-2. SNA Local Node Characteristics

Network ID: An eight character name that identifies the network to which this machine is connected. This name will be used in error logs and alerts.

Local Node Name: This is the actual name of this node. Each node in a network should have a unique name or problems can occur in certain types of communications. Control point name.

Node type: Identifies the type of node functions that this system will perform. There will be a much larger discussion of node types during the APPN lectures.

Network node server address: This value identifies the address of your network node, if you are using one. It only applies if your network node is connected by Token-Ring or ETHERAND networks.

Local node ID: This is the last five digits of an XID. It is used during link activation. For 3270 non-DFT emulation, this value should match IDNUM on your PU statement in VTAM.

Local node alias name: This is just an alias for your node name. Another name you can be known by. If this is left blank, the local node name will be put here.

Topic 6.2. SNA Data Link Controls

```

Create/Change SDLC DLC Adapter Profile

Use the spacebar to select.

Adapter number. . . . . : 8
Load DLC. . . . . ▶ Yes      ■ No
Free unused link. . . . . ▶ Yes      ■ No

Maximum RU size . . . . . [8256] bytes
Send window count . . . . . [4]
Receive window count. . . . . [4]
Line type . . . . . ▶ Switched...
                        ■ Non-switched
Link station role . . . . . ■ Secondary...
                        ■ Primary...
                        ▶ Negotiable...

Line mode . . . . .
  ▶ Line turnaround required
  ■ Constant request to send
NRZI. . . . . ▶ Yes      ■ No
Modem rate. . . . . ▶ Full speed
                        ■ Half speed

Enter Esc=Cancel F1=Help

SNASDLC1

```

Visual 6-3. SDLC DLC

Free unused link Will bring down the link if it is not in use. This frees up resources. Select **NO** if:

- A non-switched line is used.
- Sessions are automatically activated. To avoid constantly activating and deactivating the link.
- If SDLC DLC is used for 5250 Workstation Feature.

Max RU size: The maximum RU that is supported by this adapter. It must be large enough to handle all RUs you wish to accept. Communications Manager will add nine bytes to this value to make up a packet information unit (PIU). If SDLC is used to talk to a host, the value must match MAXDATA - 9.

Window counts: Number of I-frames that will be sent/received before waiting for/sending an acknowledgement. Depending on the host software version and release, they may need to match VTAM MAXOUT exactly. Defaults are good. For maximum performance, these can be increased to 7.

Line mode: Indicated whether full duplex (Constant request to send) or half duplex (Line turnaround required) transmission facilities are in use.

NRZI: Non Return Zero Inverted

Create/Change SDLC DLC Adapter Profile

Use the spacebar to select.

Adapter number. : 0
Load DLC. ▶ Yes ■ No
Free unused link. ▶ Yes ■ No

Maximum RU size [0256] bytes
Send window count [4]
Receive window count. [4]
Line type ▶ Switched...

Specify Data Set Ready Timeout

Data set ready timeout. [5] minutes

Enter Esc=Cancel F1=Help

Modem rate. ▶ Full speed
 ■ Half speed

SNASDLC2

Visual 6-4. SDLC DLC 2

Data Set Ready Timeout: specifies the maximum time, in minutes, that the DLC will wait for the data set ready (DSR) signal from the modem. This is only valid on switched lines.

The default of 5 is good here.

Create/Change SDLC DLC Adapter Profile

Use the spacebar to select.

Adapter number. : 0

Specify Negotiable Link Station Data

Local station address (in hex). [01]
 XID repoll count. [10]
 Non-XID repoll count. [7]

Enter Esc=Cancel F1=Help

Primary...
 Negotiable...

Line mode

- Line turnaround required
- Constant request to send

NRZI. Yes No

Modem rate. Full speed Half speed

SNASDLC3

Visual 6-5. SDLC DLC 3

Local station address: Must be a different value from the partner station. For host communications, Match with PU ADDR in VTAM. This value only applies to a secondary link station.

XID Repoll count: Number of times the primary link station will send XID frames before initiating disconnection of the link. A value of 0 means to retry indefinitely. Recommendation is 10 for a switched line and 100 for a non switched line.

Non-XID Repoll count: Number of times the primary link station will send Non-XID frames before initiating disconnection of the link. A value of 0 means to retry indefinitely. Recommendation is 10 for a switched line and 100 for a non switched line.

XID frames are used during link initiation. Non-XID frames are used for all other data exchanges.

```

Create/Change IBM Token-Ring Network DLC Adapter Profile

Use the spacebar to select.

Adapter number . . . . . : 0
Load DLC . . . . . ▶ Yes
                    ■ No
Maximum number of link stations. . . . . [02]
Percent of incoming calls. . . . . [050]%

Free unused link . . . . . ▶ Yes
                    ■ No
Congestion tolerance . . . . . [080]%

Maximum RU size. . . . . [1024 ] bytes
Send window count. . . . . [2]
Receive window count . . . . . [1]

C&SM LAN ID. . . . . [      ]
Send alert for beaconing . . . . . ■ Yes
                    ▶ No

Enter Esc=Cancel F1=Help

SNATRN01
    
```

*larger than
VTAM MAXDATA!
-9*
*VTAM MAXOUT
VTAM VPACINb*
*VTAM PU
for Netview
Alerts*

Visual 6-6. Token-Ring DLC

Link Stations: One is required for every physical partner station that will use SNA for communications. Must be no larger than the link station value in the IEEE 802.2 profile (more later).

Percent of incoming calls: Percent of link stations that will be reserved for a partner station trying to contact you, rather than you contacting it.

Congestion tolerance: When this percentage of link stations are allocated, the system will bring down links that are not in session. Only works if **Free unused link** is **Yes**

*VTAM MAXDATA **
Maximum RU size: Must be at least large enough for any RU that may be received. Does not need to exactly match the host, just be large enough.

C&SM LAN ID: Your LAN segment ID. It can be any value but a Network Administrator may wish to assign it. Used for identification in alerts.

Send alert for beaconing: Select **Yes** if you want this station to send an NMVT alert to the host when a beaconing condition exists on the ring.

```

Create/Change IBM PC Networks DLC Adapter Profile

Use the space bar to select.

Adapter number . . . . . : 8
Load DLC . . . . . : ▶ Yes
                  ■ No
Maximum number of link stations. . . . . : [02]
Percent of incoming calls. . . . . : [050]%

Free unused link . . . . . : ▶ Yes
                  ■ No
Congestion tolerance . . . . . : [080]%

Maximum RU size. . . . . : [1024] bytes
Send window count. . . . . : [2]
Receive window count . . . . . : [1]

C&SM LAN ID. . . . . : [   ]
Send alert for continuous carrier. . . . . : ■ Yes
                                          ▶ No

Enter Esc=Cancel F1=Help

SNAPCN01

```

Visual 6-7. PC Network DLC

```

Create/Change ETHERAND Network DLC Adapter Profile

Use the space bar to select.

Adapter number . . . . . : 8
Load DLC . . . . . : ▶ Yes
                  ■ No
Maximum number of link stations. . . . . : [02]
Percent of incoming calls. . . . . : [050]%

Free unused link . . . . . : ▶ Yes
                  ■ No
Congestion tolerance . . . . . : [080]%

Maximum RU size. . . . . : [1024] bytes
Send window count. . . . . : [2]
Receive window count . . . . . : [1]

C&SM LAN ID. . . . . : [   ]

Enter Esc=Cancel F1=Help

SNAETN01

```

Visual 6-8. ETHERAND DLC

The only difference between the Token-Ring DLC and the PC Network/ ETHERAND DLC is the alert parameter. The PC Network sends alerts for continuous carrier. The ETHERAND DLC does not send alerts

The valid ranges for the parameters are generally smaller, than Token-Ring. Remember to use online help for valid ranges.


```

                                Create/Change X.25 DLC Profile

Use the spacebar to select.

Link profile name. . . . . : UNKNOWN
Comment. . . . .
[
Load DLC . . . . . ▶ Yes      ■ No
Free unused connections. . . . . ▶ Yes      ■ No
Maximum RU size (bytes). . . . . [1024]
Number of incoming connections . . . . . [5 ]
Insert calling address in
  call request packet. . . . . ▶ Yes      ■ No
Negotiate packet size. . . . . ■ Yes      ▶ No
Negotiate window size. . . . . ■ Yes      ▶ No
Default link station role. . . . .
  ■ Secondary
  ■ Primary
  ▶ Negotiable
Default retry count. . . . . [5 ]
Default timeout (seconds). . . . . [200 ]
Accept reverse charges . . . . . ■ Yes      ▶ No
-----
Enter Esc=Cancel F1=Help

SNAX2501

```

Visual 6-10. X.25 DLC

Link profile name: This is the name of a corresponding X.25 link profile. An X.25 DLC profile must be associated with an X.25 link profile.

Free unused connections: Always select **No** if you are using Permanent Virtual Circuits (PVCs).

Default retry count: The number of times Qualified Logical Link Control (QLLC) commands will be retried.

Default timeout: Time, in seconds, to wait for a response from issued Qualified Logical Link Control (QLLC) commands.

Several parameters here must be coordinated with the network provider. Consult them for the correct values.

- Insert calling address in call request packet
- Negotiate packet size
- Negotiate window size

Unit 7. LAN Adapter and Protocol Support

What This Unit is About

Communications on a Local Area Network (LAN) is rapidly becoming the standard method of communications, not just for LAN Server/Requester communications, but also for communicating to host systems. Extended Services/LS 2.0 provides a standardized method for communications over a LAN. This method is called the Network Driver Interface Specification (NDIS). NDIS makes it very easy to add LAN adapters and Protocols to the system.

This unit will first introduce the NDIS and explain its operation. The second topic will be devoted to actual configuration of the LAN environment.

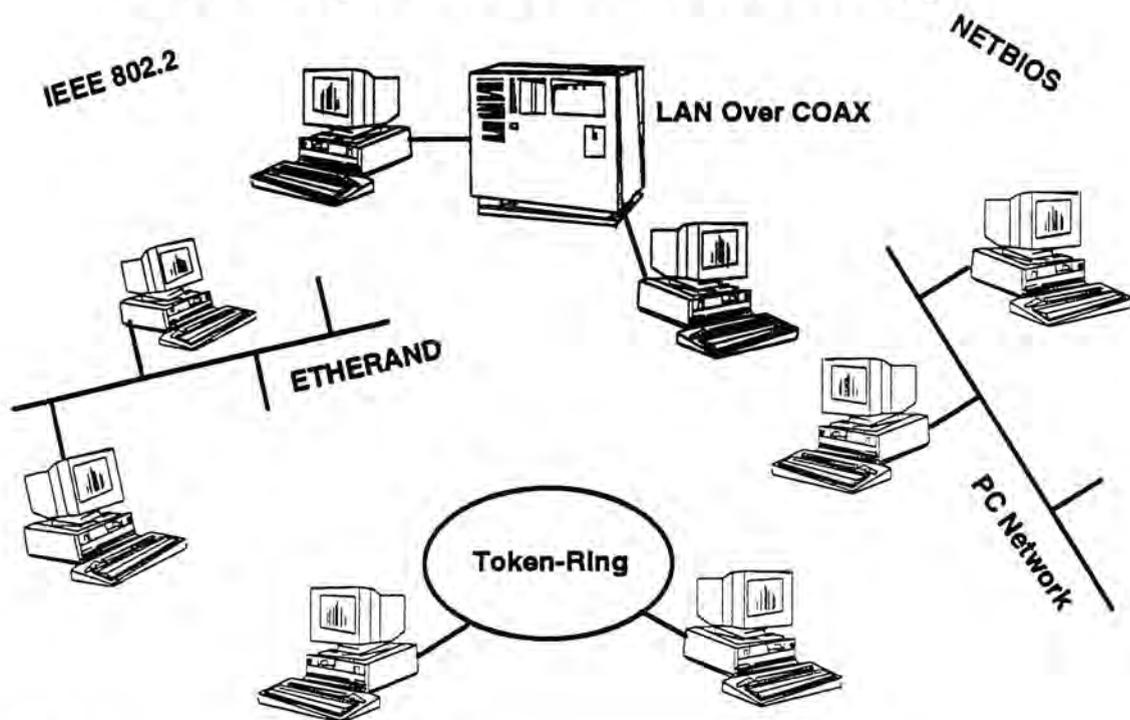
What You Should Be Able to Do

After completing this unit, you should be able to

- Define the following terms, and give their purpose: NDIS, NETBIOS, IEEE 802.2, PROTOCOL.INI, Network Information File.
- Describe the benefits of NDIS.
- Identify the supported LAN adapters and protocols.
- Configure LAN adapters and protocols for a system.

Topic 7.1. LAN Adapter and Protocol Support Architecture

LAN Adapter and Protocol Support

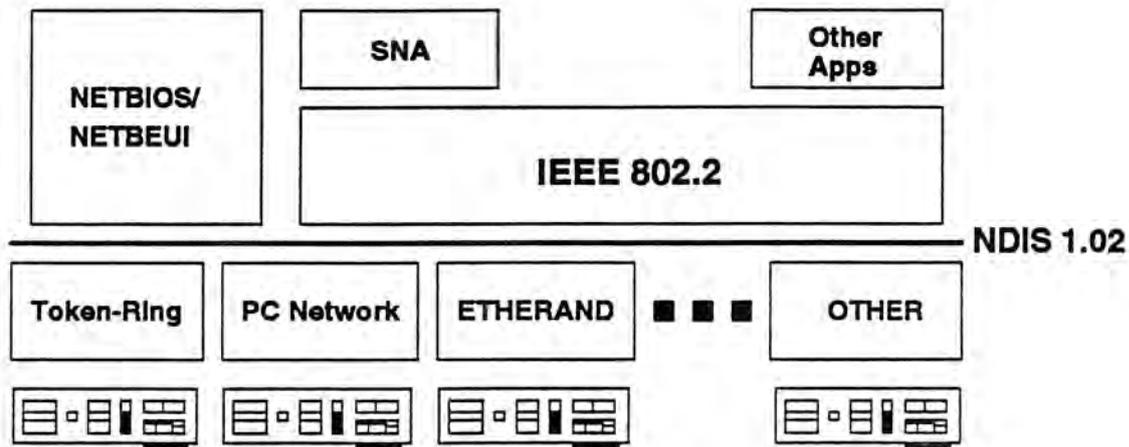


LANOV601

Visual 7-1. LAN Adapter and Protocol Support

- The following LAN types are supported:
 - Token-Ring
 - Ethernet
 - IEEE 802.3
 - PC Network
 - LAN over COAX
 - Additional NDIS conforming adapter drivers may be installed as they become available.
- The following protocols:
 - NETBIOS
 - IEEE 802.2

LAN Adapter/Protocol Support Architecture



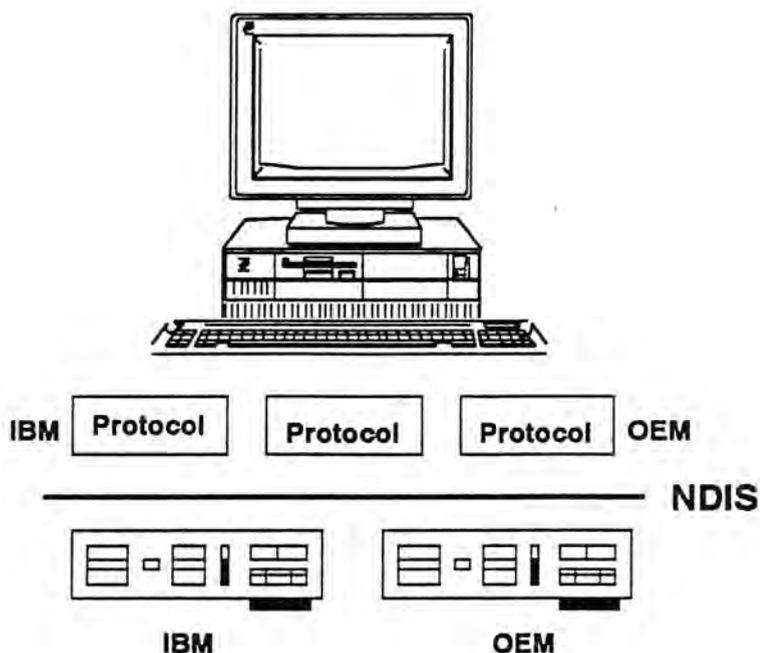
LANOV002

Visual 7-2. LAN Adapter and Protocol Support Architecture

- Old (EE 1.3) IEEE 802.2 and NETBIOS are being replaced with new, performance oriented protocol stacks.
- A new layer (NDIS) has been introduced that separates the hardware from the protocol stacks. This allows new adapters to be supported without needing to change the protocol stack software. The adapter just needs to conform with the NDIS layer.
- Support for new adapters will no longer be tied to an Extended Services/LS 2.0 release.
- New protocol stacks can be added in the same fashion.
- NETBIOS is now separated from IEEE 802.2. This provides a significant performance enhancement. This is different from EE 1.3 where the NETBIOS protocol filtered down through the IEEE 802.2 layer.
- The IEEE 802.2 subsystem can determine the type of processor (80286, 80386/486) and optimize for it.
- Up to 4 adapters are supported.
- Communication Manager features are still limited to two adapters however.

NDIS: Network Driver Interface Specification
NETBIOS: Network Basic Input Output System
IEEE: Institute of Electrical and Electronic Engineers

Network Driver Interface Specification



LANOV703

Visual 7-3. NDIS

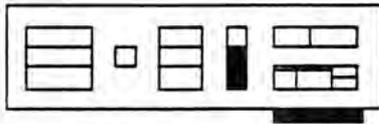
- The 3COM/Microsoft LAN Manager Network Driver Interface Specification (NDIS) Version 1.02 provides a standardized method for communications between network adapter drivers and protocol drivers.

Network adapter drivers: are device drivers that interface between NDIS and the actual network adapter. They handle basic transmission and reception of packets on the network.

Protocol drivers: are drivers that interface between NDIS and an application. They provide a high level of communications from the data link layer to the application layer.

- NDIS is externalized from both the top and the bottom, this allows new adapters and protocols to be added and work with the existing system. For example, a new adapter can be added that will automatically be able to use the existing NETBIOS and IEEE 802.2 protocols.
- LAN Adapter and Protocol Support requires that network adapter and protocol drivers conform to the NDIS Version 1.02 architecture.

NDIS Benefits



Adapter Developer

- One driver for multiple PC platforms
- Minimal development effort
- Supports existing OS/2 EE 1.2 and 1.3 adapters

LANOV704



IBM Hardware/Software

- Large base of existing hardware and software
- No changes to product to accommodate new hardware
- Release Independent adapter configuration/installation

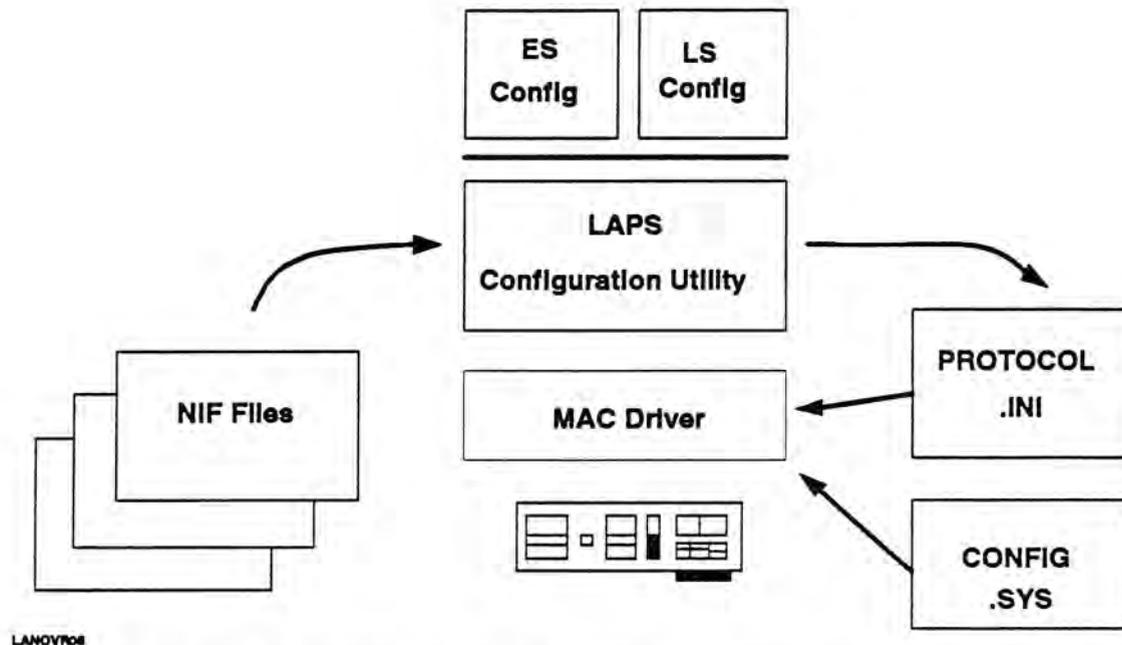
Visual 7-4. NDIS Benefits

- De-facto industry standard
- Multiple vendor support. Any vendor as long as they conform to NDIS.
- Take advantage of enhancements in adapter technology without waiting for a new Extended Services/LS 2.0 release.
- There will be conformance testing done on OEM device drivers to verify conformance with Extended Services/LS 2.0. This certification process ensures that the drivers/adapters are compliant with the NDIS architecture and that they operate correctly with Extended Services/LS 2.0. Drivers that have been certified will have an entry in their NIF file indicating that they have been tested with IBM NETBIOS and IBM IEEE 802.2.
- A non-certified adapter can still be installed. However, a warning will be presented to the user during configuration indicating that the adapter has not been certified. The user may proceed and the adapter will be installed.
- A NON-CERTIFIED ADAPTER THAT IS NDIS COMPLIANT SHOULD STILL WORK.

NIF: Network Information File

LS 2.0: LAN Services Version 2.0

LAPS Configuration Architecture



Visual 7-5. LAN Transport Configuration Architecture

- The same LAN transport mechanism will be provided with both the Extended Services and the LS 2.0 products.
- It is a common set of functions.
- It is capable of standalone operation. It is not required that you actually be running Extended Services or LS 2.0 in order to use the LAN transport facility.
- All configuration is done from the PM interface. If you are configuring from Communications Manager, the system will jump out of the EZVU session and bring up the PM interface.
- The configuration process uses a file, provided with the adapter, called a Network Information File (NIF). More later on this file.
- The output of the configuration is an updated PROTOCOL.INI file and an updated CONFIG.SYS file. PROTOCOL.INI is a file in the LAN transport directory that contains information that the various LAN device drivers use during initialization. CONFIG.SYS is updated with the required device driver information.

Network Information File

- **Template for PROTOCOL.INI entries**
- **Contain adapter/protocol configuration information**
- **Used to customize configuration of OEM adapters**
- **Created by the adapter developer**

LANOV706

Visual 7-6. Network Information File

- This file is used by the configuration/installation program to dynamically build the PM configuration window. NIF file uses architected keywords that are understood by the configuration/installation program.
- Each adapter/protocol will have its own unique parameters dialog based upon its NIF file.
- NIF file contains specific information about each parameter:
 - context sensitive help info
 - allowable range of values for the parameter
 - default value for the parameter
- A NIF file is coded in ASCII text.

```

[PROT_MAN]
  DriverName = PROTMANS

;-----*
;----- PROTOCOL SECTION -----*
;-----*

[LANDD_nif]
  DriverName = LANDDS
  Bindings = IBMTOK_nif
  NETADDRESS = T400007171046
  ETHERAND_TYPE = I
  SYSTEM_KEY = 0x0
  OPEN_OPTIONS = 0x2000
  TRACE = 0x0
  LINKS = 41
  MAX_SAPS = 4
  MAX_G_SAPS = 0
  USERS = 4
  T1_TICK_G1 = 255
  T1_TICK_G1 = 15
  T2_TICK_G1 = 3
  T1_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

;-----*
;----- MAC SECTION -----*
;-----*

[IBMTOK_nif]
  DriverName = IBMTOKS
  MAXTRANSMITS = 6
  RECVBUFS = 2
  RECVBUFSIZE = 256
  XMITBUFS = 1

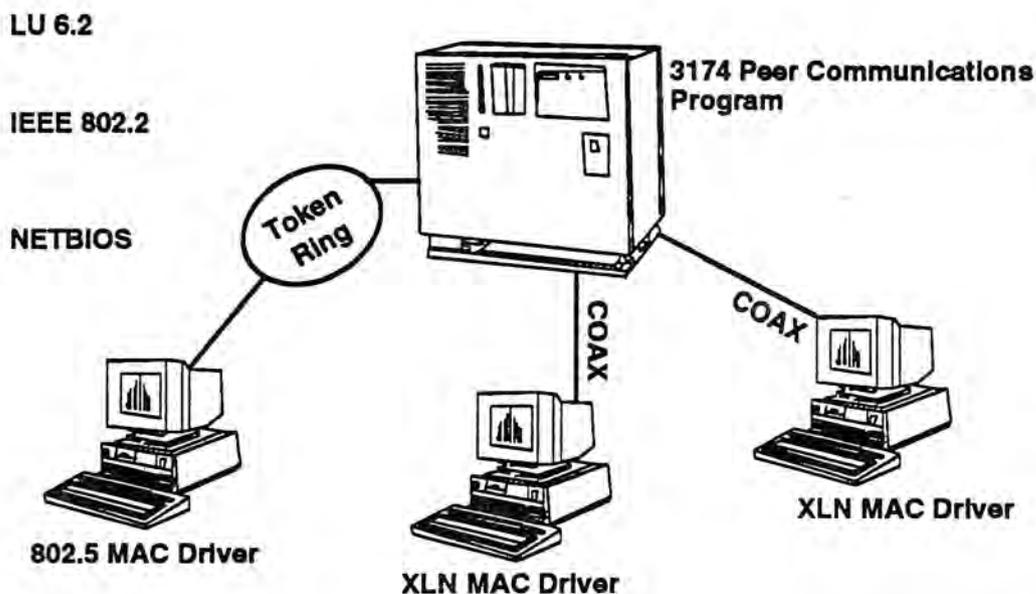
```

Visual 7-7. PROTOCOL.INI

- The PROTOCOL.INI file is ASCII text and can be edited with any text editor.
- The configuration/installation program will update this file with any parameter that you change.

Note: While you can edit the PROTOCOL.INI with an editor, it is recommended that you use the configuration/installation program. The configuration/installation will provide you with useful information on the parameters that you won't get when editing the PROTOCOL.INI. Editing PROTOCOL.INI with an editor is best reserved for very quick, minor changes by experts.

LAN Over COAX



LANOC2D1

Visual 7-8. LAN Over COAX

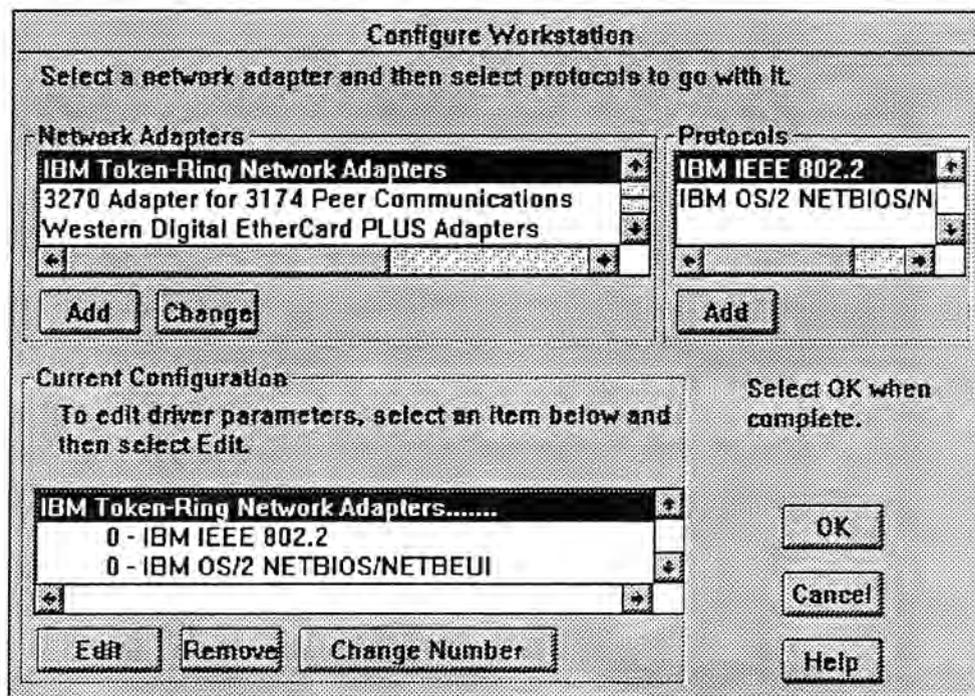
- LAN over COAX provides for routing LU 6.2, IEEE 802.2, and NETBIOS data, through a 3270 COAX adapter, to a 3174 control unit.
- All of the COAX connected workstations and the 3174 become a single 3174-LAN segment.
- The 3174-LAN segment can be bridged to another Token-Ring network. The bridge function is provided by the 3174 Peer Communications Program.
- The 3174 Peer Communications Program provides the following three functions:
 - Local peer to peer function:** This allows COAX attached workstations to communicate with each other, through the 3174, without host involvement. (LU 6.2, IEEE 802.2, and NETBIOS)
 - Bridge function:** This allows the 3174-LAN segment to communicate with workstations on a Token-Ring network that is also attached to the control unit.
 - Local Management function:** Provides full management of the 3174-LAN segment via online tests at the control unit.
- The NDIS XLN MAC driver emulates the function of an 802.5 (Token-Ring) MAC driver. It interfaces with the following adapters:
 - IBM 3270 Connection adapter (Microchannel)
 - IBM 3278/3279 Emulation adapter (PC/AT)

- A Maximum of 4 COAX adapters is supported in a Family 2 (Microchannel) system.
- Only one COAX adapter can be used in a Family 1 (PC/AT) system.
- In order to have 3270 DFT terminal emulation and LAN over COAX in use concurrently, you must have at least 2 COAX adapters installed. Thus, you cannot concurrently use 3270 DFT terminal emulation and LAN over COAX in a Family 1 system.
- 3270 DFT terminal emulation will always use the lowest numbered adapter if it is available.
- LAN over COAX will start at the highest numbered adapter and work downward as subsequent adapters are used.
- Each COAX adapter will have its own device statement in CONFIG.SYS.
- In addition to CONFIG.SYS, there will be entries for each COAX adapter in the PROTOCOL.INI file.

MAC: Media Access Control

Topic 7.2. LAN Adapter and Protocol Support Configuration.

LAN Adapter/Protocol Configuration



LANCF001

Visual 7-9. LAN Adapter/Protocol Configuration

This is the main configuration/installation panel:

- The upper left window will display all adapters for which NIF files were found.
- The upper right window will display all protocols for which NIF files were found.
- The bottom window will display the current system configuration.
- To add an adapter, select the adapter from the top window, and press the **Add** button.
- To add a protocol:
 1. Select the adapter (from the current configuration window) you wish to add the protocol to
 2. Select the protocol you wish to add
 3. Press the **Add** button.
- The number in front of a protocol identifies the adapter number that this protocol is installed on. It can be changed by pressing the **Change Number** button.
- Edit the current adapters and protocols by selecting them and pressing the **Edit** button.
- Remove an adapter or protocol by selecting it and pressing the **Delete** button.

Note: The LAN Adapter and Protocol Support files will be installed in a directory structure beginning with IBMCOM on the BOOT drive of the system.

LAN Adapter Parameters

Parameters for IBM Token-Ring Network Adapters

Edit the parameters as needed.

Early release	no
Primary adapter	NO
Alternate adapter	no
Network adapter address	
Shared RAM address	
Maximum number of queued transmits	6
Number of receive buffers	2
Receive buffer size	256
Number of adapter transmit buffers	1

OK Cancel Range Help

LANCFG02

Visual 7-10. LAN Adapter Parameters

This is part of the edit option for a Token-Ring adapter:

- The values displayed are obtained from the NIF file unless the value has been changed. Then, the value comes from the PROTOCOL.INI file.
- **Help** is context sensitive for each parameter.
- **Range** will give the allowable range of values for the particular parameter.

IEEE 802.2 Protocol Parameters

Parameters for IBM IEEE 802.2

Edit the parameters as needed. Except for parameters preceded by "*", changes affect all instances of the driver.

*Network adapter address	T400007171046
*Type of Ethernet driver support	1
*System key value	0
*Adapter open options	2000
*802 trace level	0
*Maximum link stations	41
*Maximum SAPS	4
*Maximum group SAPS	0
*Maximum number of users	4

* * * * *

OK Cancel Range Help

LANCF003

Visual 7-11. IEEE 802.2 Protocol Parameters

This is part of the edit option for the IEEE 802.2 protocol:

- Any parameter that is not preceded by an asterisk will change all instances of the protocol. If there is an asterisk, a change will only effect this particular instance of the protocol.



Unit 8. Low Entry Networking

What This Unit is About

As terminals/workstations began to grow more powerful, the need for host involvement in communications between two stations became less important. The processors in today's workstations are powerful enough to handle all of the tasks required to initiate a communications session without the host. This is known as peer-to-peer communications. Low entry networking is the term used to describe the communications between two SNA nodes of type 2.1 that use LU 6.2. This will serve as an introduction to the more powerful networking capabilities that are provided by Advanced Peer to Peer Networking (APPN).

What You Should Be Able to Do

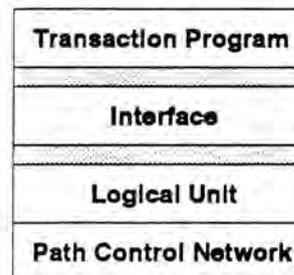
After completing this unit, you should be able to

- Define Logical Unit type 6.2.
- Define SNA node type 2.1.
- Configure Communications Manager to establish a LEN connection to another T2.1 node.
- Configure a Transaction Program definition.
- Describe a basic LU6.2 transaction program flow.

Topic 8.1. LU 6.2

What is LU 6.2?

- **LU 6.2 is an SNA logical unit type specialized for distributed processing among peer programs.**
- **The LU 6.2 is a connection between a transaction program (TP) and the underlying network resources.**
- **LU 6.2 provides a formalized interface that transaction programs use to access network services.**



APCOVER1

Visual 8-1. What is LU 6.2

- It all begins with the need for two programs to share data between them.
- LU 6.2 was developed to meet this need by allowing two LU 6.2s to establish a session between them and transfer data across that session.
- Transaction programs actually communicate with each other. A transaction program is a program that is executed by or within LU 6.2 and does services related to the processing of a transaction.
- An example of a transaction would be a request for a record from a database server.

Why use LU 6.2?

- Well suited to program to program processing.
 - Distributed files (e.g., DDM)
 - File Transfer
 - Network Management
 - Office Communications

APCOV700

Visual 8-2. Why use LU 6.2?

Why use LU 6.2?

- **The capability of terminals/workstations has changed dramatically.**
- **When SNA was first introduced, the capability of terminals was extremely limited compared to the host.**
 - The host program was always the Primary logical unit (PLU).
 - The host was responsible for all session level error recovery.
 - Protocols were not symmetrical between PLU and SLU.
 - Relationship was Master-Slave.
- **As distributed processors have increased in power and capability, LU 6.2 has been developed to exploit a peer to peer connection.**

APCOVER02

Visual 8-3. Why Use LU 6.2?

LU 0

- Program to program
- Special purpose unarchitected protocols
- 4700 finance terminals, JES2 NJE, HCF

LU 1, 2, 3, 4, 7

- Program to device communications
- Device dependent - data stream oriented

LU 6.0, 6.1

- Program to program between host LUs
- CICS - CICS, CICS - IMS
- Parallel sessions
- Complex

LU 6.2

- General purpose program to program communications.

LU 6.2 Concepts

- **Sessions:**
A session is a connection that permits a dialog between two logical units.

- **Conversations:**
A conversation is a connection, across a session, that allows a dialog between two transaction programs.

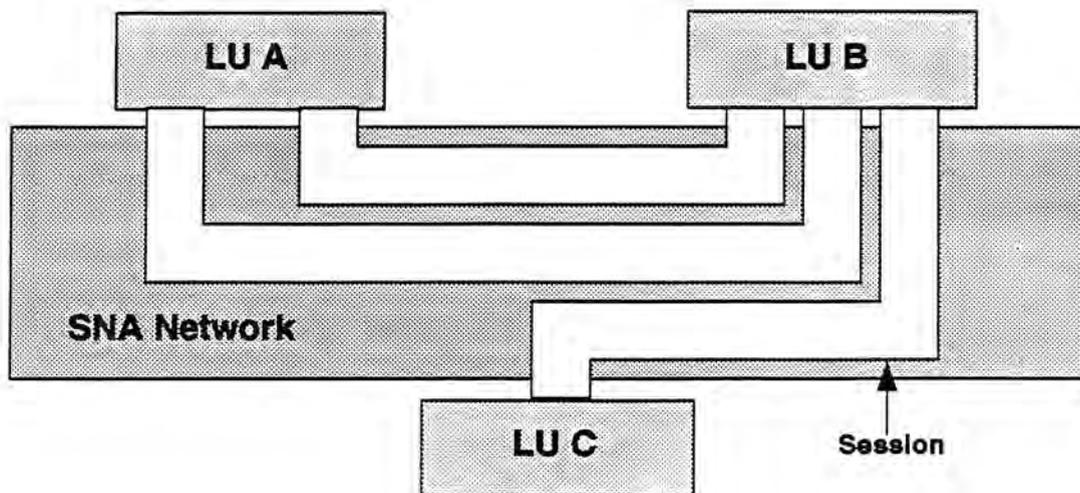
- **Protocol Boundary:**
A protocol boundary governs the rules of a conversation.

APCOV703

Visual 8-4. LU 6.2 Concepts

- Every LU in a network must have a unique name. This name is how the LUs find each other to communicate.

