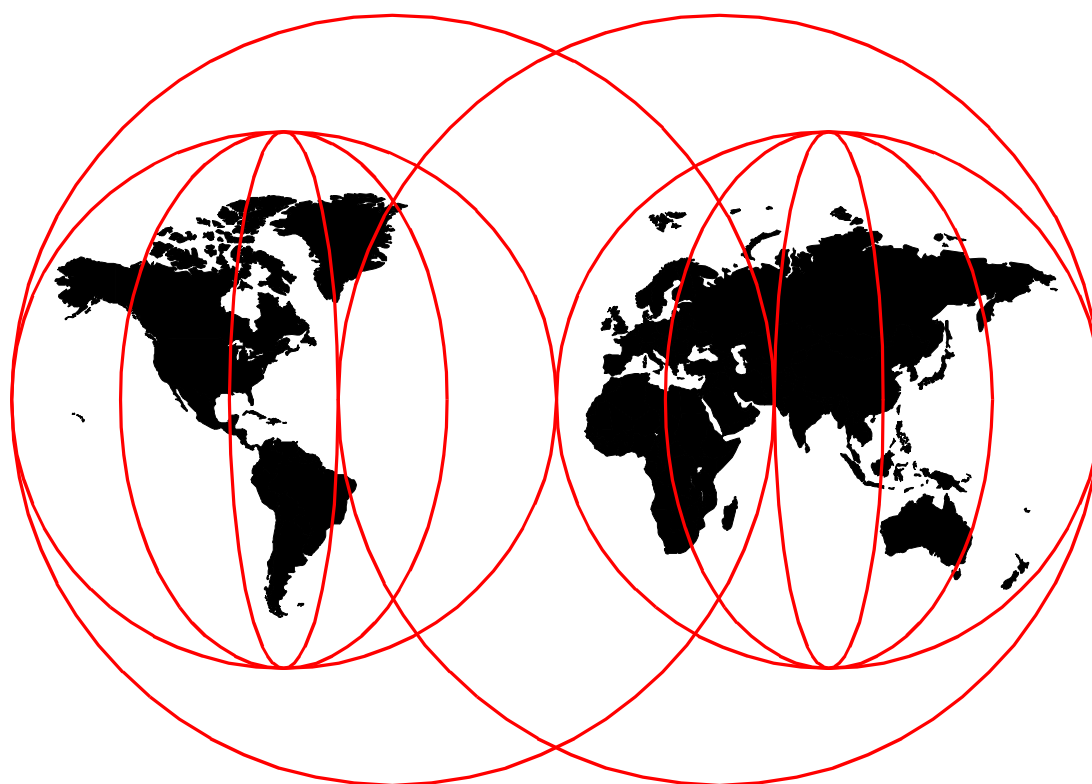


Multiprise 3000

Basic Emulated I/O Definitions

Bill Ogden



International Technical Support Organization

www.redbooks.ibm.com



International Technical Support Organization

SG24-5669-00

**Multiprise 3000
Basic Emulated I/O Definitions**

December 1999

Take Note!

Before using this information and the product it supports, be sure to read the general information in Appendix B, "Special Notices" on page 47.

First Edition (December 1999)

This edition applies to the initial shipments of the Multiprise 3000 system.

Comments may be addressed to:
IBM Corporation, International Technical Support Organization
Dept. HYJ Mail Station P099
522 South Road
Poughkeepsie, NY 12601-5400

When you send information to IBM, you grant IBM a non-exclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Contents

Preface	v
Author and Contributors	v
Comments Welcome	v
Chapter 1. Introduction	1
1.1 Making a Plan	1
1.1.1 Our Plan and Assumptions	1
1.2 Overview of Emulated I/O Definitions	3
1.3 Emulated I/O Device Managers	3
1.4 Enable OS/2 Desktop	4
Chapter 2. Specific Examples	5
2.1 Emulated 3270 Sessions (Multiprise Console Only)	5
2.2 Emulated 3270 Sessions (Console and LAN)	13
2.3 Emulated Disks and Tapes	18
2.3.1 Emulated Disk Drives	19
2.4 Emulation Definitions For OS/390 TCP/IP	21
2.5 OS/390 SNA With LANs	25
Chapter 3. Additional Tips	29
3.1 Review: TCP/IP Choices	29
3.2 LANTRAN.LOG	30
3.3 PCOM Keyboard Customization	30
3.4 Displaying Square Brackets From Under ISPF	31
3.5 More Than One Ethernet Adapter	31
3.6 DIX and IEEE802.3	32
3.7 Multiple OS/2 TCP/IP LAN Interfaces	33
Chapter 4. LPARs and HMCs	35
4.1 Hardware Management Console	35
4.2 Web Interface	37
4.3 Multiple LPARs and Emulated I/O	37
4.3.1 How Many LAN Adapters Do I Need?	38
Appendix A. IOCDS and DEVMAP Listings	41
Appendix B. Special Notices	47
Appendix C. Related Publications	49
C.1 IBM Redbooks Publications	49
C.2 IBM Redbooks Collections	49
C.3 Other Resources	49
How to get IBM Redbooks	51
IBM Redbooks fax order form	52
Index	53
IBM Redbooks evaluation	55

Preface

This redbook describes basic emulated I/O definitions needed for an initial Multiprise 3000 installation. Several sample configurations are used to provide specific examples; these examples assume the use of OS/390. Descriptions are limited to emulated CKD disks, two specific SCSI tape drives, and LAN definitions for local 3270s, OS/390 TCP/IP, and SNA. WAN functions are not discussed. This document assumes the reader is familiar with S/390 and OS/390 terms and functions.

The primary examples assume that a Hardware Management Console (HMC) is not attached to the system and that basic (non-LPAR) mode is used. Both HMC connection and LPAR usage is discussed, but in less detail.

Author and Contributors

The author of this document is **Bill Ogden**. He is a retired IBM Systems Engineer who enjoys working with entry-level OS/390 systems and with the users of such systems. Bill has been with the ITSO for many years. Since his retirement, he participates part-time with the ITSO, and also works as an independent consultant.

Contributors:

Chuck Berghorn, with the P/390 development group, designed and guided much of the emulated I/O capabilities used with the Multiprise 3000.

Al Bishop, with S/390 Product Engineering, helped select the specific examples used in this book.

Jay Hall, with the P/390 development group, helped us understand LAN adapter customization.

Krisanne Wallner, program manager for the Multiprise 3000, helped us produce this book in an unusually short time.

Boyd Andrews, S/390 system test group, helped us understand HMC connections.

Comments Welcome

Your comments are important to us!

We want our redbooks to be as helpful as possible. Please send us your comments about this or other redbooks in one of the following ways:

- Fax the evaluation form found in Chapter , "IBM Redbooks evaluation" on page 55 to the fax number shown on the form.
- Use the online evaluation form found at <http://www.redbooks.ibm.com/>
- Send your comments in an internet note to redbook@us.ibm.com

Chapter 1. Introduction

This redbook is intended to provide assistance with initial emulated I/O installation. It does this by examining the definitions required to install several sample systems. The examples chosen are somewhat arbitrary and you will need to adapt these to the system you are actually installing.

The documentation here is rather terse and is not intended to provide much background information. For more background, you might read *Multiprise 3000 Technical Introduction* (SG24-5633) and *P/390, R/390 S/390 Integrated Server: OS/390 New User's Cookbook* (SG24-4757-01).¹ Much of the material in this document was extracted from these two references.

We assume you have read the *Multiprise 3000 Technical Introduction*, or a similar document, and understand the concepts of emulated devices.

1.1 Making a Plan

Before starting to define emulated I/O devices you need a plan. Your plan should include the following items:

- What emulated devices do you want: 3270s? 3380/3390s? Tape drives? LAN connections for OS/390 TCP/IP and VTAM?
- What hardware do you have for emulation devices: OS/2 disk space? LAN adapters? SCSI tape drives? PC printers?
- What OS/390 addresses (device numbers) will you use for these emulated I/O devices?
- How will you change or adapt your OS/390 configuration to match new devices and new addresses? For example, will all your changes be through HCD? Through direct IOCDs changes?
- Do you need any particular “hardware addresses” for your emulated devices?
- Will you have a LAN-attached Hardware Management Console (HMC)?

You need to have a clear picture of what you want to accomplish before starting to define emulated I/O devices.

1.1.1 Our Plan and Assumptions

We make the following assumptions for most of our examples:

- The target system will run in basic mode (that is, not in LPAR mode). The Multiprise 3000 and emulated I/O can be used in LPAR mode, but we strongly suggest that you start with basic mode until you have more experience with emulated I/O definitions.
- We do not have an HMC.
- Our target operating system is OS/390. The Multiprise 3000 and emulated I/O can be used with VM and VSE systems, and the definitions involved are about the same as for OS/390. However, to provide specific examples, we will assume that OS/390 is being used.

¹ The “dash number” (-01) is important. An earlier edition of this redbook did not contain the relevant material.

- We assume an OS/390 system already exists on the primary Multiprise 3000 disks, with various I/O addresses specified in its IODF. Furthermore, we assume the following I/O addresses are used:
 - 700 is the address of the MVS master console.
 - 701-71F and 900-91F are defined as local, non-SNA 3270 terminals, to be used by VTAM for connection to TSO and/or CICS. (These would traditionally be connected to local, non-SNA 3174 control units.)
 - E20 and E21 are the addresses of CTC definitions intended for use with an IBM 3172 LAN Channel Station, used by OS/390 TCP/IP for a LAN interface.
 - E40 is defined as a CTC intended for use with an IBM 3172 LAN SNA control unit.
 - A80-A9F are defined as 3390 disk drives, and these particular drives will be emulated I/O units.
 - 570 is defined as a 3480 tape drive with the COMPACT feature.
 - 590 is defined as a 3490E tape drive.
- There is nothing special about these addresses. We use them in order to provide specific examples in this document. These addresses match those included in the AD preloaded system and the 390ADS preloaded system and may be realistic examples for these prebuilt OS/390 systems.
- We will not change the OS/390 IODF definitions and we will not use HCD to make adjustments to our IOCDS. Instead, we will use stand-alone IOCDS edits and builds to adjust our IOCDS to match our emulated I/O definitions.² We assume you understand the stand-alone IOCDS building process.
- All emulated I/O devices are addressed on chpid X'FC'. Each emulated device must be assigned a unit address on this chpid. You can assign the unit address (in the range X'00' to X'FE') and there is no inherent meaning to any of the addresses. You can use them in any order³. We arbitrarily elected to use the following unit address plan:

Unit Addresses	Usage
00 - 0F	Unit record devices
10 - 1F	Channel to channel devices
20 - 2F	Tape devices
30 - 3F	Emulated 3380 drives
40 - 5F	Emulated 3390 drives
60 - 6F	Other devices
70 - FE	Local 3270 terminals

- Again, there is nothing special about these unit addresses. However, an orderly plan like this makes implementation easier. (Note that address X'FF' is not usable; this is a restriction for emulated I/O with the Multiprise 3000.)
- Modern S/390 systems have four usable IOCDS files, known as A0 through A3. You can maintain four different IOCDS files and select which one you want when you perform a Power-On Reset (POR) function. For our examples, we will use only A0.

² This may appear to be a radical step, but it is the easiest method to use with prebuilt systems. These prebuilt (or "preloaded") systems tend to have a large number of devices defined for OS/390 (in the IODF), while the actual devices used (in the IOCDS) may be much more limited.

³ With the minor exception that CTC definitions used for a TCP/IP 3172 must be have adjacent even/odd addresses.

1.2 Overview of Emulated I/O Definitions

Emulated I/O involves definitions (or actions, or hardware) at the following levels:

- Hardware available to OS/2 is needed. All emulated devices are managed through OS/2 programs. This hardware may be LAN adapters, SCSI tape drives, hard disks, a PC printer on a parallel port, and so forth.
- These devices are defined, in some manner, to OS/2. This may be through CONFIG.SYS or MPTS or OS/2 TCP/IP or something similar.
- These devices are then defined to the emulated I/O device managers. This is done with the Emulated I/O Configuration function, which runs under the Support Element application. This step customizes a DEVMAP file.
- The devices must be known to IOCDS. This could be done by defining them with HCD and creating a new IOCDS (and IODF) or it could be done by directly adding them to an IOCDS source file.
- The devices must be known to OS/390 (by being present in its IODF). This must be done through HCD definitions. For this document, we assume that all the devices you may add are already defined in your IODF. If this is not true, your systems programmer will need to add them. (We make our assumption because many Multiprise 3000 owners will use the preloaded systems from IBM and these already contain a large number of device definitions in their IODF. By adjusting hardware addresses, you can use these existing definitions.)
- In some cases, an additional step may be needed to customize a particular OS/2 program. For example, 3270 emulator sessions must be customized.

These points are all important. If you find emulated I/O implementation confusing, you might review each point in this list for each emulated I/O device you want to create.

1.3 Emulated I/O Device Managers

Emulated I/O is organized around the *device managers* (OS/2 programs) used to provide various types of emulation. It is convenient to organize this discussion by device manager (using their OS/2 program names), and the available device managers include:

Device Manager	Control Unit Emulated	Emulated Devices and Actual Devices
AWSCKD	3880-CDC 3990-C2 9343-E0 3880-01	3380 emulation, using SBC hard disks 3390 emulation, using SBC hard disks 9345 emulation, using SBC hard disks 3350, 3330 emulation, using SBC hard disks
AWS3274, LAN3274	local non-SNA 3174	3278, etc, use LAN-connected tn3270 sessions. These appear as local, channel-attached, non-SNA 3270s
LAN3172	3172 (SNA)	LAN (token ring, Ethernet) SNA connections to VTAM
LCS3172	3172 (TCP/IP)	LAN TCP/IP connections to OS/390 TCP/IP

Device Manager	Control Unit Emulated	Emulated Devices and Actual Devices
WAN3172	3172 (SNA)	SDLC modem lines, when appear as LAN SNA devices
AWS34XX	3803, 3480/3490	3420, 3480, 3490, 3490E drives, using SCSI tape drives
AWS2821	2821, 3211	1403 or 3211 line printer, using PC printers or OS/2 files
AWS2540	2821	2540 card reader, using an OS/2 disk directory
AWSTAPE	3803	3420 tape drive, using OS/2 disk files

These device managers⁴, together with several common programs that provide the emulated channel functions, are packaged with the OS/2 code supplied with the Multiprise 3000.

1.4 Enable OS/2 Desktop

As shipped, you cannot access the OS/2 functions in the Multiprise 3000. This is to prevent inadvertent changes to the system. In practice, you need to access OS/2 functions for a number of reasons. You can enable access to the OS/2 desktop by doing the following:

1. Start the SE function. (This is normally started automatically by OS/2.)
2. Log onto the SE function with userid ACSADMIN. The default password is PASSWORD.
3. Click the **Console Actions** icon in the upper left area of the SE display.
4. Click the **User Profiles** icon.
5. Disable the Secure Desktop function.

You should now be able to use icons on the OS/2 desktop.

At this point, you would probably log off the SE function, and log on again with the userid SYSPROG. (The ACSADMIN userid has a restricted set of functions available.)

You can elect to enable the OS/2 desktop for a single user, as identified by an SE application logon name. The method listed above enables the OS/2 desktop for all users.

⁴ Several other minor device managers, not listed here, are also included.

Chapter 2. Specific Examples

This chapter walks through several specific examples of emulated I/O and the definitions associated with each example. The second example builds on the first example, and so forth. It is necessary to start with the first example and understand it before going on to more detailed configurations. The first example contains more background description than the later examples.

2.1 Emulated 3270 Sessions (Multiprise Console Only)

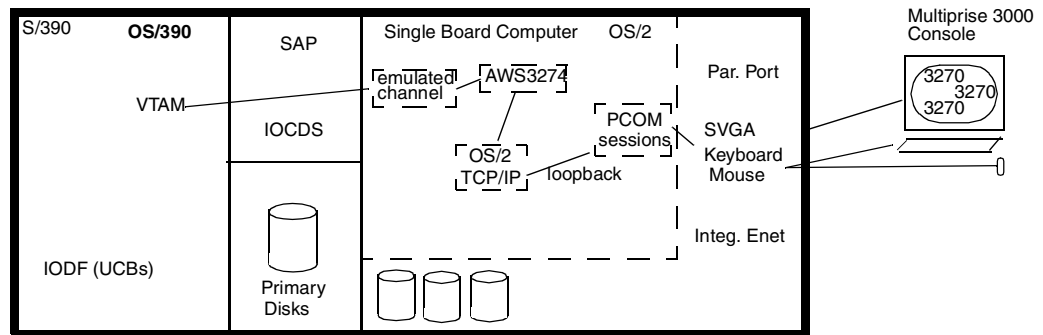


Figure 1. Highly Conceptual View of Multiprise 3000, with SBC elements emphasized

Assume we have a system with OS/390 preloaded on the primary disks. We need at least two local 3270 sessions to begin working with the system, one for the MVS master console and one for TSO. At this point we do not need any other emulated devices: no LAN connections⁵, no emulated 3380/3390 drives, no emulated tape drive, and no emulated unit record devices. This is a very basic situation, but it provides a starting point for more complex definitions.

Our goal is to define three 3270 sessions to be available on the Multiprise 3000 console. One session is to have address 700 (for the MVS master console) and the other sessions are have addresses 701 and 702 (for VTAM TSO sessions). No external LAN devices are involved.

Figure 1 is an illustration of this situation. Drawings such as this are important for understanding emulated I/O and we will take a few words to explain it. We can view a Multiprise 3000 as having three elements: the S/390 processor(s), the SAP processor, and the Single Board Computer (SBC). This illustration over emphasizes the SBC elements, because they are the elements of emulated I/O.

The SBC (running under OS/2) has its own set of I/O devices, including disks, an integrated Ethernet adapter, display/keyboard/mouse adapters, and so forth. Running under OS/2 is OS/2 TCP/IP; most Multiprise 3000 emulated I/O configurations will require OS/2 TCP/IP. The box shown as AWS3274 is one of the emulated I/O device managers, with this name. PCOM is a 3270 emulator included with the system, and is used to provide the three 3270 sessions we want. PCOM provides tn3270 (TCP/IP) sessions, and in this case, we are using

⁵ In this case, the integrated Ethernet adapter will not be used. Or it might be used for an HMC connection; this is ignored in this example.

an internal loopback address (instead of a LAN adapter) to connect the tn3270 sessions to OS/2 TCP/IP.

Why did we focus on the AWS3274 device manager? AWS3274 is intended for emulating local 3270 terminals, using the PC (SBC) display and keyboard. This is exactly what we want for this exercise.

The following steps are required to define our three local 3270 devices:

1. MPTS definitions
2. OS/2 TCP/IP definitions
3. DEVMAP (Emulated I/O Configuration) definitions
4. IOCDs definitions and rebuilding
5. PCOM definitions
6. Load OS/390 and test the system

Each of these steps is described in the following sections.

2.1.0.1 MPTS Definitions

Start an OS/2 window and enter the command `MPTS`. Wait a few seconds until the initial screen changes, and then press Enter twice. You should then see a screen something like that shown in Figure 2.

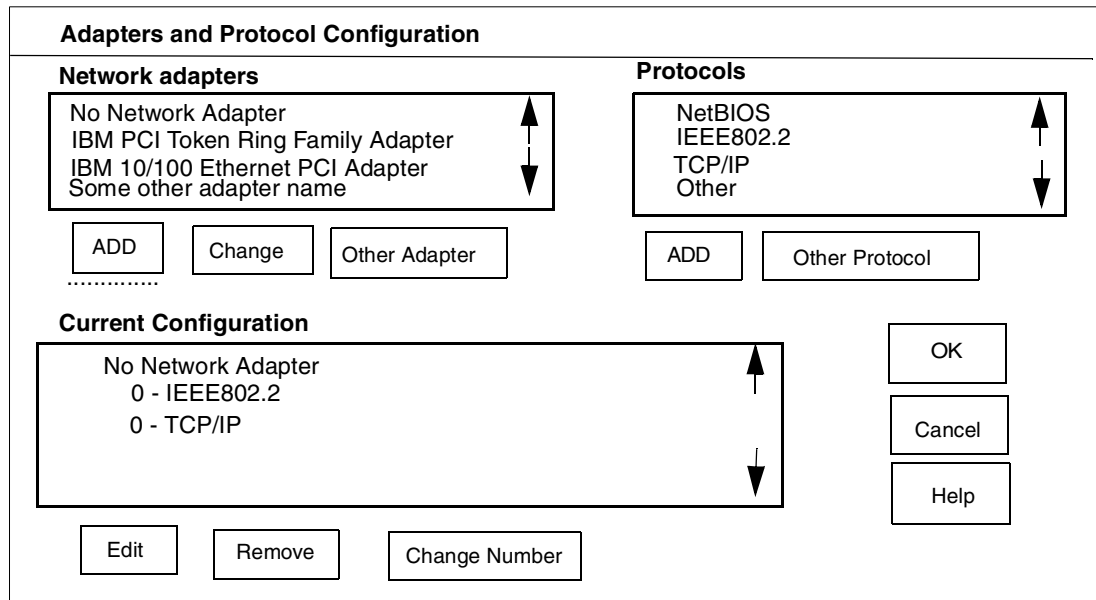


Figure 2. Primary MPTS Configuration Display

You need to work with MPTS to produce the Current Configuration shown in the figure. OS/2 TCP/IP will not function unless a LAN adapter is defined for it. In this case we have defined a special virtual adapter named *No Network Adapter*; this should be the first adapter listed in the Network Adapters window. We have assigned the protocols IEEE802.2 and TCP/IP to this adapter.