Sessions

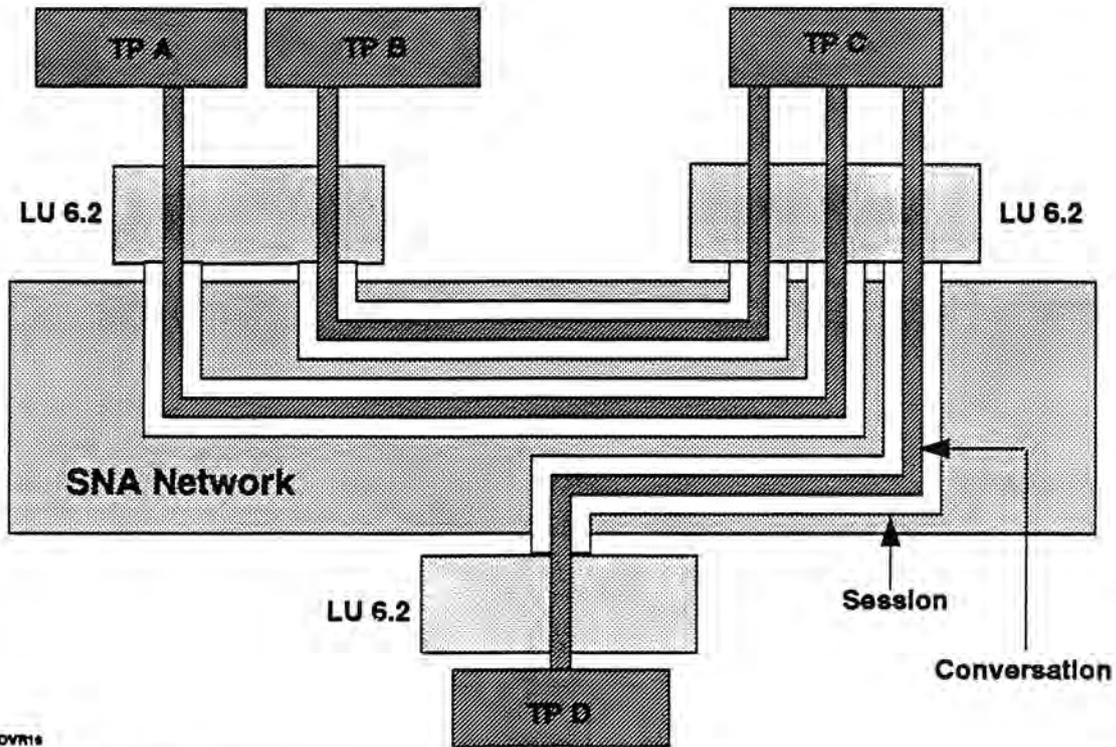


APCOV784

Visual 8-5. Sessions

- Session connect logical units
- An LU 6.2 session is a serially reusable resource. When one transaction program is finished with it, the session is available for another transaction program.
- A single LU 6.2 can have several sessions active at the same time. The sessions can be to different partner LUs, the same partner LU, or both.
- When you have more than one session to the same partner LU, it is known as parallel sessions.
- Session security is available to verify that a session is allowed between two LUs.

Conversations

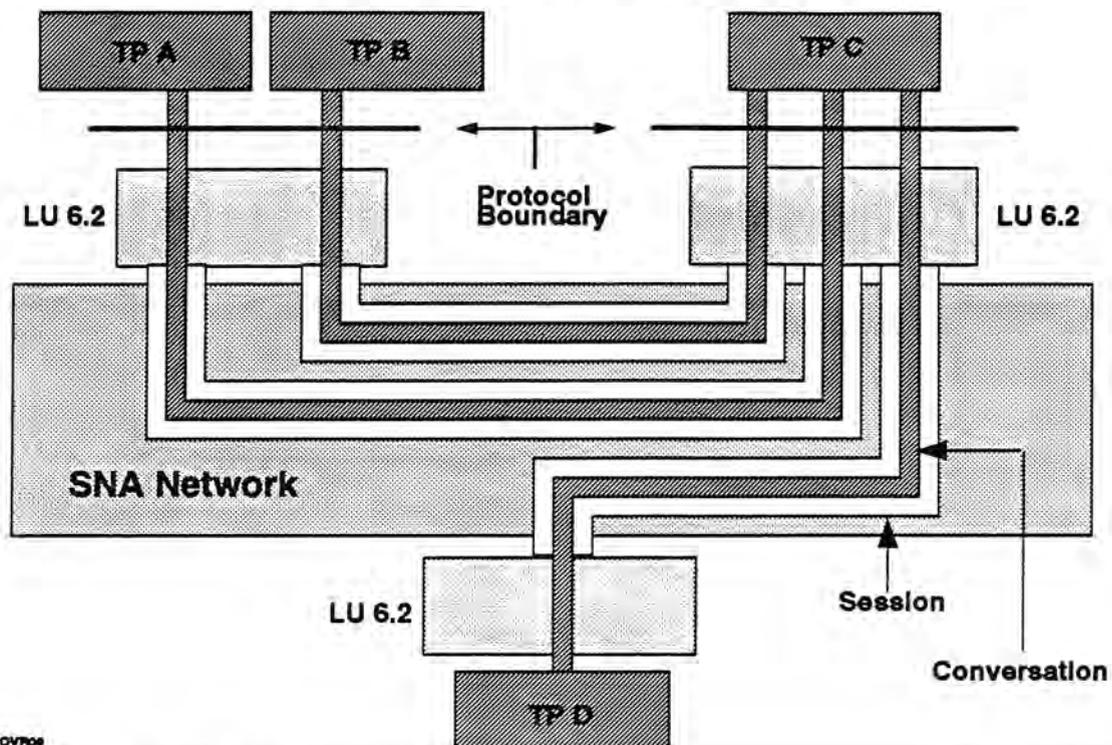


APCOVR16

Visual 8-6. Conversations

- Conversations connect two transaction programs.
- A conversation permits two transaction programs to maintain a dialog.
- The conversation can only send data one direction at a time. That is, when one side is in send state, the other side must be in receive state.
- Transaction programs see only the conversation. The Transaction program does not see or need to be concerned with session protocols.
- Conversation security is available to verify an end user's authorization to run a particular transaction program.
- A session can have only one conversation at a time.

LU Protocol Boundary



APCOVRO8

Visual 8-7. LU Protocol Boundary

- The protocol boundary is a formalized interface between the transaction program and the logical unit.
- The protocol boundary permits an application to be developed independently of the underlying communications facility.
- When application programs are written with an SAA compliant programming language, the protocol boundary provides for transparent porting of an application across SAA platforms.

LU 6.2 Services

- Session Services
- Conversation Support
- Synchronization Support
- Outage Notification

APCOVER07

Visual 8-8, LU 6.2 Services

Session Services

- **Allocation of sessions between LUs for programs to converse over.**
- **Sessions are selected based on a particular MODE of communications.**
 - **Synchronization level**
 - **Security support**
 - **Class of service**
 - **Maximum RU size**
- **LU identification and verification.**

APCOV704

Visual 8-9. Session Services

- When a session is established, a mode is used to set the characteristics of that session.
- In LU 6.2 all BINDS are negotiable, thus the BIND sent by the session requestor can be accepted, rejected, or modified by the destination session.
- An identical MODE name is required at both ends. The contents of these modes do not have to be the same though.
- Several modes are architected and come with most LU 6.2 implementations.

Default Used when no mode is explicitly specified also known as BLANK.

#BATCH For batch types of transactions

#INTER For interactive types of transactions

#BATCHSC Batch with security

#INTERSC Interactive with security

CPSVCMG For CP - CP sessions

SNASVCMG For service transaction programs managing parallel sessions.

Conversation Support

- Remote program selection and startup.
- User identification and verification.
- Half duplex flip-flop communications.
- Multiple concurrent conversations.
- Any data stream support.
- Data mapping.

APCOV700

Visual 8-10. Conversation Support

- Transaction program conversations are mapped to sessions via brackets and the SNA Function Management Header 5 (FMH-5).
- A remote program is specified during the allocation of a conversation. That program can then be executed at the remote system. In Communications Manager, an application called the **Attach Manager** is responsible for handling the remote program execution. It is also used for security validation.
- Half-Duplex flip flop communications means that data can only be sent in one direction at a time.

Synchronization Support

- Program synchronization. (Similar to WAIT/POST)
- Commitment Control (SYNCPOINT).
- Attention Mechanism.
- Error notification.

APCOVER10

Visual 8-11. Synchronization Support

- SYNCPOINT/BACKOUT verbs allow complex database services in which a logical unit of work can be committed or backed out.
- Either end of a conversation can report an error. The transaction that is in receive state reports an error by sending a negative response (-RSP) to data sent. The sender will turn the line around at that point.

LU 6.2 Verb Support

■ **Basic Conversation Verbs.**

Intended for use by service transaction programs. Requires the programmer to construct the General Data Stream (GDS) records, including the record length and the GDS ID.

■ **Mapped Conversation Verbs.**

Shield the transaction programmer from the complexities of the basic conversation. In particular, the building of the GDS length and ID fields.

The user has no knowledge of the GDS header and the data passed to and from the LU 6.2 API is simply user data.

APCOVER11

Visual 8-12. LU 6.2 Verb Support

- There are also some type independent verbs that can be used regardless of the conversation type.
- **Control Operator Verbs** exist to define and control LUs and sessions.
- A conversation can be in one of several states.

Reset A conversation can be allocated by the transaction program.

Send A Transaction program can send data or request confirmation.

Receive A program can receive data

Confirm Program can reply to confirmation requests.

LU 6.2 APIs

There are two APIs available for writing LU 6.2 applications:

■ CPI-C

This is the SAA implementation of LU 6.2. By using this API and following the guidelines of SAA, you can develop applications which are easily integrated and made to run on any SAA hardware and software environment.

■ APPC

APPC implementations are product specific. The APPC for the AS/400 is not the same as the APPC for OS/2.

APCOVR20

Visual 8-14. LU 6.2 APIs

- With two exceptions, you do not need to consider the API used in the partner transaction program when choosing the API you will use.
 - CPI communications does not support the sending or receiving of Program Initialization Parameter (PIP) data.
 - CPI communications does not provide the equivalent value of Locks parameter on the [MC_]PREPARE_TO_RECEIVE verb.
- If you need to run the application in other SAA environments, choose the CPI-C API.
- To minimize the OS/2 programming skills required, choose CPI-C.
- To develop an application that can accept multiple conversations in the same process, choose APPC.
- To develop an application that starts multiple TPs in the same process, choose APPC.
- To develop applications where more than one process will use the same TP, choose APPC.
- To optimize for performance, choose APPC. The APPC API is optimized for OS/2. It incurs less overhead than CPI-C calls.

Note: Regardless of the API chosen, there are no restrictions on the number of conversations allocated. However, the CPI-C calls do not permit a single process to accept multiple conversations.

Topic 8.2. SNA Node Type 2.1

SNA Node Type 2.1

- **Designed to permit the establishment and management of logical unit type 6.2 sessions.**

Without host involvement.

Between adjacent peer processors.

- **This facilitates any-to-any, peer-to-peer connectivity and enhances the number and scope of LU-LU sessions supported.**
- **Supports both Dependent and Independent logical units.**

APCOVER12

Visual 8-15. SNA Node Type 2.1

- The T2.1 node eliminates hierarchical control.
- Peer processors can dynamically negotiate network roles.
- Reduces user coded definitions.

Dependent LUs

- Logical unit types 0, 1, 2, 3, 4, 6, and 7
- Typically attached to PU type 2.0 nodes.
- Require an SSCP-LU session for session control.
- Limited to a single concurrent LU-LU session.
- Can serve as secondary logical units only.
- Cannot communicate with another dependent LU without an intermediate host primary LU.

APCOVER14

Visual 8-16. Dependent LUs

- LU 0 can support peer-to-peer (PU 5 to PU 5) sessions, establish multiple concurrent sessions between the same session partners, and assume either primary or secondary session roles. It is still, however, dependent on an SSCP - LU session for session establishment and control.
- LU 6.2 sessions can exist in a PU 2.0 node, but they will be dependent LUs.

Independent LUs

- **Logical unit type 6.2.**
- **SNA Node Type 2.1.**
- **Can initiate LU-LU sessions (send a BIND) without SSCP mediation.**
- **Supports multiple concurrent sessions.**
- **Supports multiple sessions to the same partner LU. (Parallel Sessions)**

APCOVER16

Visual 8-17. Independent LUs

- An independent LU can be either primary or secondary LU. The primary LU is the LU that sends the BIND and is typically the first speaker on the session.
- A secondary LU can send a BID for a session so that they can allocate a conversation on the session.
- The BID process takes additional time, so a slight performance gain can be realized by making sure that the Primary LU is usually the one that needs to allocate conversations.

Node Type 2.1 Connectivity

- **There are three types of connections that a T2.1 node can make to other SNA nodes:**
 - **As a peer node involved in a direct connection to another T2.1 node.**
 - **As a peripheral node to a T4 or T5 subarea node providing PU 2.0 boundary function support.**
 - **As a peripheral node to a T4 or T5 subarea node providing T2.1 boundary function support.**

APCOVER18

Visual 8-18. Node Type 2.1 Connectivity

- T2.1 nodes support links to more than one adjacent node.
- The link station role (primary vs secondary) can be negotiated during link activation.

Network Accessible Unit

- One component of the architecture that addresses the top four layers of SNA.

- There are three NAU types for T2.1 nodes:
 - Control Point
 - Logical Unit
 - Intermediate session routing

APCOVR17

Visual 8-19. Network Accessible Unit

- Note that what was once a Network Addressable Unit is now a Network **Accessible** Unit. This is because LU names are mapped to their corresponding Control point and link. LUs are not identified with addresses in this scenario.

LEN Node Configuration

- Local Node Characteristics
- Peer Connections
- Partner LUs
- Transaction Program Definitions
- Local LUs
- Modes

APCCFG10

Visual 8-21. LEN Node Configuration

SNA Local Node Characteristics

Local Node Characteristics - TANKERS

Required Features

Network ID:

Local node name:

Node type:

End Node to Network Node Server

End Node - No Network Node Server

Network Node

Your network node server address:

Optional Features

Local node ID: (Hex)

Local node alias name:

Comment:

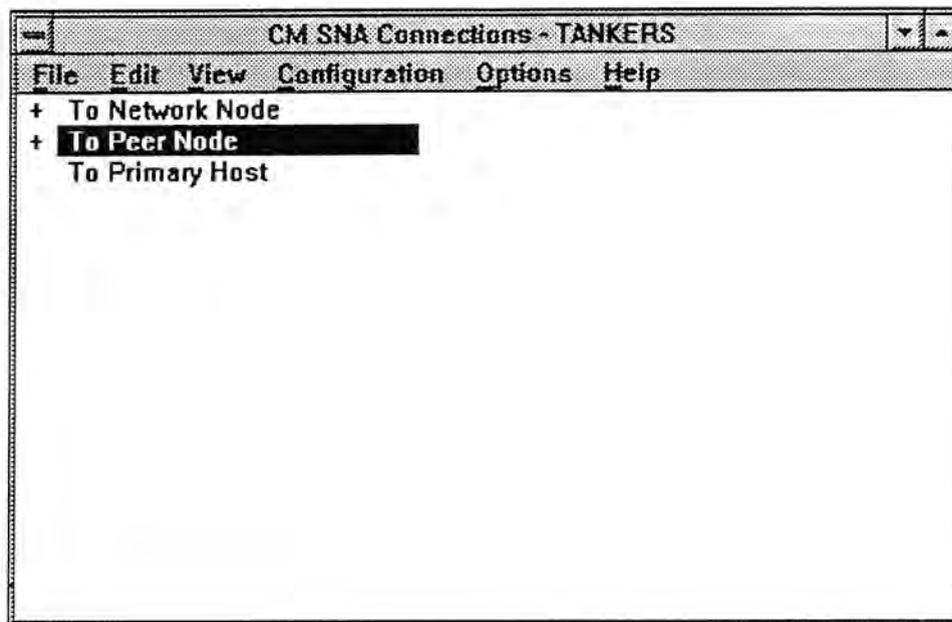
Activate Attach Manager at start up

APCCF001

Visual 8-22. SNA Local Node Characteristics

- When you configure your control point (local node name), you automatically get an LU with the same name. It is called the CP LU. You can use this LU for most of your communications and never create another local LU.
- Your **Network ID** identifies the network you are on. You can be on a different network than your partner.
- The node with the higher **Local node ID** will be the primary link station in a negotiable link station situation.
- For a LEN node connection, choose **End Node - No Network Node Server**.
- Don't forget to start the Attach Manager if you will be servicing incoming allocates on your system.

SNA Connections

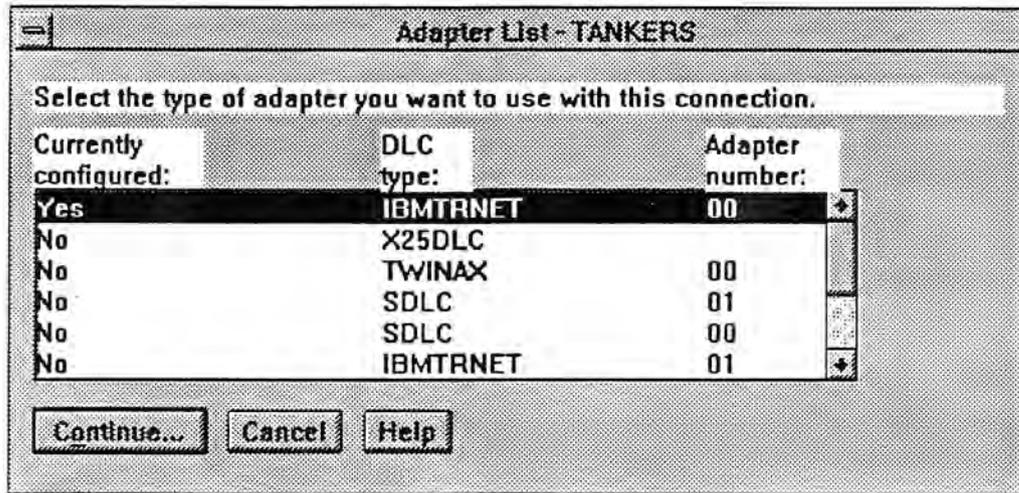


APCCF002

Visual 8-23. SNA Connections

- LEN connections are connections to a **Peer** node.
- The + sign means that there is additional information available. The list will expand to expose the links that already exist.
- To see the peer connections that already exist, you would just click on the plus sign.

SNA Peer Connections



APCCFG03

Visual 8-24. SNA Peer Connections

- Identify the DLC that you will be using to connect to this particular peer.
- You can choose an unconfigured DLC, but you will need to configure it later.
- Click on continue when ready.

SNA Peer Connections

Creating a Connection to a To Peer Node - TANKERS

Link name: LINK0004

Partner network ID: USIBMES (Required for partner LU definition)

Partner node name: OS2PEER (Required for partner LU definition)

LAN destination address: 400012345678

Comment: Connection to a peer node (Optional)

OK Define Partner LUs... Cancel Help

APCCP004

Visual 8-25. SNA Peer Connections

- This is the description of the peer node.
- The link name will default to the next available link. There really is no need to change it.
- The **Partner Node Name** is the control point name of the remote node.
- You need to know the name of the remote node's network.
- When you have finished defining the node, choose **Define Partner LUs** to define the LUs associated with this node.

Peer Connection Partner LUs

Creating Partner LUs - TANKEFS

To add a Partner LU, enter the LU name, alias, and comment. Then select the Add button.

To change a Partner LU, select an LU from the list, change the LU name, Alias, and/or Comment fields and select the Change button.

To Delete a Partner LU, select an LU from the list and select the Delete button.

LU name:	<input type="text" value="SOMELU"/>	LU name	Alias
Alias:	<input type="text" value="Partner"/>	USIBMES.SOMELU	Partner
Comment:	<input type="text" value="A partner LU"/>		

APCCF006

Visual 8-26. Peer Connection Partner LUs

- An alias is just another name for the partner LU. It is often easier to remember an alias than the true fully qualified partner LU name.
- Aliases are case sensitive. If a transaction program tries to use an alias of PARTNER, it will not work because I have defined it as Partner.
- A program can be written to use either an alias or the fully qualified partner LU name. If you use the actual name, it is not necessary to create partner LU definitions.
- Most programs are currently written to use an alias however, and PLU definitions are required.
- Note that the network ID from the previous panel is appended to the LU name when it is added to the list.
- Be sure to click on **Add** to get the values added to the list.

Transaction Program Definitions

Creating a Transaction Program Definition - TANKERS

Options:

Conversation security required Service TP

Transaction Program (TP) name:

OS/2 program path and file name:

Program parameter string: (Optional)

Icon path and file name: (Optional)

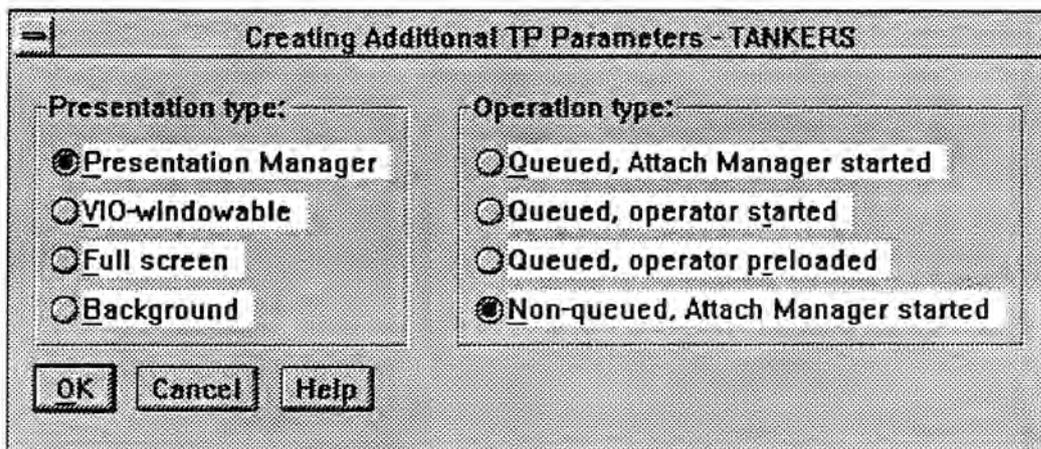
Comment: (Optional)

APCCF006

Visual 8-27. Transaction Program Definitions

- A Transaction Program definition is only necessary if other systems will be issuing allocates to your system. This will match up an incoming transaction program name with the correct executable file.
- The Attach Manager is what actually uses this profile.
- A service TP is one that is written by IBM using the Basic conversation verbs. They typically perform a special service such as Remote Data Services for accessing the Extended Services for OS/2 Database Manager.
- The TP name is case sensitive and must match the name that will be coming across on the Allocate.

Additional TP Parameters



APCCF007

Visual 8-28. Additional TP Parameters

The operation types mean:

Queued, Attach Manager started: Each incoming Allocate will be queued and only one instance of this transaction program will run at a time. As soon as one remote TP is through with it, the next Allocate in the queue will be serviced.

Queued, Operator started: This is the same as above except an operator must be present to start the program as the Attach Manager will not start it.

Queued, operator preloaded: If the program is not already running, incoming Allocates will be rejected.

Non-queued, Attach Manager started: Starts a new instance of the program for each incoming Allocate. This will minimize the wait at the other end, but it will put more stress on this system.

Local LUs

Creating a Local LU - TANKERS

LU name: LOCALLU

Alias: LUALIAS

NAU address

Independent LU

Dependent LU NAU: [] (1 - 254)

Comment: Another local LU (Optional)

OK Cancel Help

APCCP004

Visual 8-29. Local LUs

- Because you already have a local LU by default, it is seldom necessary to create additional local LUs.
- One reason you may need to create an additional local LU is when a transaction program is coded to use a specific LU alias.
- Transaction programs always refer to local LUs by their alias. This allows a transaction program to be developed independent from the underlying network.

Modes

Creating a Mode Definition - TANKERS

Mode name: MYMODE

Class of service: #CONNECT

Mode session limit: 8 (0 - 32767)

Minimum contention winners: 0 (0 - 32767)

Receive pacing window: 4 (0 - 63)

RU size

Default RU size

Maximum RU size: (256 - 16384)

Comment: A Mode Definition (Optional)

OK Cancel Help

APCCF006

Visual 8-30. Modes

- Because there are several modes provided by Communications Manager, it is seldom necessary to create additional modes.
- One reason you may need to create an additional mode is when a transaction program is coded to use a specific mode name.
- Class of Service is also provided and has the same names as the provided modes. (except for #CONNECT)
- You must specify how many sessions, with a particular partner, will be able to use this mode.
- Minimum contention winners is used to specify the number of sessions you wish to be the contention winner of. A contention winner is the Primary LU and will have first speaker status.
- **RU Size** - The default RU size will use 256 bytes as the minimum RU size. The maximum RU size will be set to the maximum RU that can be sent on the link without segmentation. When you choose maximum RU size, you can set the maximum RU size rather than defaulting.
- All values in a mode can be negotiated between the partners.

Unit 9. Advanced Peer to Peer Networking (APPN)

What This Unit is About

In this unit, we will take a look at Advanced Peer to Peer Networking (APPN). APPN is an extension to the SNA Low Entry Networking architecture. The primary advantages to APPN are reduced cost, dynamic configuration, and SAA support. Through the use of APPN, you will be able to drastically reduce the amount of configuration that must be done to your network.

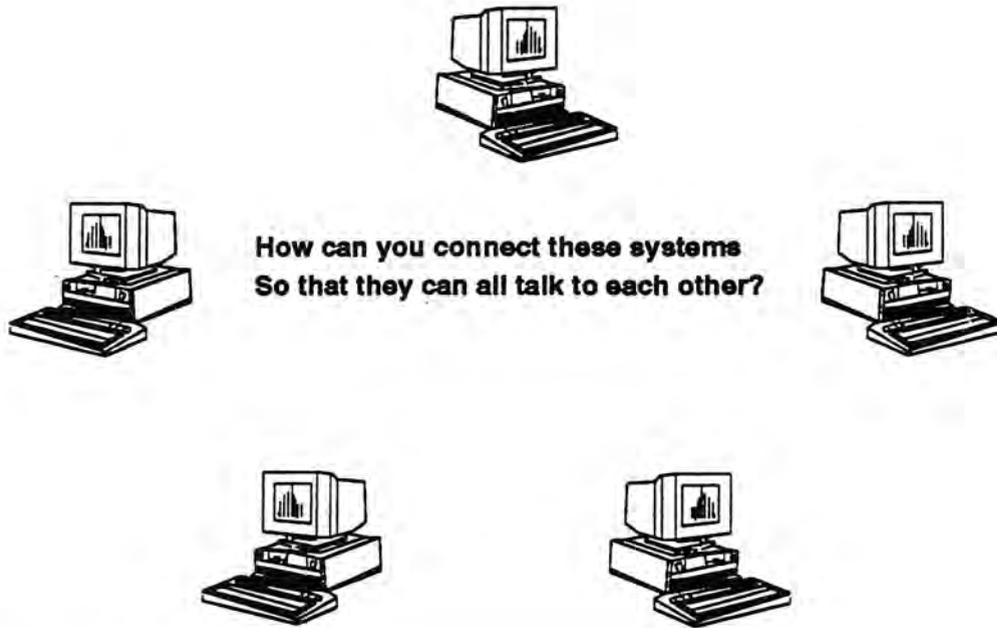
What You Should Be Able to Do

After completing this unit, you should be able to

- Configure an APPN Network Node.
- Configure an APPN End Node.
- List the functions and benefits of APPN.

Topic 9.1. Advanced Peer to Peer Networking

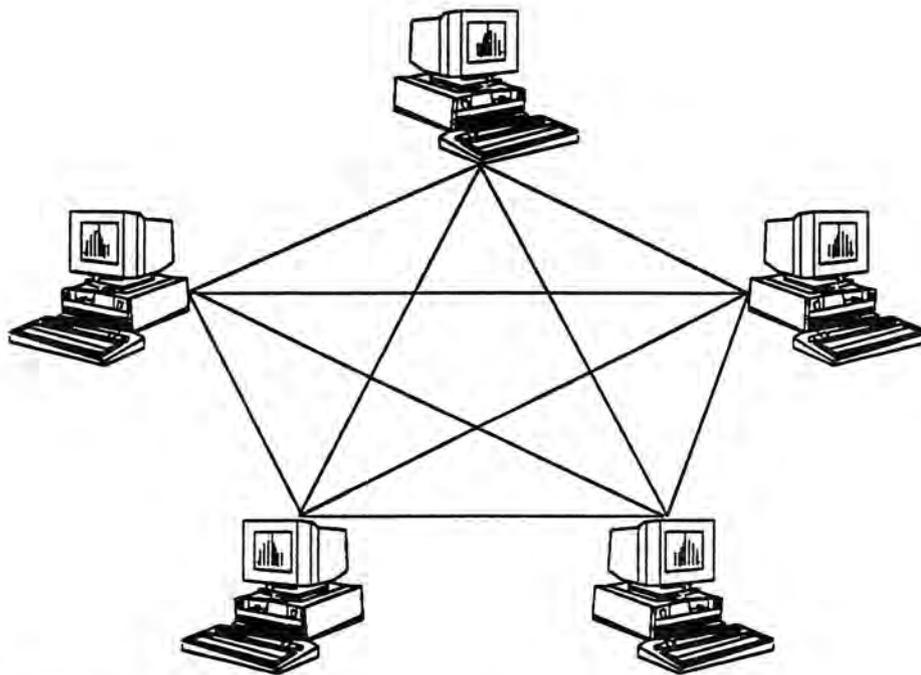
Connecting Type 2.1 Nodes



APH0V001

Visual 9-1. Connecting T2.1 Nodes

The Problem With LEN Nodes

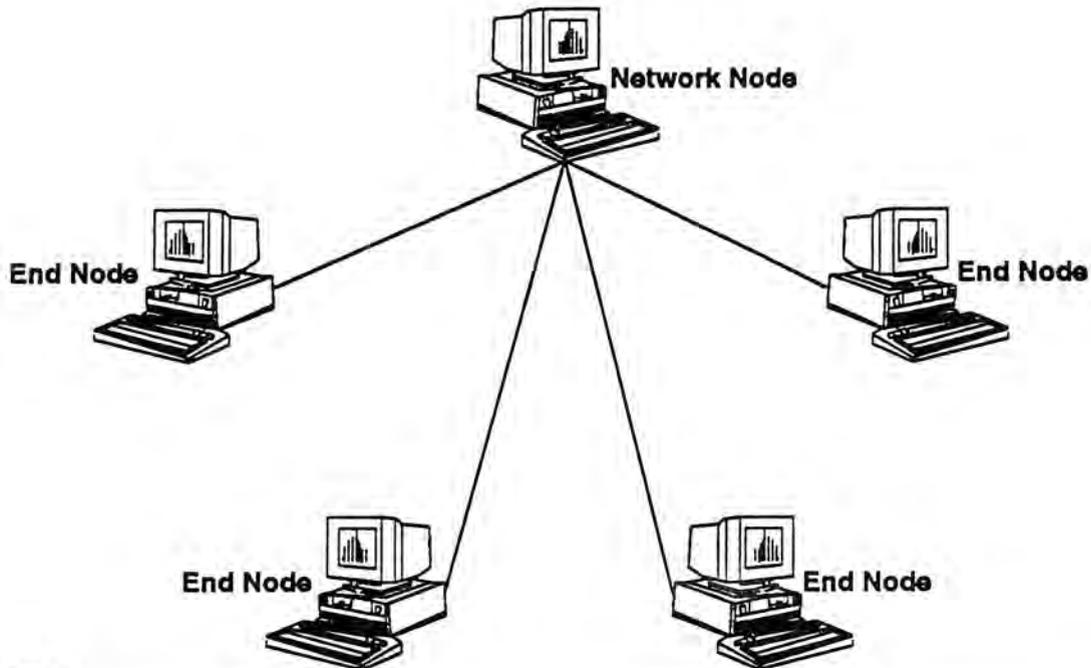


APNOVR02

Visual 9-2. The problem with LEN Nodes

- One of the major problems with LEN nodes is that they only allow two adjacent T2.1 nodes to communicate. This means that each node will need to have a link (connection) to every other node it will communicate with.
- This also requires a lot of advance configuration, as each node that you will communicate with must be pre-configured.
- As the number of nodes grows, the amount of configuration grows exponentially.
- Cost is also an issue. It can get very expensive to maintain a link to every other node you wish to communicate with.

The Solution: APPN



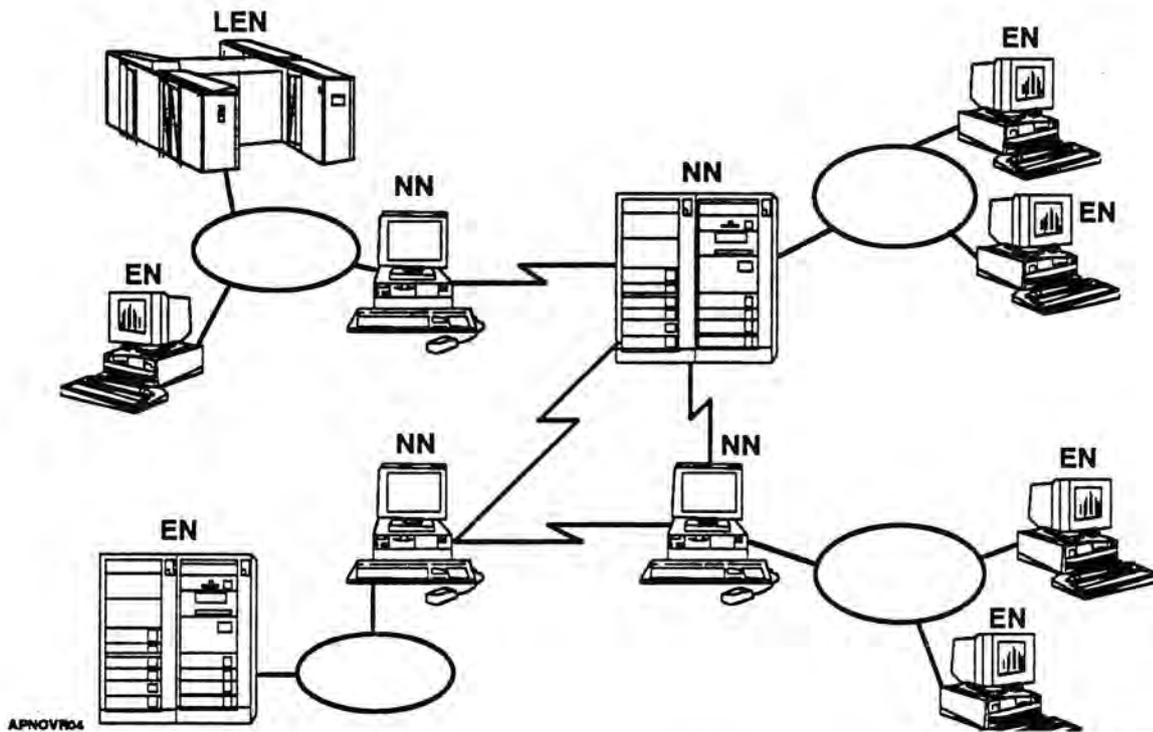
APNOV03

Visual 9-3. The Solution: APPN

APPN is an extension to the type 2.1 node. It does not replace the SNA Low Entry Networking. In fact, a LEN node can still participate in an APPN network. APPN addresses the concerns raised on the previous page by:

- Providing the capability to route communications to another node through an intermediate (Network) node. This way, the only links that need to exist are links to the intermediate node.
- Allowing the network to dynamically configure, locate resources, and choose routing.
- As part of SAA it also allows customers to retain their investment dollars in a technology that won't be abandoned tomorrow.
- APPC and LU 6.2 remain unchanged. APPC programs run in an APPN network just like they did between LEN nodes.

Complex APPN Network



Visual 9-4. A Complex APPN Network

- APPN provides for decentralized peer networking. No longer do you need to have a master (host) present to provide for networking.
- There are many different ways to set up an APPN network. It is very arbitrary and it can be set up in the way that best accomplishes the work to be done.
- APPN is very easy to set up and use. Since most of the network configuration is dynamically created, the setup work is minimized.
- Network nodes can act as intermediate nodes in connections between other nodes in this network.
- The network nodes will also choose the best route for the session through the network.
- Network nodes can themselves participate as origin and destination nodes as well as intermediate nodes.

APPN Node Types

- End Node (EN)
- Network Node (NN)
- Low Entry Networking Node (LEN)

APNOV704

Visual 9-5. APPN Node Types

Each of these node types will be discussed further in the following pages.

End Node

- **A node that implements some of the APPN extensions to the T2.1 architecture.**
- **May participate in an APPN network by using the services of an attached adjacent network node server.**
- **Provides no network services to other nodes.**
- **Provides session services for its own LUs only.**
- **May have a pair of CP - CP sessions with its network node server. Without these sessions, it is treated as a base T2.1 node (LEN) by the server.**
- **Can register its LUs with its network node server.**

APNOV704

Visual 9-6. End Nodes

- An end node cannot act as an intermediate node in a network. It can only be an origin or destination node.
- The CP - CP sessions are used for communications between the end node and the network node. It is across these sessions that the dynamic network configuration occurs.
- One part of the dynamic configuration occurs when an end node registers its LUs with a network node. This makes the location of that end node's LUs known to the network. This occurs automatically when the end node comes online (establishes a connection) to the network node.
- Some IBM products that can act as end nodes include:
 - Extended Services for OS/2 Communications Manager
 - AS/400
 - DPPX/370
 - OS/2 Extended Edition 1.3 with Networking Services/2 installed.

Network Node

- **A node that implements all of the APPN extensions to the T2.1 architecture and provides:**
 - **Connectivity Functions**
 - **Distributed Directory Functions**
 - **Intermediate Session Routing**
 - **Route Selection Functions**
 - **Data Transport Functions**
 - **Network Management Functions**

- **These functions are provided for:**
 - **The network node itself**
 - **APPN End nodes it is serving**
 - **LEN Nodes that it is serving**

APNOV707

Visual 9-7. Network Nodes

- A network node provides all of the APPN functions, including Intermediate Routing Services, Topology Routing Services, and Directory Services.
- A network node can provide these services to its adjacent end nodes and LEN nodes. When it does, it is known as a Network Node Server.
- When a network node is serving a LEN node, the LEN node must be pre defined in the network node. It cannot register with the network node.
- Some IBM products that can act as network nodes include:
 - Extended Services for OS/2 Communications Manager
 - AS/400
 - S/36 with the APPN feature
 - OS/2 Extended Edition 1.3 with Networking Services/2 installed.
 - 3174 with LIC C1.0
 - VTAM - current release 0393

LEN Node

- **A node that implements the base T2.1 architecture and none of the APPN extensions.**
- **May participate in an APPN network by using the services on an attached network node server.**
- **Cannot establish CP-CP sessions.**
- **Provides no network services to other nodes.**
- **Provides session services for its own LUs only.**
- **Cannot register its LUs to its network node server.**

APNOV024

Visual 9-8. LEN Nodes

- Since a LEN node cannot have CP - CP sessions, it is not able to register with its network node server. Therefore, the LEN node must be pre-defined to the network node server.
- A host subarea network that is attached to a network node is considered to be one large LEN node. This means that every node in the subarea that you wish to communicate with must be pre-defined. More on this later.
- Any product that supports the base T2.1 node may act as a LEN node in an APPN network.

APPN Functional Overview

- **Directory Services**

- **Topology Routing Services**

- **Intermediate Routing Services**

APPN900

Visual 9-9. APPN Functional Overview

While these are not all of the services provided by APPN, they are the most important for this overview. We will explore each of these services in the following foils.

Directory Services

A directory is a table of resource names (LUs) and their respective owning control points.

■ Local Resource Directory (EN)

- Each node contains a list of its own LUs and LUs in adjacent (Peer) nodes.
- These must be explicitly defined.

■ Network Node Directories

- Domain Directory
- Cache Directory

APNOV810

Visual 9-10. Directory Services

- Directory services is responsible for determining which node a resource resides in.
- All T2.1 nodes have a directory to locate LUs in the neighboring nodes. This is the Local Resource Directory.
- Local Directory entries are statically defined by system definition.
- A network node has the capability to provide directory services for other nodes.
- A resource in a directory is usually a control point or LU, but they can also be files, devices, or any other implementation defined resource.
- All resource names must be unique within a network.
- When an attempt is made to communicate with another LU, the directories are searched to find the location of that LU in the network.