The general process for using this screen is:

1. Select an adapter in the Network Adapters window. Click **ADD**. The adapter will appear in the Current Configuration window.
2. Select a protocol in the Protocols window. Click **ADD**. The protocol will appear under the adapter in the Current Configuration window. Select another protocol, if appropriate, and **ADD** it.
3. Make other adjustments, as needed. (See text below.)
4. Select another adapter in the Network Adapters window, and repeat the steps.
5. You can add and remove adapters and protocols until you have the right configuration. Nothing is saved until you click **OK**.

After you click OK, you will need to exit the other MPTS panels. Eventually it may ask permission to update CONFIG.SYS. You should accept this update.⁶ MPTS will offer to reboot the system. You can do this, or defer rebooting until after the next step.

Changes to MPTS are not effective until after an OS/2 reboot.

2.1.0.2 OS/2 TCP/IP Definitions

OS/2 TCP/IP must be configured next. The OS/2 configuration utility can be started from an SE panel or from the OS/2 desktop. Either way can be used. From the desktop, the starting sequence is **OS2 --> Programs --> TCP/IP Shadows --> TCP/IP Configure --> TCP/IP Configure (Local)**. The result should be the screen shown in Figure 3.

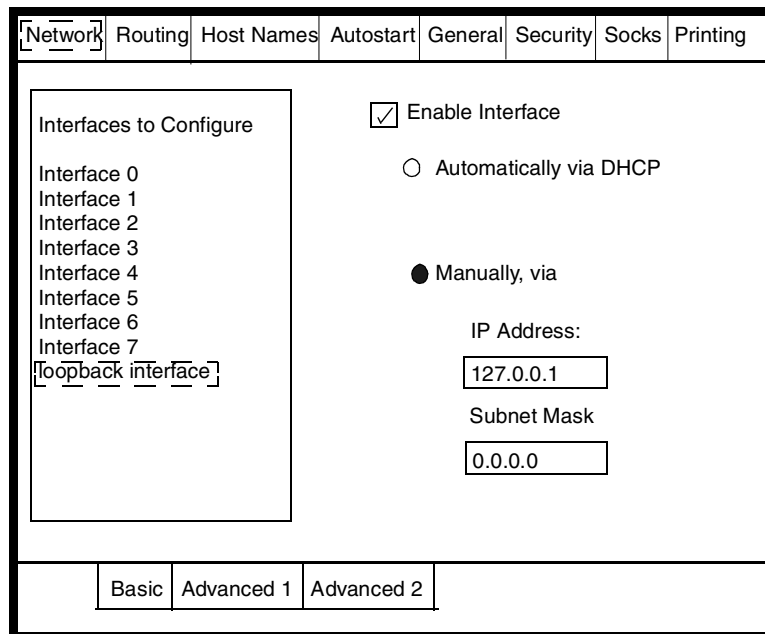


Figure 3. OS/2 TCP/IP Configuration Screen for Network Interfaces

The tabs along the top of this panel (Network, Routing, Host Names, and so forth) produce different configuration screens. The only one needed at this point is the Network Configuration, shown in the figure. You do the following:

⁶ On P/390-based systems, it was necessary to reorder the contents of CONFIG.SYS after this step. This is not required for Multiprise 3000 systems.

1. Select the **loopback interface** element in the left-hand list
2. Click the **Enable Interface** box on the right side
3. Click the **Manually** button
4. Enter the IP Address and Subnet Mask shown in the figure (127.0.0.1 and 0.0.0.0)
5. Ensure that no other interface is enabled, by selecting each interface and verifying that the Enable Interface box is not checked.

Address 127.0.0.1 is required; do not use any other IP address for the loopback function.

It is not necessary to customize any other functions in TCP/IP. Remember that this setup applies to OS/2 TCP/IP, which will be used for emulated I/O functions. It does not apply to OS/390 TCP/IP. Exit from the TCP/IP setup.

At this point, after customizing MPTS and OS/2 TCP/IP, you should reboot the OS/2 system. Changes to the OS/2 TCP/IP configuration are not effective until after OS/2 is rebooted.⁷

2.1.0.3 DEVMAP Definitions

A device map (DEVMAP) is defined by using the Emulated I/O Configuration function available through the SE. You need to select **Groups** (left window) and **CPC Configuration** (right window) in your SE screen. Then drag the **CPC** icon (left window) to the **Emulated I/O Configuration** icon (right window). This should produce the screen shown in Figure 4.

```

                                Device Map Filename

Active Device Map   > D:\IOCP\AWSMAPAC.DVM
Device Map 0       > D:\IOCP\AWSMAPA0.DVM
Device Map 1       > D:\IOCP\AWSMAPA1.DVM
Device Map 2       > D:\IOCP\AWSMAPA2.DVM
Device Map 3       > D:\IOCP\AWSMAPA3.DVM

Place cursor under any device map name to edit or view.
The active device map cannot be edited, only viewed.

Note: The Active map was copied from D:\IOCP\AWSMAPA0.DVM

```

Figure 4. First Panel of Emulated I/O Configuration

There are four DEVMAPs and these correspond to the four IOCDs files that are available. Device map 0 (with the full name D:\IOCP\AWSMAPA0.DVM) is automatically associated with IOCDs A0, and so forth. In the figure, we can assume that the last POR used IOCDs A0, because the active DEVMAP is number 0.

We intend to use IOCDs A0, and must therefore customize DEVMAP 0. Place the cursor under the Device Map 0 line and press Enter. The next screen is a

⁷ This is not completely true, but it is a safe statement. Those familiar with OS/2 TCP/IP may understand other techniques for restarting it. However, these alternate methods may fail if MPTS has also been reconfigured without a subsequent reboot.

Functions panel; press F2 to obtain the Update System Devices screen, as shown in Figure 5.

```

          U P D A T E   S Y S T E M   D E V I C E S
Active Devices: 3                Available disk space in Gbytes: 14.0
                                   Path -> G:\OS390

Addr  Device  Label  Atype  Size  Mgr  FN/P
>     >      >    >    >    >   >
70    3278           Dspy   >    3
71    3278           Dspy   >    3
72    3278           Dspy   >    3

Mgr Codes: 1=AWSFBA 2=AWSCKD 3=AWS3274 4=LAN3274 5=AWS3215 6=AWS2821
7=AWS2540 8=LAN3172 9=LCS3172 A=MGR3172 B=WAN3172 C=AWSICA  D=AWSTAPE
E=AWS34X0  F=AWS34X1 G=AWS34X2 H=AWSOMA  I=AWSPCSR

```

Figure 5. Update System Devices Screen

You need to produce the entries shown in the figure. To do this, you may need to erase whatever entries are already in your device map A0. The application behind this map is character based, not GUI, and may require some practice to use it. To erase lines, move the cursor to the line and press F9. You may be prompted to press F9 again⁸. You can press Alt-F1 for Help, and ESC to leave the Help screen.

Very briefly, the relevant fields are:

- *Addr* is two hex digits and is the unit address (for chipid X'FC') to be assigned to the device defined on that line.⁹
- *Device* is the device type being emulated. The valid types are defined in other documentation. You can list D:\P390\AWSCTYPE.MGR for a brief listing of the valid device names.¹⁰
- *Label* is only for emulated disk drives and contains the volser.
- *Atype* is filled in automatically.
- *Size* is used only when creating or referencing emulated disk drives.
- *Mgr* is the emulated I/O device manager to be used for this device. The single character in this column matches the device manager names listed at the bottom of the screen. There is not a fixed relationship between the single character and a specific device manager. You should select a device manager by name (such as AWS3274) and then determine the reference character from the list *on your screen*.
- *FN/P* contains optional parameters unique to each device manager.

⁸ If an OS/2 file is associated with the line entry (such as a file used for an emulated disk), you may be asked to press Alt-F9 again to delete the file. Do not do this without consulting the owner of the system; he may want to preserve whatever emulated disk drives he has created. Your goal is simply to clear the DEVMAP so you can enter the three 3270 devices.

⁹ The terminology can vary. The term *subchannel address* is sometimes used in other redbooks (although there is another, hardware-related meaning for subchannel address), and *device address* is also used. These terms should not be confused with the OS/390 *device number* (also known as a *UCB address* or a *device address*).

¹⁰ This is not a documented interface and might change in future releases. Do not change this file.

To create a new line, move the cursor to the line under the heading (that is, to the line with the > characters. Type the relevant fields and use the Tab key to move between fields. *Press Enter after completing the line*, before moving the cursor from the line. This should move the line to the appropriate place in the existing list and clear the input line.

Create the three lines shown in the figure. Press F10 and then F6 to exit and save your changes.

Why did we select addresses 70, 71, and 72? These are completely arbitrary, but they correspond to the convention we set for ourselves in Chapter 1.1.1, "Our Plan and Assumptions" on page 1.

2.1.0.4 IOCDS Definitions

We assume the reader is familiar with general Support Element operations and with IOCDS files. For our example, we are using IOCDS A0 and our complete IOCDS is as follows:

```

ID      MSG1=' ITSO A0 ',                               *
        MSG2=' SYS1 . IODF00 ', SYSTEM=( 7060, 1)
        CHPID PATH= (FC) , TYPE=EIO
        CHPID PATH= (FD) , TYPE=DSD
CNTLUNIT CUNUMBR=FD00 , PATH= (FD) , CUADD=00 , UNITADD= ( ( 00, 16 ) ) , *
        UNIT=3990-2
IODEVICE ADDRESS= (AA0, 16) , CUNUMBR=FD00 , UNIT=3390 , UNITADD=00
CNTLUNIT CUNUMBR=FC70 , PATH= (FC) , UNITADD= ( ( 70, 001 ) ) , UNIT=3174
CNTLUNIT CUNUMBR=FC71 , PATH= (FC) , UNITADD= ( ( 71, 001 ) ) , UNIT=3174
CNTLUNIT CUNUMBR=FC72 , PATH= (FC) , UNITADD= ( ( 72, 001 ) ) , UNIT=3174
IODEVICE ADDRESS=700 , MODEL=X , UNITADD=70 , CUNUMBR= ( FC70 ) , *
        UNIT=3270
IODEVICE ADDRESS=701 , MODEL=X , UNITADD=71 , CUNUMBR= ( FC71 ) , *
        UNIT=3270
IODEVICE ADDRESS=702 , MODEL=X , UNITADD=72 , CUNUMBR= ( FC72 ) , *
        UNIT=3270

```

This is a very simple, but workable IOCDS. It defines sixteen 3390 drives (internal drives on the Multiprise 3000; these have the special chpid type DSD) and three local 3270 terminals.¹¹ We created this IOCDS by entering it using the editor that is part of the SE's IOCDS functions. We then used the stand-alone Build function for a new IOCDS. Alternatively, we could create the IOCDS using any PC editor, place it on diskette, and use the Import function for new IOCDSs. It is a simple ASCII text file, in basic S/390 assembly language format.¹²

Except for the chpid type DSD, the CNTLUNIT and IODEVICE statements for the disk drives should be familiar to you. If not, you will need some external assistance in understanding general IOCDS concepts.

The three CNTLUNIT and IODEVICE statements relating to 3174 control units and 3270 devices are for our emulated I/O. *An important rule is that every emulated I/O device must have a separate CNTLUNIT statement.* This is contrary to normal IOCDS conventions, but is required for emulated I/O. We are defining three emulated 3270 terminals and have three CNTLUNIT (and IODEVICE) statements. The UNITADD value (in both types of statements) refers

¹¹ This IOCDS is workable. The author has IPLed and run OS/390 with it. However, it ignores the question of how the OS/390 was copied to the primary drives. We can assume it was preloaded or loaded using another IOCDS that had tape drives defined.

¹² This means the operation codes, such as CHPID, start in column 10. Continuation characters must be in column 72, and continued lines must start in column 16.

to the Addr field value we used in the DEVMAP. This is the unit address for chpid X'FC'. You should also note the definition for chpid X'FC', using type EIO.

Each of the IODEVICE statements contains an ADDRESS parameter, and this specifies the address (device number) that OS/390 will use. In our case, we are defining three 3270 devices for addresses 700, 701, and 702.

Your IOCDs will probably be quite different than the one shown above. However, the rules for adding emulated devices are the same. The key points include:

- You must have a separate CNTLUNIT and IODEVICE statement for each emulated device. You cannot group devices in a single statement.
- The UNITADD values must correspond to the addresses you assigned in the DEVMAP.
- You probably want to use ADDRESS parameters to assign “software addresses” (device numbers, UCB addresses) that are completely independent of the chpid and unit addresses.

Why did we select addresses 700-702 for the 3270 terminals (and addresses AA0-AAF for the 3390 disks)? These were the addresses already defined in the OS/390 we wanted to use. In a sense, these were “given” values for this exercise.

OS/390 requires an SPE (a software upgrade) before chpid types DSD and EIO can be used. If your OS/390 does not have this SPE, it will not work with either the internal primary disks or any form of emulated I/O.

2.1.0.5 PCOM Definitions

PCOM is the common name for IBM's eNetwork Personal Communications product. It provides 3270 emulation and is included with the Multiprise 3000 system. The system CD-ROM used to install the Multiprise 3000 internal code (including OS/2, the device emulation programs, the Support Element program, and so forth) includes initial customization for PCOM. It also provides an OS/2 desktop icon to start three PCOM sessions.

The default customization for PCOM has the following characteristics:

- the PCOM sessions use the connection **PC -> LAN -> TCP/IP -> S/390**.
- Each sessions is configured for a 32x80 screen size.
- The link configuration is to IP address 127.0.0.1.
- The advanced link data is set to port number 7490. An LU name can also be specified with the advanced link information. For this example, the LU name should be blank. The Auto-Reconnect option should be selected in the advanced link options.

There are a number of ways to define new PCOM sessions and to redefine existing sessions. We do not explore these here; you can experiment with PCOM when appropriate. A key element in the default definitions (as provided with the Multiprise 3000) is port number 7490. This is the port that the AWS3274 device manager monitors, and your tn3270 emulator must specify this port number, since it is a nonstandard port number.

2.1.0.6 Test Your New Definitions

It is important to understand the order in which emulated I/O definitions are used. When OS/2 is initialized, MPTS information is used. It is not referenced again until the system is rebooted. OS/2 TCP/IP is started automatically when OS/2 is ready. Any changes to MPTS or OS/2 TCP/IP will require a reboot to activate the changes.

An IOCDS and DEVMAP are used by the POR function, which can be started by an SE icon or by activating an SE profile. Changes to an IOCDS or DEVMAP are not effective until the next POR that uses the appropriate IOCDS.

PCOM definitions are used when PCOM sessions are started. They can be changed while the system is active, although the particular PCOM session being changed may need to restart itself. PCOM should be started (by clicking the **Emulator Sessions** icon on the OS/2 desktop) after POR and before IPL (or Load) is started.

If you POR with the DEVMAP and IOCDS we have described and then start the PCOM sessions, the 3270 screens should have a message like this:

```
** 0070 Connected to P/390 Node via IP Address 127.0.0.1:7490 **
```

This confirms that your PCOM emulator sessions have made connection with the AWS3274 device manager and that your DEVMAP address (70), your TCP/IP address (127.0.0.1) and the PCOM port number (7490) are correct.

You should be able to IPL your system. If your MVS master console address is set correctly (700) and your VTAMLST includes the proper addresses (701 and 702), you should have a usable system with two TSO sessions.

For our example, we assume that address 700 is for the MVS master console. In our CONSOL00 member in our PARMLIB, this is defined as:

```
CONSOLE
  DEVNUM(700)
  AREA(10)
  ...
  ...
  UNIT(3270-X)
CONSOLE
  ...
```

The VTAM terminals must be defined as local, non-SNA terminals in SYS1.VTAMLST (or an equivalent library). We used the following definitions in member NSNA70X:

```
LCL70X  LBUILD
LCL701  LOCAL  TERM=3277, CUADDR=701, FEATUR2=(EDATS,MODEL2),           X
          USSTAB=USSN, DLOGMOD=DYNAMICB
LCL702  LOCAL  TERM=3277, CUADDR=702, FEATUR2=(EDATS,MODEL2),           X
          USSTAB=USSN, DLOGMOD=DYNAMICB
```

This assumes we have a USSTAB named USSN already installed. It also assumes that this VTAMLST member is activated when VTAM is started. You will need one line in this member for each emulated 3270 session.

2.1.0.7 Forcing a Session Association

AWS3274 (and LAN3274, described next) “listen” for tn3270 connections, using OS/2 TCP/IP port 7490.¹³ When a new tn3270 connection is established, AWS3274 (and LAN3274) look for the first unused 3270 definition in the DEVMAP.¹⁴

If a TSO user logs onto the system at different times, he may have different UCB addresses, depending on how many other users were already logged onto the system. This is normally acceptable for VTAM terminals. It is not acceptable for MVS master consoles.¹⁵ As an option, you can “reserve” AWS3274/LAN3274 definitions (in DEVMAP) for particular tn3270 sessions. This is done by using LU name functions.¹⁶ PCOM, and most other modern 3270 emulators, permits the definition of an LU name for each session. In PCOM, this field appears in the Advanced screen of the Configure Link function.

If the LU name (in the emulator session) is blank, then AWS3274/LAN3274 works as described in the last paragraphs. However, if an LU name is specified in the 3270 emulator, then AWS3274/LAN3274 will look for the first DEVMAP definition that also specifies this LU name. If a DEVMAP entry is not available with a matching name, the tn3270 connection is not completed. If a DEVMAP entry specifies an LU name, then only tn3270 sessions with a matching LU name can be used for that DEVMAP entry.

For example, our first PCOM session might have LU=OP defined in the Advanced screen of the Configure Link function. A matching DEVMAP might be as follows:

Addr	Device	Label	Atype	Size	Mgr	FN/P
>	>	>	>	>	>	>
70	3278		Dspy		3	/R=OP
71	3278		Dspy		3	
72	3278		Dspy		3	

Note the syntax in this example. The /R= field specifies an LU name. Only tn3270 sessions with a matching LU name will be permitted to use this definition in the DEVMAP. In our example, our IOCDs changes this definition into MVS device number 700, which is the MVS master console.

You can have multiple DEVMAP lines with the same LU names. You can use as many different LU names as you like.

2.2 Emulated 3270 Sessions (Console and LAN)

The LAN3274 device manager converts tn3270 sessions (connected through OS/2 TCP/IP) to appear as local, non-SNA 3270 sessions to OS/390. That is, we emulate more local, non-SNA terminals--just as we did in the first example. In this case we will use the Multiprise 3000 integrated Ethernet adapter to connect to the LAN. (This same process would be used for a token ring connection; we

¹³ You can change this port number, using the Emulated I/O Configurator. Most administrators do not change it, and we assume that port 7490 is used in all our examples.

¹⁴ AWS3274 looks for unused sessions defined for AWS3274, and LAN3274 looks for unused sessions defined for LAN3274.

¹⁵ If the address for the only master console (700 in our examples) happens to be the first address defined in DEVMAP for AWS3274 (or LAN3274) terminals, then everything works correctly.

¹⁶ An LU name is normally part of SNA definitions and connections. This is not the case here; what we are describing has nothing to do with SNA. We are simply using a defined field (LU name) for a different purpose.

elected to use Ethernet for our examples.) A conceptual sketch of this configuration is shown in Figure 6 on page 14.

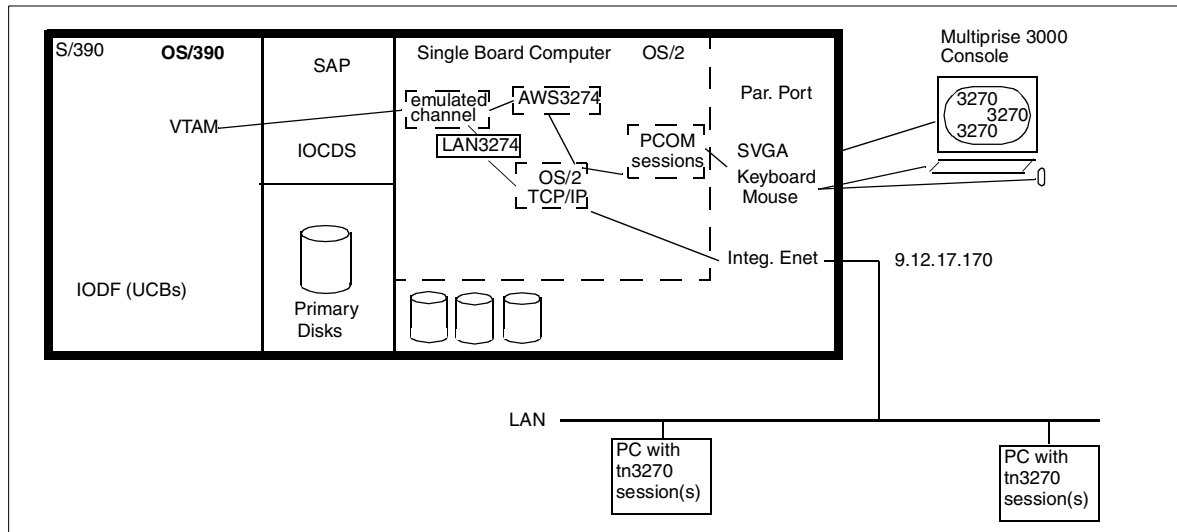


Figure 6. Adding LAN 3270 Sessions

This example is an extension of the first example; we assume the AWS3274 device manager is still being used, and we will add the LAN3274 device manager to it. The same sequence of definitions is needed:

1. MPTS definitions
2. OS/2 TCP/IP definitions
3. DEVMAP (Emulated I/O Configuration) definitions
4. IOCDs definitions and rebuilding
5. PCOM definitions
6. Load OS/390 and test the system

Each of these steps is described in the following sections.