Domain Directory

- **Contains entries for resources within the network node itself.**
- **Contains entries for resources located in the end nodes that it serves.**
- **These resources are known as the network node's Domain.**

APNOVR11

Visual 9-11. Domain Directory

- The domain directory is where all LUs that belong to a given network node's domain are kept.
- When an end node registers its LUs with the network node, the entries go in the domain directory.
- Explicitly defined LEN nodes locations are also kept in the domain directory.

Cache Directory

- **Contains resources located in other domains.**
- **Both the origin and destination network node server cache the results of the most recent successful directory searches.**
- **Entries in the cache directory are an "educated guess" of a resource location.**
- **Cache hits are verified by directing a search to the destination network node.**
- **When the cache directory is full, an aging algorithm is used to replace the least recently used entry.**

APNOVR12

Visual 9-12. Cache Directory

- The cache directory is used to store the location of a resource that is not in the network node's domain.
- An entry is made in the cache directory when a network node sends out a locate request for a LU that it does not know about.
- When the location of the LU is returned, it is entered into the cache directory so that any future requests for that LU will be known and will not need to have a locate request sent out.

Creating Entries in a Directory

- **Explicit System Definition**
Used for LEN nodes, APPN end nodes without CP - CP sessions to a server network node, and for subarea connected resources.

- **Registration**
An APPN end node with CP - CP sessions dynamically registers its local resources with its server network node.

- **Caching**
When a search originates from an end node, the network node created an entry for both the origin and destination resources.

APNOVR13

Visual 9-13. Creating Entries in a Directory

- When a destination LU's location is not known by the origin LU's network node server, a locate request is sent out to each of its adjacent network nodes. Each one of these network nodes then sends the locate to each of its adjacent network nodes until every network node has received the locate request.
- Even if the destination LU is located at a particular network node, the locate request is still propagated. This is done to make sure that there are no duplicate names in the network.
- Eventually, a reply to the notification will be returned. If the LU was found, its location (Network node, End node, LU name) is entered into the cache directory.
- When an LU is found in the cache directory, a search is still sent out to see if the resource is still there, but it is sent directly to the owning network node in a search called a "Directed Search". It is not propagated to every network node.

Topology Routing Services

- **Topology routing services calculates the least weight route between an origin and a destination node.**

- **Route selection is based upon:**
 - ◆ **Topology Database Information**

 - ◆ **The Class of Service characteristics requested by the session.**

APNOVR14

Visual 9-14. Topology Routing Services

- **Topology routing services determines the path that will be taken from the origin LU to the destination LU. It includes the particular links as well as the nodes that will be traversed in route to the destination.**
- **Every network node in the network knows about all other network nodes and all of the links that connect them. This is the topology database.**
- **The least weight route is the best route that meets the requirements set forth in the class of services that was selected for the session.**

Topology Database

- **The topology database contains current network node and link status.**
- **Each network node has a copy of the complete topology database.**
- **The topology database is dynamically updated in response to route and node status changes.**
- **Changes in link and node status are communicated by propagating Topology Database Updates (TDUs) from the originating node to the adjacent nodes across the CP - CP sessions.**
- **The nodes receiving the TDUs continue to propagate them to their adjacent nodes until all NN topology databases reflect the updates.**

APNOVR18

Visual 9-15. Topology Database

- Whenever there is a change to the network topology, a topology database update is transmitted on the CP - CP sessions that connect the network nodes.
- There is only one topology per network. Each network node has a copy of this topology. It includes:
 - All network nodes and their properties.
 - All transmission groups (links) between the network nodes and their properties.
- The topology contains no information about end nodes or LEN nodes.
- When a new network node come into the network, the entire topology is updated and transmitted to the network nodes.
- Any changes that occur in the network cause a broadcast of only those changes rather than the entire topology.

Class of Service

- **A user (LU) can request that a session use particular nodes and links based on a class of service entry.**
- **Some values used in class of services are:**
 - ◆ **Speed**
 - ◆ **Security**
 - ◆ **Cost**
- **During session initiation, the Topology Routing Services compares the available paths and nodes. The best route available which meets the COS requirements will be selected.**

APNOVR16

Visual 9-16. Class of Service

- Nodes and Transmission groups have properties associated with them.
- Based on the class of services chosen for the session, these properties are mapped to node and TG weights.
- The node weight is a relative measure of the goodness of that node or TG for that class of service.
- The route that is chosen will be the one with the least weight.
- The class of service indicates the relative importance of each node and TG property.
- There are five pre-defined COS definitions:
 - Default class
 - Batch oriented
 - Interactive oriented
 - Batch oriented with security
 - Interactive oriented with security

Intermediate Session Routing

- **The APPN intermediate routing is accomplished entirely by machine microcode and requires no user-maintained application or routing tables.**
- **When the optimum route has been selected, the Topology Routing Service builds a Route Selection Control Vector (RSCV).**
- **The RSCV carries routing information describing the total network path from origin to destination.**
- **The RSCV is an ordered list of each node (CP) and link (Transmission Group) traversed in the session path.**
- **As the BIND flows from the origin CP to the destination CP, it creates "Session Connectors" in each network node.**

APNOVR17

Visual 9-17. Intermediate Session Routing

- The maximum length of the RSCV is 255 bytes, so the maximum number of intermediate nodes varies with the length of the CP names.
- A session connector is represented by a pair of LFSIDs.
 - One LFSID represents the session address on the incoming link.
 - The other LFSID represents the session address on the outgoing link.
- A session connector designates a unique route for a session through a network node.
- The chain of session connectors provides a "next adjacent" path linkage from origin to destination.

LFSID Logical Form Session Identifier.

RSCV Route Selection Control Vector

APPN Storyboard Demo

APNOVR18

Visual 9-18. APPN Storyboard Demo

- This Storyboard demo is available to you. There is a file called **APPNDEMO.ZIP** in the C:\S7049 directory of each system. You may make a copy of this, and anything else in that directory for that matter.
- The file will need to be unzipped with the PKUNZIP2.EXE program. This program comes with OS/2 Extended Services

Topic 9.2. APPN Configuration

Network Node Configuration

Local Node Characteristics - TANKERS

Required Features

Network ID: USIBMES

Local node name: OS28064

Node type:

End Node to Network Node Server

End Node - No Network Node Server

Network Node

Your network node server address: _____

Optional Features

Local node ID: 05D FA606 (Hex)

Local node alias name: OS28064

Comment: _____

Activate Attach Manager at start up

OK Cancel Help

APNCF001

Visual 9-19. Local Node Configuration

- The example above shows the Local node configuration for a network node.
- For an end node, you would select **End node to Network Node Server**
 - If your network node server is on a LAN, you can place the LAN address of the network node in the correct field.
 - This will actually create your connection to the network node, and you do not need to explicitly create such a connection.

End Node Connections

Creating a Connection to a To End Node (or Unknown Node Type) - TANKEP

Link name: LINK0004

LAN destination address: 400004210001

Comment: Connection to an end node. (Optional)

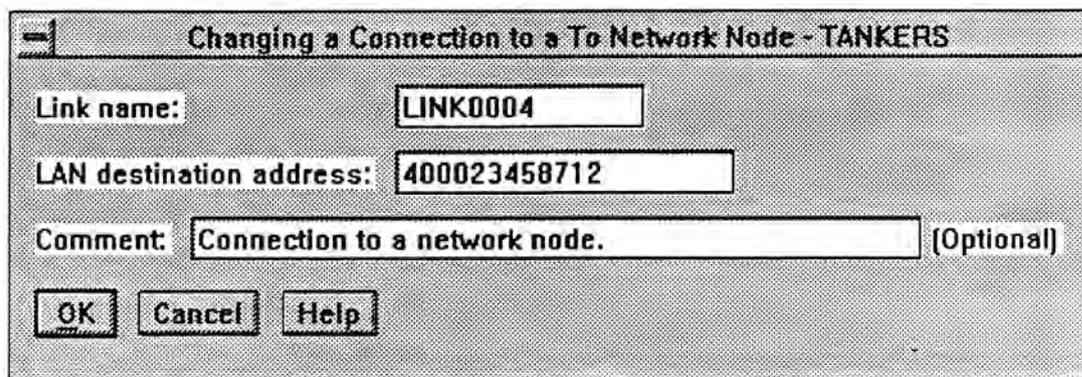
OK Cancel Help

APNCF002

Visual 9-20. End Node Connections

- A network node should create connections to each of the end nodes that it serves.
- Note that you no longer define partner LUs here because they are no longer associated with a particular link.

Network Node Connections



Changing a Connection to a To Network Node - TANKERS

Link name: LINK0004

LAN destination address: 400023458712

Comment: Connection to a network node. (Optional)

OK Cancel Help

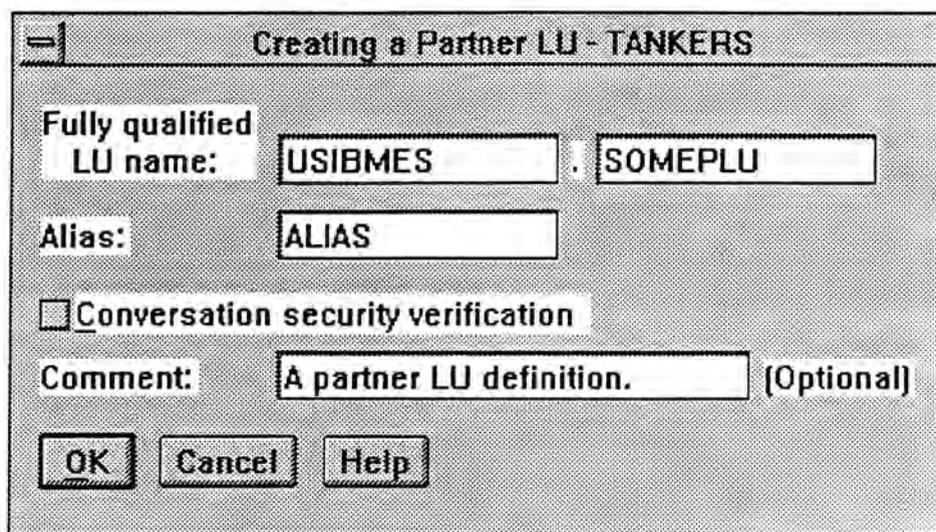
APNCF002

Visual 9-21. Network Node Connections

- This is used to connect network nodes to other network nodes and to connect end nodes to network node servers.
- An end node will automatically get one of these when configured as an end node to a network node server.
- Network nodes should create one of these connections for the other network nodes it will connect to.

Note: A network node may not want a connection to every other network node.

Partner LU Definitions



Creating a Partner LU - TANKERS

Fully qualified
LU name: USIBMES . SOMEPLU

Alias: ALIAS

Conversation security verification

Comment: A partner LU definition. (Optional)

OK Cancel Help

APNCF004

Visual 9-22. Partner LU Definitions

- The only real distinction for these partner LUs is that they are no longer associated with a particular connection.
- The network node will determine the best route to the partner LU.

Unit 10. Advanced APPN Topics

What This Unit is About

This unit will cover some of the more advanced topics of Communications Manager APPN. These topics are not advanced in their complexity. In fact, they serve to make APPN configuration even easier. The reason they are labelled advanced is that most of them cannot be configured with the PM panels. You must use an editor and modify a special text file. Others are optional features that may not even be used on a regular basis.

What You Should Be Able to Do

After completing this unit, you should be able to

- Use Link level, Session level, and Conversation level security.
- Edit an APPN NDF file.
- Configure a connection network.
- Configure the system to use implicit modes and inbound partner LUs.
- Define a wildcard entry in the APPN directory.
- Configure transaction program defaults.
- Understand the purpose of adaptive pacing.
- Understand the purpose of RU segmentation and reassembly.

Security

- Link Level
- Session Level
- Conversation Level

ADVSEC01

Visual 10-1. Security

- The security features provided have nothing to do with protecting or encrypting the data exchanged by the programs. That is left to the programs themselves.
- Each of these security features is completely independent of the others. You can use one, none, or any combination.
- All security information is stored in a binary file with the extension **.SEC**. This file is located in the C:\CMLIB\APPN directory.

Link Level Security

- **Link level security relates to the physical security of the logical link.**
- **Link security is very important for route calculation.**
- **If the security for a link does not fall within the COS for the session, the link will be considered unacceptable.**
- **Communications Manager assigns a security value to each DLC.**
- **You can override the assigned security for a DLC and assign your own.**

ADVSEC02

Visual 10-2. Link Level Security

- Link security can be changed by editing the NDF file and changing the security parameter for a link definition.
- When a COS is used that requires higher security than the link offers, that link will not be available for routing decisions.
- Usually, you do not need to change the default security for a link.
- There are seven defined security values:

nonsecure	There is no security on the link.
public_switched_network	Specifies transmission over a public switched network.
underground_cable	Specifies transmission over a secure underground cable.
secure_conduit	Specifies unguarded conduit, such as pressurized pipe.
guarded_conduit	Specifies guarded conduit protected against physical tapping.
encrypted	Specifies that link-level encryption is provided.
guarded_radiation	Specifies guarded conduit protected against physical and radiation tapping.

Session Level Security

- **Used to determine whether two LUs are allowed to establish a session with each other.**
- **Used to prevent unauthorized computers from establishing a session to your computer.**
- **The session security password is used as an encryption key. The LU issuing the BIND will encrypt the BIND data before sending it.**
- **The other system must have the same key in order to decrypt the data and have it recognized as a BIND.**
- **A session security password is never sent over the link. Both systems must have the password configured.**

ADVSEC03

Visual 10-3. Session Level Security

- Session security cannot be used with implicit inbound partners.
- Passwords can be either HEX format or character format.
 - HEX passwords must be 16 characters long.
 - Character passwords must be 8 characters long.

Conversation Level Security

- Used to validate the identity of the initial sender.
- Used to prevent unauthorized users from accessing your workstation and its resources.
- Unlike session security, the USERID and PASSWORD are sent across the session to be validated at the other side.
- Conversation security is optional and you decide whether or not to require it for a program.
- You can require conversation security for some programs and not require it for others.

ADVSEC04

Visual 10-4. Conversation Level Security

- If a user sends a USERID and a PASSWORD, it will be checked at the receiving system, regardless of whether the receiving TP requires security.
- If the password is not in the table of valid users on the receiving system, the user will not be able to run any TPs on the system.
- USERIDs and PASSWORDs are CaSe SeNsItIvE.
- USERIDs and PASSWORDs are stored in a table on the system receiving the attach. The sending application must somehow get the USERID and PASSWORD from the user.
- There is only one conversation security table. Users in this table can run any transaction program on the system. If they are not on the list, they can only run TPs that do not require security.

Session Security Configuration

Creating LU to LU Security - TANKERS

To add a password, select one local LU alias and one partner LU. Provide the requested information, then save. When you have defined all LU to LU Passwords, select OK.

Local LU Alias:
OS28064

Fully qualified partner LU:
 Undefined name
 Defined name USIBMES.ATL

Password type:
 Character
 Hex

Save

OK Cancel Help

Password: *****
 Retype the password: *****
 Comment: (Optional)

ADVSEC04

Visual 10-5. Session Security Configuration

- Session security works between a specific pair of LUs.
- The partner LU does not have to be defined on the outbound side to use session security. It must be defined on the inbound side though.
- Make sure that you click on **Save** to enter the data into the table, before clicking **OK** or pressing **Enter**. Otherwise, the data will not be saved.
- Remember, the password must exactly match at both ends of the desired session in order to establish the session.
- CaSe SeNsItIvE

Conversation Security Configuration

Changing a Transaction Program Definition - TANKERS

Options:

Conversation security required Service TP

Transaction Program (TP) name:

OS/2 program path and file name:

Program parameter string: (Optional)

Icon path and file name: (Optional)

Comment: (Optional)

ADV8EC06

Visual 10-6. Conversation Security Configuration

- The first step in using conversation security is to require it for some of your transaction programs.
- Once the security requirement has been turned on, the user must be in the conversation security table to use this TP.

Conversation Security Configuration

Creating Conversation Security - TANKERS

Enter User ID and password twice for confirmation, and then select Save.
When you have defined all User IDs and Passwords, select OK

User ID: TANKERS

Password: *****

Retype the password: *****

Utilize User Profile Management

Comment: Some User (Optional)

Defined user IDs

Save

OK Cancel Help

ADVREC07

Visual 10-7. Conversation Security Configuration

- This is where USERIDs and PASSWORDs are added to the table.
- Make sure that you click on **Save** to enter the data into the table, before clicking **OK** or pressing **Enter**. Otherwise, the data will not be saved.
- **Utilize User Profile Management** will cause the Attach Manager to check the UPM database if the USERID and PASSWORD was not found in the conversation security table. It will always check the table first.
- The recommended method is to always use UPM for the checking. The table is good to overcome a few UPM restrictions though:
 - UPM USERIDs and PASSWORDs can only be eight characters long.
 - A UPM PASSWORD must be at least four characters long.
 - UPM always stores the values as uppercase.

Conversation Security Verification

Changing a Partner LU - TANKERS

Fully qualified
LU name: .

Alias:

Conversation security verification

Comment: [Optional]

ADVBE004

Visual 10-8. Conversation Security Verification

- If you turn on conversation security verification for a particular partner, you can then accept either a USERID and PASSWORD, or a USERID and an indicator that shows the user as having already been validated.
- This is usually used when one TP starts another TP on behalf of a third TP.

Transaction Program Defaults

Changing Transaction Program Defaults - TANKERS

Default program directory: *

Presentation type:

- Presentation Manager
- VIO-windowable
- Full screen
- Background

Operation type:

- Queued, Attach Manager started
- Queued, operator started
- Queued, operator preloaded
- Non-queued, Attach Manager started

Comment: (Optional)

OK Cancel Help

ADVTPD01

Visual 10-9. Transaction Program Defaults

- The default transaction program works like this:
 - If an attach comes in for a transaction program that does not have an explicit definition, the transaction program defaults will be used.
 - The default path will be searched in an effort to find an executable file with the same name as the incoming transaction program name.
 - If an executable is found, that program is run using the values set on this panel.
- The default program directory is the path that will be searched for the executable files. If you put an asterisk here, the entire PATH specified in CONFIG.SYS will be searched.
- This is great for reducing system configuration requirements.
- Only the first eight characters of an incoming TP name will be used for the executable file name. No long file name support.

Network Definitions File

- **The NDF file is an ASCII text description of your SNA network definitions.**
- **The file can be edited with any text editor.**
- **Some advanced features can only be configured by editing the NDF file. They have no PM panel.**
- **Editing the file is also good for making quick duplications of items like partner LU definitions.**
- **Verification must be performed, after the NDF file is changed, before the changes will take effect.**

ADVNDP01

Visual 10-10. Network Definitions File

- The verification process creates a file with an extension of **.CF2**. This is the binary representation of the NDF file that Communications Manager uses when it operates.
- The CF2 file is located in the C:\CMLIB\APPN directory.
- When changes are made to your network configuration with the PM panels, those changes are written to the NDF file.
- Verification can be performed outside of the Communications Manager configuration panels by running the verify program from the Communications Manager group.

Sample NDF file

```

DEFINE_LOCAL_CP  FQ_CP_NAME(USIBMES.DS28864 )
                  CP_ALIAS(DS28864 )
                  NAU_ADDRESS(INDEPENDENT_LU)
                  MODE_TYPE(EN)
                  MODE_ID(X'FA686')
                  HOST_FP_SUPPORT(NO);

DEFINE_LOGICAL_LINK  LINK_NAME(LINK0883)
                    ADJACENT_NODE_TYPE(NM)
                    PREFERRED_MN_SERVER(YES)
                    DLC_NAME(IBMTRNET)
                    ADAPTER_NUMBER(0)
                    DESTINATION_ADDRESS(X'400888640888')
                    CP_CP_SESSION_SUPPORT(YES)
                    ACTIVATE_AT_STARTUP(YES)
                    LIMITED_RESOURCE(NO)
                    LINK_STATION_ROLE(USE_ADAPTER_DEFINITION)
                    SOLICIT_SSCP_SESSION(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(USIBMES.OS28864M )
                  PARTNER_LU_ALIAS(OS28864M)
                  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);

DEFINE_TP  TP_NAME(APPCSRV)
           FILESPEC(D:\APPCSRV.EXE)
           PARM_STRING(From: OS28864)
           CONVERSATION_TYPE(EITHER)
           CONV_SECURITY_RQD(NO)
           SYNC_LEVEL(EITHER)
           TP_OPERATION(NONQUEUED_AM_STARTED)
           PROGRAM_TYPE(VIO_WINDOWABLE)
           RECEIVE_ALLOCATE_TIMEOUT(INFINITE);

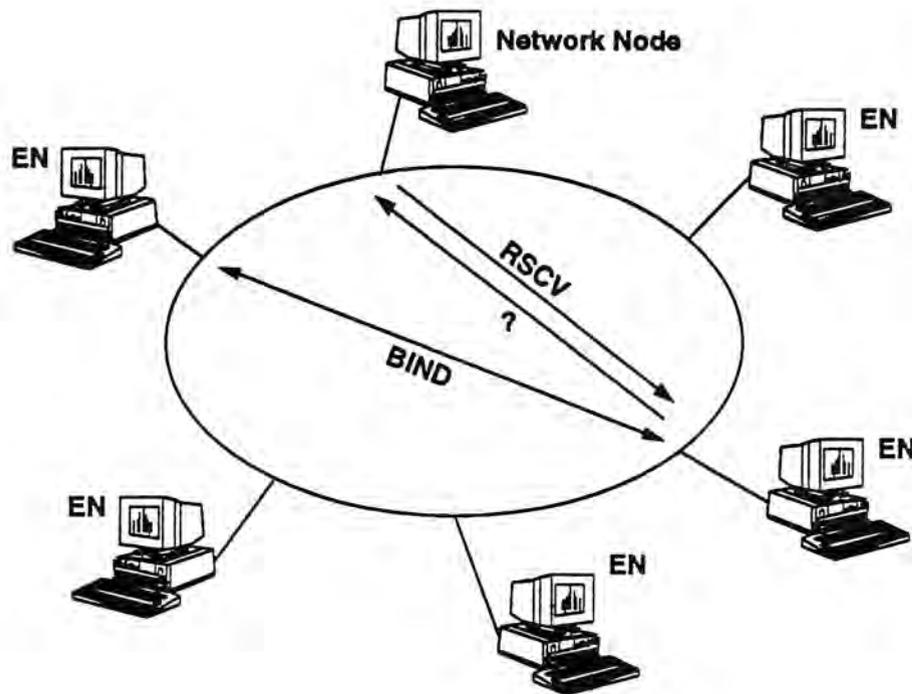
START_ATTACH_MANAGER;

```

Visual 10-11. Sample NDF file

- Most of the entries in this example relate directly to changes that you have made with the PM panels in lab.
- Some of the values, that you may not recognize, will be discussed in the following foils.

Connection Network



ADVCHT01

Visual 10-12. Connection Network

- A connection network allows systems on a LAN to establish a direct link with each other without explicitly defining that link.
- All of the systems in a connection network must have a configured link to a network node server.
- When an end node wants to talk to another end node, it will send the locate request to the network node like always.
- When the network node discovers the location, it sends back an RSCV that describes a direct path to the end node.
- The end nodes can then establish a direct link to each other without using the network node as an intermediate node.
- LEN node cannot participate in a connection network.

Connection Network Configuration

```
■ DEFINE_CONNECTION_NETWORK
  FQ_CN_NAME (APPN.IBMCONN)
  ADAPTER_INFO (DLC_NAME (IBMTRNET)
                ADAPTER_NUMBER (0)) ;
```

- Put this statement in the NDF file of all systems that will be part of the connection network.

ADVCT02

Visual 10-13. Connection Network

- The connection network name can be anything you like as long as it is a unique name.
- Each system in the connection network must use the same name.
- Up to five adapters can be described.

Implicit Definitions

■ Implicit Partner LU

- ◆ Network definitions can be configured to accept inbound requests and build the partner LU dynamically.
- ◆ The fully qualified partner LU, rather than an alias, can be specified on outbound requests.

■ Implicit Links

- ◆ When a connection attempt is originated by an undefined adjacent node, an implicit link will be created. Implicit links are preceded by an @ sign.

■ Implicit Modes

- ◆ If a default mode has been specified in configuration, any mode name can be used on inbound or outbound requests. If the name is not recognized, the default mode will be used.

ADVIMP01

Visual 10-14. Implicit Definitions

- Unfortunately, most programs are currently written to use an alias to specify the partner LU. Therefore, it is still often necessary to create a partner LU profile, even though you technically do not have to.
- If you are only receiving attaches, you can use the implicit inbound PLU support to avoid creating any partner LU definitions.
- You should always explicitly define the links between END/LEN nodes and network node servers.
- An implicit mode is actually created with the name that was specified. The contents of this new mode will be the same as the default mode.
- While it is not mentioned in this foil, implicit CNOS is also available. By using implicit CNOS, you do not need to predefine the session limits. You can use explicit CNOS to another PLU if you need to.

CNOS Change Number Of Sessions

Wildcards

- Used to reduce the burden of defining all LEN node LUs to a network node server.
- Two types:
 - ◆ Partial Wildcard
USER1*
USER2*
 - ◆ Full Wildcard
*
- Especially useful for a network node that is attached to a subarea network.
- By assigning all unrecognized LUs as belonging to the subarea LEN node, you can avoid explicitly defining all of the subarea LUs.

ADVWLD01

Visual 10-15. Wildcards

- Only one network node in an APPN network can use a full wildcard.
- Be careful in choosing your wildcards. If one network node uses a wildcard of **USER*** and another uses **USE***, both will return a positive reply to a search request for **USER123**
- Make the prefixes unique and do not overlap them.
- A wildcard will only be used if there is not an explicit entry located.

Session Flow Control

■ Adaptive Pacing

- ◆ Session Level Pacing
- ◆ BIND Pacing
- ◆ The pacing window can be changed dynamically, based upon conditions at the receiving node.

■ Segmenting and Reassembly

- ◆ RUs larger than the Basic Transmission Unit of a link can still be sent across the link.
- ◆ Large RUs are broken up into several smaller segments that can be sent across the link.
- ◆ The segments are then reassembled into an RU at the receiving node.

ADV8FC01

Visual 10-16. Session Flow Control

- If a node is very busy, it can dynamically lower its pacing window size to lighten the load. When congestion eases, it can again raise its pacing window.
- Segmentation is key to being able to route over several links which do not have the same data handling capabilities.

Unit 11. 5250 Work Station Feature

What This Unit is About

The 5250 Work Station Feature of Communications Manager provides the ability to emulate 5250 terminals and printers from an OS/2 work station. The 5250 emulation uses SNA LU 6.2 and APPC to communicate with AS/400 and System 36 hosts.

This unit contains three topics. The first topic gives an overview of the features provided. The second topic covers the configuration of Communications Manager that is necessary to use the 5250 Work Station Feature. Finally, the third topic examines the parameters on the AS/400 that must match in order to connect.

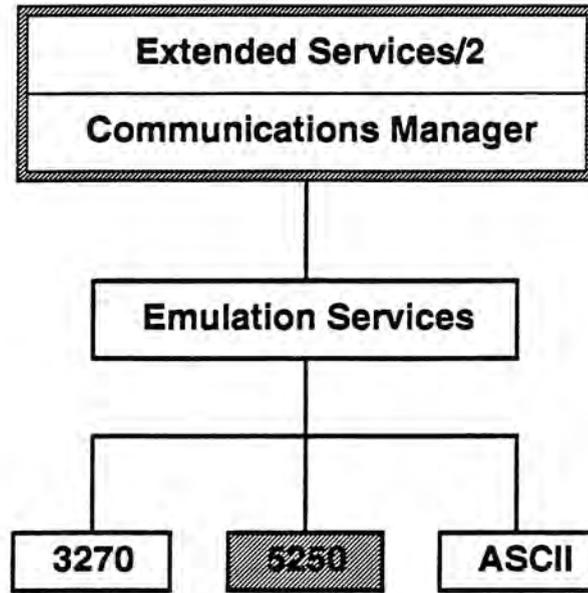
What You Should Be Able to Do

After completing this unit, you should be able to

- Describe the 5250 Work Station Feature's capabilities.
- List the connectivity options that are available to the 5250 Work Station Feature.
- Understand the matching host requirements for a connection to an AS/400.
- Configure the 5250 Work Station Feature.

Topic 11.1. 5250 Work Station Feature Overview

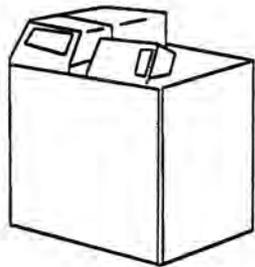
5250 Emulation



5250V101

Visual 11-1. 5250 Work Station Feature

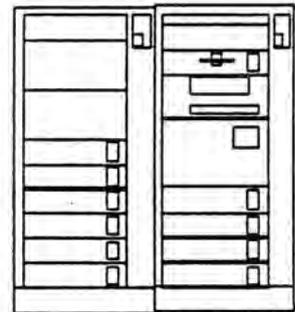
5250 Workstation Feature



S/36

Printers

Terminals



AS/400



5250 Work Station Feature

5250V1R02

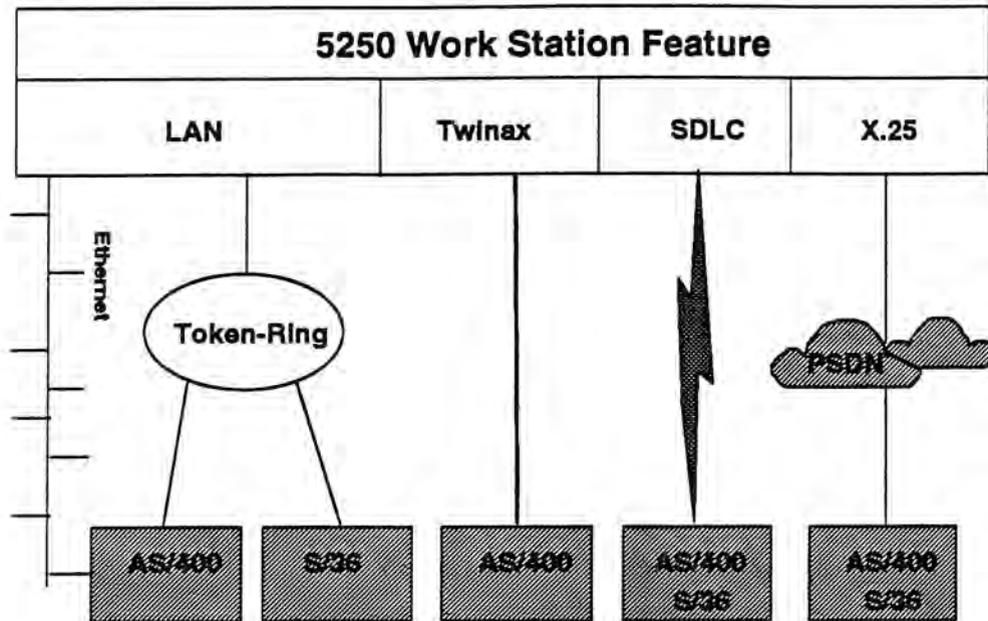
Visual 11-2. 5250 Work Station Feature

- Terminals
 - IBM 5292 Model 1 (color)
 - IBM 3197 Model C20 (Color)
 - IBM 5291 (Monochrome)
 - IBM 3196 (Monochrome)
- Printers
 - IBM 5224
 - IBM 5256
 - IBM 5219

Note: Printer function tables for IBM Proprinters, Graphics printers, Quietwriter printers, and Wheelprinters come with Communications Manager. Additional PFTs can be built to support additional printers. Use PC Support or Display Write to create PFTs.

- AS/400 requirements
 - OS/400 SSP R 1.2 or higher.
 - AS/400 PC Support is required for file transfer or virtual print functions.
- System 36 requirements
 - S/36 SSP 5.1 or equivalent
 - LAN Communications
 - Base Communications

5250 Work Station Feature Connectivity



5250VR02

Visual 11-3. 5250 Connectivity

- Twinax can only be used to an AS/400 because the S/36 does not support LU 6.2 over Twinax.
- 5250 Work Station Feature cannot be routed through the Communications Manager SNA Gateway because the gateway does not support independent LU 6.2.
- A Work Station that is configured as an APPN Network node can be used to route 5250 Workstation Feature data to the host.

5250 Work Station Feature

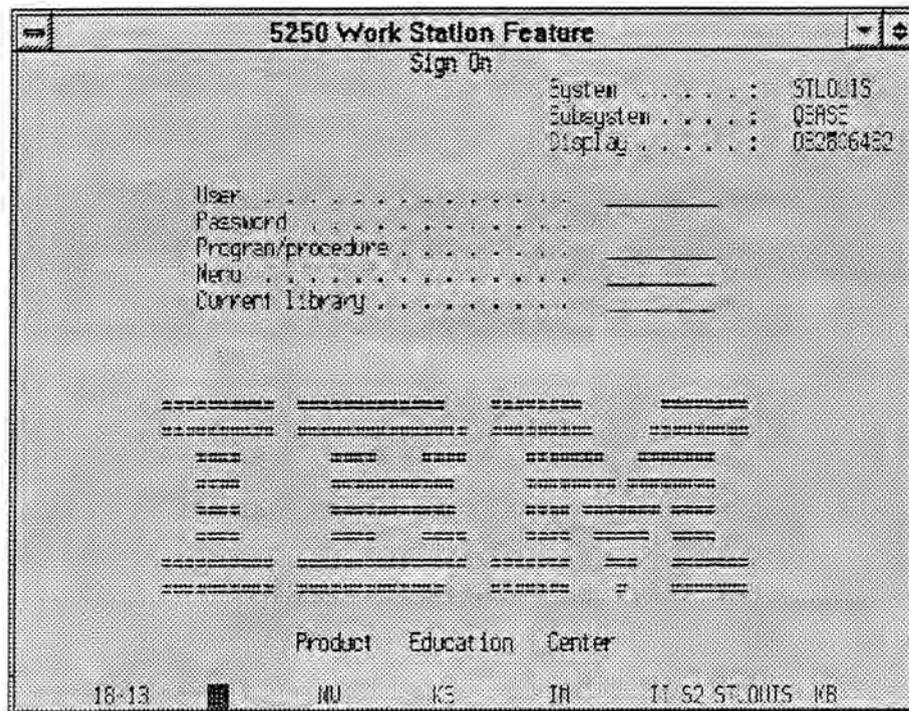
- **Five Terminals/Printers**
- **Individual Keyboard Remap**
- **Five Separate Host Systems**
- **Printer Operator Control Panel**
- **EHLLAPI API Support**
- **Auto Sign On Feature for Terminals**
- **Windowed or Full Screen Operation**
- **Host Directed and Local Copy Print Functions**

5250V1R04

Visual 11-4. 5250 Features

- Unlike 3270 emulation, the 5250 Work Station Feature can have each session be connected to a different host system.
- The auto sign on feature must also be enabled on the AS/400.
- Although the 5250 sessions default to operating in a window, they can be changed to run as full screen sessions.
- With AS/400 PC Support, you also get:
 - PC Organizer and Text Assist for full function edit support.
 - Shared Folders
 - File Transfer
 - Messaging between work stations.
 - Virtual print function.

5250 Work Station Feature



Visual 11-5. 5250 Work Station Feature in a Window

- Although the 5250 Work Station Feature runs in a window, all of the sessions are in the same window.
- Use **Alt+Page up** to scroll between sessions.
- There are keyboard remap functions to allow a key to cause a jump to a particular session.
- Can be run in a full screen session as well.
- There are various font sizes when run in a window. The default font size will be the font you have chosen for your OS/2 windowed command prompts.
- Cut and Paste to/from the PM clipboard is available when run in a window.

5250 UPM Logon Panel

The image shows a screenshot of a dialog box titled "Logon". At the top, it says "Note: The password will not display." Below this, there are three input fields: "User ID" containing the text "TANKERS", "Password" which is empty, and "Node name" containing the text "ATLANTA". At the bottom of the dialog box, there are three buttons: "OK", "Cancel", and "Help".

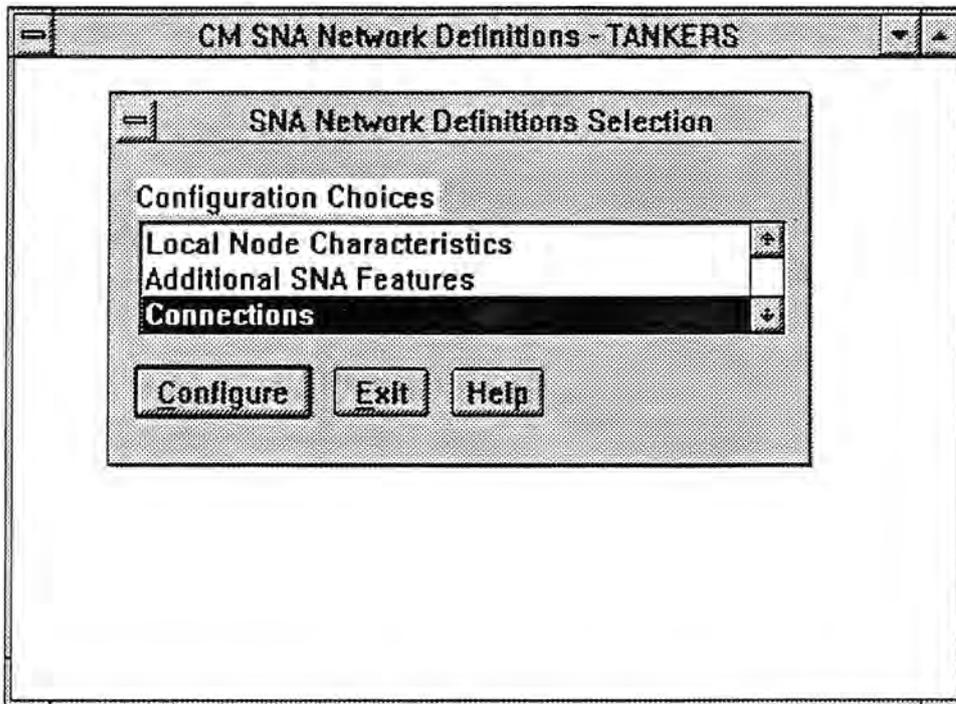
028UPM01

Visual 11-6. 5250 UPM Logon Panel

- 5250 Work Station Feature uses APPC conversation security.
- A UPM panel is used for the user to provide the USERID and PASSWORD. These are checked at the host system.
- The userid and password are the users actual host sign on information.
- The conversation security logon does not actually log the user on to the host unless auto sign on is being used as well.
- Each host that is contacted will cause a UPM logon panel to appear.
- You can use a UPM User Logon Profile to automate the procedure. It will automatically enter information for remote node logons.