2.2.0.1 MPTS Definitions

We need to know how to define the particular LAN adapters used with Multiprise 3000 systems. The current, standard adapters for the Multiprise 3000 systems are:

Adapter Description	MPTS Name
Integrated Ethernet adapter	Intel(R) PRO PCI ADAPTER
Additional Ethernet adapters (the shipping box for the adapter says "IBM 10/100 Etherjet PCI Management Adapter)	IBM 10/100 Ethernet PCI Adapter
Token Ring Adapters	IBM PCI Token-Ring Family Adapter (IBMTRP.OS2)

In this example, we use the integrated Ethernet adapter and define it through OS/2 TCP/IP. Since we now have a "real" adapter, we no longer need the No

Network Adapter item described in the first example. You should configure MPTS to look like Figure 7 on page 15.

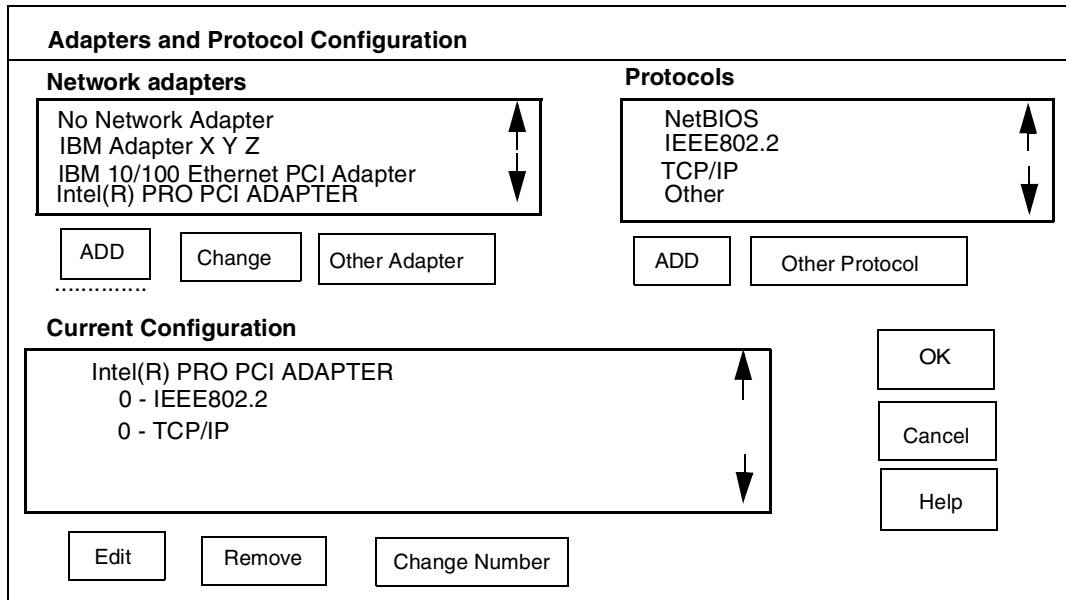


Figure 7. MPTS Definition For Integrated Ethernet Adapter

Remember that the TCP/IP protocol (shown in the Current Configuration window in the figure) indicates that OS/2 TCP/IP will be used with this LAN adapter.

With the mouse, double-click on the **IEEE802.2** protocol name in the Current Configuration window. This displays a pop-up window with a number of parameters. Find the *Type of Ethernet* parameter and change it from I to D; this changes the protocol from IEEE802.3 Ethernet to DIX Ethernet. DIX (or “Standard”) Ethernet is commonly used, and this is probably what you want.¹⁷ Do not change any other protocol parameters unless you understand what you are doing.

2.2.0.2 OS/2 TCP/IP Definition

Go to the OS/2 TCP/IP configuration function again and click **Enable Interface** for Interface 0, as shown in Figure 8 on page 16. This corresponds to the first interface in MPTS that has TCP/IP defined as a protocol. The loopback interface should remain enabled, since we want to continue using the AWS3274 terminals we defined in the first example.

We use IP address 9.12.17.170 in our example. You must supply your own IP address, of course. Do not use the one in the example if you plan to connect to the Internet.¹⁸ If you have a completely isolated system, you can use any IP address you like, including the ones in our examples.

Enter your IP address (and subnet mask, if required) for Interface 0. Remember that this is the IP address of your OS/2 system and has no relation to any address you may use for OS/390 TCP/IP later.

¹⁷ See Chapter 3.6, “DIX and IEEE802.3” on page 32 for more discussion about this topic.

¹⁸ And do not try to connect to 9.12.17.170. The author chose it arbitrarily, and it is not a coordinated Internet address.

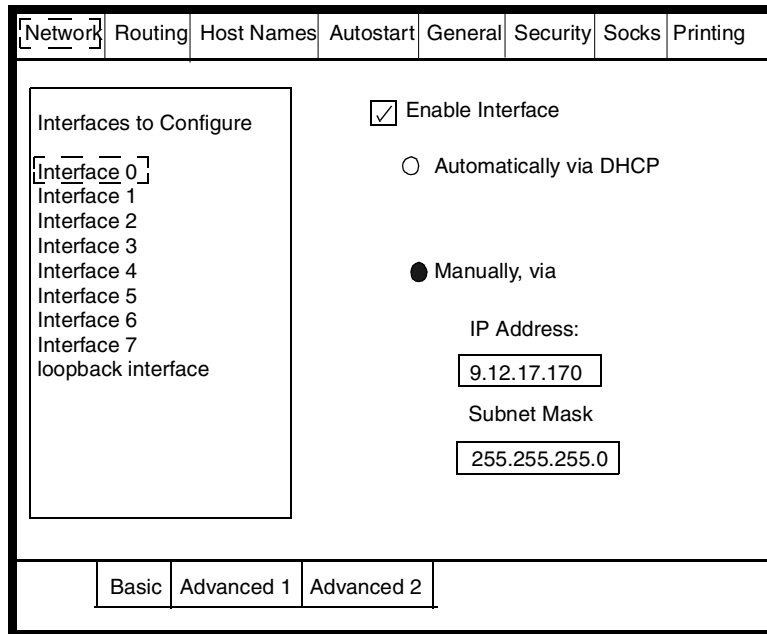


Figure 8. OS/2 TCP/IP Definition for Integrated Lan Adapter

While Interface 0 is selected (in the OS/2 TCP/IP Network display) click **Advanced 1** and enter the value 1492 for the Maximum Transmission Unit Size.¹⁹ Do not change any other values in the Advanced screens unless you clearly understand the option being changed.

2.2.0.3 DEVMAP Definitions

Add additional devices to the A0 DEVMAP, as shown in Figure 9 on page 16. Notice that the Mgr number is different. In our example, we added thirteen devices (addresses X'73' through X'7F'). This was an arbitrary number of devices. It represents the maximum number of concurrent sessions possible.

```

      U P D A T E   S Y S T E M   D E V I C E S
Active Devices: 3          Available disk space in Gbytes: 14.0
                          Path -> G:\OS390

Addr  Device  Label  Atype  Size  Mgr  FN/P
>    >      >      >      >      >      >
70    3278    >      Dspy   >      3
71    3278    >      Dspy   >      3
72    3278    >      Dspy   >      3
73    3278    >      Dspy   >      4
74    3278    >      Dspy   >      4
..    ....
7F    3278    >      Dspy   >      4

Mgr Codes: 1=AWSFBA 2=AWSCKD 3=AWS3274 4=LAN3274 5=AWS3215 6=AWS2821
7=AWS2540 8=LAN3172 9=LCS3172 A=MGR3172 B=WAN3172 C=AWSICA D=AWSTAPE
E=AWS34X0 F=AWS34X1 G=AWS34X2 H=AWSOMA I=AWSPCSRV

```

Figure 9. LAN3274 Definitions For a DEVMAP

¹⁹ This is a special requirement for Ethernet with current P/390-technology emulated I/O, including Multiprise 3000 emulated I/O. The reasons are complex and involve mixed DIX and IEEE802.3 packet formats.

We continued using the same range of unit addresses (in the DEVMAP) we used for AWS3274 devices because this was consistent with our plan, as outlined in Chapter 1.1.1, “Our Plan and Assumptions” on page 1.

2.2.0.4 IOCDs Definitions

We need to define more local 3270 terminals in our IOCDs. Following the assumptions in the first example, we assume we want these in the address range 7xx.²⁰ Addresses 700, 701, and 702 were used for the AWS3274 terminals, so we will continue from there. For our example, we are using IOCDs A0 and our complete IOCDs is now as follows:

```

ID      MSG1='ITSO A0' , *
        MSG2='SYS1.IODF00',SYSTEM=(7060,1)
CHPID  PATH=(FC),TYPE=EIO
CHPID  PATH=(FD),TYPE=DSD
CNTRLUNIT CUNUMBR=FD00,PATH=(FD),CUADD=00,UNITADD=((00,16)), *
        UNIT=3990-2
IODEVICE ADDRESS=(AA0,16),CUNUMBR=FD00,UNIT=3390,UNITADD=00
CNTRLUNIT CUNUMBR=FC70,PATH=(FC),UNITADD=((70,001)),UNIT=3174
CNTRLUNIT CUNUMBR=FC71,PATH=(FC),UNITADD=((71,001)),UNIT=3174
        CNTRLUNIT CUNUMBR=FC72,PATH=(FC),UNITADD=((72,001)),UNIT=3174
CNTRLUNIT CUNUMBR=FC73,PATH=(FC),UNITADD=((73,001)),UNIT=3174
        CNTRLUNIT CUNUMBR=FC74,PATH=(FC),UNITADD=((74,001)),UNIT=3174
        .....
        CNTRLUNIT CUNUMBR=FC7F,PATH=(FC),UNITADD=((7F,001)),UNIT=3174
IODEVICE ADDRESS=700,MODEL=X,UNITADD=70,CUNUMBR=(FC70), *
        UNIT=3270
IODEVICE ADDRESS=701,MODEL=X,UNITADD=71,CUNUMBR=(FC71), *
        UNIT=3270
IODEVICE ADDRESS=702,MODEL=X,UNITADD=72,CUNUMBR=(FC72), *
        UNIT=3270
IODEVICE ADDRESS=703,MODEL=X,UNITADD=73,CUNUMBR=(FC73), *
        UNIT=3270
IODEVICE ADDRESS=704,MODEL=X,UNITADD=74,CUNUMBR=(FC74), *
        UNIT=3270
        .....
IODEVICE ADDRESS=70F,MODEL=X,UNITADD=7F,CUNUMBR=(FC7F), *
        UNIT=3270

```

This simply continues the previous definitions. Emulated I/O devices *must* have individual CNTRLUNIT and IODEVICE definitions for *each* emulated device.