Topic 11.2. 5250 Work Station Feature Configuration

Configure Connections



5250NA01

Visual 11-7. Network Configuration for 5250

- In order to use the 5250 Work Station Feature, you need to complete the following SNA network information.
 - SNA Local Node Characteristics
 - Connections

Local Node Characteristics

Local Node Characteristics - OS28064

Required Features

Network Name:

Local node name:

Node type:

End Node to Network Node Server

End Node - No Network Node Server

Network Node

Your network node server address:

Optional Features

Local node ID: (Hex)

Local node alias name:

Comment:

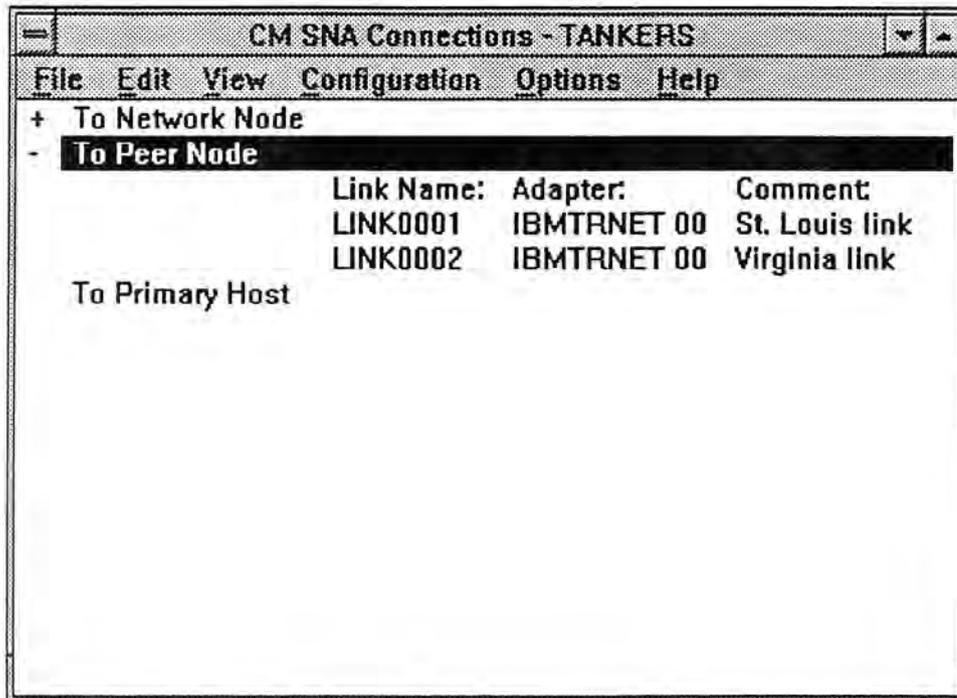
Activate Attach Manager at start up

5258NAC6

Visual 11-8. Local Node Characteristics

- Your network ID will need to match a value that is configured on the host system. For an AS/400, this value can be obtained by looking at the controller description for the controller that is defined for your work station. You can issue the command **DSPCTLD ctl**, where **ctl** is your controller description name. The value that it should match is called **Remote network identifier**.
- Your local node name also needs to match a value on your host system. It is also contained in the controller description. The value it must match is called **Remote control point**.

Configure Links

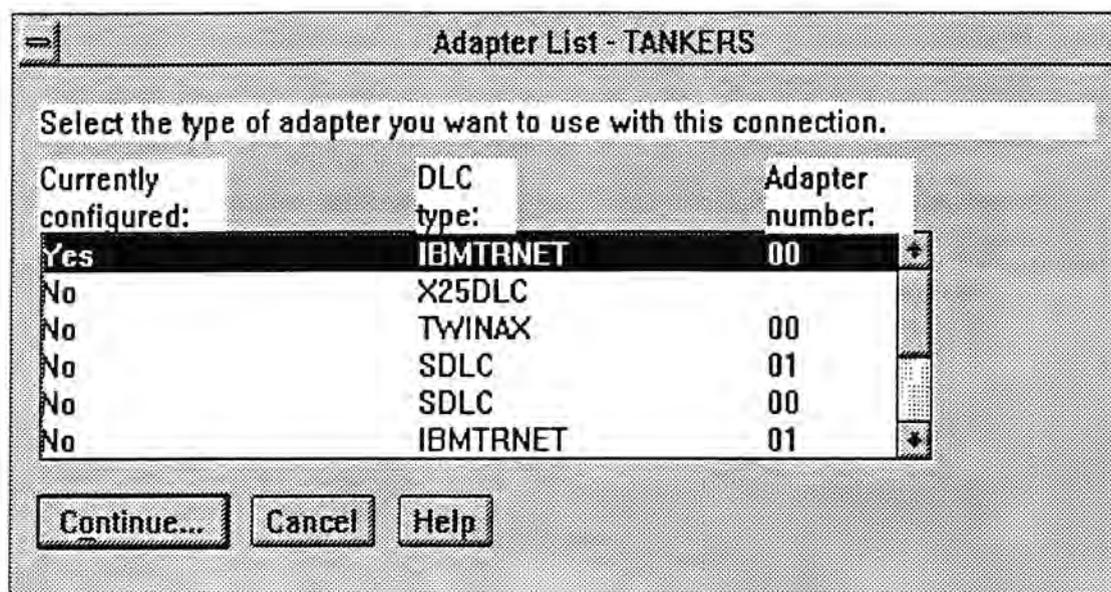


525SNA02

Visual 11-9. Creating Links for 5250

- The AS/400 or System 36 can be your network node, another end node attached to a network node, or a peer node. It all depends on your setup.
- If you are unsure, and you have a direct connection to the host (ie. LAN), use a Peer node link.

Select The Appropriate DLC



1258NA01

Visual 11-10. Choosing a DLC

- Choose the appropriate DLC.

Complete Peer Information

Creating a Connection to a To Peer Node - TANKERS

Link name:

Partner network ID: (Required for partner LU definition)

Partner node name: (Required for partner LU definition)

LAN destination address:

Comment: (Optional)

OK Define Partner LUs... Cancel Help

6255NA04

Visual 11-11. Partner Node Information

- Link name:** The link name will default. You can change it, but there is no need to.
- Partner network ID:** This is the network that the host system is on. On the AS/400, this is the **Local network ID** and can be obtained by using the command **DSPNETA**.
- Partner node name:** This is the host system's control point name. This can also be found with the **DSPNETA** command, and it should match with the **Local control point name**.
- LAN destination address:** This value should match up with the host systems local adapter address. On the AS/400, this value is obtained by issuing the command **DSPLIND line**, where line is a valid AS/400 line description. The matching parameter is called **Local Adapter Address**.

Complete Partner LU Information

Changing Partner LUs - TANKERS

To add a Partner LU, enter the LU name, alias, and comment. Then select the Add button.

To change a Partner LU, select an LU from the list, change the LU name, Alias, and/or Comment fields and select the Change button.

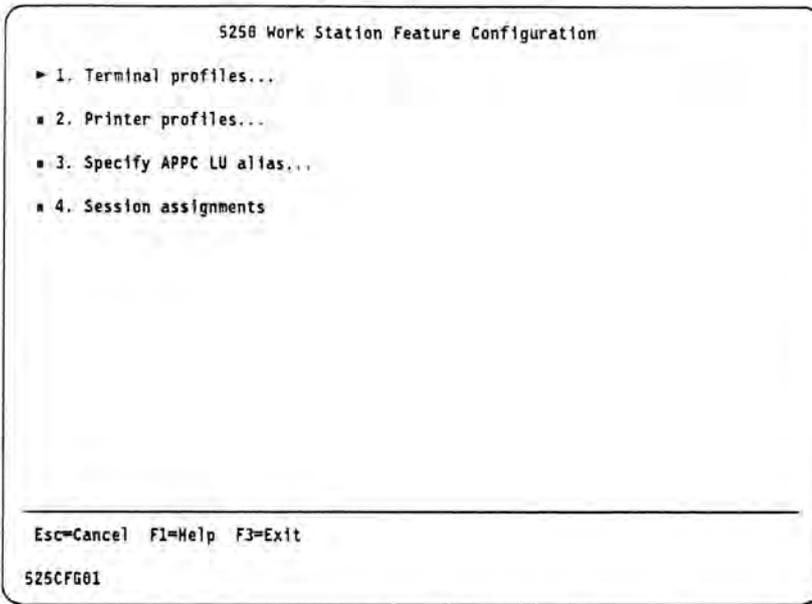
To Delete a Partner LU, select an LU from the list and select the Delete button.

LU name:	<input type="text" value="VIR"/>	LU name	Alias
Alias:	<input type="text" value="VIRGINIA"/>	USIBMES.VIR	VIRGINIA
Comment:	<input type="text"/>		

0288NAd

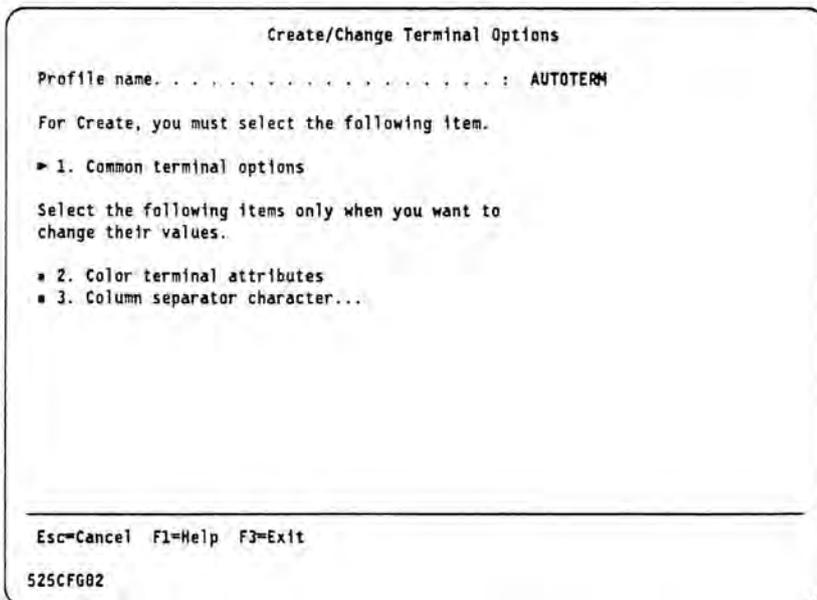
Visual 11-12. Partner LU Information

- The LU name should match up with the host systems local LU. On the AS/400, this value can be obtained by issuing the **DSPNETA** command. The parameter is called **Default local location**
- The Alias does not need to match anything at the host system.
- The 5250 Work Station Feature requires the use of an alias however.



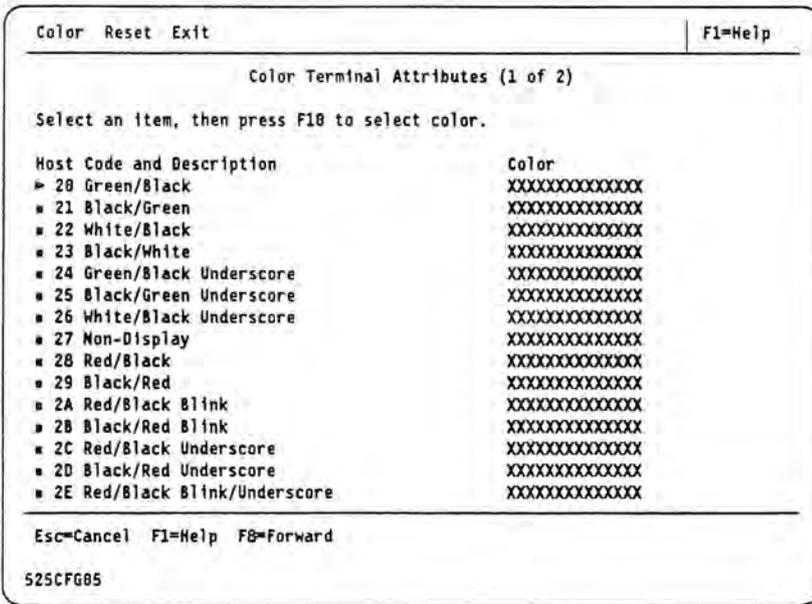
Visual 11-13. 5250 Work Station Feature Configuration

- This is the 5250 Work Station Feature configuration main menu.

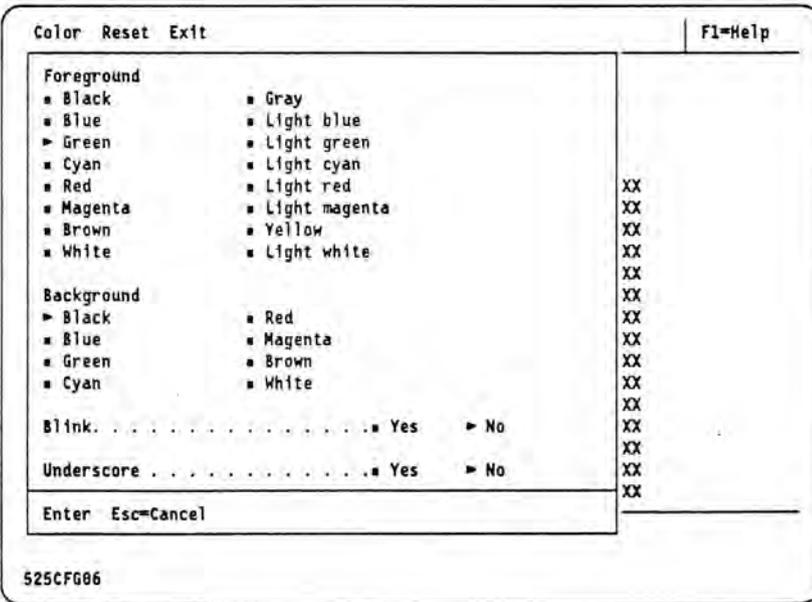


Visual 11-14. Create/Change Terminal Options

- This is the first panel of the Terminal Options configuration.

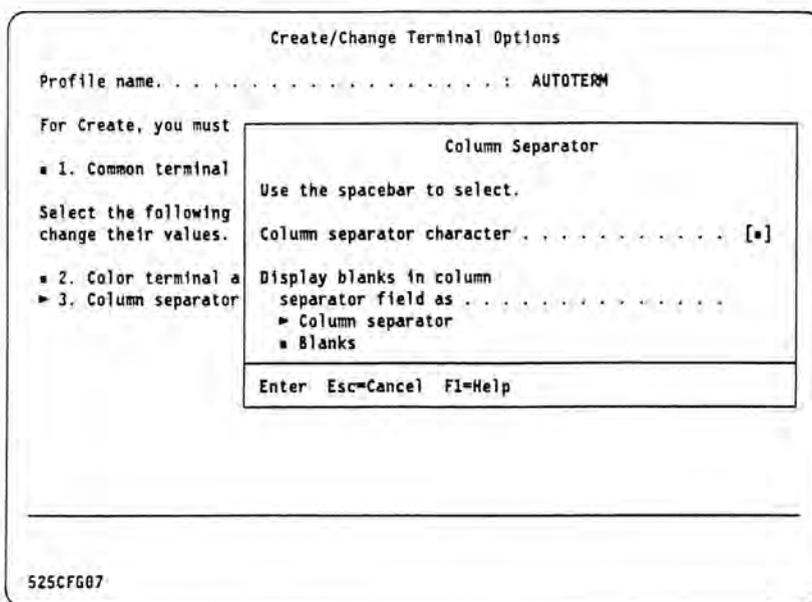


Visual 11-17. Color Terminal Attributes (part 1)



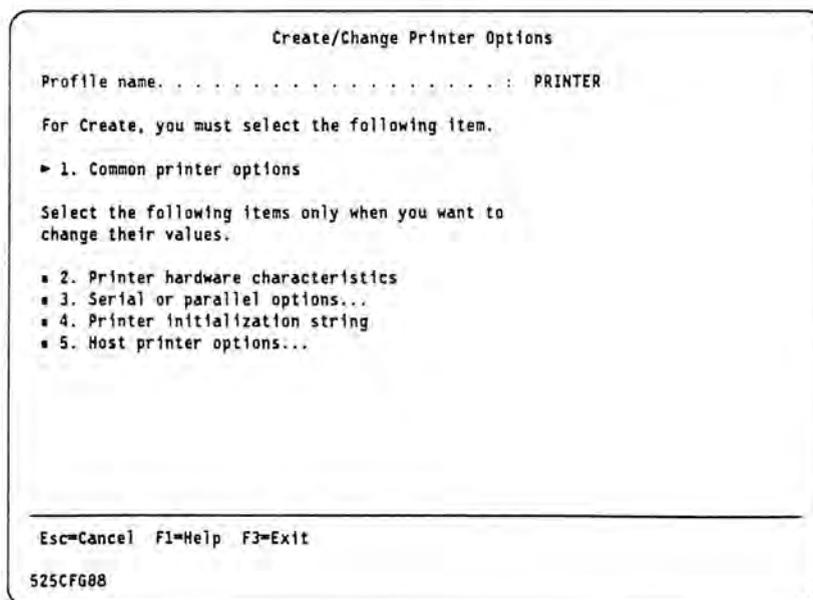
Visual 11-18. Color Terminal Attributes (part 2)

- Set the colors to your personal preference.
- Make sure that you make the foreground and background colors the same on non-display fields or the characters will display.



Visual 11-19. Column Separator

- The column separator character will be substituted for any null values in a field and, optionally, for any blanks.



Visual 11-20. Create/Change Printer Options

- This is the first panel of the Printer Options configuration.
- These panels will only go through the **Common printer options**.

```

Common Printer Options

Use the spacebar to select.

Profile name. . . . . : PRINTER
Comment . . . . .
  [5250 Work Station Feature 5256 Printer Default Model Profile]

AT keyboard profile name. . . . . [ACSSAPUS]
Enhanced keyboard profile name. . . . . [ACSSENUUS]
Printer type. . . . .
  ▶ IBM Proprinter
    ■ IBM Quietwriter printer
    ■ IBM Wheelprinter
    ■ IBM Graphics printer
    ■ Printer function table...

Host type . . . . . ■ System/36...
                   ▶ AS/400...
Host code page. . . . . [837 ]
PC code page. . . . . [437 ]

Enter Esc=Cancel F1=Help F4=List

525CF609
    
```

Visual 11-21. Common Printer Options (part 1)

- A printer function table allows you to use a printer that is not listed here.

```

Common Printer Options

Use the spacebar to select.

Profile name. . . . . : PRINTER
Comment . . . . .
  [5250 Work Station Feature 5256 Printer Default Model Profile]

Specify Workstation ID
Workstation ID (for host). . . . . [      ]

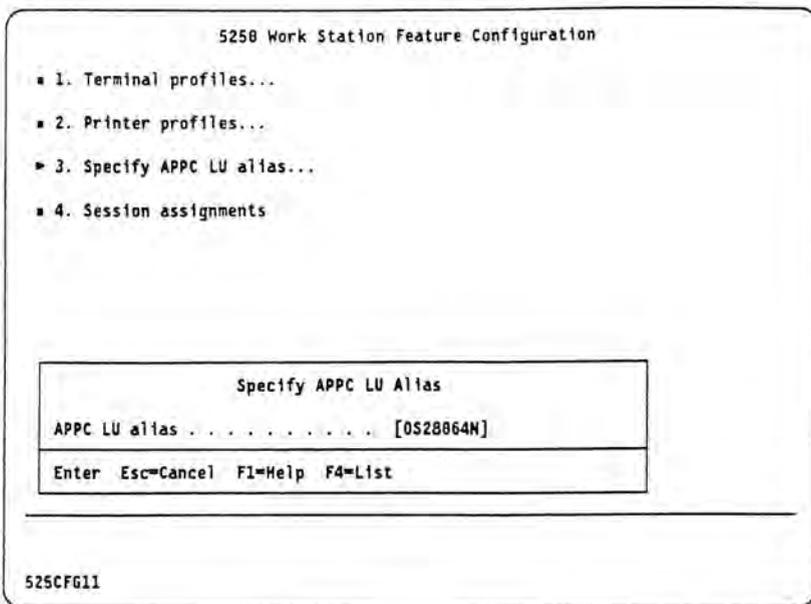
Enter Esc=Cancel F1=Help

  ■ Printer function table...

Host type . . . . . ■ System/36...
                   ▶ AS/400...
Host code page. . . . . [837 ]
PC code page. . . . . [437 ]

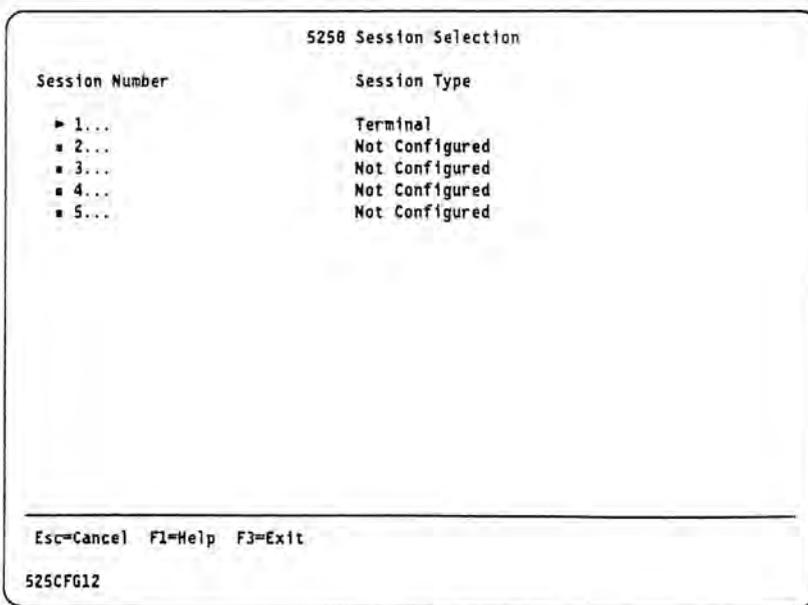
525CF610
    
```

Visual 11-22. Common Printer Options (part 2)



Visual 11-23. Specify APPC LU Alias

- This can be any one of your LU aliases. All 5250 sessions will use the same local LU. The easiest way is to use the CP LU, this way you don't need to create an LU explicitly.



Visual 11-24. 5250 Session Selection

- This is where the sessions are actually defined.

5250 Session Selection

Session Number	Session Type
▶ 1...	Terminal
▪ 2...	Not Configured
▪ 3...	Not Configured
▪ 4...	Not Configured
▪ 5...	Not Configured

5250 Terminal/Printer Session Assignments

5250 Work Station Feature profile name [TERMINAL]
 APPC partner LU alias. [ATLANTA]
 APPC mode name [#INTER]
 Short session ID [C]

Enter Esc=Cancel F1=Help F4=List

525CFG13

Visual 11-25. 5250 Terminal/Printer Session Assignments

5250 Work Station Feature profile name: This is one of the terminal/printer profiles that you have created. [F4] will give you a list of profiles.

APPC partner LU alias: This is the alias for one of your host system partner LUs. You can use [F4] for a list of partner LU aliases.

APPC mode name: This is the name of one of your defined APPC modes. The host system will need to have this mode name as well. The easiest method is to use the IBM supplied mode #INTER. This way, you don't need to explicitly create a mode. Press [F4] for a list of modes.

Short session ID: This will default to the next available ID. You may change it, but it must be unique among all emulations.

Topic 11.3. ASI/400 Configuration Parameters

```

Change Ctl Desc (APPC) (CHGCTLAPPC)

Type choices, press Enter.

Controller description . . . . . > OS2RM400      Name
Online at IPL . . . . . *YES_                 *SAME, *YES, *NO
APPN-capable . . . . . *YES_                 *SAME, *YES, *NO
Switched line list . . . . . TR00IALN_       Name, *SAME
      + for more values
Character code . . . . . *EBCDIC             *SAME, *EBCDIC, *ASCII
Maximum frame size . . . . . 1994_           265-16393, 265, 521, 1033...
Remote network identifier . . . . . USIBMES_   Name, *SAME, *NETATR, *NONE
Remote control point . . . . . OS2RM400      Name, *SAME, *NONE
SSCP identifier . . . . . *SAME_             000000000001-FFFFFFFFFFFF...
Initial connection . . . . . *ANS_           *SAME, *ANS, *DIAL
Switched disconnect . . . . . *YES_           *SAME, *YES, *NO
Disconnect timer . . . . . 170_              0-65535 seconds
LAN remote adapter address . . . . . 400004000000 000000000001-FFFFFFFFFFFF...
LAN DSAP . . . . . 04_                       *SAME, 04, 08, 0C, 10, 14...
LAN SSAP . . . . . 04_                       *SAME, 04, 08, 0C, 10, 14...
                                          More...

F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

      06-37   SA      MW      KS      IM      II S1 ATLANTA KB

52540001
    
```

Visual 11-26. AS/400 Controller Description (1 of 3) *DSPCTLD OS2RM400*

- Remote network identifier = Communications Manager Network ID.
- Remote control point = Communications Manager Local node name.
- LAN remote adapter address = Communications Manager LAN address.

*PO NAME
controller
description
name*

```

Change Ctl Desc (APPC) (CHGCTLAPPC)

Type choices, press Enter.

LAN frame retry . . . . . 10_                0-254, *SAME, *CALC
LAN connection retry . . . . . 10_           0-254, *SAME, *CALC
LAN response timer . . . . . 10_            0-254 (0.1 seconds)
LAN connection timer . . . . . 70_          0-254 (0.1 seconds)
LAN acknowledgement timer . . . . . 1_       0-254 (0.1 seconds)
LAN inactivity timer . . . . . 100_         0-255 (0.1 seconds)
LAN acknowledgement frequency . . . . . 1_   0-127, *SAME, *CALC
LAN max outstanding frames . . . . . 2_      1-127, *SAME, *CALC
LAN access priority . . . . . 0_            0-3, *SAME, *CALC
LAN window step . . . . . *NONE_          1-127, *NONE, *SAME
APPN CP session support . . . . . *NO_     *SAME, *YES, *NO
APPN node type . . . . . *ENDNODE          *SAME, *CALC, *NETNODE...
APPN transmission group number . . . . . 1_   1-20, *SAME, *CALC
APPN minimum switched status . . . . . *VRYONPND *SAME, *VRYONPND, *VRYON
                                          More...

F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

      05-37   SA      MW      KS      IM      II S1 ATLANTA KB

52540002
    
```

NODE TYPE

Visual 11-27. AS/400 Controller Description (2 of 3) *DSPCTLD OS2RM400*

```

Change Ctl Desc (APPC) (CHGCTLAPPC)

Type choices, press Enter.

Recovery limits:
  Count limit . . . . . 2 _____ 0-99, *SAME, *SYSVAL
  Time interval . . . . . 5 _____ 0-120 (minutes)
Model controller description . . *NO _____ *SAME, *YES, *NO
Connection network network ID . *SAME _____ Name, *SAME, *NETATR, *NONE
Connection network CP . . . . . *SAME _____ Name, *SAME, *NONE
Control owner . . . . . *USER _____ *SAME, *USER
Text 'description' . . . . . 'Room 400 controller for OS/2' _____

Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

      06-37  SA      MW      KS      IM      II S1 ATLANTA KB

52540003

```

Visual 11-28. AS/400 Controller Description (3 of 3) *DSPCTLD OS2RM400*

```

Change Line Desc (Token-Ring) (CHGLINTRM)

Type choices, press Enter.

Line description . . . . . > TR001ALN  Name
Resource name . . . . . LIN001 _____ Name, *SAME
Online at IPL . . . . . *YES _____ *SAME, *YES, *NO
Vary on wait . . . . . 15 _____ *NOWAIT, 15-180 (1 second)
Maximum controllers . . . . . 256 _____ 1-256, *SAME
Line speed . . . . . 4M _____ 4M, 16M, *SAME
Maximum frame size . . . . . 1994 _____ 265-16393, *SAME, 265, 521...
TRLAN manager logging level . . *OFF _____ *SAME, *OFF, *MIN, *MED, *MAX
TRLAN manager mode . . . . . *OBSERVING _____ *SAME, *OBSERVING...
Log configuration changes . . . *LOG _____ *SAME, *LOG, *NOLOG
Token-ring inform of beacon . . *YES _____ *SAME, *YES, *NO
Local adapter address . . . . . 400007132024 400000000000-7FFFFFFFFF...

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

      06-37  SA      MW      KS      IM      II S1 ATLANTA KB

52540004

```

Visual 11-29. AS/400 Line Description (1 of 3) *DSPLIND &AS4001LINE.*

- Local adapter address = Communications Manager LAN destination address for a link.

```

Change Line Desc (Token-Ring) (CHGLINTRN)

Type choices, press Enter.

SSAP list:
Source Service Access Point . 04      02-FE, *SAME, *SYSGEN
SSAP maximum frame . . . . . *MAXFRAME *MAXFRAME, 265-16393
SSAP type . . . . . *SNA      *CALC, *NONSNA, *SNA

Source Service Access Point . 06      02-FE
SSAP maximum frame . . . . . *MAXFRAME *MAXFRAME, 265-16393
SSAP type . . . . . *NONSNA    *CALC, *NONSNA, *SNA

Source Service Access Point . AA      02-FE
SSAP maximum frame . . . . . *MAXFRAME *MAXFRAME, 265-16393
SSAP type . . . . . *NONSNA    *CALC, *NONSNA, *SNA
+ for more values
Early token release . . . . . *SAME      *YES, *NO, *SAME, *LINESPEED
Error threshold level . . . . *OFF      *SAME, *OFF, *MIN, *MED, *MAX
Link speed . . . . . 4M      *SAME, *MIN, 1200, 2400...
More...
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

      05-35   SA      MW      KS      IM      II S1 ATLANTA KB

52540005
    
```

Visual 11-30. AS/400 Line Description (2 of 3) *DSPLIND &AS4001LINE.*

```

Change Line Desc (Token-Ring) (CHGLINTRN)

Type choices, press Enter.

Cost/connect time . . . . . 0      0-255, *SAME
Cost/byte . . . . . 0      0-255, *SAME
Security for line . . . . . *NONSECURE *SAME, *NONSECURE...
Propagation delay . . . . . *LAN      *SAME, *MIN, *LAN...
User-defined 1 . . . . . 128     0-255, *SAME
User-defined 2 . . . . . 128     0-255, *SAME
User-defined 3 . . . . . 128     0-255, *SAME
Autocreate controller . . . . *YES     *YES, *NO, *SAME
Autodelete controller . . . . 1440    1-10000 (minutes), *NONE...
Recovery limits:
Count limit . . . . . 2      0-99, *SAME, *SYSVAL
Time interval . . . . . 5     0-120 (minutes)
Text 'description' . . . . . *BLANK

Bottom
F3=Exit  F4=Prompt  F5=Refresh  F12=Cancel  F13=How to use this display
F24=More keys

      05-37   SA      MW      KS      IM      II S1 ATLANTA KB

52540006
    
```

Visual 11-31. AS/400 Line Description (3 of 3) *DSPLIND &AS4001LINE.*

```

Display Network Attributes
System: ATLANTA
Current system name . . . . . : ATLANTA
Pending system name . . . . . :
Local network ID . . . . . : USIBMES
Local control point name . . . . . : ATL
Default local location . . . . . : ATL
Default mode . . . . . : BLANK
APPN node type . . . . . : *ENDNODE
Maximum number of intermediate sessions . . . . . : 200
Route addition resistance . . . . . : 128
Server network ID/control point name . . . . . : USIBMES STL

More...

Press Enter to continue.

F3=Exit F12=Cancel

01-01 SA MW KS IM II S1 ATLANTA KB
52540007
    
```

Remote Node Type

Visual 11-32. AS/400 Network Attributes (1 of 2) "DSPNETA"

- Local network ID = Communications Manager Partner network ID for a link.
- Local control point name = Communications Manager Partner node name for a link.
- Default local location = Communications Manager LU name on a partner LU definition.

```

Display Network Attributes
System: ATLANTA
Alert status . . . . . : *OFF
Alert primary focal point . . . . . : *NO
Alert default focal point . . . . . : *NO
Alert logging status . . . . . : *ALL
Alert controller description . . . . . : SL061LPU
Alert hold count . . . . . : 0
Message queue . . . . . : QSYSOPR
Library . . . . . : QSYS
Output queue . . . . . : QPRINT
Library . . . . . : QGPL
Job action . . . . . : *FILE
Maximum hop count . . . . . : 16
DDM request access . . . . . : *OBJAUT
PC Support request access . . . . . : *OBJAUT
Default ISDN network type . . . . . :
Default ISDN connection list . . . . . : QCCNNLANY

Bottom

Press Enter to continue.

F3=Exit F12=Cancel

01-01 SA MW KS IM II S1 ATLANTA KB
52540008
    
```

Visual 11-33. AS/400 Network Attributes (2 of 2) "DSPNETA"

Unit 12. Asynchronous Communications

What This Unit is About

Asynchronous communications uses an asynchronous modem to communicate, over telephone lines, to another asynchronous modem on another system. The typical operation that is performed when doing asynchronous communications is ASCII terminal emulation. While performing terminal emulation, many other tasks can be performed such as file transfer, data capture, and screen snapshot.

Extended Services for OS/2 Communications Manager provides the ability to perform asynchronous communications and terminal emulation. This is provided through supplied terminal emulators and a rich asynchronous communications API.

This unit will discuss the features of the asynchronous communications support in the first topic. The second topic will be devoted to configuration of the asynchronous communications features.

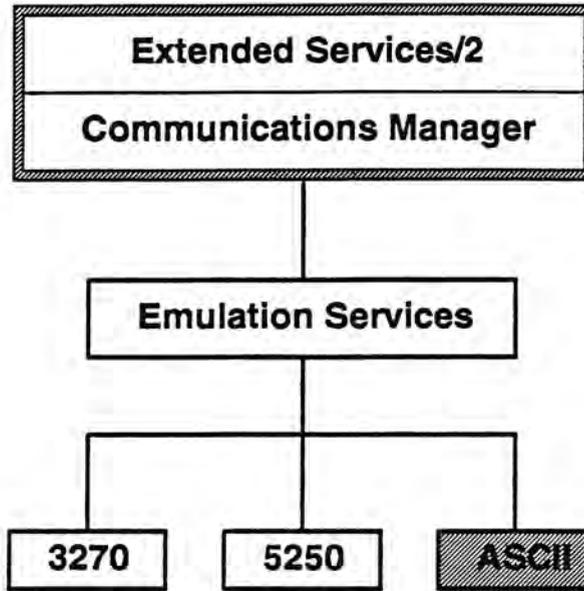
What You Should Be Able to Do

After completing this unit, you should be able to

- Describe the features of the Asynchronous Communications service.
- Configure the following Asynchronous Communications profiles:
 - Special Function Definitions
 - Device String Profiles
 - Asynchronous Communications Port Profiles
 - Telephone Network Profiles
 - ASCII Terminal Emulation Profiles
 - Asynchronous File Transfer Profiles
- Use the ASCII terminal emulation feature.
- Perform file transfer through an ASCII terminal.

Topic 12.1. Asynchronous Communications Features

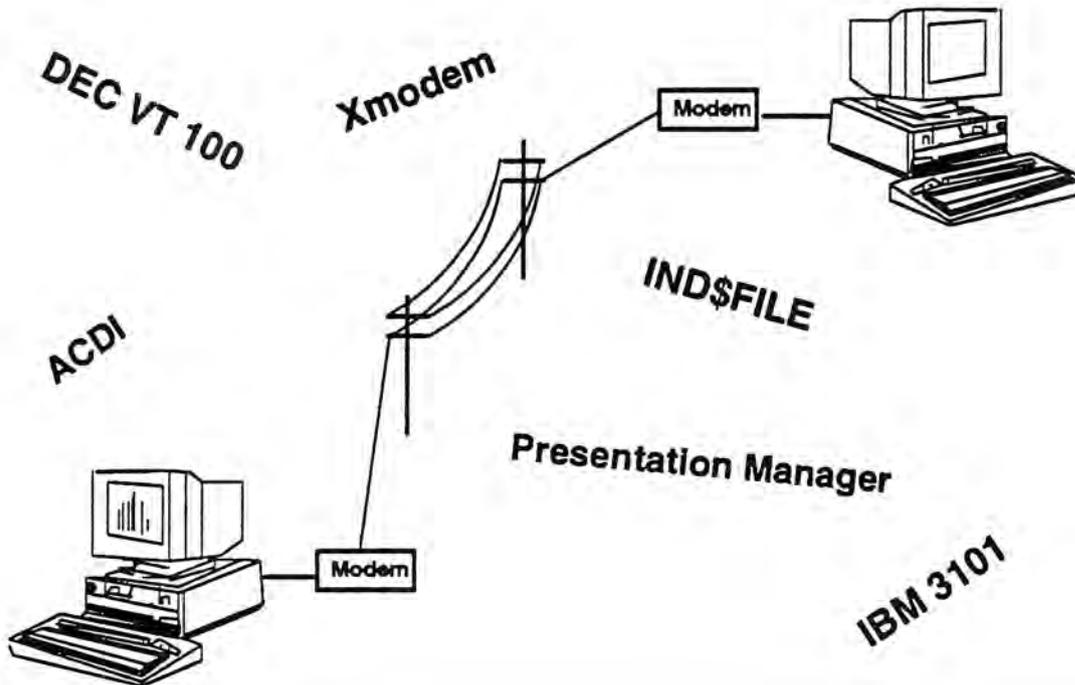
ASCII Emulation



ABC0VR01

Visual 12-1. ASCII Terminal Emulation

Asynchronous Communications



ASCOV702

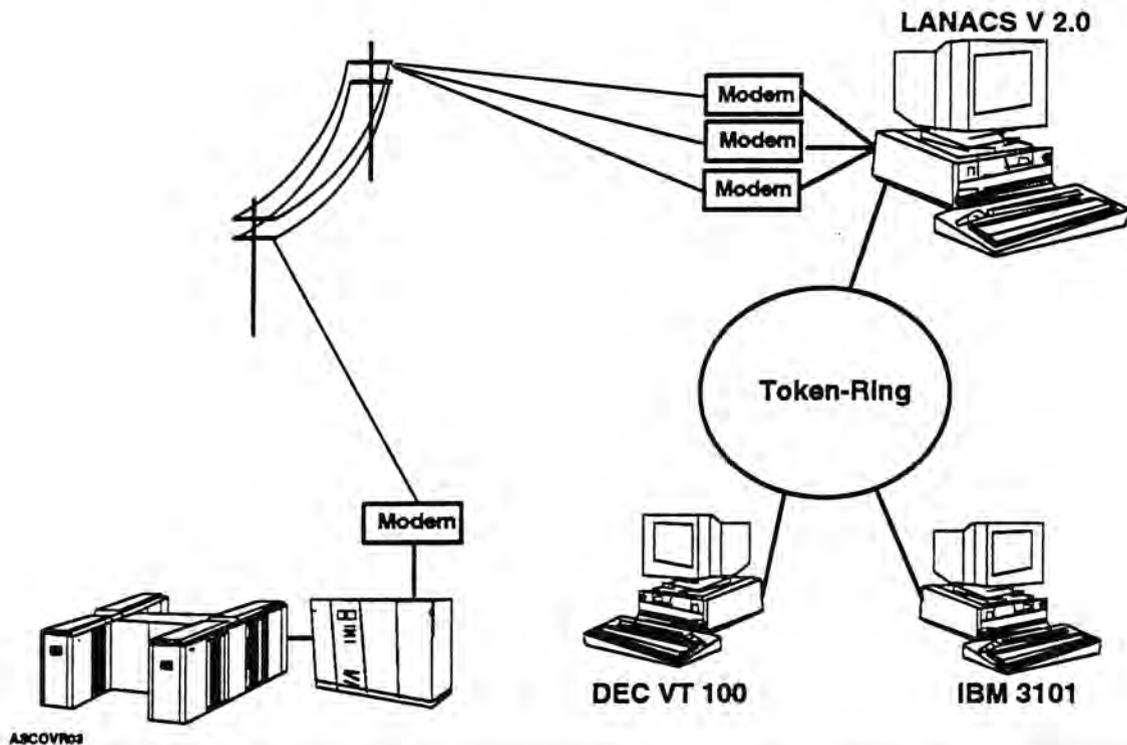
Visual 12-2. Asynchronous Communications

- Two ASCII terminal emulators, IBM 3101 and DEC VT100, are provided with the product. These are PM windowed emulators and support the following PM features:
 - Sizing, minimizing, maximizing, and scrolling of windows
 - Copy data into the clipboard. Only copy is supported.
- File transfer is supported through both of the ASCII emulators.
 - IND\$FILE for transfers to/from an IBM host system.
 - Xmodem for everyone else.
- Users can write their own Asynchronous applications as well through an API called ACDI. (for example, SOFTERM)
- Only one of the provided ASCII emulations can be run at a time. They do not support concurrent use.
- COM1 through COM3 are supported by Communications Manager

API Application Programming Interface

ACDI Asynchronous Communications Device Interface

ACDI Redirection



Visual 12-3. ACDI Redirection

- ACDI (including the ASCII emulators) can be redirected across a LAN to a system with shared modems. The system must be running the LANACS v 2.0 DOS program.

Note: The IBM LAN Server is not a valid destination as a modem server. It must be a LANACS server. The LAN server can be used for non-ACDI asynchronous communications packages. (for example, SOFTERM in non-ACDI mode)

- This is only good for placing outgoing calls. The server cannot route incoming calls to a LAN workstation.
- Redirection uses NETBIOS.
- Can be installed using BCS or REINST (additional features).

LANACS Local Area Network Asynchronous Connection Server

NETBIOS Network Basic Input Output System

Asynchronous Configuration Profiles

- **Special Function Definitions**
- **Device String Profiles**
- **Asynchronous Communications Port Profiles**
- **Telephone Network Profiles**
- **ASCII Terminal Emulation Profiles**
- **Asynchronous File Transfer Profiles**

ASC0V04

Visual 12-4. Asynchronous Configuration Profiles

The following profiles can be configured. Not all are required though:

Special Function Definitions: This profile will almost never be changed. It sets characters to represent a certain function.

Device String Profiles: This is the way you can customize the commands that are sent to the modem. Several profiles are provided for some common modems.

Asynchronous Communications Port Profiles: Use these to tell Communications Manager what type of device is connected to a COM port.

Telephone Network Profiles: Use these to store any network access numbers that you may need to dial before or after a phone number.

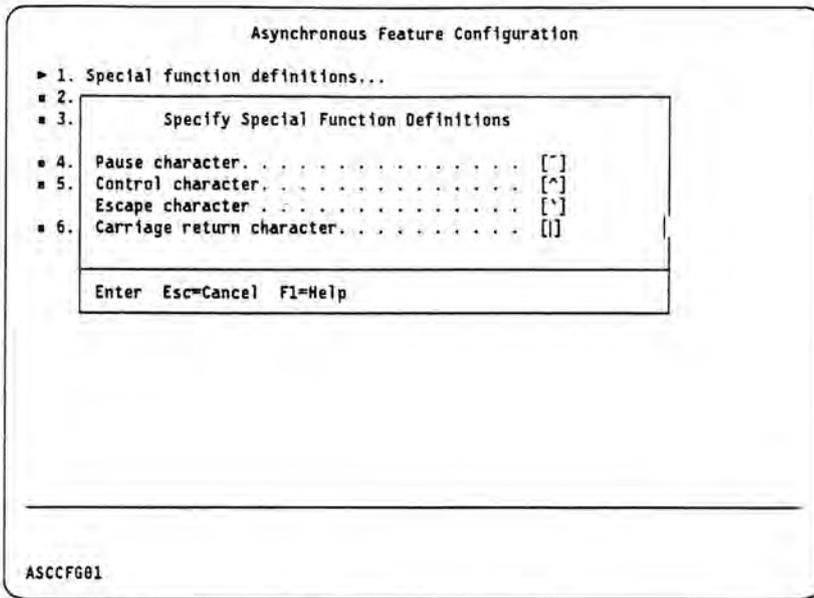
ASCII Terminal Emulation Profiles: These are the actual terminal configurations. A phone number is stored with the profile so you want to create one for each party you will call.

Asynchronous File Transfer Profiles: Used to perform file transfers. Menu mode is the only mode available for asynchronous file transfers.

Note: Your modem must be set to reflect the true state of CARRIER and DTR. This is done through modem switches or software commands (Hayes: AT &C1 &D2)

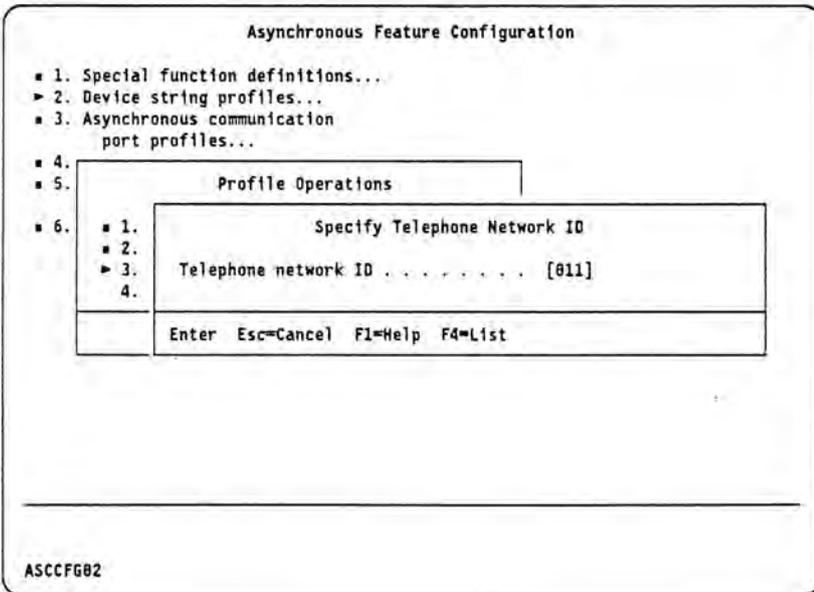
DTR Data Terminal Ready

Topic 12.2. Asynchronous Communications Configuration



Visual 12-5. Special Function Definitions

You should almost never need to change special function definitions.



Visual 12-6. Device String Profiles part 1

The telephone network ID identifies the telephone network you will be using. The United States is "011". Use [F4] to list all of the networks.

```

Create/Change Attention Command Set Strings (1 of 2)

Use the spacebar to select.

Device string profile name . . . . . : DEMO
Telephone network ID . . . . . : 811
Comment . . . . . : [Hayes Smartmodem 120>

Auto answer delay done by. . . . . ▶ DCE  ■ DTE...
Device carrier exchange
  timeout (seconds). . . . . [60 ]
Device initialization. . . . . [ATZ|ATE1Q8V1X1S7=60S>
Dialing prefix . . . . . [ATDT >
Dialing suffix . . . . . [  >
Auto answer. . . . . [ATS0=1| >
Hangup . . . . . [---+---ATH0| >
Voice to data originate. . . . . [ATD| >
Voice to data answer . . . . . [ATA| >
Successful command response. . . . . [OK|^J ]
Unsuccessful command response. . . . . [ERROR|^J ]
Incoming call response . . . . . [RING|^J ]
Valid connection response. . . . . [CONNECT ]

Enter Esc=Cancel F1=Help F8=Forward
ASCCFG83

```

Visual 12-7. Device String Profiles part 2

```

Create/Change Attention Command Set Strings (2 of 2)

Specify call failure types and associated call failure response strings.
Call failure types:
  1 = Busy indication
  2 = Wrong number
  3 = Other

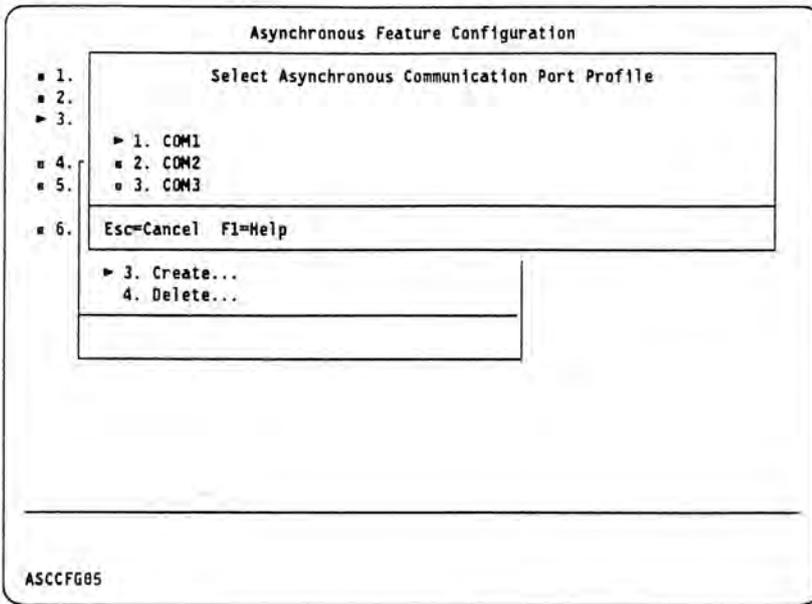
Type      Response String
[1]      [BUSY|^J      ]
[2]      [NO CARRIER|^J ]
[ ]      [      ]
[ ]      [      ]
[ ]      [      ]
[ ]      [      ]
[ ]      [      ]
[ ]      [      ]

Enter Esc=Cancel F1=Help F7=Backward
ASCCFG84

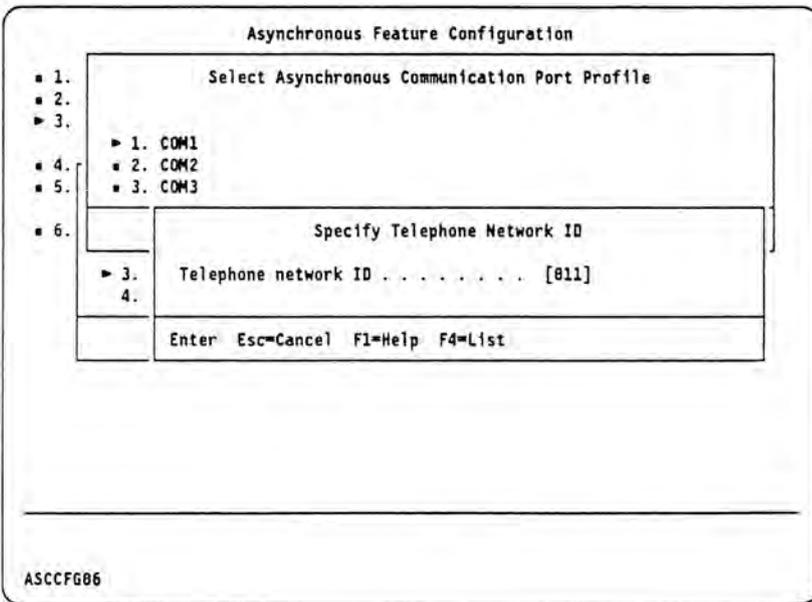
```

Visual 12-8. Device string profiles

- All of these commands are dependent upon the particular modem you are using. Consult the modem documentation for assistance.
- Use the Hayes models and it will most likely work.

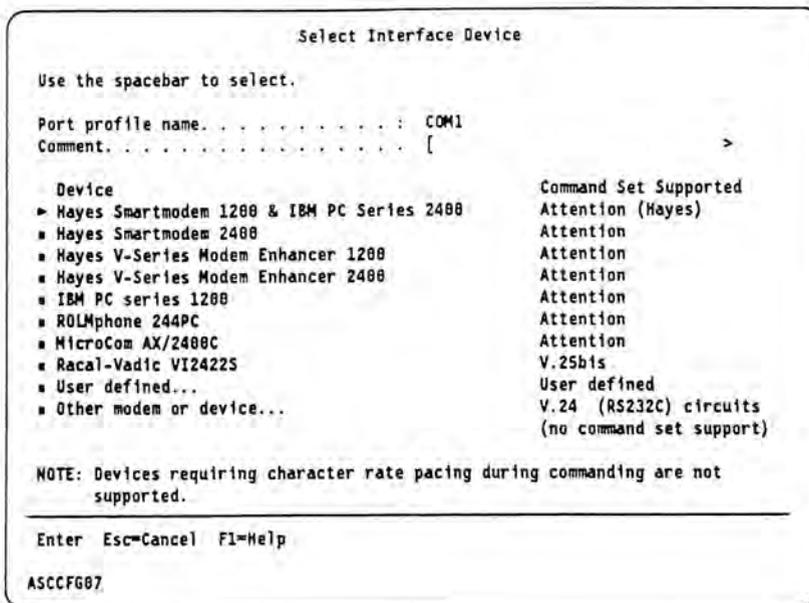


Visual 12-9. Communications Port Profiles part 1



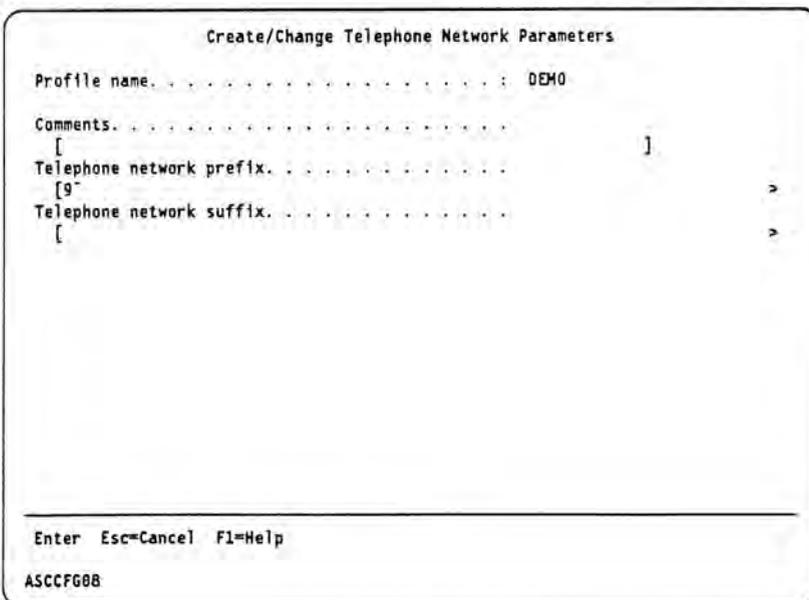
Visual 12-10. Communications Port Profiles part 2

- All three COM ports can be defined and used. Only one can be used at a time however.
- Telephone network ID means the same thing here.



Visual 12-11. Communications Port Profiles part 3

- When you configure a COM port, you are telling the system what kind of device is attached to the COM port.



Visual 12-12. Telephone network profiles

- A telephone network profile allows you to specify strings that will be dialed before and after the actual phone number (eg. Long distance access codes).

```

Create/Change ASCII Terminal Emulation Profile (1 of 3)

Use the spacebar to select.

Profile name. . . . . : DEMO
Comments. . . . . : [IBM 3101 ASCII terminal emulat>
Communication port. . . . . ▶ COM1
                                     COM2
                                     COM3
Emulation mode. . . . . ▶ IBM3101...
                                     ■ VT100
COM port speed. . . . . : [1200 ]
Bits per character. . . . . ▶ 7 bits      ■ 8 bits
Parity type . . . . . ▶ Even           ■ Odd
                                     ■ Mark
                                     ■ Space
                                     ■ None
Number of stop bits . . . . . ▶ 1 bit     ■ 2 bits

Local display . . . . . ■ Yes           ▶ No
Auto return . . . . . ▶ Yes           ■ No
Enter key . . . . . ■ CR/LF          ▶ CR
Line-ending control . . . . . ▶ Yes     ■ No

Enter Esc=Cancel F1=Help F4=List F8=Forward

ASCCFG09
    
```

Visual 12-13. Terminal Emulation Profiles part 1

```

Create/Change ASCII Terminal Emulation Profile (1 of 3)

IBM 3101 Parameters

Use the spacebar to select.

Turnaround character. . . . . ▶ CR
                                     ■ ETX
                                     ■ EOT
                                     ■ DC3
Scrolling . . . . . ▶ Yes
                                     ■ No
Mode. . . . . ▶ Character
                                     ■ Block
Null suppression. . . . . ▶ Yes
                                     ■ No

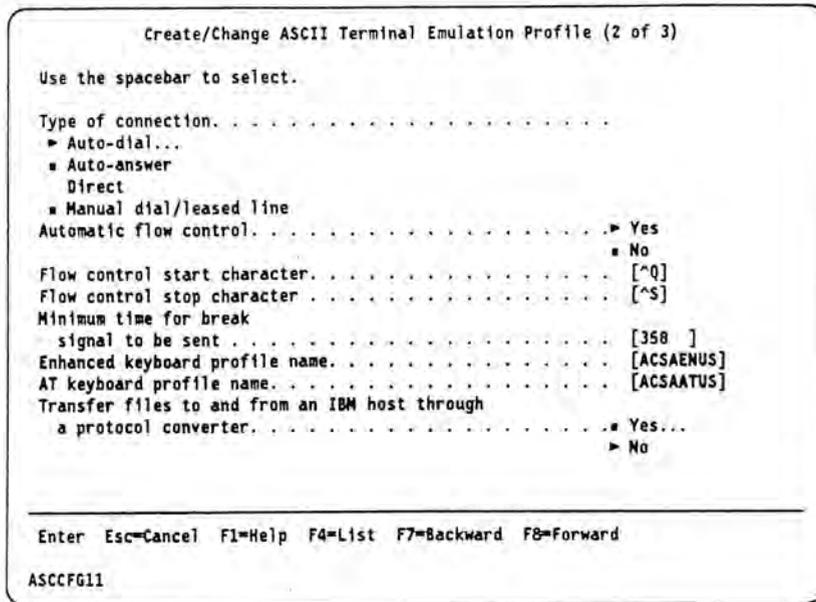
Enter Esc=Cancel F1=Help

Line-ending control . . . . . ▶ Yes     ■ No

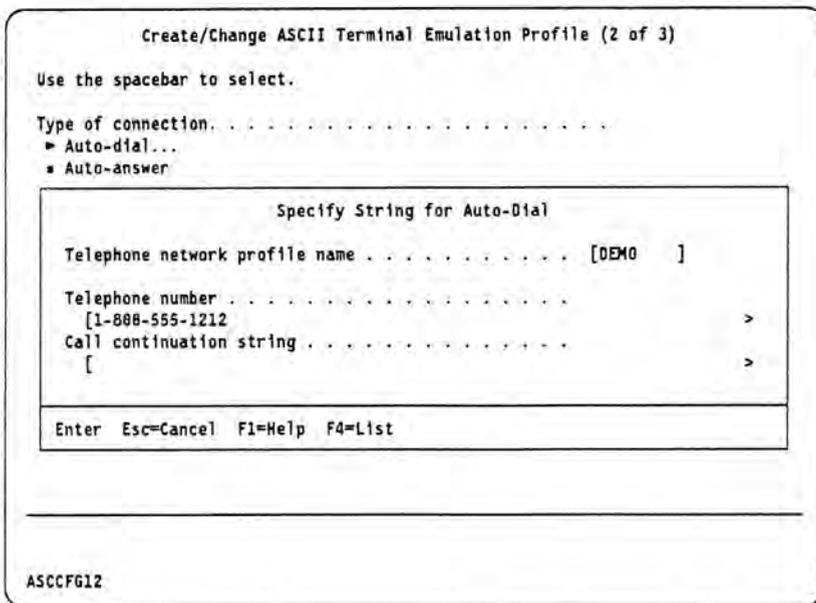
ASCCFG10
    
```

Visual 12-14. Terminal Emulation Profiles part 2

- Although there are more parameters here than the other profiles you have seen, very few will ever need changing. Several standard settings have emerged over time.



Visual 12-15. Terminal Emulation Profiles part 3



Visual 12-16. Terminal Emulation Profiles part 4

- If you are remapping the keyboard, make sure and specify your keyboard profile here.
- If you are not using a telephone network profile, leave the field blank.
- The call continuation string can be used to automate logon to the remote system.


```

                                Create/Change TSO Profile

Use the spacebar to select.

Profile name. . . . . : DEMO

Comment . . . . .
  [MODEL PROFILE ASYNC FILE TRANSFER  IBM HOST(TSO)  TEXT FILES]
ASCII to/from EBCDIC translation. . . . . ▶ Yes      ■ No
Use CR/LF as record separator . . . . . ▶ Yes      ■ No
PC file code page . . . . . [437 ]
Host file code page . . . . . [037 ]
IBM host file transfer command
  name. . . . . [INOS$FILE]
Append to target file . . . . . ■ Yes      ▶ No
Modify host file characteristics
  options . . . . . ■ Yes      ▶ No
One-to-one character mapping. . . . . ▶ Yes      ■ No

-----
Enter Esc=Cancel F1=Help F4=List

ASCCFG15

```

Visual 12-19. File Transfer Profile

- File transfer profiles for IBM hosts look just like the 3270 versions.
- Xmodem is a very unique profile. All it has is a comment line.

Unit 13. Subsystem Management

What This Unit is About

Subsystem management is used to monitor and control communications resources. It also allows you to make performance adjustments in the SNA communications service. During this unit, you are going to be presented with the various subsystem management tools that are available to you.

What You Should Be Able to Do

After completing this unit, you should be able to

- List the various subsystem management functions that are available.
- Perform specific subsystem management functions.

Topic 13.1. Subsystem Management

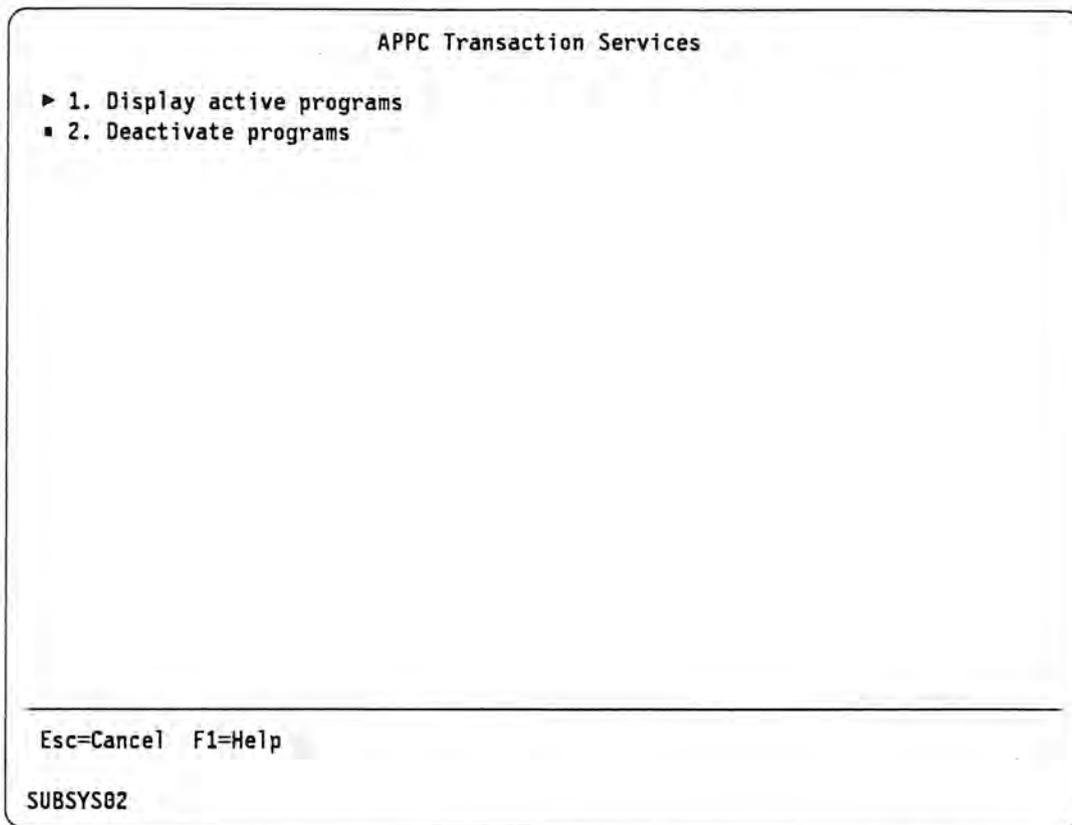
Subsystem Management Functions

- **APPC Transaction Services**
- **Display active SNA configuration**
- **SNA logical link services**
- **Session services**
- **Data link control services**
- **Attach manager services**
- **Signed-on list**
- **X.25 virtual circuit services**
- **X.25 physical link services**

SUBSYS01

Visual 13-1. Subsystem Management Functions

- Subsystem management is under the control of the keylock. When a configuration file is locked, no subsystem management functions can be performed, except display.
- In order for Subsystem management to be selectable, APPC must be running.



Visual 13-2. APPC Transaction Services

- APPC transaction services allows you to display and deactivate APPC transaction programs.
- The display function displays all active TPs.
- The deactivate function lets you deactivate specific TPs.

Display SNA Configuration

```

Display Active SNA Configuration
Display Options Help
Logical Unit 6.2
Number of logical units (LUs) 1
1>LU name OS28064M
LU alias OS28064M
Fully-qualified LU name USIBMES.OS28064M
Default LU Yes
LU local address Independent
Configured sessions limit 65535
Transaction programs limit No limit
LU type 6.2
Number of partner LUs (PLUs) 1
1.1>Partner LU alias OS28064
Partner LU uninterpreted name X'0000000000000000'
Partner LU name USIBMES.OS28064
Partner LU session limit 65535
DLC name
Adapter number 8
Destination DLC address X..
Parallel sessions Supported
Session security Not configured
Conversation security Configured, Active
Already verified security Not configured, Not configured
Implicit partner No
Number of modes for this PLU 1
1.1.1>Mode name CPSUCMG
Max RU size, lower limit 256
Max RU size, upper limit 512
Max negotiable session limit 2
Current session limit 2

```

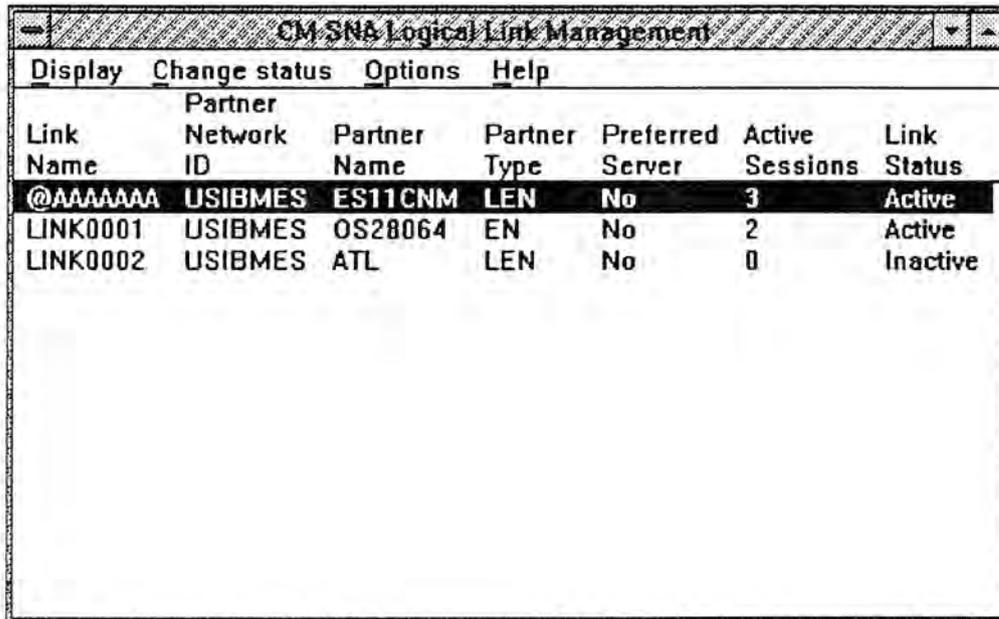
SUBSYS10

Visual 13-3. Display Active SNA Configuration

- This is just one of the many items that can be displayed with the **Display Active SNA Configuration** function.
- Just about everything related to SNA communications can be displayed.
- The display tool can also be used to display the SNA configuration of a remote system.
- The remote system must have an program called **RDSPSRVR** installed in the default transaction program path or have an explicit transaction program definition for the program.

Note: The RDSPSRVR program is installed when you install the utilities from the **Additional features** option of REINST.

SNA Logical Link Services



The screenshot shows a window titled "CM SNA Logical Link Management" with a menu bar containing "Display", "Change status", "Options", and "Help". Below the menu bar is a table with the following columns: Link Name, Partner Network ID, Partner Name, Partner Type, Preferred Server, Active Sessions, and Link Status. The table contains three rows of data.

Link Name	Partner Network ID	Partner Name	Partner Type	Preferred Server	Active Sessions	Link Status
@AAAAAAA	USIBMES	ES11CNM	LEN	No	3	Active
LINK0001	USIBMES	OS28064	EN	No	2	Active
LINK0002	USIBMES	ATL	LEN	No	0	Inactive

SUBSYS12

Visual 13-4. SNA Logical Link Services

With SNA Logical Link Services, you can:

- Activate inactive links
- Deactivate active links
- Display detailed information on a specific link

Just select the link you want to work with, and select an action from the action bar.

SNA Logical Link Services

Extended Link information: @AAAAAA	
Link status:	Active
Fully qualified partner name:	USIBMES.ES11CNM
Partner type:	LEN
DLC type:	IBMTRNET
Adapter number:	0
Destination address:	40000712110104
CP sessions supported:	No
TG number:	0
Link station role:	Secondary
Activation direction:	Outbound
Deactivate pending:	Not in progress
Active sessions:	3
BTU size:	1929
Connection type:	Host or Peer
<input type="button" value="Cancel"/> <input type="button" value="Help"/>	

SUBSYS12

Visual 13-5. Detailed Link Information

- This is an example of detailed link information.
- This particular link is an implicit link to a 370 host.
- Implicit links will be prefixed with an @ sign.

Session Services Menu

- ▶ 1. Display sessions
- 2. Display gateway sessions
- 3. Change APPC session limits
- 4. Immediate deactivation of APPC session

Esc=Cancel F1=Help

SUBSYS03

Visual 13-6. Session Services Menu

```

Display Sessions

Select a list number and press Enter to display detail data.

An asterisk (*) in the List Number indicates an active LU 6.2 session.

List      Partner      LU      Mode      DLC
Number    LU Alias    LU Alias Name    Type      Type

▶ 1*      0S28064    STLOUIS  QPCSUPP   LU 6.2
■ 2       0S28064    STLOUIS  SNASVCMG  LU 6.2
■ 3*      0S28064    0S28064N CPSVCMG   LU 6.2
■ 4*      0S28064    0S28064N CPSVCMG   LU 6.2
■ 5       A          B          LU 2      IBMTRNET
■ 6       B          B          LU 2      IBMTRNET

Esc=Cancel F1=Help

SUBSYS04

```

Visual 13-7. Display Sessions

- An asterisk precedes any active session.

```

Display APPC Detail Session Data

List number . . . . . : 1
LU alias . . . . . : 0S28064
LU name . . . . . : 0S28064
Partner LU alias . . . . . : STLOUIS
Partner fully qualified LU name . . . . . : USIBMES.STL
Mode name . . . . . : QPCSUPP
Type of connection . . . . . : PU 2.1
Current mode session limit . . . . . : 64
SSCP-LU session status . . . . . : NONE
Active conversation ID . . . . . : 6AE27FCF
DLC type . . . . . :
Adapter number . . . . . : 8
Circuit type . . . . . :
Link name . . . . . :
Destination name . . . . . :
Destination address . . . . . : 400007132022
Active TP name . . . . . :
5250 WORK STATION FEATURE

Esc=Cancel F1=Help

SUBSYS05

```

Visual 13-8. Display APPC Detail Session Data

- You can get the same LU 6.2 session information, and more, from the **Display Active SNA Configuration** function.

```
Change APPC Session Limit Options

LU alias. . . . . : OS28064
Partner LU alias. . . . . : STLOUIS
Mode name . . . . . : QPCSUP

Maximum number of sessions for this mode . . . . . [32767]
Minimum number of contention winners source. . . . . [32 ]
Minimum number of contention winners target. . . . . [0 ]
Number of automatically activated sessions . . . . . [0 ]

Enter Esc=Cancel F1=Help

SUBSYS06
```

Visual 13-9. Change APPC Session Limits

- This function allows you to change the session limits between a pair of LUs using a particular mode.
- Before you can change session limits, you must set the current number of sessions for the mode to zero. That is, you cannot directly change session limits from one non-zero value to another non-zero value.
- Use the **Immediate Deactivation of APPC Session** function to set the current sessions to zero.

Immediate Deactivation of APPC Session

Enter an asterisk (*) in a field if you will accept all of the names defined in the configuration file for that field.

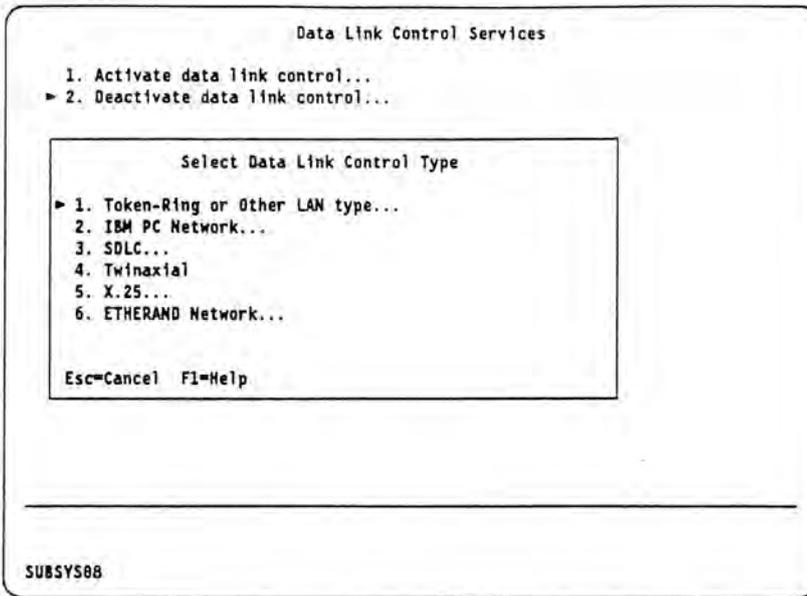
LU alias. [OS28864]
Partner LU alias. [STLOUIS]
Mode name [QPCSUPP]

Enter Esc=Cancel F1=Help F4=List

SUBSYS07

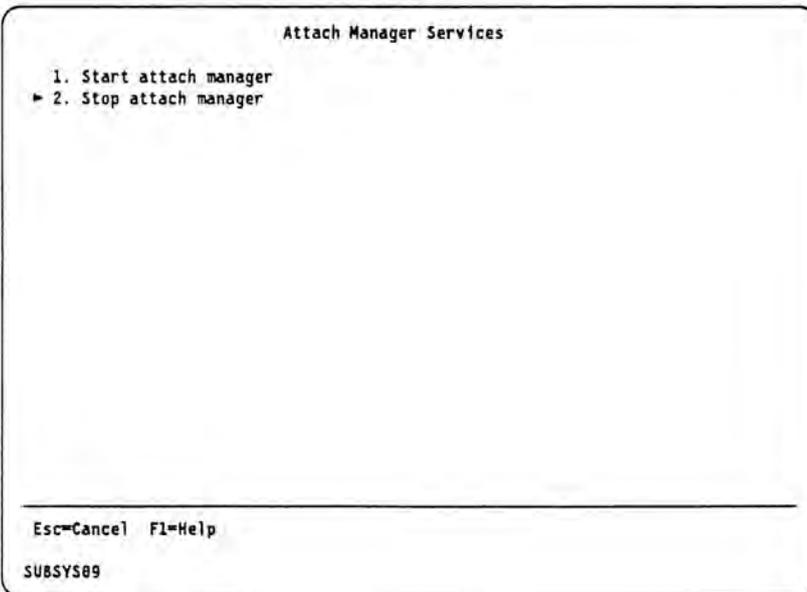
Visual 13-10. Immediate Deactivation of APPC Session

- This function will deactivate all of the sessions, using the specified mode, between two LUs.



Visual 13-11. Data Link Control Services

- You can activate and deactivate any of your configured data link controls.

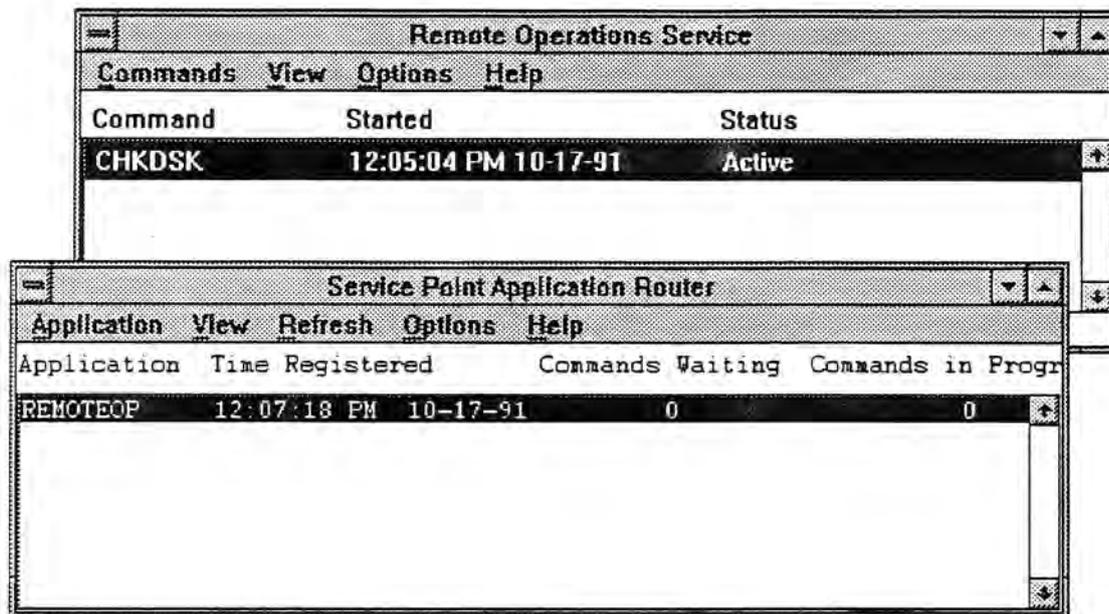


Visual 13-12. Attach Manager Services

- Start and Stop is all you can do to the Attach Manager.