2.2.0.5 PCOM Definitions

Our prospective LAN terminals need not use PCOM. Any modern tn3270 emulator should work. You need to point your tn3270 emulator sessions to the OS/2 TCP/IP address (9.12.17.170 in our example) and to port 7490.

2.2.0.6 VTAM Definitions

You can define a different VTAM local non-SNA major node for these terminals, or continue building the major node described in the first example. Our example used SYS1.VTAMLST(NSNA70X) as follows:

```

LCL70X  LBUILD
LCL701  LOCAL  TERM=3277,CUADDR=701,FEATUR2=(EDATS,MODEL2), *
        USSTAB=USSN,DLOGMOD=DYNAMICB

```

²⁰ This is because our assumed OS/390 system has local 3270 devices already defined at addresses 700 -71F, and we want to conform to these existing addresses.

```

LCL702 LOCAL TERM=3277, CUADDR=702, FEATUR2= (EDATS, MODEL2) , X
        USSTAB=USSN, DLOGMOD=DYNAMICB
LCL703 LOCAL TERM=3277, CUADDR=703, FEATUR2= (EDATS, MODEL2) , X
        USSTAB=USSN, DLOGMOD=DYNAMICB
LCL704 LOCAL TERM=3277, CUADDR=704, FEATUR2= (EDATS, MODEL2) , X
        USSTAB=USSN, DLOGMOD=DYNAMICB
.....
LCL70F LOCAL TERM=3277, CUADDR=70F, FEATUR2= (EDATS, MODEL2) , X
        USSTAB=USSN, DLOGMOD=DYNAMICB

```

We assume your TSO definitions (for the maximum number of users) and your VTAM definitions for TSO LU connections have sufficient numbers of users and connections defined.

2.2.0.7 Forcing Session Associations

If you want to do so, you can force certain user sessions to particular DEVMAP entries (and thus to particular UCB addresses). You can use the /R= parameter in your DEVMAP, as described in the first example. You can also specify client IP addresses in the DEVMAP. Only a client with the matching IP address can then use that DEVMAP device. For example:

Addr	Device	Label	Atype	Size	Mgr	FN/P
>	>	>	>	>	>	>
70	3278		Dspy		3	/R=OP
71	3278		Dspy		3	
72	3278		Dspy		3	
73	3278		Dspy		4	
74	3278		Dspy		4	
75	3278		Dspy		4	/R=JOE
76	3278		Dspy		4	/R=JOE
77	3278		Dspy		4	
78	3278		Dspy		4	9.12.17.201
79	3278		Dspy		4	

In this example, the 3270 connection at unit address 78 will be used only if the connecting client is at IP address 9.12.17.201. If a client attempts to connect, and the client has LU name=JOE set in its emulator session, the connection will be only to address 75 or 76. If these are not available, the connection fails.

2.3 Emulated Disks and Tapes

All Multiprise 3000 systems include a 4mm tape drive. You can emulate a 3490 drive using the 4mm tape drive. You may need this to restore your operating system or various applications.²¹ The steps involved in defining the 4m drive for emulated I/O are:

1. Modify the OS/2 CONFIG.SYS file
2. Add an entry in your DEVMAP
3. Add an appropriate IOCDS entry
4. IPL and use the drive

²¹ IBM has a number of recommendations limiting the usage of the 4mm drive. In general, these recommendations are that it be used only for receiving products and fixes. In particular, IBM recommends that it not be used for routine large-volume backup functions.

2.3.0.1 Modify CONFIG.SYS

You need to edit the CONFIG.SYS file. The e editor is included with OS/2 and this can be used. Open an OS/2 window, go to the C drive root directory, and enter the command `e CONFIG.SYS` in the OS/2 window.

Toward the bottom of the CONFIG.SYS file there is a section that begins REM P/390 EMULATED I/O. Within this section you should find a line similar to this:

```
REM DEVICE=D:\P390\AWS34XX.SYS /ID=AWS34X0
```

You should remove the “REM” portion; that is, you should *uncomment* the line. If this has already been done in your system, simply leave the line unchanged.

You should also read D:\P390\AWS34X0.DOC. You may need to add a BASEDEV statement to CONFIG.SYS.

2.3.0.2 DEVMAP Entry

Add an entry in your DEVMAP, as shown in Figure 10 for Addr 20. Address 20 was arbitrarily chosen to match our addressing plan.

UPDATE SYSTEM DEVICES						
Active Devices: 3			Available disk space in Gbytes: 14.0			
			Path -> G:\OS390			
Addr	Device	Label	Atype	Size	Mgr	FN/P
>	>	>	>	>	>	>
20	3490				E	
70	3278		Dspy		3	
71	3278		Dspy		3	
72	3278		Dspy		3	
73	3278		Dspy		4	
74	3278		Dspy		4	
..	
Mgr Codes: 1=AWSFBA 2=AWSCKD 3=AWS3274 4=LAN3274 5=AWS3215 6=AWS2821						
7=AWS2540 8=LAN3172 9=LCS3172 A=MGR3172 B=WAN3172 C=AWSICA D=AWSTAPE						
E=AWS34X0 F=AWS34X1 G=AWS34X2 H=AWSOMA I=AWSPCSR						

Figure 10. DEVMAP Entry For Tape Drive

The first emulated tape drive uses device manager AWS34X0. The second drive (such as a SCSI-attached IBM 3490-F01 unit) uses device manager AWS34X1, and so forth.

2.3.0.3 IOCDS Entry

The additional IOCDS entry would be like the following:

```
CNTLUNIT CUNUMBR=FC20, PATH=(FC), UNITADD=( (20,001) ), UNIT=3490
IODEVICE ADDRESS=580, UNITADD=20, CUNUMBR=(FC20), UNIT=3490
```

The statements here could be added to the complete IOCDS shown in Chapter 2.2.0.4, “IOCDS Definitions” on page 17. Again, address 580 was chosen because our OS/390 system already has a 3490 generated at this address.

2.3.1 Emulated Disk Drives

Emulated disk drives appear in the DEVMAP as shown in Figure 11 on page 20.

An emulated drive can be created in two ways: (1) create a new, empty drive by using the Emulated I/O Configurator, or (2) by copying (or unzipping) an OS/2 file containing a predefined emulated disk file. If you are copying a file (from CD-ROM or tape or some other OS/2 source), you need to do this first. Place the file on the OS/2 G drive.

```

      U P D A T E   S Y S T E M   D E V I C E S
Active Devices: 3                Available disk space in Gbytes: 13.0
                                Path -> G:\OS390

Addr  Device  Label  Atype  Size  Mgr  FN/P
>    >    >    >    >    >    >
40    3390    WORK01 CKD    200C    2    G:\WORK01.AA9
41    3390    OS39R8 CKD    3339C   2    G:\OS390\OS39R8_1.AA0
70    3278                Dspy    3
71    3278                Dspy    3
72    3278                Dspy    3
73    3278                Dspy    4
74    3278                Dspy    4

Mgr Codes: 1=AWSFBA 2=AWSCKD 3=AWS3274 4=LAN3274 5=AWS3215 6=AWS2821
7=AWS2540 8=LAN3172 9=LCS3172 A=MGR3172 B=WAN3172 C=AWSICA D=AWSTAPE
E=AWS34X0 F=AWS34X1 G=AWS34X2 H=AWSOMA I=AWSPCSR

```

Figure 11. Emulated Disk Drives

Create a DEVMAP entry, as shown in the figure. If the OS/2 file already exists, do not specify a Size entry. Be certain to specify the OS/2 file name correctly²²; it must always be a full path name, beginning with the drive letter. When you press Enter, the configurator should automatically show the Size (if the file already exists, and you entered the file name correctly). This Size display indicates that the device manager found the file and it appears to have the correct format.

If the file does not exist, you can specify a size. This is normally done in cylinders. You can specify any number of cylinders up through 3339 (for a 3390 device) or 2655 (for a 3380 device). You may also specify a file name; this can be any arbitrary name, although the format shown in the figure is most common.²³ Be certain the G drive has sufficient space for your new emulated drive; you can place emulated disks only on the G drive. When you press Enter, the system will partly format the new file; this can take several minutes.

The IOCDS definitions for the drives would be like this:

```

CNTLUNIT CUNUMBR=FC40, PATH=FC, UNITADD=( (40,001) ), UNIT=3990-2
IODEVICE ADDRESS=AA9, CUNUMBR=FC40, UNIT=3390, UNITADD=40
CNTLUNIT CUNUMBR=FC41, PATH=FC, UNITADD=( (41,001) ), UNIT=3990-2
IODEVICE ADDRESS=AA0, CUNUMBR=FC41, UNIT=3390, UNITADD=41

```

Again, the ADDRESS parameters were selected to match existing 3390 addresses in our existing OS/390 system.

Emulation of 3350 and 3330 units is for special uses only. OS/390 no longer supports these devices. Emulated disk drives will normally be 3390 or 3380 units.

²² If the emulated drive is larger than 2GB, there will be two OS/2 files and the file names will have a special format. An example is shown for Addr 41 in the figure. Use the name of the first OS/2 file; this is the one with “_1” as the last two characters of the base name.

²³ If you do not specify an OS/2 file name, one is created based on the volser and address.

2.4 Emulation Definitions For OS/390 TCP/IP

Figure 12 on page 21 illustrates a system with both OS/2 TCP/IP (to attach local 3270 sessions) and OS/390 TCP/IP (for tn3270, ftp, Web server, and so forth). Two LAN adapters are involved, each with a different IP address.