Topic 13.2. Service Point Application Router and Remote Operations Service

SPA Router/ROP Service



SUBSPACE

Visual 13-13. Service Point Application Router/Remote Operations Service

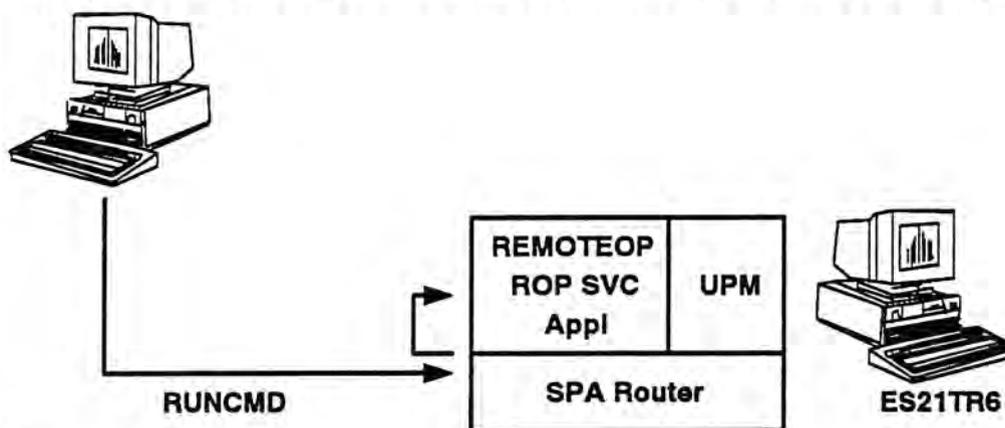
- Service Point Application Router and Remote Operations Service allow a network to be managed remotely from the NetView program.
- Commands can be initiated at a NetView console and they will be executed at a remote OS/2 workstation.
- SPA Router is the program that receives the command from NetView. It then sends it to a specified application, such as the ROP service. The application that is to receive the command is included in the NetView command.
- The ROP Service processes the commands. The commands may be any OS/2 commands that have a command line interface and do not need interactive user input.
- These services are installed by placing Extended Services for OS/2 disk 1 into the A drive and entering **A:\ROPS**.
- A group will be created that contains the two programs.
- Start The SPA Router first, then the ROPS Service. ROPS must register with the SPA Router.

SPA Router and ROP Service

The NETVIEW operator (Bubba) wants to look at the directory on Drive C on PU ES21TR6. The ROP Service application name is REMOTEOP. A password of TEXAS has been set up in UPM on ES21TR6.

NETVIEW Console

RUNCMD SP=ES21TR6, APPL=REMOTEOP, OP=BUBBA; PASS=TEXAS; DIR C:



SUBSPA01

Visual 13-14. SPA Router and ROP Service Example

- In this example, you can see how the information is routed:
 - A remote NetView console operator will issue a command to a specific PU.
 - The SPA router receives the command and determines which application should process the command.
 - In this case, the ROP (REMOTEOP) service processes the command and the result is sent back to the NetView operator.

Output from NETVIEW Console

```

C - C - 3270 Emulator
NCCP      N E T V I E W      ES102 MARTY      10/17/91 14:21:37
* ES102   RUNCMD SP=ES21TR6,APPL=REMOTEOP,OP=BUBBA;PASS=TEXAS;DIR C:
-         Start of Output [] DIR C:
-
-         The volume label in drive C is OS2.
-         The Volume Serial Number is E5B3:7C14
-         Directory of C:\
-
-         10-09-91 11:53a <DIR>      0 .
-         10-09-91 11:53a <DIR>      0 ..
-         10-09-91 12:11p      83      0 AUTOEXEC.BAT
-         10-11-91  3:48p     2125     0 Config.Bak
-         10-17-91 11:38a     2154     0 CONFIG.SYS
-         10-11-91 12:59p    10406     0 ERROR.LST
-         10-09-91 12:30p <DIR>      0 IBMCOM
-         10-17-91  1:06p     1500     0 IBMVLV.INI
-         10-09-91 12:28p <DIR>      0 MUGLIB
-         10-09-91 11:54a <DIR>      0 OS2
-          6-29-91  4:57p     7764     0 OS2LDR.MSC
-         10-09-91 12:22p <DIR>      0 SPOOL
-         10-14-91  9:22a      74      0 STARTUP.CMD
-
-         ??? ***
    
```

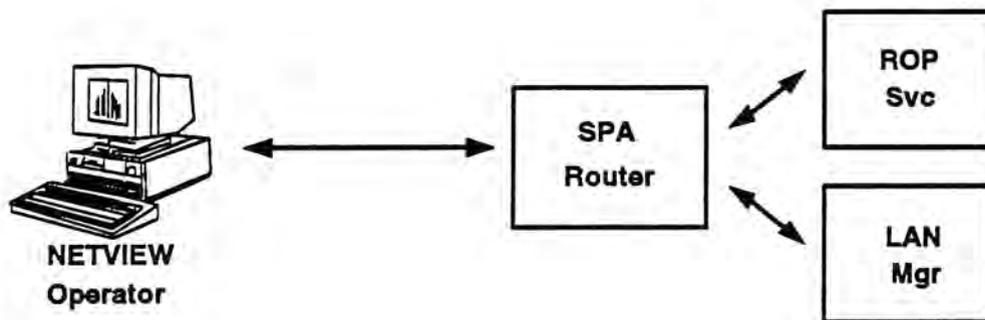
SUBSPA02

Visual 13-15. NetView Console Output

- The result is displayed on the remote NetView console.

Using SPA Router

- Running the SPA Router and ROP Service together provides remote operations from the Netview program
- SPA Router can also route commands to other programs like LAN Network Manager



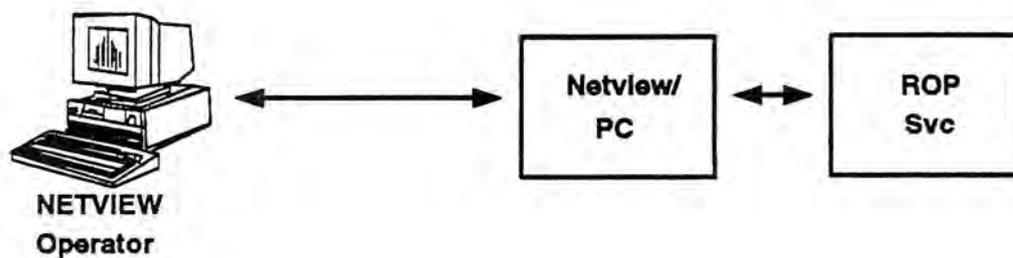
SUBSPA04

Visual 13-16. Using SPA Router

- Just as the ROP service can register with the SPA Router, so can LAN Network Manager.
- Commands could then be sent to either ROP Service or LAN Network Manager.

Using ROP Service

- Run Netview/PC Version 1.2.1 or later with ROP Service to provide remote operations with Netview



SUBSPA06

Visual 13-17. Using ROP Service

- The ROP service could register with NetView PC instead of the SPA Router. This way you could take advantage of the higher functionality of NetView PC.

Unit 14. Problem Determination

What This Unit is About

There will come a time when things just don't work the way they should. When this happens, it may be time to turn to the problem determination tools that are available to Communications Manager. In this unit you will find out what problem determination tools are available and how to use them. We will also discuss the IBM service and support that is available for OS/2 and Communications Manager.

What You Should Be Able to Do

After completing this unit, you should be able to

- List the problem determination tools that are available.
- Describe the Network Management functions in Communications Manager.
- Perform a trace on Communications Manager information.
- Access the Communications Manager error log.
- Use the Communications Manager message log.
- Activate the Communications Manager dump facility.
- Describe IBM service/support for OS/2 and Communications Manager.

Topic 14.1. Problem Determination

Service Coordinator Duties

- **Establish and maintain problem related records.**
- **Advise users that a Service Coordinator is available to help resolve or define problems that users cannot resolve using other resources available to them.**
- **Use the diagnostics tools provided with OS/2 and Extended Services**
- **Interface with IBM.**

PROOV01

Visual 14-1. Service Coordinator Duties

- As an interface to IBM, the service coordinator:
 - Reports suspected Extended Services program defects to IBM.
 - Responds to the IBM Support Center with the results of problem determination steps.
 - Receives Corrective Service Diskettes (CSDs) from IBM and helps to install them.
- Service coordinators must inform IBM if they are relocated, reassigned, or if a new person assumes the responsibilities.
- Use *IBM Extended Services for OS/2 Problem Determination Guide for the Service Coordinator*, S04G-1006 to work through the problem determination flowcharts.

System Administrator

- **Install and configure the Communications Manager.**
- **Verify the proper operation of Communications Manager in the end user environment.**
- **Interface with the Network Administrator to identify Communications Manager requirements such as NETBIOS and IEEE 802.2 protocols.**

PROOVRO2

Visual 14-2. Communications Manager Systems Administrator

- Installation includes the determination of the requirements for all users in the network and creating configuration diskettes or configuration worksheets for the users.
- If Communications Manager is being used by entry-level or first time users, the system administrator provides run books or instruction sheets to assist the user in performing Communications Manager functions. The information provided is customized to the specific Communications Manager functions being used.

Network Administrator

- **Serves as a network installer, coordinator, and analyst by:**
 - ◆ **Interfacing with other Network Administrators.**
 - ◆ **Interfacing with the Systems Administrator to identify LAN specific Communications Manager requirements such as NETBIOS and IEEE 802.2 protocols.**

PROOV03

Visual 14-3. Network Administrator

- The network administrator has the primary responsibility for setting up and maintaining the local area network to which the computers are connected. The network administrator should be an experienced user or application programmer.
- Interface with end users to answer questions or resolve problems associated with LAN hardware or non-IBM LAN application software.
- Monitoring system performance and fine tuning as necessary to improve performance and resolve problems.

Host Computer Personnel

- **Configure the host system software to function properly with the Extended Services program and the other components in your network.**

- **Resolve host related problems.**

PRG0V104

Visual 14-4. Host Computer Personnel

- Host personnel maintain the midrange and mainframe computers that may be part of the network.

IBM Support Center

- Helps to resolve program defects in supported software.
- Provides trained personnel, experienced in solving users' problems.
- The Support Center researches the problem based upon symptoms reported.
- The problem cause and solution are then documented.

PROOV706

Visual 14-5. IBM Support Center

The support center process works as follows:

1. Service coordinator completes a problem report form.
2. Phone IBM support Center and report the problem. The IBM representative will ask questions about the problem which can be obtained from the completed PRF.
3. IBM Support Center assigned a problem management record to the problem
4. IBM will research the problem to find a solution, or determine the cause of the problem.
5. The Support Center will return a status call within eight hours.
6. If the problem is new and unique, IBM will continue to research the problem and an Authorized Program Analysis Report (APAR) number will be assigned. Record this number on the PRF.
7. When the problem is solved, the APAR is closed and the problem cause and solution are documented.

PRF: Problem Report Form

Diagnostic Tools

- Logging Utilities
- Trace Utilities
- Dump Utilities
- Status Utilities

PROOV07

Visual 14-6. Diagnostic Tools

- Use the diagnostic tool in conjunction with the problem determination flowcharts in the *IBM Extended Services for OS/2 Problem Determination Guide for the Service Coordinator*, S04G-1006.
- The status utility is the OS/2 PSTAT program which provided information about running processes in the system.

Topic 14.2. Logging Utilities

Logging Utilities

- OS/2 Logging Facility
- LANTRAN.LOG
- Communications Manager Message Log
- Communications Manager Error Log
- FFST/2 Message Log

PROLOG01

Visual 14-7. Logging Utilities

- The OS/2 logging facility, SYSLOG, is available as a problem determination aid, but will not be discussed in this course.

LANTRAN.LOG

```
LT00073: FFST/2 is installed but is not initialized. LANTRAN.LOG is being created.
IBM OS/2 LANMSGDD [Beta 09/03/91] 1.01 is loaded and operational.
```

```
IBM OS/2 LAN Protocol Manager
```

```
IBM OS/2 LANDD [Beta 09/03/91] 2.01.2
```

```
IBM OS/2 LANDLLDD 12/12/90 17.12
```

```
IBM OS/2 LANDLLDD is loaded and operational.
```

```
IBM OS/2 NETBEUI 2.01
```

```
IBM - IBM Token-Ring Network Driver, Version V.2.02
```

```
IBM Token-Ring adapter data rate is 4 mbps.
```

```
IBM LANDD is accessing IBM 802.5 LAN Interface.
```

```
Adapter 0 was initialized and opened successfully.
```

```
Adapter 0 is using node address 400007171046.
```

```
IBM LANDD was successfully bound to MAC: IBMTOK_nif->VECTOR.
```

```
IBM OS/2 NETBIOS 3.0
```

```
Adapter 0 has 35 NCBs, 8 sessions, and 7 names available to NETBIOS applications.
```

```
NETBIOS 3.0 is loaded and operational.
```

```
IBM OS/2 LAN Netbind
```

```
PROLAN01
```

Visual 14-8. LANTRAN.LOG

- Information about the initialization of a LAN workstation is stored in the LANTRAN.LOG file.
- This file is created new each time the system is booted.
- The command:


```
DEVICE=C:\IBMCOM\LANMSGDD.OS2 /I:C:\IBMCOM
```

 controls the LANTRAN.LOG file:
 - /I: determines where the LANTRAN.LOG file will be written
 - /P: disables the pause on error function
 - /S: turns off the message display. Message will still be logged though.
- The LANTRAN.LOG can be viewed with the TYPE command or with an editor to investigate suspected LAN communications problems.
- If FFST/2 is installed, this information will be logged there as well.

Message Log

Display Messages

To view all messages in the current log, press Enter.

To view messages in another log or only certain messages in any log, type in your choices and press Enter.

Message log name. [MESSAGE.DAT]

Message date. [18]-[22]-[91]

Message time. []:[]

Type the name of an originator, leave blank for all originators, or press F4=List to select a name from a list.

Originator. [3278EM]

Enter Esc=Cancel F1=Help F4=List

PROMSG01

Visual 14-9. Message Log

- The Communications Manager message log is used to:
 - Save Communications Manager messages, and related help information for later reference when the messages:
 - Are not associated with the current application, screen or panel.
 - Are produced by Communications Manager applications that generate multiple messages or require a record of messages that have been generated.
 - Store messages that are associated with user applications that contain the LOG_MESSAGE verb.
- It provides a sequence of events or errors that led to a particular event or problem.
- The name, size, and wrap characteristics of the message log file are specified in the workstation profile and auto-start options.
- Only messages that were logged after the specified date and time will be displayed.
- Messages can be restricted to a particular originator. Press [F4] for a list of originators.
- The message log file can be deleted while Communications Manager is not running.

```

Message Log Display

Log name . . . . . :
MESSAGE.DAT
Activated. . . . . : 10-23-91 13:31

To get help information for a message, place the cursor on
the message number and press F1.

Message number. . . . . ACS0608W
A Systems Network Architecture (SNA) error occurred in 5258 Work
Station Feature session 01. Session 01 stopped.

Date/Time . . . . . : 10-22-91 13:58:36
Originator. . . . . : 5258WSF

Esc=Cancel F1=Help F7=Backward F8=Forward

PROMSG02
    
```

Visual 14-10. Display of Message Log

```

Message Log Display

Log name . . . . . :
MESSAGE.DAT
Activated. . . . . : 10-23-91

To get help information for a messa
the message number and press F1.

Message number. . . . . ACS
A Systems Network Architecture (S
Station Feature session 01. Sess

Date/Time . . . . . : 10-2
Originator. . . . . : 5258

Esc=Cancel F1=Help

PROMSG03
    
```

Visual 14-11. Help for messages

- Help is available for all messages. Just locate the cursor at the desired message, and press the [F1] key.
- The message log can be printed with the OS/2 print command.

Error Log

Error Log Services

Log name :
 ERROR.DAT

Activated : 10-23-91 13:31

▶ 1. Display error log...

Error Log Display Criteria

Log name
 [ERROR.DAT]

Log type [0000]

From date [10]-[23]-[91]

From time [13]:[31]

Enter Esc=Cancel F1=Help

PROERR01

Visual 14-12. Error Log

- One of the primary uses for the error log is to store Communications and Network Management data whenever an alert is generated.
- A complete copy of any alert is also logged in the error log. This is useful for later reference in case the host link was not active and the alert never arrived.
- The name, size, and wrap characteristics of the error log file are specified in the workstation profile and auto-start options.
- Only errors that were logged after the specified date and time will be displayed.
- Errors can be restricted to a particular type. Press [F4] for a list of types.
- The error log file can be deleted while Communications Manager is not running.
- The error log file is in binary format and cannot be viewed or edited outside of Communications Manager.

First Failure Support Technology/2

- Software RAS tool

- Packaged with EXTD/2 1.0 and LS/2 2.0

PROBTD1

Visual 14-15. First Failure Support Technology/2

- FFST/2 is unconditionally installed and activated whenever the Extended Services for OS/2 is installed. FFST/2 is also packaged with the LS 2.0 product. The installation program will detect the current version of FFST/2 that is installed, and will only install a more recent version.

RAS Reliability, Availability, and Serviceability

FFST/2 Utilization

- **Communications Manager does not utilize FFST/2.**
- **LAN Adapter and Protocol Support uses FFST/2 to log error messages.**
- **Database Manager uses FFST/2 for the creation of error log entries.**

PROFST02

Visual 14-16. FFST/2 Utilization

- The information that is logged in the LANTRAN.LOG file is also logged in the FFST/2 log if FFST/2 is active.

FFST/2 Capabilities

- Customized dump
- Error logging
- Generic alert
- Message service
- Console services
- Routers

PROFSTC2

Visual 14-17. FFST/2 Capabilities

FFST/2 selectively provides many RAS functions required by both OS/2 applications and OS/2 system software:

Customized Dump: FFST/2 can collect and dump storage areas and/or files selected by the calling application.

Error Logging: FFST/2 can construct a symptom record which uniquely identifies the error detected and places it in the OS/2 system error log.

Generic Alert: FFST/2 can build and forward a software generic alert that describes the error detected. This alert will include key segments of the symptom record built by the FFST/2 error logging facility.

Message Service: FFST/2 can retrieve and log application-specified messages from NLS message files. FFST/2 can also, optionally, display the message using the FFST/2 Message Console Facility. The message display can be turned off by the user through the FFST/2 Initialization/Configuration program.

Console Services: FFST/2 also provides a PM message control facility that maintains a scrollable copy of all messages logged or displayed by FFST/2.

Routers: The FFST/2 Router provides the path to send the generic alerts. The generic alerts will be routed by Communications Manager over an SNA link or over a LAN to the IBM LAN Manager. Both paths end at NetView and may then use the FFST/2 Service for both hardware and software RETAIN support.

FFST/2 Operations

- Enable/disable of FFST/2 functions
- Enable/disable display of FFST/2 messages
- Control max number of dump data sets
- Select target location of dump data files
- Select path and filename of FFST message log

PROFST04

Visual 14-18. FFST/2 Operations

Topic 14.3. The Trace Facility

Trace Utilities

- **OS/2 System Trace Utility and Formatter**

- **GDDM-OS/2 Link Trace**

- **Communications Manager Trace Services**

PROTRC04

Visual 14-19. Trace Utilities

- The OS/2 system trace utility is available for problem determination purposes.
- GDDM-OS/2 Link trace is enabled by running the GQFTRACE program. When it is run, it will trace all information related to the GDDM-OS/2 Link product. It can be used for GDDM-OS/2 Link problem determination.

Trace Services

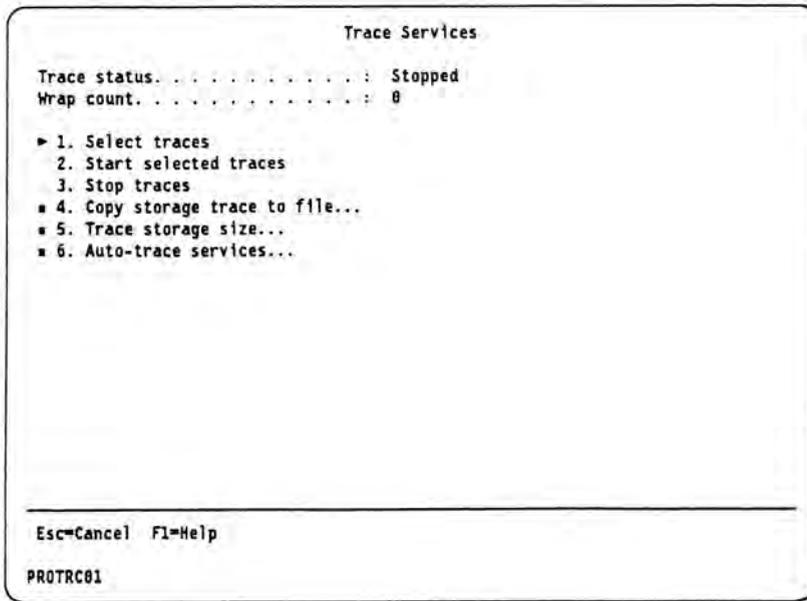
- **Trace services is used to diagnose a communications problem with a particular function or user written application by recording, or tracing a sequence of events.**

- **Trace Services can be accessed through:**
 - **The Trace Services Menu interface.**
 - **The command line interface commands.**
 - **The Common Services API.**

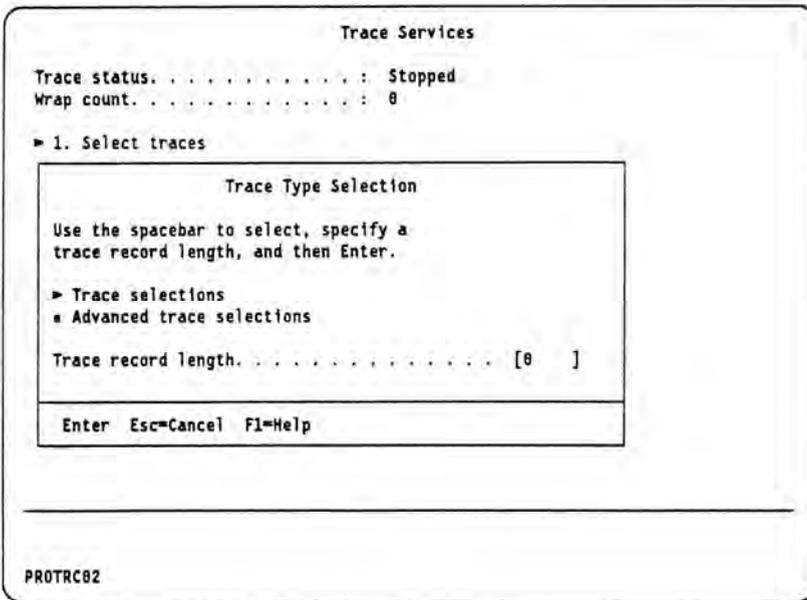
PROTIPS

Visual 14-20. Trace Services

- The active configuration file must not be locked if you wish to perform trace services.

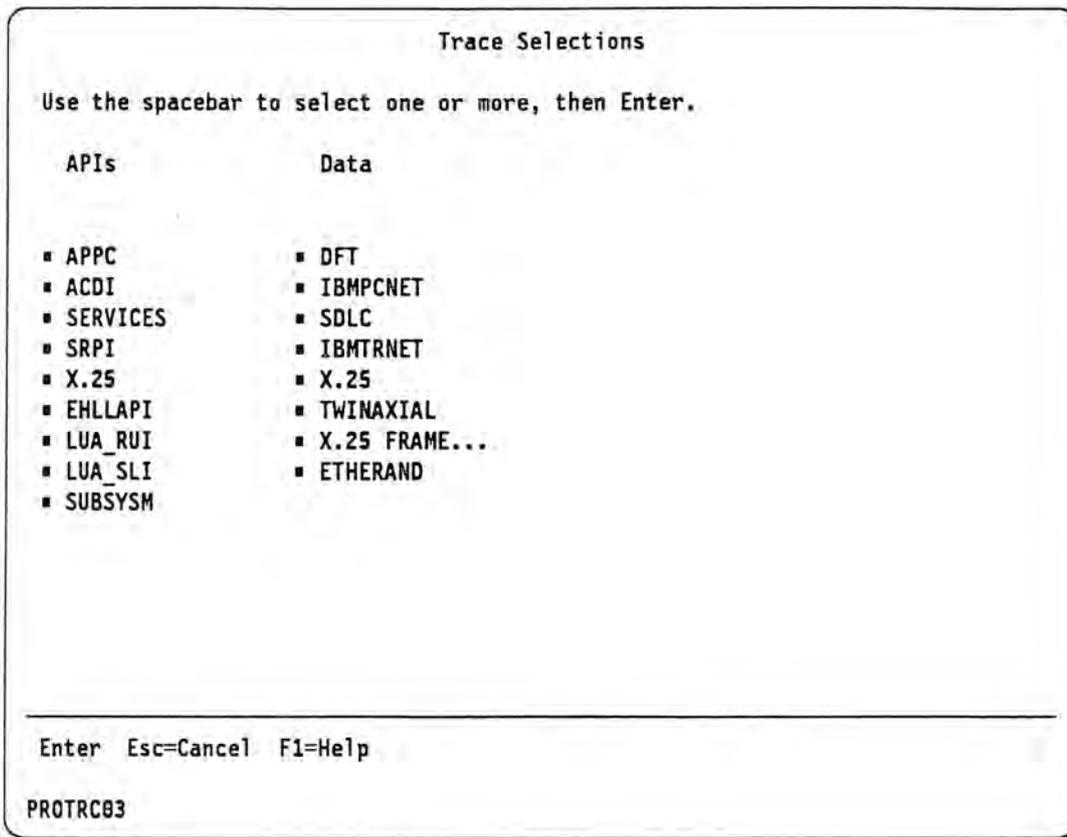


Visual 14-21. Trace Services Main Menu



Visual 14-22. Selecting Traces

- You can select **Normal Traces** and/or **Advanced Traces**.
- The trace record length is used to determine the amount of trace data that will be saved. If you leave the value at 0, the all date will be saved. The maximum is 12000 bytes.



Visual 14-23. Normal Trace Selections

- These are the traces you can select with the **Trace Selections** option.
- The **API** trace will trace the interface calls that are made by an application to the selected API. For example, when an MC_ALLOCATE verb is issued, the APPC API trace will have an entry.
- The data traces will trace all Packet Information Units (PIUs), that come in or go out of the specified DLCs.

Advanced Trace Selections

Use the spacebar to select one or more, then Enter.

System Events

▪ EVENT 01	▪ EVENT 16
▪ EVENT 02	▪ EVENT 17
▪ EVENT 03	▪ EVENT 18
▪ EVENT 04	▪ EVENT 19...
▪ EVENT 05	▪ EVENT 20
▪ EVENT 06	▪ EVENT 21
▪ EVENT 07	▪ EVENT 22
▪ EVENT 08	▪ EVENT 23
▪ EVENT 09	▪ EVENT 24
▪ EVENT 10	▪ EVENT 25
▪ EVENT 11	▪ EVENT 26
▪ EVENT 12	▪ EVENT 27
▪ EVENT 13	▪ EVENT 28
▪ EVENT 14	▪ EVENT 29
▪ EVENT 15	▪ EVENT 30

Enter Esc=Cancel F1=Help

PROTRC04

Visual 14-24. Advanced Trace Selections

- The advanced traces are meant to be used under the direction of IBM Support Representatives.
- Each event will trace a particular activity.
- The Support personnel know which event does what.

```
Auto-trace Services
Auto-trace status . . . . . : Disabled
▶ 1. Select and store auto-traces
▪ 2. Enable auto-trace
  3. Disable auto-trace
▪ 4. Trace storage size...

Esc=Cancel F1=Help
PROTRC05
```

Visual 14-25. Auto-trace Services

- Auto-trace is used to activate traces as Communications Manager is starting.
- The auto-trace is useful to trace Communications Manager start-up information.
- Link activations and early API calls are good candidates for auto- trace.
- Don't forget to disable the auto-trace when you are through, or the trace will be active every time you start Communications Manager. Performance will be affected.

CMTRACE

CMTRACE

(C) Copyright IBM Corporation 1990, 1991

Usage:

```
CMTRACE START flags      Start one or more trace categories
CMTRACE STOP  flags      Stop one or more trace categories
CMTRACE COPY  flags file  Copy a trace to a file
```

The flags are:

```
/api, followed by one or more (blank separated) of:
  ACDI, APPC, EHLAPI, LUARUI, SERVICES, LUASLI, SRPI, SUBSYSM, X25,
  X25FRAME
/data, followed by one or more (blank separated) of:
  DFT, ETHERAND, IBMPCNET, SDLC, IBMTRNET, TWINAXIAL, X25
/event, followed by one or more (blank separated) numbers between 1 and 30
/key, followed by a 1-8 character key
/reset resets the trace buffer. Previous trace records are lost
/stdout write the trace data to standard output
/storage <n>, where <n> is number of 64KB segments for trace buffers
/trunc <n>, where <n> length at which trace records are truncated
```

The flags that can be used with the various operations are:

```
AUTOSTART /key, /api, /data, /event, /trunc, /storage
START     /key, /api, /data, /event, /reset, /trunc, /storage
STOP      /key, /api, /data, /event
COPY      /key, /stdout
```

Case is immaterial in all flags and keywords. Flags and keywords may be abbreviated so long as they remain unique.

PROTRC06

Visual 14-26. CMTRACE

- CMTRACE is the command line interface to activate traces.
- The use of the menu interface vs. the command line interface will be mainly a matter of personal preference.
- The command line is often just plain faster for an experienced user.
- The only thing you cannot do from the command line is to control the trace wrap count. You need to use the menu interface for that.

FMTTRACE

FMTTRACE

(C) Copyright IBM Corporation 1990, 1991

`fmttrace [/flags] file`

where flags are:

- D(d) - produce (don't produce) a detail file
- S(s) - produce (don't produce) a summary file
- A(a) - format (don't format) the API trace
- P(p) - format (don't format) the CPI-C trace
- F(f) - format (don't format) the line flow trace
- R(r) - format (don't format) TestRTS
- T(t)xxxxxxx - include (exclude) verbs with matching TP ID
- C(c)xxxxxxx - include (exclude) verbs with matching conversation ID
- L(l)xxxxxxx - include (exclude) flows with matching LFSID
- H(h) - use uppercase (lowercase) alphabets in hex output

the default flag setting is /SdAPFRh

file is the name of the input trace file. The file extension defaults to .trc. If the D flag is specified, a file with the same name and extension .det is produced. If the S flag is specified, a file with the same name and extension .sum is produced. If the file is specified as '-', input is read from stdin and the output files, if any, are `fmttrace.det` and `fmttrace.sum`

PROTRC07

Visual 14-27. FMTTRACE

- FMTTRACE is a utility provided with Communications Manager that formats trace information.
- Formatted traces are much easier to read.
- There are several formatting options available.
- Examples of formatted and non-formatted traces follow.

Unformatted Trace

```

<==SEND==> IBMTRNET #00 40008064000004 DAD2B7D014873DAC 16:28:55:28
#:0050 TH:2C0003020005 RH:0B90A0

```

```

340502FF 0003D100 0007C1D7 D7C3E2D9 <4.....J...APPCSR>
E500180F E4E2C9C2 D4C5E24B D6E2F2F8 <V...USIBMESKOS20>
F0F6F4A4 B16AD410 5F000108 DCDAB7D0 <064u.jM._.....>
39873DAC 001312FF 48656C70 204D722E <9g=.....Help Mr.>
2057697A 617264 < Wizard >

```

```

==>RECV<== IBMTRNET #00 40008064000004 DAD2B7D014873DAC 16:28:56:78
#:004A TH:2C0002030005 RH:039001

```

```

004112FF 4472697A 7A6C6520 4472617A <.A..Drizzle Draz>
7A6C6520 44726162 6C652044 726F6E65 <zle Drable Drone>
2E205469 6D652066 6F722074 68697320 <. Time for this >
6F6E6520 746F2063 6F6D6520 686F6D65 <one to come home>
ZE <. >

```

PROTRC10

Visual 14-28. Unformatted Trace

- This is an unformatted trace of data on the Token-Ring DLC.

Note: The directional arrows indicate incoming vs. outgoing data.

Detailed Trace Formatting

```

FMTRACE
(C) Copyright IBM Corporation 1990, 1991

Line:      2 Send MU
Time stamp: 16:28:55:28
DLC type:  IBMTRNET
Adapter number: 00
Destination address: 40008064000004
ALS ID: DAD2B7D014873DAC
TH: FID2, OIS, LFSID=0x00302, SNF=0x0005
RH: RQ, FMD, FI, OIC, RQE1, BB, CD
FMH-5
  Command code = Attach
  User ID already verified = No
  PIP present = No
  Conversation type = Mapped
  Synchronization level = None
  Transaction program name = APPCSRV
  Logical unit of work identifier:
    LU name = USIBMES.OS28064
    Instance number = 0xa4b16ad4105f
    Sequence number = 0x0001
  Conversation correlator = 0xdcab7d039873dac
Application data
  Hex dump:
    48656c70 204d722e 2057697a 617264          <Help Mr. Wizard >

Line:     10 Recv MU
Time stamp: 16:28:56:78
DLC type:  IBMTRNET
Adapter number: 00
Destination address: 40008064000004
ALS ID: DAD2B7D014873DAC
TH: FID2, OIS, LFSID=0x00302, SNF=0x0005
RH: RQ, FMD, OIC, RQE1, CEBI
Application data
  Hex dump:
    4472697a 7a6c6520 4472617a 7a6c6520    <Drizzle Drizzle >
    44726162 6c652044 726f6e65 2e205469    <Drable Drone. Ti>
    6d652066 6f722074 68697320 6f6e6520    <me for this one >
    746f2063 6f6d6520 686f6d65 2e          <to come home.  >

PROTRC12

```

Visual 14-29. Detailed Trace Formatting

- This is the identical trace data, after being run through the trace formatter.
- This is a detailed trace which is created by using the /D option of the trace formatter.

Summary Trace Formatting

```

oFMTTRACE
(C) Copyright IBM Corporation 1990, 1991

-Line- --TpId-- -ConvId- -----API-----
-Line- --DLC--- # -----DA----- LFSID -----Flow-----

      2                               -----TPStrtd(0S28064,APPCREQ)----->
10 1434afd0 <-----TPStrtd----->
18 1434afd0 --McAllocate(0S28064N,#INTER,APPCSRV)-->
32 1434afd0 dcdab7d0 <-----McAllocate----->
46 1434afd0 dcdab7d0 -----McSendData(15,None)----->
50 1434afd0 dcdab7d0 <-----McSendData----->
54 1434afd0 dcdab7d0 -----McRcvWait(100)----->
59 IBMTRNET 00 400000640000004 00302 -----FMH5,App1Data----->
67 IBMTRNET 00 400000640000004 00302 <-----App1Data----->
75 1434afd0 dcdab7d0 <-----McRcvWait(0x0009,0x00000000)----->
80 1434afd0 -----TPEnded(Soft)----->
84 1434afd0 <-----TPEnded----->

PROTRC11

```

Visual 14-30. Summary Trace Formatting

- This is an example of a summary trace created by the trace formatter.
- Both data and APPC API data have been captured with this trace.
- The two data flows are the same data flows from the previous examples.

Note: Notice that the Allocate and data are not actually sent when the verbs are issued. They are held in a buffer until a verb that flushes the buffer is issued. That verb is the McRcvWait.

Topic 14.4. The Dump Facility

Dump Utilities

- **Standalone Dump Utility**

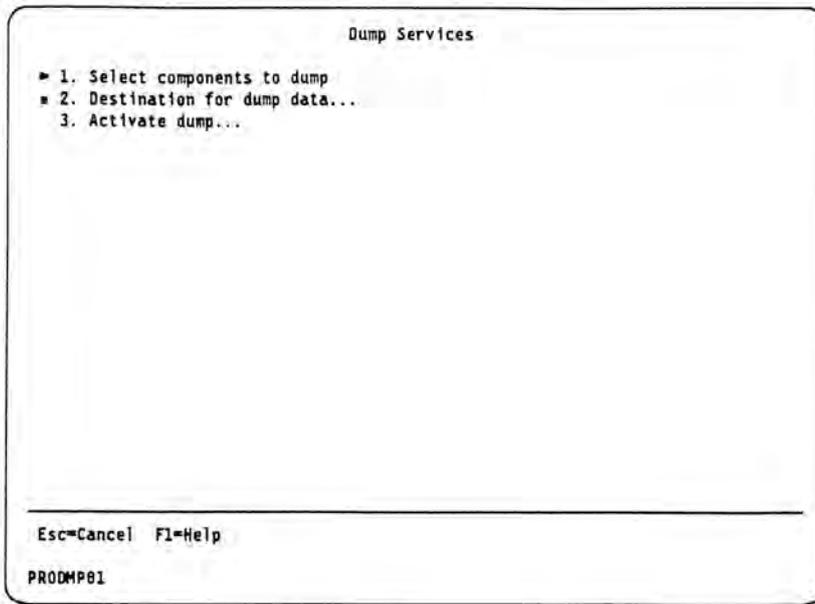
- **FFST/2 Dump Utility**

- **Communications Manager Dump Services**

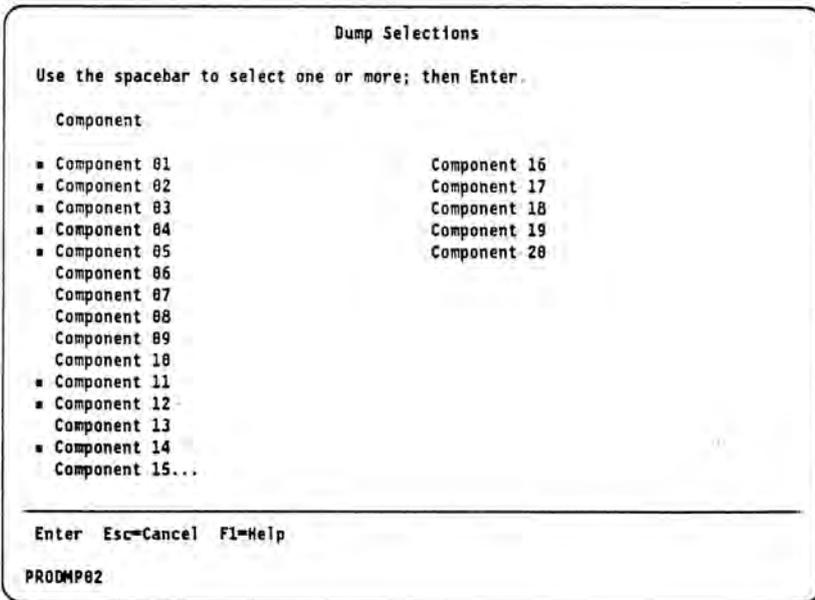
PRODM08

Visual 14-31. Dump Utilities.

- Only the Communications Manager dump facilities will be discussed in this class.
- Communications Manager dump services is a menu-driven utility that makes a copy of a portion of memory used by Communications Manager.
- The results of a dump are meant to be analyzed by IBM Support personnel.
- Dump services can also be activated by an application program through the common services API.
- The active configuration file must not be locked if you wish to perform dump services.

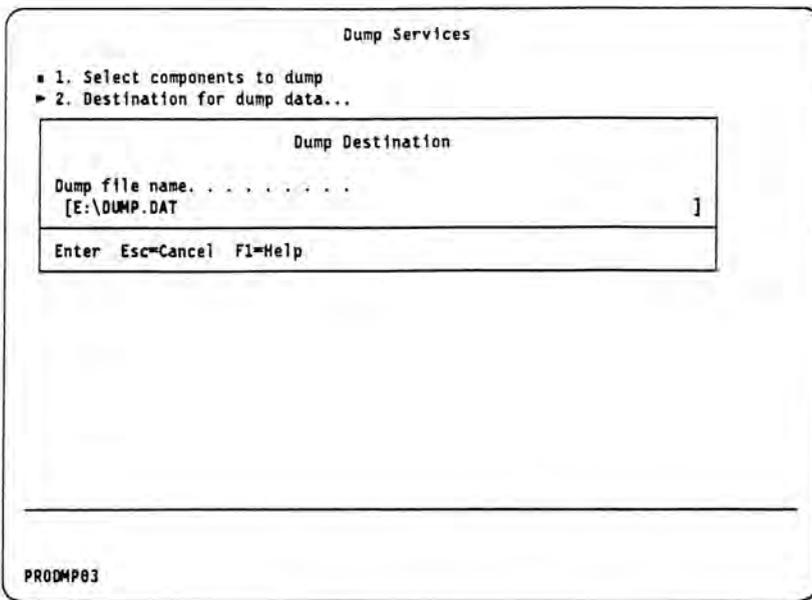


Visual 14-32. Dump Services



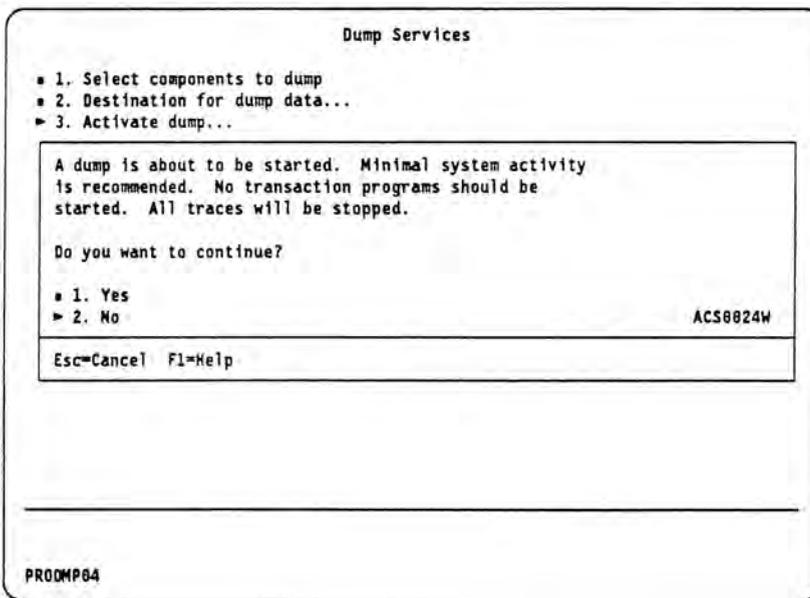
Visual 14-33. Dump Selections

- The *IBM Extended Services for OS/2 Messages and Error Recovery Guide*, S04G-1017 contains information on which component to dump for a particular situation.
- IBM Support personnel has this information as well.



Visual 14-34. Dump Destination

- Use the full path for the dump destination. Otherwise, it will go to C:\CMLIB.



Visual 14-35. Dump Services (part 4)

- All traces are stopped during a dump.

Appendix A. Common Acronyms

ACDI:	Asynchronous Communication Device Interface
API:	Application Programming Interface
APPC:	Advanced Program to Program Communications
BCS:	Basic Configuration Service
C & SM:	Communication and System Management
CCITT:	International Telephone Telegraph Consultative Committee
CICS:	Customer Information Control System
CM:	Communications Manager, also Comm Mgr
CPI-C:	Common Programming Interface - Communications
CSD:	Corrective Service Diskette
CSI:	Common Service Interface
CSMA/CD:	Carrier Sense Multiple Access / Collision Detection
CUT:	Control Unit Terminal
DBCS:	Double Byte Character Set
DCA:	Document Content Architecture
DCE:	Data Circuit Terminating Equipment
DFT:	Distributed Function Terminal
DIA:	Document Interchange Architecture
DIF:	Data Interchange Format
DLC:	Data Link Control
DTE:	Data Terminal Equipment
ECF:	Enhanced Connectivity Facility
EHLAPI:	Emulator High Level Language API
GDDM:	Graphical Data Display Manager
IEEE:	Institute of Electrical and Electronics Engineering
ISO:	International Standard Organization
LAA:	Locally Administered Address
LAN:	Local Area Network:
LU:	Logical Unit

LUA:	Conventional LU Application Access Method
MAC:	Media Access Control
NAU:	Network Addressable Unit
NCP:	Network Control Program
NDIS:	Network Device Interface Specification
NMVT:	Network Management Vector Transport
NPSI:	NCP Packet Switching Interface
OIA:	Operator Information Area
OSI:	Open System Interconnect
PSDN:	Packet Switching Data Network
PU:	Physical Unit
QLLC:	Qualified Logical Link Control
RDS:	Remote Data Service
RH:	Request/Response Header
RU:	Request/Response Unit
SAP:	Service Access Point
SNADS:	SNA Distribution Service
SQL:	Structural Query Language
SQLLOO:	SQL LAN Only Option
SRPI:	Server Requester Programming Interface
SSCP:	System Services Control Point
TCP/IP:	Transmission Control Protocol / Internet Protocol
TP:	Transaction Program
TSAF:	Transparent Service Access Facility
UPM:	User Profile Management
VTAM:	Virtual Telecommunications Access Method
WAN:	Wide Area Network
WSF:	Workstation Feature

**Extended Services for OS/2 Communications
Manager**
(Course Code S7049)

Lab Notebook

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IBM Personal Systems Education

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This course was revised by **G. Schindler Associates**. Comments concerning this notebook and its usefulness for its intended purpose are welcome. You may send written comments to:

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Labs

Lab 1. Communications Manager Installation

What This Unit is About

During this lab, you will get a chance to use several of the Extended Services for OS/2 installation tools. You will install the Communications Manager, Create a custom install diskette, install the Communications Manager utilities, and use the programmable configuration tool.

What You Should Be Able to Do

After completing this unit, you should be able to

- Install Communications Manager using Basic Configuration Services.
- Create a Custom Install Diskette.
- Use the REINST utility.
- Use a Programmable Configuration exec to modify an existing configuration file.

Required Materials

You will need the following materials to complete this lab:

- This lab guide.
- Extended Services for OS/2 diskettes.
- One blank, formatted diskette.

Topic 1.1. Installation

Note: Normally you would use the ES diskettes for all ES installs; however, this is time consuming. In order to save you time in the lab, we have "COPIED" all the ES diskettes into a directory called C:\ESDISKTS\. All the processes that follow are exactly the same but instead of having you feed diskettes, the code will be extracted out of the C:\ESDISKTS\ directory.

- 1. Begin the install process by entering **C:\ESDISKTS\ESINST** at an OS/2 command prompt.
- 2. Choose the **Basic Configuration and Installation** option, when prompted.
- 3. Call your configuration file **MYCFG**.
- 4. Configure one 3270 LAN terminal session, no printer, and make sure to auto-start it.
- 5. Configure for the following:

Note: Refer to APPENDIX A for configuration information.

- IBM Token Ring Network
 - Adapter = 16/4 /A (Not Bus Master)
 - Specify a Locally Administered Address
 - Local LAN Adapter Address = 4000003681xx
 - 3270 Host Session 1 address = 02
 - Specify a Destination Address = 400009103689
 - Local Node Name: OVTNEx
 - Network ID = CANEDES
 - Local Node ID
- 6. If you had other items to configure, you could do that now. Since you are done configuring, just press [F3] to begin the installation.
 - 7. Be sure to install onto the **C** drive when asked.
IMPORTANT: DO NOT INSTALL DATABASE MANAGER.
 - 8. Eventually, you will be presented with the **IBM Extended Services Install/Remove Menu**. If you wanted to install Database Manager, you would select it now. You are not going to install Database Manager, so just press [F3] to complete the install process.
 - 9. When the **Install/Remove Complete** panel appears, remove any diskettes from the **A** drive, shutdown and reboot the system by pressing [Ctrl + Alt + Del].

-
- 10. When the system comes back up, look at the new groups that have been added to your desktop. Look at the contents of them as well.
 - 11. Start the Communications Manager to see if your 3270 session works.

Note: Start the Communications Manager by double clicking the entry in the Communications Manager group.

- When you are prompted for a configuration file to use, enter your **MYCFG** file.
- Your 3270 session should appear on the screen.

Topic 1.2. Creating Custom Install Diskettes

- ___ 1. Insert your blank, formatted diskette into the **A** drive.
Note: If you do not have a diskette, see an instructor.
- ___ 2. Invoke the Custom build utility in one of the following ways:
 - Enter **CUSTBLD** at an OS/2 command prompt.
 - Double click on the entry in the **Extended Services** group.
- ___ 3. Include Communications Manager on your Custom Install Diskette.
- ___ 4. Specify the drive letter you would be installing Communications Manager onto.
Note: If you will want to actually test your Custom Install Diskette, use the **C** drive.
- ___ 5. You must include at least one configuration file on the Custom Install Diskette, so select the **Configuration Files** option.
- ___ 6. The directory is **C:\CMLIB**.
- ___ 7. Select **MYCFG** as the configuration file.
- ___ 8. Choose the **Additional Features** option.
- ___ 9. Add any of the additional features that you want.
- ___ 10. Press [F3] to exit the Communications Manager Custom Build Menu.
- ___ 11. If you wish to include Database Manager on your Custom Install Diskette, you would select **Database Manager** at this time.
- ___ 12. When you have added all the components you want, press [F3] to exit the CUSTBLD program.
- ___ 13. You now have a Custom Install Diskette that, when used, will install all of the features you specified.
IMPORTANT: DO NOT INSTALL THE CUSTOM INSTALL DISKETTE AT THIS TIME. You may test it, if you wish, after the final lab at the end of the week.
- ___ 14. Use the **DIR** command to look at what was placed on the **A** diskette.

Topic 1.3. Installing the Communications Manager Utilities

The Basic Configuration Services option did not allow you to install the Communications Manager Utilities. You need to use REINST to get these tools installed. This is done through the **Advanced Features** option of REINST

- 1. Invoke the REINST utility in one of the following ways:
 - Enter **REINST** at an OS/2 command prompt.
 - Double click on the entry, **Add or Remove Features**, in the **Extended Services** group.
- 2. Choose **Communications Manager** at the **IBM Extended Services Install/Remove Menu**.
- 3. Choose **Additional Features**
- 4. Choose **Utilities**.
- 5. When you return to the **Communications Manager Install Menu** press [F3] to install the utilities.
- 6. When you return to the **IBM Extended Services Install/Remove Menu**, press [F3] to exit the REINST program.
- 7. Because you have changed your communications configuration, you should now exit the Communications Manager and restart it.
- 8. The utilities are now ready to use. You will find them in the Communications Manager group.

Topic 1.4. Programmable Configuration

A REXX program called CFGADD.COMD has been placed in the **C:\S7049** directory. This program will add 1 session to your configuration. You will examine and execute this program in order to see how the programmable configuration tool works.

1. Using either the OS/2 system editor, or the enhanced editor, view the file C:\S7049\CFGADD.COMD.

Note: The enhanced editor will make it much easier to count line numbers. Make sure to change the font to a non-proportional font (Courier or System Monospaced). This will make the file more readable. If you use the system editor, turn off word wrap.

2. With the aid of the Programmable Configuration Reference Manual, examine the file. Be sure to read the paragraph in the introduction section regarding "VERIFICATION CONSIDERATIONS".

3. Make sure that Communications Manager is running.

4. Execute the REXX program in the following manner:

- Make a working directory called C:\WORKING.
- Change to the C:\WORKING. directory.
- Copy the CFGADD.COMD from the C:\S7049 to the C:\WORKING directory.
- Enter **CFGADD** from the C:\WORKING directory.

Note: The configuration program should be executed from a directory that contains all the necessary files i.e. CFG.NDF,CF2 and SEC files. After updating, these files are then copied back to their respective directories, which completes the process.

5. You will see a return code from each statement as it executes. If you do not get a return code of 0 from each statement, look at the MYCFG.LOG and the MYCFG.LG file in the **C:\CMLIB** directory. These files are created by the programmable configuration utility.

Note: If you already have a 3270 terminal with the same parameters as the one you are creating, you will get a non-zero return code from the 3270SNA statement. Therefore, if you run this particular program twice, the second execution will not have all zero return codes.

6. You will need to exit the Communications Manager and restart it to see your new session.

7. Now, for an optional CHALLENGE. Change the CFGADD.COMD file so that it will prompt the user for pertinent information.

- Configuration file name
- 3270 Session number

- 3270 Session name
- 3270 Short Session ID
- LU Address

Note: Use the REXX **SAY** and **PULL** commands to prompt the user and read their input. Instructions for using the REXX commands can be found in the REXX online command reference.

This concludes the Communications Manager Installation lab.

Lab 2. Using 3270 Emulation

What This Unit is About

During this lab, you will get a chance to use the Communications Manager 3270 emulation. You will experiment with font sizes, set up and transfer files to and from the host, remap your keyboard, use the clipboard, and use the presentation space printing feature.

What You Should Be Able to Do

After completing this unit, you should be able to

- Change 3270 terminal emulation font sizes.
- Use the PM clipboard with 3270 terminal emulation.
- Transfer files between the workstation and a 370 host.
- Remap the keyboard.
- Print from the presentation space.

Required Materials

You will need the following materials to complete this lab:

- This lab guide.

Topic 2.1. General Use

In this topic, you are going to get some experience with some of the general use tasks that can be performed with Communications Manager 3270 emulation.

Note: In 3270 Emulation, the "enter" and "clear" keys are:

- "enter" is the Ctl key.
- "clear" is the Pause key. Use when MORE or HOLDING is displayed.

Emulator operations

1. If Communications Manager is not running, start it.
 2. Start your 3270 session.
 3. At the LOGO Screen, type TOROCE and "enter"(Ctl key) to get to the VM host system.
 4. Log on to the host with the following information:
 - User ID from your tent card. i.e. OS2IDxx (Where xx = 01 to 20)
 - Use the password provided by your Instructor (You will be prompted change it while logging on... Write it down).
 5. Experiment with the font sizes and window sizes to see how much space a model 2 session takes up.

Note: The fonts can be adjusted by clicking on the terminal's system menu, choosing **Emulator operations** and then choosing **Font size**
- * What is the maximum number of maximized model 2 terminals you can fit on your screen at once? 2
- * Can you get a model 2 terminal to fill the screen? yes
6. Another option you may want to change is the window maximize style.
 7. Select **Window maximize style** from the emulator operations dialog box.
- * What is the difference between the two styles?

- * How can you return to the original style?
-
-

- ___ 8. Now lets work through a problem situation. Suppose that your operator information area (OIA) was displaying a message that read **MACH690** Where can you go for help? The first place you may wish to try is **Emulator help**.
- ___ 9. Select **Emulator help** from the system menu pull down.
- ___ 10. Now click on the **OIA message help** and click the **OK** button.
- ___ 11. Follow the instructions that appear in the help window, and search for help on **MACH690**.

Note: Search the **index** rather than the default of **All Sections** by clicking on the appropriate radio button. Also, do not put a space between MACH and 690.

Note: You can move windows that appear on top of the instructions in order to continue reading the instructions.

Clipboard

- ___ 1. Pick the 3270 session that you are logged on to and maximize it.
- ___ 2. Type some characters in at the cursor position (do not hit enter).
- ___ 3. Use the mouse to select as much of the terminal session as you can. This is done by holding down mouse button one and dragging the pointer over the area you wish to mark.
- ___ 4. Go to the 3270 system menu and select **Cut**.

* Did all of the text get cut? _____

* Why or why not?

- ___ 5. Now open the OS/2 System Editor. The easiest way is to enter **E** at an OS/2 command prompt.
- ___ 6. Change the font in the OS/2 System Editor to **COURIER** with a size of eight.
- ___ 7. Turn word wrap off and maximize the OS/2 System Editor.

- ___ 8. Choose the **Paste** function from the **Edit** pull down.
- ___ 9. The text from your 3270 session should appear in the OS/2 System Editor.
- * Did the the protected areas of the 3270 terminal get copied? _____
- * Is this what you expected? _____

Topic 2.2. 3270 Keyboard Remap

Now lets configure a keyboard profile called 3270KEYS profile. To do this, you need to go to the Keyboard remap section under advanced configuration.

- ___ 1. Choose the Communications Manager from the window list (Ctl-Esc).
- ___ 2. Choose **Advanced--> Keyboard remap** from the pull down.
- ___ 3. The configuration file is **MYCFG**.
- ___ 4. You want to create a keyboard for **IBM 3270 Terminal Emulation**.
- ___ 5. You have an **IBM Enhanced 101** keyboard.
- ___ 6. **Create** a new profile called 3270KEYS. Use the default keyboard profile as the model.
Note: A list of models can be displayed by pressing the [F4] key.
- ___ 7. You don't need to change anything on the first panel.
- ___ 8. Select the key that represents **J** and **Edit** it.
- ___ 9. Make the **Alt+J** perform a jump function between your 3270 sessions.
Note: A list of functions can be displayed by pressing the [F4] key.
- ___ 10. Next, edit the PC **Enter** key so that when you press Enter, the key will generate a true 3270 enter function.
- ___ 11. When you are done, choose **Exit--> Exit remap--> Save then exit** from the pull down.
Note: Notice that verification occurs automatically when you exit keyboard remap. If there are any verification errors, look at the Communications Manager message log to find out what is wrong. The message log is accessed from the Communications Manager Main Menu.
- ___ 12. Change the 3270 Profiles (both sessions) to use the new keyboard profile. Do so via Advanced Configuration and the 3270 Feature Profiles.
- ___ 13. Stop and restart the Communications Manager to make your changes active.

Topic 2.3. Keyboard Remap Use

Now lets try out the keyboard profile called 3270KEYS profile.

___ 1. Try out your **Alt+J** key combination. This is the key that you remapped to perform the jump function. It should jump between all of your started 3270 terminals.

* What happens when you jump to a minimized 3270 session?

* What would happen if you jump to a 3270 session that does not have a jump key defined?

___ 2. Try out your **Enter** key.

* Does it perform the correct function according to your remap? _____

Topic 2.4. Color and File Transfer Profiles

In this topic, you will change the way that the host color codes are displayed on one of your terminal sessions. In addition, you will create two file transfer profiles for use with the menu driven file transfer option. You will create a profile for transferring text files and one for transferring binary files.

- 1. Choose **Color and alarm** via Advanced Configuration.
- 2. Change the colors of your **A** session.
Note: Make sure to at least change the top four color items. These are the colors that the host system uses. Also, be sure to change the background color so your changes will be most noticeable.
- 3. When you are finished, choose **Exit--> Save and exit** from the action bar.
- 4. Choose **File Transfer**
- 5. Create a new profile called **VMTEXT**. Use the provided model for VM text files.
Note: A list of models can be displayed by pressing the [F4] key.
- 6. None of these fields need to be changed for a text file. The model was set up correctly already.
- 7. Create another file transfer profile called **VMBIN**. This profile will be used for binary file transfers. Use the same model as before, but make the following changes to it:
 - Set **ASCII to/from EBCDIC translation** to **NO**
 - Set **Use CR/LF as record separator** to **NO**
- 8. When you are finished, press [F3] to return to the Communications Manager Configuration Menu.

Topic 2.5. File Transfer

In this topic, you are going to send and receive files from a host system. You will use the menu driven mode and the command line mode of file transfer. You will also get a chance to use the Communications Manager online help.

Menu Mode

Note: Be sure you are logged on to the host.

- ___ 1. Using the menu mode, send the text file called **C:\S7049\3270LAB.TXT** to the host.

Note: The menu mode is started by selecting **Transfer files** from the Communications Manager Main Menu.

- ___ 2. When you are prompted for a terminal to transfer the file through, select the terminal you are logged on to.

- ___ 3. Select **Send File**.

- ___ 4. Use your file transfer profile for text files.

- ___ 5. Call the file **3270LAB SCRIPT A** at the host.

- ___ 6. Write down any messages returned when the transfer completes.

Number of bytes transferred 2979
File Transfer is complete.

- ___ 7. Switch to your host session and type **FLIST** at the command prompt. Edit the **3270** file by placing an "x" beside the file name then "enter".

* Does the file look ok? yes

- ___ 8. Return to a ready prompt at the host (PF3).

- ___ 9. Go back to the file transfer panel, customize the profile and send the file to the host until it transfers without error (see note).

Note: The records segmented error has to do with the file record length. The logical record length of a file can be set by selecting "**Customize Profile**" and modifying the **Host File Characteristics**. Since you do not know the record length of the file, you may want to try a large record length in order to fix the error. The help screen will tell you what the maximum record length can be.

- ___ 10. Now, again using the menu mode, receive the binary file called **PIANO EXEBIN B** that has been placed on your VM B disk.

- ___ 11. Use your file transfer profile for binary files.

- __ 12. Call the file **C:\S7049\PIANO.EXE** on the workstation.
- __ 13. When the transfer completes, switch to OS/2 command prompt, change to the **C:\S7049** directory and run the **PIANO** program.
- * Does the program work? yes
- * If not, what are some possible reasons, and how can you fix it?

- __ 14. Transfer the file until the program runs correctly.

Command Mode

- __ 1. Now you will transfer a file using command mode.
- __ 2. Open an **OS/2 Windowed Command Prompt.**
Note: Make sure it is a **Windowed** command prompt and not a full screen prompt. You are going to bring up the Communications Manager online help and in order to be able to view the help while you are entering the file transfer command, you need to use a window rather than a full screen.
- __ 3. Open the **Extended Services Command Reference** folder.
Note: This is located in the Extended Services folder.
- __ 4. Do a search on **SEND**
Note: This will get the help file for the send command. You should be able to read the help screen while you key the correct command into the windowed command prompt. Move and size the windows so that both are visible on the screen.
- __ 5. Send the text file called **C:\S7049\3270LAB.TXT** to the host.
- __ 6. Call the file **3270LAB SCRIPT A** at the host.
Note: Make sure the host is logged on and ready before starting the file transfer.
- __ 7. Switch back to the host session.
- __ 8. Use **FLIST** as you did before to view the file and ensure it transferred properly.
- __ 9. Send the file until it transfers correctly.

- ___ 10. Close the help screen for the send command.
- ___ 11. From the **Extended Services Command Reference** do a search on **RECEIVE**.
- ___ 12. Now, again using command mode, receive the file **PIANO EXEBIN A**, from the host,
- ___ 13. Call the file **C:\S7049\PIANO.EXE** at the workstation.
- ___ 14. When the transfer completes, switch to OS/2 command prompt, change to the C:\S7049 directory and run the **PIANO** program.
- * Does the program work? _____
- * If not, what are some possible reasons, and how can you fix it?

- ___ 15. That's all for file transfer.

Topic 2.6. Presentation Space Printing

In this topic, you will get a chance to see the 3270 presentation space print in action. If you configure a logical printer or activate the presentation space print feature in a logical terminal, you will have a 3270 Print Control Window when the printer or logical terminal is started.

— 1. Click the mouse on the **3270 Print Control** window or use the task/window list to select it.

* How many sessions are sharing this window? 2

* What session types are they? Terminal

— 2. Click the mouse on action bar items - **Control, Setup, and Configure**. Explore the contents of each menu. Press [F1] to get help for any field you wish to know more about.

— 3. Now, you will look at how presentation space print is processed from the 3270 emulation window to the Print Control window to the Print Manager window.

— 4. Arrange your desktop so that the following windows are open and in view:

- One 3270 terminal
- The 3270 Print Control window
- The IBM 4201 printer

Note: Use small font sizes and size the windows so that each window can be viewed.

— 5. Make sure that you can see the **Print Status** field of the 3270 Print Control window.

— 6. Click the mouse on the 3270 terminal window and press Shift-Print Screen.

Note: Notice that the hard disk light flickers as the information is processed.

* What happens to the 3270 Print Control window?

Flashes

* What happens to the Printer window?

Jobs are added.

Note: You may Cancel the print job by clicking on newly created print job and selecting the **Delete** action from the context menu.

Lab 3. Communications Manager SNA Gateway

What This Unit is About

During this lab, you are going to configure and use the SNA Gateway feature of Communications Manager. This lab will require that you work together with a partner team. While one system is acting as the gateway, the other system will act as the downstream workstation.

What You Should Be Able to Do

After completing this unit, you should be able to

- Configure an SNA Gateway host connection profile.
- Configure SNA workstation LU profiles for dedicated LUs.
- Use subsystem management to observe gateway links and sessions during gateway operation.
- Create a downstream workstation for the Communications Manager SNA Gateway.

Required Materials

You will need the following materials to complete this lab:

- This lab guide.

Topic 3.1. SNA Gateway Configuration

There are 2 ways to configure the gateway:

- Hard way...Do every profile via Advanced Configuration.
- Easy way...Do 1 session to the host via BCS and then enhance the configuration. Since we have already established a session to the host, lets's do it the easy way!

___ 1. Team up and work together as follows:

GATEWAY (Local Node Alias)	DOWNSTREAM (Local Node Alias)
TEAM01	TEAM02
TEAM03	TEAM04
TEAM05	TEAM06
TEAM07	TEAM08
etc.	etc.

The host folks have given each "Gateway" PU 4 sessions, LU addresses 02,03,04 and 05. During the previous lab, you configured each workstation to use 2 of these sessions. You have also verified that the session works. Now, you will create a gateway to pass sessions 04 and 05 to a downstream partner on the token ring network.

___ 2. **CREATING THE HOST CONNECTION PROFILE**

At the workstation you have chosen to be your gateway, start Communications Manager and get it up full screen. Configure as follows:

- Advanced
- Configuration (use mycfg)
- SNA Feature Profiles
- SNA Gateway Profiles
- HOST Connection
- Create
- Token Ring Network
- Permanent Connection = Yes
- Enter
- Adapter 0
- Destination Address = 400009103689
- Enter
- At page 2 just hit enter to accept all defaults

At this point, you have created a logical connection to the host for the gateway.

3. CREATING WORKSTATION PROFILES

You need to create 1 profile for every LU session that you want to pass downstream. From the SNA Feature Configuration screen, configure as follows:

- SNA Gateway Profiles
- Workstation LU
- Create a new profile for each LU session. Use the M6 model for the first LU session then use that profile as a model for each subsequent profile created.
- Accept all defaults except for the following parameters:

PROFILE NAME	CP NAME (PU NAME)	LU ADDRESS AT WORK-STATION	LU ADDRESS AT HOST	DESTINATION ADDRESS
TEAMxxA (xx = partner)	OVTNEx (partners PU)	02	04	LAA of Downstream Workstation
TEAMxxB (xx = partner)	OVTNEx (partners PU)	03	05	LAA of Downstream Workstation

- When you have finished, verify your configuration.
 - What happened? _____
 - What do you need to do? _____
 - Why? _____
- Stop and Exit Communications Manager
- Go to an OS/2 prompt, type REINST and follow the prompts to properly install the new Gateway configuration. When asked to select which Configuration files to use for updating your CONFIG.SYS, choose MYCFG. After you have completed the REINST, ensure that you can start Communications Manager with no errors.

Note: You can also get to REINST by selecting the Add or Remove Features ICON in the Extended Services Folder.

4. CREATING A DOWNSTREAM WORKSTATION

- What do you need to change in your 3270 configuration to connect via your gateway partner, instead of directly to the host?
- Go to the 3270 Terminal Emulation Profile (using Advanced Configuration) and change the destination address from 400009103689 to your gateway partners LAA (Appendix A).

- Exit and restart your Communications Manager.
- Do you have a host session? _____ How can you verify that it is coming from your Partner? _____

This concludes the Communications Manager SNA Gateway lab.

Lab 4. Advanced Configuration

What This Unit is About

Coming into this lab, you should have created a configuration file using the Basic Configuration Services and you have used some of the Advanced Configuration Services to modify your configuration. In this lab you will use the Communications Manager Advanced Configuration to create workstation profiles. The knowledge and techniques learned here will prepare you for subsequent labs on LEN and APPN.

Remember, once you go into advanced and change a configuration file, you will no longer be able to use BCS to change the file.

What You Should Be Able to Do

After completing this unit, you should be able to

- Load IBM supplied default config files using the REINST utility.
- Configure 3270 Token Ring using Advanced Configuration
- Configure LAN Adapter and Protocol Support.
- Configure a Token-Ring DLC.

Required Materials

You will need the following materials to complete this lab:

- This lab guide.
- Extended Services for OS/2 diskettes.
- *IBM Extended Services for OS/2 Communications Manager Configuration Guide*, S04G-1001
- *IBM Extended Services for OS/2 Communications Manager Host Connection Reference*, S04G-1004

Topic 4.1. Loading Default Configuration Files

In this topic, you will load a default configuration file using the Advanced Installation feature of ESINST.

- 1. Exit the Communications Manager completely.
- 2. In order to remove changes made to the LAN Adapter and Protocol file in the previous lab, execute the following program:
 - Enter **C:\S7049\CLEANUP**
Note: Cleanup just removes the protocol.ini file, which you will be rebuilding during this lab.
- 3. Initiate the Extended Services installation by entering **C:\ESDISKTS\ESINST** at an OS/2 command prompt.
Note: Normally you would use the ES diskettes for all ES installs; however, this is time consuming and as mentioned previously, we have "COPIED" all the ES diskettes into a directory called C:\ESDISKTS\. All the processes that follow are exactly the same but instead of having you feed diskettes, the code will be extracted out of the C:\ESDISKTS\ directory.
- 4. Make selections as follows:
 - Advanced Installation of Communications Manager
 - Target drive C
 - Install the default configuration file 'ACSCFG'
 - Select **Additional features --> Utilities**
Note: Utilities are not part of the default configuration, so you should reinstall them at this time.
 - Press F3 to complete the process.
 - Be sure to update the CONFIG.SYS based on 'ACSCFG' only.
- 5. Restart your workstation when prompted.
- 6. Copy the 'ACSCFG.CFG' file in the C:\CMLIB directory into another file called TEAMxx (xx = team number from your tent card). This new configuration file will now be used during the remainder of this LAB.
- 7. Carry on with the next section of this lab.

Topic 4.2. Creating 3270 Token-Ring Profiles

Now, you will create the 3270 Token-Ring profiles.

- 1. Start the Communications Manager using the TEAMxx configuration file just created.
 - 2. Choose Advanced Configuration
 - 3. Choose 3270 Feature Profiles
 - 4. Choose **Token-Ring or other LAN type--> Create**
 - 5. Connection
 - 6. Adapter 0
 - 7. Destination Address = 400009103689
 - 8. Session 1
 - 9. Terminal
 - 10. ID/LU Name = TRMOD2
 - 11. LU Address = 02
 - 12. Press the Enter key to accept all other defaults.
 - 13. F3 back to Communications Manager configuration menu.
 - 14. Carry on with the next section of this lab.
- Use the help panels and/or the *IBM Extended Services for OS/2 Communications Manager Configuration Guide*, S04G-1001 if you need help on a field.

Topic 4.3. SNA Data Link Control and Local Node Characteristics

Because you will be doing SNA communications, you will need to configure the Token-Ring Data Link Control profiles. There is also some information in the Local Node Characteristics that will need to be set in order to establish the connection with the host.

- ___ 1. Choose **SNA Feature Profiles--> Data Link Control (DLC) profiles.**
- ___ 2. Choose **Token-Ring or other LAN type**
- ___ 3. Make sure that **Create** is highlighted. and press Enter.
- ___ 4. Use the *IBM Extended Services for OS/2 Communications Manager Host Connection Reference*, S04G-1004 and appendix A of this lab book to fill in the appropriate information here.
 - You will want to have at least 15 link stations to get you through all of the labs this week. Change it now.
 - Don't reserve any links stations for incoming connections.
 - Set C&SM LAN ID = CANEDES

Remember: The RU size just needs to be large enough, it does not need to match the host. You probably do not need to change it. See MAXDATA parameter in appendix B.

- ___ 5. Next, choose **SNA Network definitions--> Create**
Note: Don't be alarmed when the PM desktop appears.
- ___ 6. Choose **Local Node Characteristics.**
- ___ 7. Use the *IBM Extended Services for OS/2 Communications Manager Host Connection Reference*, S04G-1004 and appendix A of this lab book to fill in the following fields.
 - Network ID
 - Local Node Name
 - Local Node ID
- ___ 8. The rest of the fields do not matter for 3270 emulation. When you are finished, click on **Save and Return.**
- ___ 9. When the **SNA Network Definition Selection** dialog appears, click on **Exit.**
- ___ 10. You are done with SNA configuration, so press [F3] to return to the Communications Manager Configuration Menu.
- ___ 11. Carry on with the next section of this lab.

Topic 4.4. LAN Adapter and Protocol Support

In order to use the Token-Ring LAN, for 3270 emulation, you need to install the Token-Ring adapter and IEEE 802.2 protocol support.

- 1. Choose **LAN Adapter and Protocol Support**
Note: Don't be alarmed when the PM desktop appears.
- 2. Choose **Configure Workstation**
- 3. Choose **IBM Token-Ring Network Adapters** from the **Network Adapters** list, then click on **Add**.
- 4. Choose **IBM IEEE 802.2** from the **Protocols** list, then click on **Add**.
Note: This sets up adapter 0 as a Token-Ring adapter that can send/receive IEEE 802.2 protocol data. There are some changes that need to be made though.
- 5. Click on, **IBM Token-Ring Network Adapters** in the **Current Configuration** list, then click on **Edit**
 - You don't need to change anything here, but look at some of the parameters.
 - Click on **Cancel** when you are through looking.
- 6. Now, click on, **IBM IEEE 802.2** in the **Current Configuration** list, then click on **Edit**
 - You need to set your **Network Adapter Address**. Your address is listed in appendix A of this lab book.
Note: You need to put a **T** in front of the address. The **T** stands for Token-Ring. Press [F1] while the cursor is on a field for more information on that field.
 - Make sure that you have at least as many link stations here as you did in the Token-Ring DLC profile.
 - Click on **OK** when you are through.
- 7. When you return to the **Configure Workstation** dialog, click on **OK** because you are done now.
- 8. When you return to the **Options** dialog, make sure that **Configuration Complete** is selected and click on **OK**.
- 9. Verify the configuration file.
Note: Read the messages in the message log.
- 10. Carry on with the next section of this lab.

Topic 4.5. Install and Test

Now that configuration is done, you need to run REINST to get the code, for the new features, installed on the hard drive.

- 1. Exit the Communications Manager completely.
- 2. Execute the **REINST** program and choose Communications Manager at the install/remove menu.
- 3. This time, you will need to install a user configuration file.
- 4. The file is in the **C:\CMLIB** directory.
- 5. Select **TEAMxx**.
IMPORTANT: By now, you should be getting the idea of how often REINST needs to be run (ie. every time you add a new feature).
- 6. When you are asked which config file to update the config.sys with, select **TEAMxx**
- 7. When the 'Select F3=Exit to install features' pop-up appears, press F3 to install the features from the selected configuration file.
- 8. When the **Restart System** panel appears, reboot your system by pressing [Ctrl+Alt+Del]. Why do you need to do this?
- 9. Start your Token-Ring session to see if it works.
 - Choose **Start Emulators** from the Communications Manager Main Menu.
 - Choose **3270 terminal emulation (non-DFT)**.
 - Choose **All**.
- 10. If all goes well, you should have a 3270 session on your screen.
- 11. This concludes the Advanced Configuration lab.

Lab 5. Communications Manager LEN Node Configuration and Use

What This Unit is About

During this lab, you will get a chance to configure your workstation to use the LU 6.2 and T2.1 node capabilities to communicate on a peer to peer basis to partner systems. You will be configuring SNA local node characteristics, LEN connections, Partner LU profiles, and transaction program profiles. Once the configuration is complete, you will run an APPC program and communicate with an APPC program on a remote system.

This LAB will be used primarily to compare with the next labs to discover how APPN support enhances and simplifies the configuration of Communications Manager for LU 6.2 communications.

What You Should Be Able to Do

After completing this unit, you should be able to

- Configure Communications Manager Local Node Characteristics.
- Configure Communications Manager LEN node connections to other Communications Manager workstations.
- Configure Partner LU profiles for remote partners.
- Create an APPC Transaction Program Definition.
- Run an APPC Program and successfully communicate with a remote APPC program.

Required Materials

You will need the following materials to complete this lab:

- This lab guide.

Topic 5.1. Communications Manager LEN Node Configuration

Note: Configure to 1 partner only for a start. When you have that working, team up with another partner, add them and so on. The objective is to try and get everyone in the lab talking to everyone else.

- 1. Make sure that you are configuring the TEAMxx file.
- 2. LEN Node configuration is done under the **SNA Feature Profiles** configuration menu item.
- 3. Choose **SNA Network Definitions--> Create/Change**.
- 4. Choose **Local Node Characteristics** and make sure that the following values are set correctly.
 - Get your **Network ID** and **Local Node Name** from Appendix A of this LAB book.
 - You should be an **End Node - No Network Server**.
 - Make your Local Node Alias **TEAMxx**, where xx = your team number. This is easier to remember than your real Node name.

Note: Be sure to use all upper case for the alias name because the program you are going to be running only allows uppercase aliases. This is not a Communications Manager restriction, just this particular APPC program.
- 5. When you are finished with the Local Node Characteristics, choose **Connections** from the **SNA Network Definitions** panel.
- 6. You will be creating connections **To Peer Nodes**. They should have the following characteristics:
 - The DLC is Token-Ring
 - The Partner network ID is **CANEDES**.
 - Get your partner node names from Appendix A of this LAB book.
 - Get the LAN destination addresses from Appendix A of this LAB book.
 - Use the comment line to identify the remote node.
 - Define a LINK and PARTNER LU for each partner.

Note: Configure to one partner only first. You will add other links and partners later.

 - The LU you will talk to at the partner system is their CP LU session. This LU has the same name as their control point.
 - For an alias, use something that easily identifies the partner LU. For example, you could use TEAMxx, where xx = the partner systems team number.

Note: Be sure to use all upper case for the alias name because the program you are going to be running only allows uppercase aliases. This is not a Communications Manager restriction, just this particular APPC program.

Make sure that you click on **Add**. Don't just press enter or the LU will not be added to the list. If you make a mistake during entry, you can click on the bad entry and then click on **Change**.

- 7. When you have created all of your connections, choose: **Configuration--> Additional SNA Features** from the action bar.
- 8. You need to create a **Transaction Program Definition**. This TP definition will be used to start an APPC server program that will be executed when an incoming attach comes from an APPC requester program. The definition should have the following characteristics:
 - The TP name that the requester program will send across on the attach is **APPCSRV**.
 - Note:** Don't forget, this is case sensitive.
 - The APPC server program is called **APPCSRV.EXE**. It is in the **C:\S7049** directory.
 - On the parameter line, you should type the message that you would like to have sent to a requester that contacts your server. This message can be up to 100 characters long.
 - The APPC server program is a **VIO_Windowable** program and should be run as **Non-queued, Attach Manager started**.
- 9. When you are done, the **File** pull down will allow you to **Save and exit**.
- 10. When you return to the **SNA Network Definitions** panel, click on **Exit**.
- 11. Verify your configuration file.
- 12. If you need to, exit Communications Manager and restart it.
- 13. Carry on with the next section of this lab.