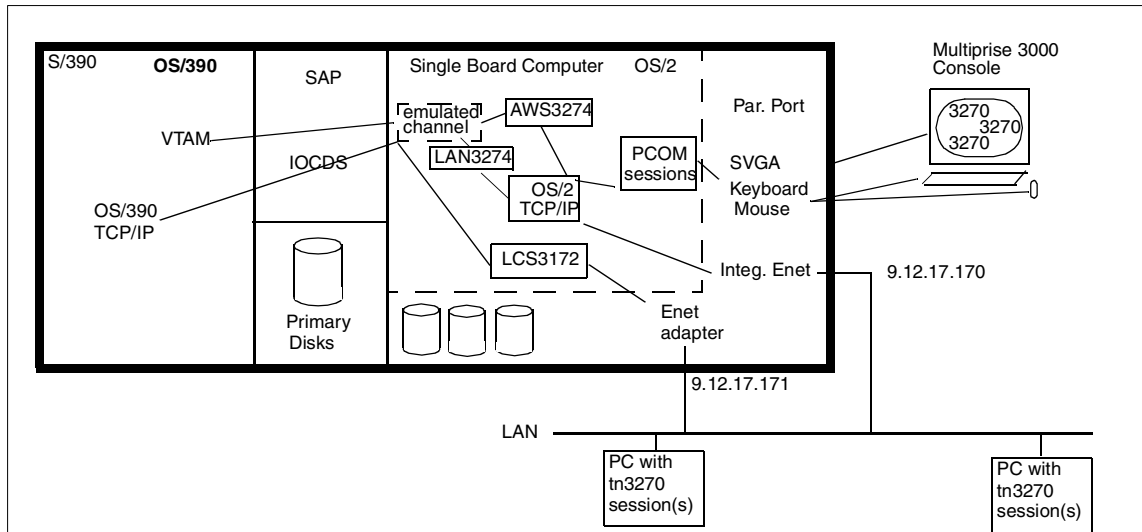


Figure 12. OS/390 TCP/IP and OS/2 TCP/IP

Defining emulated I/O for OS/390 TCP/IP involves the LCS3172 device manager, which emulates an IBM 3172 LAN control unit. Definitions involve the following elements:

1. MPTS definitions
2. CONFIG.SYS alternation
3. DEVMAP (Emulated I/O Configuration) definitions
4. IOCDS definitions and rebuilding
5. OS/390 IPL verification
6. OS/390 TCP/IP profile changes

Each of these steps is described in the following sections.

2.4.0.1 MPTS Definitions

You cannot use the same LAN adapter with OS/2 TCP/IP and OS/390 TCP/IP.²⁴ If you want to use OS/2 TCP/IP (for local 3270 emulation, as described in Chapter 2.2, “Emulated 3270 Sessions (Console and LAN)” on page 13, you will need a second LAN adapter. An alternative is to use your only LAN adapter for OS/390 TCP/IP and use no LAN adapter for OS/2 TCP/IP. We describe both situations here.

Figure 13 illustrates an MPTS definition using two LAN adapters, while Figure 14 illustrates a definition using one LAN adapter. We will consider the situation with two adapters to be the normal case.

²⁴ The reasons are related to the low-level design of the OS/2 drivers.

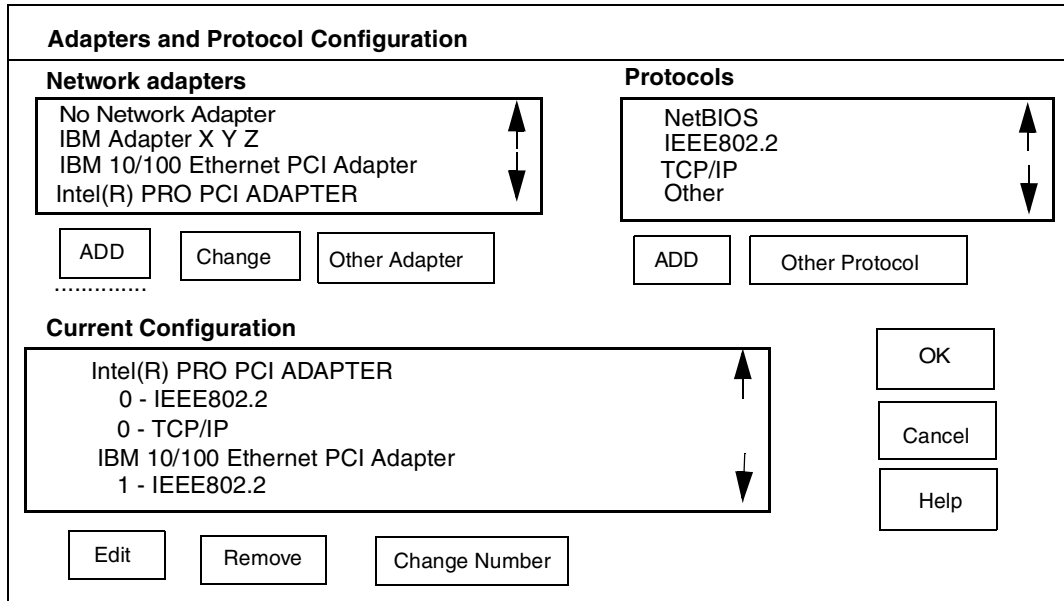


Figure 13. MPTS With Two LAN Adapters, for OS/2 TCP/IP and OS/390 TCP/IP

The adapter to be used for OS/390 TCP/IP must be defined with the IEEE802.2 protocol and *without* the TCP/IP protocol. It will not work for OS/390 TCP/IP if you specify the TCP/IP protocol in MPTS.

If you have two or more Ethernet adapters (including the integrated Ethernet adapter), you will need to specify a slot number for each adapter. See Chapter 3.5, "More Than One Ethernet Adapter" on page 31 for instructions about this situation.

Remember the MPTS adapter number; you will need it to configure the OS/390 TCP/IP profile definitions. In our example, the adapter number is 1.

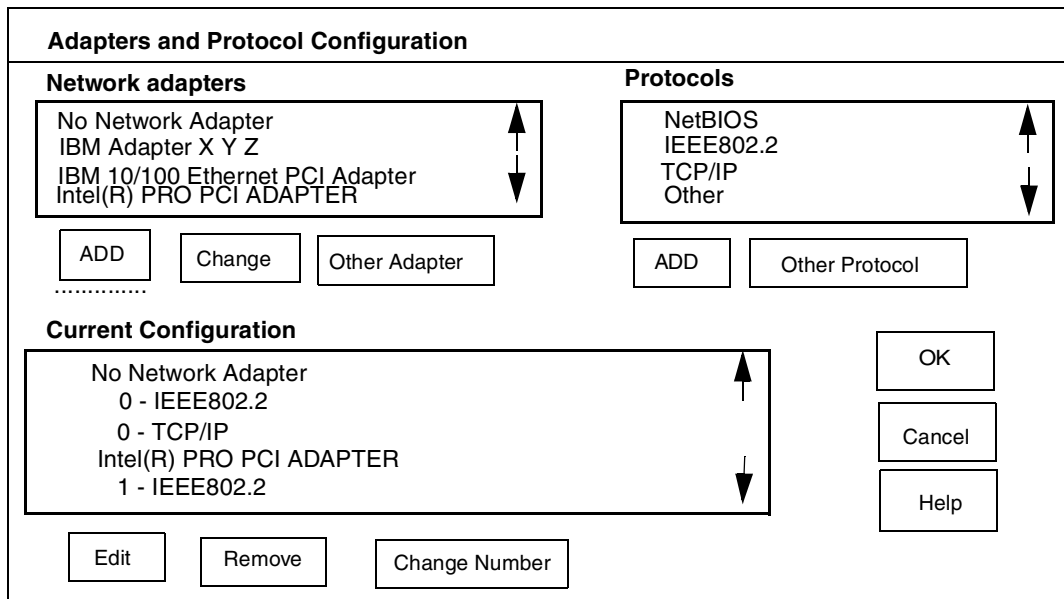


Figure 14. MPTS With One LAN Adapter, For OS/390 TCP/IP and OS/2 TCP/IP

MPTS will suggest or offer to reboot OS/2. Do not do this until after the next step.

If you have only one LAN adapter and you want to use it for OS/390 TCP/IP, you will need to define the No Network Adapter for your OS/2 TCP/IP, as shown in Figure 14. We need OS/2 TCP/IP for the AWS3274 sessions (the 3270 sessions on the Multiprise 3000 console), and an adapter must be defined in MPTS for use by OS/2 TCP/IP.

2.4.0.2 CONFIG.SYS Definition

Inspect your OS/2 CONFIG.SYS file, and locate a line similar to this:

```
REM DEVICE=D:\P390\AWSLCSDD.SYS
```

Remove the REM characters, if they are present. That is, *uncomment* the line. You will now need to reboot OS/2 to activate the MPTS and CONFIG.SYS changes.

2.4.0.3 Potential OS/2 TCP/IP Changes

If you have only one LAN adapter, and if you were previously using it for OS/2 TCP/IP (as described in our previous examples), you need to remove the corresponding interface from your TCP/IP configuration. In this case, you would have only the OS/2 TCP/IP loopback interface active, as described in our first example.

2.4.0.4 DEVMAP Definitions

The terms CTC and 3088 are both used when describing channel to channel adapters. The DEVMAP definitions use 3088, while many MVS definitions and displays use CTC. For our purposes here, we regard these as synonyms.

```
          U P D A T E   S Y S T E M   D E V I C E S
Active Devices: 3                Available disk space in Gbytes: 14.0
                                   Path -> G:\OS390

Addr  Device  Label  Atype  Size  Mgr  FN/P
>
10   > 3088   >      >      >      >      >
11   3088
40   3390   WORK01 CKD    200C   2    G:WORK01.AA9
41   3390   OS39R8 CKD    3339C  2    G:\OS390\OS39R8_1.AA0
70   3278           Dspy      3
71   3278           Dspy      3
72   3278           Dspy      3
73   3278           Dspy      4
74   3278           Dspy      4

Mgr Codes: 1=AWSFBA 2=AWSCKD 3=AWS3274 4=LAN3274 5=AWS3215 6=AWS2821
7=AWS2540 8=LAN3172 9=LCS3172 A=MGR3172 B=WAN3172 C=AWSICA D=AWSTAPE
E=AWS34X0 F=AWS34X1 G=AWS34X2 H=AWSOMA I=AWSPCSRV
```

Figure 15. DEVMAP Definitions for OS/390 TCP/IP

Figure 15 shows the two DEVMAP entries needed for an OS/390 TCP/IP adapter. We use unit addresses 10 and 11 (an even/odd pair) in accordance with our overall plan for unit addresses; you could use any even/odd pair.

If you deleted your OS/2 LAN adapter, you will need to delete the LAN3274 lines in your DEVMAP. In the figure, we assume you have both adapters.