Topic 5.2. Run The APPC Requester Program

The requester end of these two transaction programs is called **APPCREQ.EXE**. This program will send an attach command to the user specified server destination. The Attach Manager at that destination will execute the APPC server program and the server will send a message to the requestor.

The requestor program is located in the **C:\S7049** subdirectory.

- ___ 1. Run the the APPC Requester program.
- ___ 2. Select **APPC** from the action bar.
- ___ 3. Choose **Set APPC parameters**
- ___ 4. Use your CP LU alias in the LU alias field.
- ___ 5. Specify one of your partner LU aliases created during Communications Manager configuration in the Partner LU alias field.
- ___ 6. Use the mode **#INTER** .
Note: You don't need to worry about the conversation security values for this lab, so just leave them blank. You will use them in a later lab.
- ___ 7. Now you need to enter the message you wish to send to the server program.
- ___ 8. Select **Message** from the action bar.
- ___ 9. Choose **Message to send**
- ___ 10. Enter any message, up to 100 characters in length. Be sure to include your team number so the server can tell where the message came from.
- ___ 11. Now you are ready to send the message to the server.
- ___ 12. Select **Send** from the action bar.
- ___ 13. Choose **Send message**
- ___ 14. If everything is configured correctly, you will get a message back from the server program. If not, check your APPC parameters, change them, if necessary, and retry.
Note: If you stop Communications Manager it will also be necessary to stop the APPC program before you will be able to start Communications Manager again. If you get a **big red** screen that says Communications Manager is already running, you have probably forgotten to stop the APPC program.
- ___ 15. Send a message to all of your configured partners to make sure it works.

-
- 16. Send a message to your own server by using your CP LU alias as the partner LU alias.
Note: Each time you send a message, a thread is started. When the message has been sent, the thread ends. You are allowed to have three threads active at one time. A message displays, telling you the number of active threads. You can send messages as long as there are three or fewer active threads.
 - 17. Use Subsystem Management to display your session status. Subsystem Management can be accessed from the Communications Manager Main Menu **Advanced** pull down.
Note: There will be more coverage of Subsystem Management in a later lab.
 - 18. When you have been able to successfully send/receive messages with one partner, go back and add more links and partner LUs to your profiles until you can communicate with everyone in the room.

Lab 6. Communications Manager APPN Configuration and Use

What This Unit is About

In this lab, you are going to actually set up a small APPN network. The lab systems will be divided up into teams. One system will be the network node and the other systems will be end nodes. Once each team has their individual networks working, you will connect the network nodes together creating one large APPN network. When this network is complete, you will be able to easily communicate with any other system in the room.

The amount of configuration required for this lab should be compared to that required of the first lab. Configuration gets easier when you have APPN to do the work for you. The next lab will demonstrate even more of the discovery capabilities of APPN.

What You Should Be Able to Do

After completing this unit, you should be able to

- Configure Communications Manager End nodes.
- Configure Communications Manager Network nodes.
- Configure Partner LU profiles for remote partners.
- Configure connections from the end nodes to the network node and vice versa.
- Run an APPC Program and successfully communicate with a remote APPC program.
- Connect multiple network nodes together into a large APPN network.

Required Materials

You will need the following materials to complete this lab:

- This lab guide.

Topic 6.1. End Node Configuration

Complete this topic if you are an end node in your network. If you are a network node, go to the next topic.

- 1. As preparation for this lab, you should delete all the connections that you created in the previous lab.

Note: To see the connections, just click on the [+] sign next to the **To Peer Node** menu item. To delete a connection, just select it with the mouse and then press the **Delete** key.

- 2. In order to act as an end node in an APPN network, you need to first modify your SNA **Local node definitions**. You can get to local node definitions quickly by choosing it from the **Configuration** pull down of the connections panel.

- Your node type is now an **End Node to Network Node Server**.
- Set the network node server address to your designated network node's Token-Ring Address.

- 3. This will automatically create a link to your network node. When you return to the connections panel, double click on this new connection to see what it looks like.

Note: You will need to use the [+] sign to see the connection.

- 4. When you deleted the connections to your peer nodes, you also deleted the partner LUs that were associated with that link. For now, you still need to have a partner LU description for each partner you wish to talk to. To create these, select **Additional SNA Features** from the **Configuration** pull down of the connections panel.

- 5. Create the same partner LUs that you had during the previous lab.

- Don't worry about conversation security for now.
- Use the comment field to identify the partner.

Note: Remember that a fully qualified LU name is: Network ID.LU Name i.e. CANEDES.OVTNEA. Also, be sure to use all upper case for the alias name because the program you are going to be running only allows uppercase aliases. This is not a Communications Manager restriction, just this particular APPC program.

Notice that you do not need to specify any link information for the partner LUs this time. The network node will take care of finding the best path to the remote control point.

- 6. Make sure to do a **Save and Exit** of your SNA changes.

-
- 7. Verify the configuration file, exit Communications Manager, and restart it. Since you changed you Local node definitions, the dynamic update feature will not work.
 - 8. You are now ready to be an end node.
 - 9. Carry on with the 'Run the APPC Requester Program' Lab

Topic 6.2. Network Node Configuration

Complete this topic if you are the network node in your network. If you are an end node, go to the next topic.

- 1. As preparation for this lab, you should delete all the connections that you created in the previous lab.

Note: To see the connections, just click on the [+] sign next to the **To Peer Node** menu item. To delete a connection, just select it with the mouse and then press the **Delete** key.

- 2. In order to act as a network node in an APPN network, you need to first modify your SNA **Local node definitions**. You can get to local node definitions quickly by choosing it from the **Configuration** pull down of the connections panel.

- Your node type is now a **Network Node**.

- 3. You will need to create new connections. The connections will be **To End Nodes** this time. Create connections for the same systems as the previous lab.

Note: Notice that you do not need to specify any partner LUs this time. The partner LUs are not directly associated with a particular link any more. This only describes a link to a control point.

- 4. When you deleted the connections to your peer nodes, you also deleted the partner LUs that were associated with that link. For now, you still need to have a partner LU description for each partner you wish to talk to. To create these, select **Additional SNA Features** from the **Configuration** pull down of the connections panel.

- 5. Create the same partner LUs that you had during the previous lab.

- Don't worry about conversation security for now.
- Use the comment field to identify the partner.

Note: Be sure to use all upper case for the alias name because the program you are going to be running only allows uppercase aliases. This is not a Communications Manager restriction, just this particular APPC program.

Note: Notice that you do not need to specify any link information for the partner LUs this time. The network node will take care of finding the best path to the remote control point.

- 6. Make sure to do a **Save and Exit** of your SNA changes.

- 7. Verify the configuration file, exit Communications Manager, and restart it. Since you changed you Local node definitions, the dynamic update feature will not work.

- 8. You are now ready to be a network node.
- 9. Carry on with the 'Run the APPC Requester Program' Lab

Topic 6.3. Run The APPC Requester Program

- ___ 1. Run the APPC requester program again.
- ___ 2. Send a message to all your configured partners to make sure it works.
- ___ 3. Send a message to your own server by using your CP LU alias as the partner LU alias.
- ___ 4. Use Subsystem Management to display your sessions.
- * Do you notice any differences in the number of session compared to the last lab?

- ___ 5. Use the **Display SNA Configuration** tool, under **Subsystem Management** to observe additional information about your APPN network. There will be more on this tool later.

Topic 6.4. Connecting The Network Nodes.

Now that your network is up and running, the next step is to combine all of the teams into one big APPN network. This is done by creating links between the network nodes. There are several ways to connect the network nodes. They could all have links to each other or, they could be linked together in a circle. The combinations are numerous. All that is really necessary is that each network node must have some path by which it can get to all the other network nodes. Refer to Appendix D in this guide for your network layout.

- 1. In order to create this connection, each network node will need to create two connections **To Network Nodes**. See the diagram in Appendix D of this lab book to determine the connections that should be made.
- 2. Use the information in Appendix A of this lab book for the valid LAN addresses for your connections.
- 3. When your connections are made, verify the configuration file. Use the dynamic update feature this time.
- 4. Once all of the network nodes have connected, each system should get together with another system, **on a different team**, and set up the two system to talk to each other.
Note: This will require nothing more than another partner LU definition.
- 5. When you are ready, try to send a message to this new system.
- * Were the two LUs able to connect? _____
- 6. If not, check to be sure that all of the network nodes were done with their connections, check your new partner LU definition, and try again.

Lab 7. Advanced APPN Topics

What This Unit is About

During this lab, you are going to experiment with some of the advanced features available for APPN in Communications Manager. The first part of this lab will involve security. You will get a chance to try the various security features provided for LU 6.2 communications. Next, you will get a chance to see the various ways of executing a transaction program by experimenting with the transaction program definitions. Finally, you are going to edit your NDF file to include support for implicit inbound partner LUs and connections networks. You will then configure the transaction program defaults so that you do not need to explicitly define all of your TPs. Next, you will run some APPC programs to test these new settings.

What You Should Be Able to Do

After completing this unit, you should be able to

- Edit a Communications Manager NDF file.
- Configure a connection network.
- Configure support for implicit inbound partner LUs.
- Configure transaction program defaults.
- Use the security features provided for APPN communications.

Required Materials

You will need the following materials to complete this lab:

- This lab guide.

Topic 7.1. Using Session Level Security

In order to properly test the session level security, you will need to work with your partner team. Remember, session security does not work with implicit partners.

- 1. Session security is configured under the **Additional SNA features** section of SNA Network Definitions. It will be called **LU to LU Security**.
- 2. Set up session level security for your partner team. Do not tell your partner the password that you are using.
- 3. Verify Communications Manager. Use the dynamic update feature.
- 4. Each team should now try to run the APPC requester program to the partner team. (APPCREQ)

* Are you able to communicate with your partner? _____

* Is the error message that is returned what you expected? _____

* Why did this particular error occur?

- 5. Now go back and make sure that the password is the same value at both ends of the session.

Note: The password is case sensitive.

- 6. Verify Communications Manager. Use the dynamic update feature.
- 7. Each team should now try to run the APPC requester program to the partner team. (APPCREQ)

* Are you able to communicate with your partner now? _____

- 8. If you are able to communicate with your partner, move to the next topic. If not, double check your passwords and retry.

Topic 7.2. Using Conversation Level Security

In order to properly test the conversation level security, you will need to work with your partner team.

- 1. Change your transaction program definition for the APPCSRVR program so that conversation security is required for the program. Now select Conversational Security (from Additional SNA Features) and enter a USERID and PASSWORD **without** telling the requester team what they are.
- 2. Verify Communications Manager. Use the dynamic update feature.
- 3. Each team should now try to run the APPC requester program to the partner team. (APPCREQ) This time, you need to put a USERID and PASSWORD into the respective fields of the APPCREQ program. Since you do not know your userid and password, just put any value here.

- * Are you able to communicate with your partner? _____
- * Is the error message that is returned what you expected? _____
- * Why did this particular error occur?

- 4. The server should now tell the requester the correct USERID and PASSWORD.
- 5. Change the Conversation Security fields in the APPCREQ program to the correct values.
- 6. Try the requester again with the correct values.
- * Are you able to communicate with your partner now? _____

Note: Once you have conversation security working, lets use UPM to store the USERID and PASSWORD in the server.

- 7. Change your conversation security profile.
 - Delete all USERIDs and PASSWORDs you have added to the profile.
 - Check the box that says to **Utilize User Profile Management**.

Note: This tells conversation security to check UPM for USERIDs and PASSWORDs.
- 8. Verify Communications Manager. Use the dynamic update feature.

- ___ 9. Open the User Profile Management group from the Desktop.
- ___ 10. Double click on the **User Profile Management** program
- ___ 11. When prompted to logon, use:
 - USERID = **USERID**
 - PASSWORD = **PASSWORD**
- ___ 12. Select **Manage** from the action bar and then select **Manage users**
- ___ 13. Double click on **New** to add a new user.
- ___ 14. Enter a USERID and a PASSWORD.
Note: You need to type the password twice.
- ___ 15. Click on **OK** to finish.
- ___ 16. Close the UPM program.
- ___ 17. The server should now supply the correct USERID and PASSWORD to the requester.
- ___ 18. Each team should now try to run the APPC requester program to the partner team. (APPCREQ)
- * Are you able to communicate with your partner now? _____
- ___ 19. If you are able to communicate with your partner, move to the next topic. If not, double check your userids and passwords and retry.
- ___ 20. Remove session level security and conversational level security before proceeding with the next topic.
Note: You will need to make 3 changes under Additional SNA Features to remove the security. Refer to the previous 2 topics.

Topic 7.3. Changing Transaction Program Operation

In this section, you will get a chance to see some of the various ways of starting the executable file associated with a transaction program definition. The programs execute fast enough that you really won't be able to tell the difference between queued and non-queued. You will be able to tell the difference between attach manager started vs. operator started vs. pre-loaded.

- 1. Go back to configuration and change your Transaction Program definition for APPCSR.V.
- 2. Change the TP operation parameter to **Queued, operator started**
- 3. Verify Communications Manager. Use the dynamic update feature.
- 4. Have your partner run the requester program (APPCREQ) to your server.

* What happens?

Note: When prompted, start the server as you would any OS/2 program. Remember to put your names as command line parameters or the requester won't know it is you.

C:\S7049\APPCSRV.EXE Hi, This is the server at TEAMxx

* What happens to the requester if you try to send a message to the server twice in succession?

* Is this what you expected to happen ? _____

- 5. Repeat the exercise using **Queued, operator preloaded**.

* What is the difference here?

Topic 7.4. Editing The NDF For Implicit LUs and Connection Networks

In this section you will first edit your Network Definition File to support implicit inbound LUs. You will further modify your NDF to support connection networks. Finally you will run a transaction program between a number of partners, which will show you the benefits of implicit PLUs and connection networks in an APPN environment.

1. Use one of the editors to edit the file `C:\CMLIB\APPN\TEAMxx.NDF`
 - Make sure that the **DEFINE_DEFAULTS** verb has the parameter **IMPLICIT_INBOUND_PLU_SUPPORT** set to **YES**.
 - Remove all partner LU definition.
 - Make sure that the **DIRECTORY_FOR_INBOUND_ATTACHES** is set to *****. This will cause the entire **PATH** statement to be searched.
Note: This can be done from the PM panels as well, but it will be faster to change it here.
 - Add the verb for a connection network to the end of the file. Use the values specified in the example below.

```
DEFINE_CONNECTION_NETWORK
    FQ_CN_NAME(CANEDES.CLSROOM)
    ADAPTER_INFO(DLC_NAME(IBMTRNET)ADAPTER_NUMBER(0));
```

2. Once you have made the changes, save the file.
3. You now need to verify the file to make sure there are no errors. Use the verify program in the Communications Manager group to verify the file. It is called **Verify SNA Network Definitions**. Alternatively, you can run the APPNV program from an OS/2 command line to verify your NDF file. (If you use APPNV, use the /e option for dynamic update).
4. If verification completes without error, you are ready to try it out.
5. If Communications Manager is running, stop it.
6. Start Communications Manager.
7. There is a program called **APPCTELL** in the `C:\S7049` directory. You can use this program to send a message (just like tell on VM) to another LU. All you need to do is specify the fully qualified partner LU that you want to send the message to, and the message you want to send. For example:

```
APPCTELL CANEDES.USER45 Time to go home
```

-
- 8. Try to send a message to some other systems. As everyone finishes the modifications to their NDF files, you will be able to contact everyone on the lab without explicitly defining any partner LU definitions.
 - 9. One thing that you probably won't notice is that you should now be using the connection network to get to the other system. This is totally transparent to the user so you don't really know it is happening.
 - 10. If you use the **Display SNA Configuration** tool, you can verify that you actually have a connection network, and that you are taking advantage of it.
 - 11. Another way to see the connection network in action is to display your SNA links. You should see implicit links to the systems you sent a message to.

Lab 8. 5250 Work Station Feature

What This Unit is About

During this lab, you will configure your TEAMxx file to include support for the 5250 Work Station Feature. You will be using the Advanced Configuration of Communications Manager because BCS will not let you change your TEAMxx file. Once you have your 5250 terminals working, you will set up a logon profile to automate the conversation security checking that is done between the LU sessions. Finally, you will do some parameter matching between OS/400 and Communications Manager.

What You Should Be Able to Do

After completing this unit, you should be able to

- Configure links to the AS/400 system.
- Configure Partner LU profiles for the AS/400.
- Configure 5250 terminal profiles.
- Connect to an AS/400 host.
- Create a UPM logon profile.
- Find the required AS/400 matching parameters.

Required Materials

You will need the following materials to complete this lab:

- This lab guide.

Topic 8.1. Configure Links and PLU profiles

In this topic, you will create a link to an AS/400 host system. You will also define and associate a partner LU profile for this link. You must define a partner LU profile for the AS/400 because the 5250 Work Station Feature uses aliases.

- ___ 1. From the Communications Manager Main Menu, choose **Advanced--> Configuration**
- ___ 2. Configure your **TEAMxx**
- ___ 3. Choose **SNA Feature Profiles--> SNA network definitions--> Create/Change**
- ___ 4. Configure **Connection**
- ___ 5. If your system is configured as a **Network Node**, you will be creating links to a **LEN Node**. If your system is an **End Node**, you will be creating links to a **Peer Node**.
- ___ 6. Create the following link to the AS/400:
 - Token-Ring DLC. (IBMTRNET)
 - Use the default link name. LINK000x (Just a name that is assigned)
 - The Partner network ID is **APPN** .
 - The Partner node name is **EDUC400** .
 - The AS/400's Token-Ring address is **4000030116B5** .
 - Use any comment you wish.
 - Define a partner LU for the link:
 - The LU name is **EDUC400** .
 - The Alias is **ESPLU**

Note: You do not need to create an LU profile, because you can just use the CP LU that is automatically created.
- ___ 7. Save all the changes and return to the **Communication Configuration Menu**.
- ___ 8. Carry on with the next section of this lab.

Topic 8.2. Creating 5250 Work Station Feature Profiles

In this topic, you will setup the profiles that are necessary for the 5250 Work Station Feature. You will create two terminal profiles. One will be for an auto-logon terminal, and the other will be for a manual logon terminal. You will create a printer profile so that a printer can be defined. Finally, you will set up the actual 5250 sessions.

- 1. Choose **5250 Work Station Feature profiles**
- 2. Create a **Terminal profile** called **MANTERM**. Use the supplied model as a base.
- 3. Look at the various items that can be changed. You do not need to change anything for this manual logon profile. When you are done looking, press [F3].

Note: You will need to at least choose **Common terminal options** and press Enter. You do not need to change anything on the common terminal options screens, just press enter twice, then press [F3]
- 4. Create another **Terminal profile** called **AUTOTERM**.
- 5. Choose the **Common terminal options**.
- 6. On the second page, change the **Auto-signon** parameter to **Yes**.
- 7. Now create a **Printer profile** called **PRINTER**. Use the supplied model as a base.
- 8. Look at the various items that can be changed. You do not need to change anything for this printer profile. When you are done looking, press [F3].

Note: You will need to at least choose **Common printer options** and press Enter. You do not actually need to change anything.
- 9. The next step is to identify the LU that you will be using for your 5250 Work Station Feature sessions. Choose **Specify APPC LU alias**
- 10. The alias you should use is the alias for your CP LU session. It should be **TEAMxx**. You can use [F4] for a list.
- 11. Now you will actually set up the sessions. Use the following information:
 - Session 1
 - Use your auto logon terminal profile (AUTOTERM).
 - This will be the first session on the AS/400 system.
 - Use the **#INTER** mode.
 - Use the default Short session ID.
 - Session 2

- Use your manual logon terminal profile (MANTERM).
 - This will be the second session on the AS/400 system.
 - Use the **#INTER** mode.
 - Use the default Short session ID.
- Session 3
 - Use your printer profile (PRINTER).
 - This will be the third session on the AS/400 system.
 - Use the **#INTER** mode.
 - Use the default Short session ID.
- __ 12. Verify your configuration file, and exit the Communications Manager.
- __ 13. Check your message log for a REINST message. If a REINST is required, select NETxx and TEAMxx configuration files for all updates but select TEAMxx as your active configuration.
- __ 14. Carry on with the next section of this lab.

Topic 8.3. Using the 5250 Work Station Feature

In this topic, you will actually use the 5250 Work Station Feature.

- 1. Start Communications Manager.
- 2. Select **Start emulators**
- 3. Start all of your **5250 Work Station Feature** sessions.
- 4. When you are prompted, enter your AS/400 userid and Password.. Use OS2IDxx for both the userid and password.

Note: As your sessions start, you should notice that you will be automatically logged on to your first session. You will still need to manually log on to the second session. The UPM panel does not actually log you on to the host, it is only for checking conversation security on the sessions.

- 5. All of your sessions will exist within the same window. Jump between the sessions using the **Alt + Page up** key.
- 6. Using the first session, send a message to the instructor ID, **OS2ID00**, to verify that you have connected. To send a message:
 - Select **User Tasks**.
 - Select **Send a message**.
 - Type in your text.
 - Put **OS2ID00** in the **To user profile** field.
 - Press Enter to send the message.

Note: You will not receive any confirmation of the note being successfully sent.
- 7. Carry on with the next section of this lab.

Topic 8.4. Customizing the 5250 Work Station Feature

In this topic, you will make the 5250 Work Station Feature operate as a full screen application instead of a windowed application. You will also set up a UPM User Logon Profile. This profile will allow you to have logon entries for your remote node stored in memory when you log on locally. This will keep you from needing to enter your remote IDs for every session.

- ___ 1. Edit the file called **C:\CMLIB\STARTCM.CMD**.
- ___ 2. Find the line that reads:
SET EM5250=WIN
- ___ 3. Change it to:
REM SET EM5250=WIN
- ___ 4. Save the file.
Note: Now, the next time you start Communications Manager your 5250 Work Station Feature will run in a full screen. You will need to exit Communications Manager completely for this to work.
- ___ 5. In order to create a UPM User Logon Profile, go to the UPM group under presentation manager.
- ___ 6. Select **User Profile Management**.
- ___ 7. When prompted, log on as **USERID** with a password of **PASSWORD**.
- ___ 8. Select **Actions--> Add/Change user logon profile**.
- ___ 9. Make sure that **NEW** is highlighted.
- ___ 10. Select **Actions--> Add new entry**
- ___ 11. Enter your AS/400 userid and password. Use ESPLU as the remote node name (This is the alias of the partner LU at the AS/400).
Note: Now, when you log on locally as USERID, you will have your AS/400 userids and passwords added to your list of logons. This way, when you start the 5250 Work Station Feature, you will not be prompted for each of your AS/400 userids.
- ___ 12. In order to test the new setup out, and prove it really works, shutdown and reboot your system.
- ___ 13. When your system comes up, before you start the Communications Manager, go to the UPM group and select logon.
- ___ 14. logon as **USERID** with a password of **PASSWORD**.

__ 15. Now start Communications Manager.

__ 16. Start all of your 5250 sessions.

Note: You should notice two things:

a. Your 5250 sessions should now be full screen instead of windowed.

b. You shouldn't have any UPM logon panel to fill out when the 5250 sessions come up.

__ 17. Carry on with the next section of this lab.

Topic 8.5. AS/400 Parameter Matching

In order to use the 5250 Work Station Feature, several parameters must match between OS/400 on the AS/400 and Communications Manager on the Work Station. These parameters have different names on the two systems however. See if you can find the name of the OS/400 parameters that match up with the following Communications Manager parameters:

Use the following OS/400 commands to display configuration information on the AS/400:

Network information	DSPNETA
Line information	DSPLIND EDCLAN
Controller information	DSPCTLD <u>OVTNEx</u> → <u>PO ID</u>
Mode information	DSPMODD #INTER
Device information	DSPDEVD OVTNEx

Communications Manager Parameter	OS/400 Parameter
Network ID	<u>CANEDES</u>
Partner LU name	<u>EDUC400</u>
Destination address	<u>4000030116B5</u>
Local APPC LU name	<u>OVTNEx</u> DEV D REMOTE LOCATION
Local node name	<u>OVTNEx</u> CTLD REMOTE CP
Local LAN Address	<u>400000368123</u>
Mode name → DEV D	<u>*NSSTATR = BLANK</u>

Device name = Local PO ID
 ↳ Ctl name
 ↳ line name

Topic 8.6. Optional Challenge

The end nodes should be able to remove all of their Peer connections and get to the AS/400s through the network nodes instead.

Try it!

Lab 9. Subsystem Management

What This Unit is About

During this lab, you will get a chance to use several of the Communications Manager Subsystem Management tools. First, you will display information about your own system. Then, you will set up the systems in your network so that you can display information about another workstation in your network. Finally, you will get a chance to use the Service Point Application Router and the Remote Operations Service with NetView.

What You Should Be Able to Do

After completing this unit, you should be able to

- Use the Communications Manager Subsystem Management tools to display configuration information.
- Display a remote system's SNA configuration.
- Use the Service Point Application Router and Remote Operations Service to issue commands to an OS/2 workstation.

Required Materials

You will need the following materials to complete this lab:

- This lab guide.
- Extended Services for OS/2 diskettes.
- NetView logon information given in class.

Topic 9.1. Subsystem Management

The tools you are going to use for this topic can be accessed from the Communications Manager main menu under Subsystem Management, or from the Communications Manager applications group. Use whichever method you prefer.

SNA Logical Links

- 1. Make sure that Communications Manager is running.
- 2. First, use the **SNA Logical Link Services** application to display information about your links.
Note: All of your configured logical links will be displayed, along with their status.
- 3. Use **Options** to change the font size.
- 4. Use **Change status** to deactivate one of your links.
Note: Use the **Deactivate hard** option. This will bring the link down immediately.
- 5. Reactivate the link you just deactivated.
Note: Use the [Ctrl+R] key to refresh the display. You should see the status go from inactive to pending active to active.
- 6. Double click on one of your active links to get more detailed information about the link.

Display Active SNA Configuration

- 1. Start the **Display Active SNA Configuration** application. Using the **Display** pull down, display all of your **General SNA** and **APPN** information.
Note: Display each item to see what is available to you. Use the help panel for additional information.
- * How many LUs are in your directory? _____
- * How many LUs registered with you? _____
- * Do LUs register with an end node? _____
- * How many LU 6.2 sessions do you have? _____

- * How many CP-CP sessions do you have? _____

Hint: The mode on a CP-CP session is CPSVCMG.

Remote System SNA Configuration

One of the nice things you can do with the **Display Active SNA Configuration** is display the configuration of a remote workstation. This requires a transaction program in the remote system. This program is called RDSPSVR. The remote system can explicitly define a transaction program profile or, it can use the transaction program defaults. This program was installed when the utilities were installed. The program is in the C:\CMLIB\DSPSVR directory.

- ___ 1. Edit your NDF file and change the default directory to C:\CMLIB\DSPSVR.
- ___ 2. Save and verify the configuration file.
- ___ 3. To display the configuration of another workstation, choose **Options--> Select target**.
- ___ 4. If you are an end node, display your network node's SNA configuration.
Note: Compare the topology display for the network node to the topology of an end node.
- ___ 5. If you are the network node, display one of your end node's configuration.
Note: Compare the topology display for the network node to the topology of an end node.
- ___ 6. Display any other information you wish to see.
- ___ 7. Try to find some information about your system in the remote system's configuration.
- ___ 8. When you want to return to your own SNA configuration, you need to select yourself as the target.

Other Tools

- ___ 1. Explore each of the items, that you have not already used, under the **Communications Manager Main Menu--> Advanced--> Subsystem Management** option.
Note: Use the help panels to get more information about each tool.
- ___ 2. Start one of your 3270 and one of your 5250 emulators.

* Do you have any transaction programs running? If so, what are they for?

___ 3. Now, try deactivating your Token-Ring DLC.

* What happens to applications using that DLC?

___ 4. Try to re-activate your Token-Ring DLC.

* Were you able to re-activate it? Why or why not?

* Do all of your applications come back up when the DLC comes back up?

Topic 9.2. Service Point Application Router and Remote Operations Service

The SPA Router and ROP Service allow you to issue commands to a remote OS/2 workstation from a NetView console. In order to use this feature, it must first be installed and running on the OS/2 workstation.

- 1. Insert the Extended Services for OS/2 disk 1 into your a drive.
- 2. From an OS/2 command prompt, enter the command **A:\ROPS** . This will install the SPA Router and ROP Service. It will also create a new group called **Remote Operations** with the two applications in it.
- 3. You will need to reboot the system and start Communications Manager before using the new tools.
- 4. Open the **Remote Operations** group and start the two programs.
Note: You need to start the SPA Router first.
- 5. Your workstation is now ready to receive commands from a NetView console.
- 6. Start a 3270 terminal session.
- 7. Type in OVYNV on the command line of your 3270 session screen.
- 8. Logon to Netview. Ask your instructor for your userid and password.
Note: You may need to change the password, if it has expired.
- 9. When you get the **???** ******* prompt, press enter.
- 10. Enter **NCCF** at the **NetView Main Menu**.
- 11. You can now send commands through NetView. The syntax is:

```
RUNCMD SP=yyyyyyyy, APPL=REMOTEOP, OP=xxxxxxxx; PASS=zzzzzzzz; COMMAND
```

Where:

yyyyyyyy = PU/Control Point you wish to send the command to

xxxxxxxx = Your USERID. This will be check in the OS/2 UPM if such checking has been turned on.

zzzzzzzz = Your UPM password. If using UPM checking, this is required, if not, you can leave this parameter, and the semicolon that follows it, off.

COMMAND = The command you wish to execute. For example:
DIR C:

- __ 12. Try sending a command to your control point first.
Note: Your control point ID can be found in Appendix A of this LAB guide.
- __ 13. Now, try sending to another system that has the SPA Router and ROP Service running.
Note: The [F12] key can be used in NetView to recall the previous command.
There is a UPM userid called USERID and a password called PASSWORD that you can use if the remote system is using the UPM checking.
- __ 14. Now, try using the UPM checking in your system.
- __ 15. In the **Remote Operations** application, choose **Options--> Program options**
- __ 16. Click on **UPM operator checking**. Now, only users in your UPM database can issue commands to your workstation.
- __ 17. Try to send a command with an invalid userid/password.
- __ 18. Now, try with a valid userid/password.
- __ 19. Another nice feature is the ability to limit the commands that can be issued to the workstation. You can build a list of commands. This list can be a list of valid commands or a list of invalid commands. This is controlled by a check box that effects the entire list.
- __ 20. To try this out, choose **Options--> Edit command validation table** from the ROP application.
- __ 21. Add a command to the list. For example, your could add the DIR command.
- __ 22. Now, if you want the list to contain all of the valid commands, you need to uncheck the **Exclusive set** check box. If the list is a list of invalid commands, leave the check box checked.
- __ 23. Try it out each way with the command you entered into the list.
- __ 24. Before finishing this lab, take a few moments to look at the other options that are available on the action bar of both the SPA Router and the ROP Service applications.

Lab 10. Problem Determination

What This Unit is About

During this lab, you will get a chance to use several of the Communications Manager problem determination tools. You will first look at each of the logging utilities available. Next, you will perform a trace of Communications Manager data and API calls. The trace will then be formatted for easier reading. Finally, you are going to use the problem determination tools and experience gained throughout the week to solve a communications problem.

What You Should Be Able to Do

After completing this unit, you should be able to

- Use the Extended Services for OS/2 problem determination documentation to assist in problem determination.
- Use the LANTRAN.LOG.
- Use the Communications Manager message log.
- Use the Communications Manager error log
- Perform a Communications Manager trace.
- Format a Communications Manager trace.

Required Materials

You will need the following materials to complete this lab:

- This lab guide.
- *IBM Extended Services for OS/2 Problem Determination Guide for the Service Coordinator, S04G-1006*
- *IBM Extended Services for OS/2 Programming Services and Advanced Problem Determination for Communications, S04G-1007*

Topic 10.1. LANTRAN.LOG

Whenever you run Communications Manager over a LAN, a file called LANTRAN.LOG is created, in the C:\IBMCOM directory, when the system is started. A service coordinator may want to look at this file as the first step in solving LAN problems.

- 1. Open an OS/2 session, change to the C:\IBMCOM directory and view the LANTRAN.LOG file. The type command will work fine:

TYPE LANTRAN.LOG

- 2. Use the contents of the LANTRAN.LOG file to answer the following:

- What kind of LAN are you on? _____
- What data rate is it? _____
- Which LAN adapter is it? _____
- What is the LAN adapter address? _____

Topic 10.2. Message log and Error log

- ___ 1. Start Communications Manager if it is not already running.
- ___ 2. Go to the Communications Manager main menu and select **Message** from the action bar.
- * What is the default name of the message file? _____
- * Which Communications Manager configuration profile is used to set the default name of the message file?

- ___ 3. Put the cursor on the originator entry and press [F4] to display a list of possible message originators. Scroll through the list of all possible originators.
- ___ 4. When you have finished looking at the originators, press the escape key to leave the entry blank. This will display all messages rather than restricting them to a particular originator.
- ___ 5. Pick one of your messages that have accumulated over the week.
- ___ 6. You can get help on the possible causes and recommended actions for an error by placing the cursor on the message number field of a message and pressing the [F1] key. The *IBM Extended Services for OS/2 Problem Determination Guide for the Service Coordinator*, S04G-1006 contains most of the message descriptions.
- ___ 7. Switch to an OS/2 session, change to the C:\CMLIB directory, and try to edit the MESSAGE.DAT file.
- * Can you edit it? _____
- ___ 8. Try to delete the file.
- * Can you delete it? _____
- * Why Can't you work with this file? Is there anything you could do that would allow you to work with it?

- ___ 9. Now, take a look at the Communications Manager error log. Go to **Advanced--> Problem determination aids--> Error log services** to display the error log.

* What is the default name of the error log file? _____

* Which Communications Manager configuration profile is used to set the default name of the error log file?

___ 10. Note that you can use the **Log type** field to restrict the messages to a certain type.

___ 11. Try displaying all ALERTS that have been logged to the error log. The alert is an error type of **0017**

___ 12. Now, display all of the error log entries.

Note: The *IBM Extended Services for OS/2 Programming Services and Advanced Problem Determination for Communications*, S04G-1007 lists most of the possible errors and their type number.

___ 13. Switch to an OS/2 session, change to the C:\CMLIB directory, and try to type the ERROR.DAT file.

* Can you type it? _____

* Why Can't you type this file?

* What do you do if you wish to print the error log?

Topic 10.3. Communications Manager Trace

- 1. Use Communications Manager menus or the CMTRACE program to turn on traces for the **APPC** API and **IBMTRNET** data.

Note: If you wish to use CMTRACE, you can get syntax help by typing **CMTRACE ?** on the command line.

- 2. Run the APPCREQ program to a server on the network. It doesn't matter who.

Note: If you send the message to your own server, you will see both ends of the conversation in the trace. This will look pretty confusing and will be difficult to follow.

- 3. After sending the message, stop the trace.

- 4. Write the trace out to a file called **C:\S7049\TRACE1.TRC**

- 5. Now, go to the C:\S7049 directory.

- 6. Use the FMTTRACE program to format the TRACE1.TRC file. Make sure to create both a summary trace and a detailed trace. To do this, you need to use the **/D** parameter at the end of the command. This will cause two new files to be created, TRACE1.SUM and TRACE1.DET.

Note: You can get syntax help for FMTTRACE by typing **FMTTRACE ?** on the command line.

- 7. Use an editor to look at each of these files. If you are not familiar with trace data, the summary trace will be the most useful to you. From it, you can follow the flow of data that took place when the program was run.

Note: Make sure that you use a monospaced font and turn word wrap off, or the traces will look funny.

Appendix A. Lab Setup for initial labs

Destination Address: 400009103689

Network ID: CANEDES

Team Number	Wks Name (Local Node Alias)	LAN Address	Local Node Name (CP Name)	Local Node ID
01	TEAM01	400000368122	OVTNEB	40077
02	TEAM02	400000368123	OVTNEC	40078
03	TEAM03	400000368124	OVTNED	40079
04	TEAM04	400000368125	OVTNEE	40080
05	TEAM05	400000368126	OVTNEF	40081
06	TEAM06	400000368127	OVTNEG	40082
07	TEAM07	400000368128	OVTNEH	40083
08	TEAM08	400000368129	OVTNEI	40084
09	TEAM09	400000368130	OVTNEJ	40085
10	TEAM10	400000368131	OVTNEK	40086
11	TEAM11	400000368132	OVTNEL	40087
12	TEAM12	400000368133	OVTNEM	40088
13	TEAM13	400000368134	OVTNEN	40089
14	TEAM14	400000368135	OVTNEO	40090
15	TEAM15	400000368136	OVTNEP	40091
16	TEAM16	400000368137	OVTNEQ	40092
17	TEAM17	400000368138	OVTNER	40093
18	TEAM18	400000368139	OVTNES	40094
19	TEAM19	400000368140	OVTNET	40095
20	TEAM20	400000368141	OVTNEU	40096

Appendix B. Host VTAM/NCP Information Sample

VTAM Definitions for OS/2 EE Workstations

```
INSTRUCT  PU      ADDR=50,
           IDBLK=05D,
           IDNUM=000xx
           DISCNT=NO,
           ANS=CONT,
           IRETRY=YES,          *****
           PUTYPE=2,           * Workstation      *
           MAXDATA=1010,       * xx = team number *
           MAXOUT=7,           *****
           MODETAB=MODE3279,
           USSTAB=MSNF3279,
           SSCPFM=USSSCS,
           PACING=(1,1),
           VPACING=(2,1)

STUDxx01  LU      LOCADDR=02, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx02  LU      LOCADDR=03, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx03  LU      LOCADDR=04, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx04  LU      LOCADDR=05, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx05  LU      LOCADDR=06, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx06  LU      LOCADDR=07, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx07  LU      LOCADDR=08, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx08  LU      LOCADDR=09, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx09  LU      LOCADDR=10, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx0A  LU      LOCADDR=11, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx0B  LU      LOCADDR=12, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx0C  LU      LOCADDR=13, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx0D  LU      LOCADDR=14, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx0E  LU      LOCADDR=15, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx0F  LU      LOCADDR=16, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx11  LU      LOCADDR=17, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
STUDxx12  LU      LOCADDR=18, ISTATUS=ACTIVE, LOGAPPL=ESSAMON
```

Note: The first two digits of the PSERVIC value in the MODETAB entry define the LUs to be of type 2.

More...

3745 NCP Information

TR21PGL4 LINE ADDRESS=(1093,FULL),
 LOCADD=400009103689,
 PORTADD=4,
 MAXTSL=1050,
 RCVBUFC=4095,
 ISTATUS=ACTIVE,
 ADAPTER=TIC2,
 TRSPEED=4

Network Information

Network Name CANEDS
C & SM LAN ID CANEDS

Appendix C. APPN Connections