2.4.0.5 IOCDS Definitions

For our example, we are using IOCDS A0 and our complete IOCDS is now as follows:

```

ID      MSG1='ITSO A0',                                     *
        MSG2='SYS1.IODF00',SYSTEM=(7060,1)
        CHPID PATH=(FC),TYPE=EIO
        CHPID PATH=(FD),TYPE=DSD
CNTLUNIT CUNUMBR=FD00,PATH=(FD),CUADD=00,UNITADD=((00,16)), *
        UNIT=3990-2
IODEVICE ADDRESS=(AA0,16),CUNUMBR=FD00,UNIT=3390,UNITADD=00
CNTLUNIT CUNUMBR=FC10,PATH=(FC),UNITADD=((10,001)),UNIT=CTC
CNTLUNIT CUNUMBR=FC11,PATH=(FC),UNITADD=((11,001)),UNIT=CTC
IODEVICE ADDRESS=E20,CUNUMBR=FC10,UNIT=CTC,UNITADD=10
IODEVICE ADDRESS=E21,CUNUMBR=FC11,UNIT=CTC,UNITADD=11
CNTLUNIT CUNUMBR=FC70,PATH=(FC),UNITADD=((70,001)),UNIT=3174
CNTLUNIT CUNUMBR=FC71,PATH=(FC),UNITADD=((71,001)),UNIT=3174
CNTLUNIT CUNUMBR=FC72,PATH=(FC),UNITADD=((72,001)),UNIT=3174
CNTLUNIT CUNUMBR=FC73,PATH=(FC),UNITADD=((73,001)),UNIT=3174
CNTLUNIT CUNUMBR=FC74,PATH=(FC),UNITADD=((74,001)),UNIT=3174
.....
CNTLUNIT CUNUMBR=FC7F,PATH=(FC),UNITADD=((7F,001)),UNIT=3174
IODEVICE ADDRESS=700,MODEL=X,UNITADD=70,CUNUMBR=(FC70), *
        UNIT=3270
IODEVICE ADDRESS=701,MODEL=X,UNITADD=71,CUNUMBR=(FC71), *
        UNIT=3270
IODEVICE ADDRESS=702,MODEL=X,UNITADD=72,CUNUMBR=(FC72), *
        UNIT=3270
IODEVICE ADDRESS=703,MODEL=X,UNITADD=73,CUNUMBR=(FC73), *
        UNIT=3270
IODEVICE ADDRESS=704,MODEL=X,UNITADD=74,CUNUMBR=(FC74), *
        UNIT=3270
.....
IODEVICE ADDRESS=70F,MODEL=X,UNITADD=7F,CUNUMBR=(FC7F), *
        UNIT=3270
```

The new devices are the four lines (two CNTLUNIT and two IODEVICE) that use CUNUMBR=FC10 and FC11. If you deleted your LAN3274 devices (in your DEVMAP) you would need to delete the corresponding entries in this IOCDS. (Using our examples, these would be entries (CNTLUNIT and IODEVICE) for 3270s starting with UNITADD=73.)

Why did we assign device numbers (software addresses) E20 and E21 for our two CTC devices? In our case, these addresses were already generated in our OS/390 system as CTC devices.

2.4.0.6 IPL Verification

You need to POR with the new IOCDS and IPL OS/390. Using the MVS master console, display the addresses of your two CTC adapters. For example,

```

d u, ,,E20,2
10.02.54          IEE457I 10.02.54 UNIT STATUS 939
UNIT TYPE      STATUS
OE20 CTC       O
OE21 CTC       O
```

You should have one of three STATUS indications:

STATUS	MEANING	COMMENT
O	ONLINE	Good. You can configure the OS/390 TCP/IP profile
OFFLINE	OFFLINE	Bad. Something is wrong at a lower level.
A	ALLOCATED	Probably good. It is ONLINE and allocated
A-BSY	ALLOCATED	Probably good. It is ONLINE and active.

If the units are OFFLINE, try to vary them online with `V E20,ONLINE` and `V E21,ONLINE`. If this fails, you have a problem with your IOCDS, DEVMAP, CONFIG.SYS, or MPTS (or IODF).

2.4.0.7 OS/390 TCP/IP Profile Definitions

Your OS/390 TCP/IP profile data set (or PDS member) must reference the CTC adapters you defined (in your DEVMAP and IOCDS) and also reference the MPTS adapter number associated with the LAN adapter it will use.

Within your OS/390 TCP/IP profile definition, you should have lines similar to the following:

```

DEVICE LCS1 LCS E20
LINK ETH1 ETHERNET 1 LCS1
HOME
 9.12.17.151 ETH1
...
...
START LCS1

```

The LCS1 and ETH1 operands are arbitrary names. The LCS and ETHERNET operands are keywords and should be used as shown (assuming you have an Ethernet adapter, of course). The E20 operand is the address of the first (of the even/odd pair) CTC adapter. The “1” (the third operand in the LINK statement) is the MPTS number of the LAN adapter. The IP address will be your IP address, of course.

The IP address used for the OS/390 TCP/IP interface has no relationship with the IP address used for OS/2 TCP/IP. They cannot be the same, of course. They can both be attached to the same network, and this would be the normal situation.

Defining an OS/390 TCP/IP profile data set involves many more parameters than mentioned here, but the other details are outside the scope of this redbook.

OS/390 TCP/IP normally listens on port 23 for tn3270 sessions.

2.5 OS/390 SNA With LANs

OS/390 VTAM can be connected to a LAN adapter, for SNA operations. If token ring adapters are used, the same adapter can be used for TCP/IP (either OS/2 or OS/390) and the SNA connection. If Ethernet adapters are used, these typically cannot be shared.²⁵ Installations using SNA connections tend to use token ring LANs, and we will use these for this example.

For this example, we will assume you have a single token ring adapter and want to use it for OS/390 TCP/IP and OS/390 SNA. We will assume you have no LAN connected to OS/2 TCP/IP and are not using the integrated Ethernet adapter.²⁶

²⁵ This is because of DIX vs IEEE802.3 considerations. SNA is usually IEEE802.3 and TCP/IP is typically DIX. The OS/2 low-level drivers cannot use both protocols at the same time on the same adapter.

Defining emulated I/O for OS/390 SNA involves the LAN3172 device manager, which emulates an IBM 3172 LAN control unit. Definitions involve the following elements:

1. MPTS definitions
2. DEVMAP (Emulated I/O Configuration) definitions
3. IOCDs definitions and rebuilding
4. OS/390 IPL verification
5. OS/390 VTAMLST definitions

Each of these steps is described in the following sections.

2.5.0.1 MPTS Definitions

The MPTS definitions for our example are shown in Figure 16. We need the No Network Adapter entry (in the Current Configuration window) in order to use the 3270 sessions on the Multiprise 3000 console via the loopback function.

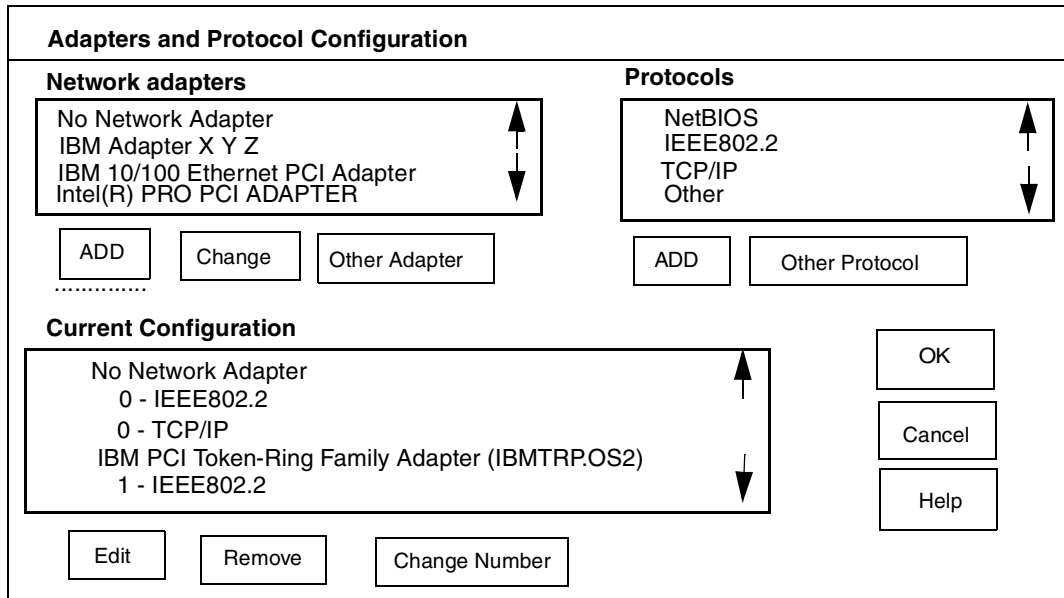


Figure 16. MPTS Definitions For OS/390 SNA

The single adapter and protocol definition for the token ring adapter can be used for both OS/390 SNA and OS/390 TCP/IP. (We would need two separate adapters to do this with Ethernet, assuming the normal use of IEEE802.3 and DIX.)²⁷

If you click on the IEEE802.2 name (in the Current Configuration for the token ring) You can change the maximum number of SAPs and link stations. You may need to do this at some point, although probably not for your initial configuration. See D:\P390\LAN3172.DOC for a discussion of this situation.

²⁶ This is an arbitrary assumption. You might use the integrated Ethernet adapter for OS/2 TCP/IP if you have both token ring and Ethernet LANs.

²⁷ See Chapter 3.6, "DIX and IEEE802.3" on page 32 for more discussion of this topic.

2.5.0.2 DEVMAP Definitions

Figure 17 illustrates the required DEVMAP definitions. Note that we added a single line, for Addr 12. The entries at Addr 10 and 11 remain, and will be used for OS/390 TCP/IP as described in the last example.

```

          U P D A T E   S Y S T E M   D E V I C E S
Active Devices: 3                Available disk space in Gbytes: 14.0
                                   Path -> G:\OS390

Addr  Device  Label  Atype  Size  Mgr  FN/P
>      >      >      >      >      >      >
10     3088
11     3088
12     3088
40     3390   WORK01 CKD    200C   2    G:WORK01.AA9
41     3390   OS39R8 CKD    3339C  2    G:\OS390\OS39R8_1.AA0
70     3278                Dspy    3
71     3278                Dspy    3
72     3278                Dspy    3

Mgr Codes: 1=AWSFBA  2=AWSCKD  3=AWS3274 4=LAN3274 5=AWS3215 6=AWS2821
7=AWS2540 8=LAN3172 9=LCS3172 A=MGR3172 B=WAN3172 C=AWSICA D=AWSTAPE
E=AWS34X0 F=AWS34X1 G=AWS34X2 H=AWSOMA I=AWSPCSRV

```

Figure 17. DEVMAP Definitions For OS/390 SNA and OS/390 TCP/IP

The DEVMAP entries for the OS/2 LAN connections (via LAN3274) have been removed, since we assumed these would not be used.

2.5.0.3 IOCDs Definitions

The IOCDs definition for an SNA 3172 is exactly the same as that for an OS/390 TCP/IP 3172. Both appear as CTC devices²⁸. The SNA unit requires only one address. It is shown here with CUNUMBR=FC12.

```

ID      MSG1='ITSO A0', *
        MSG2='SYS1.IODF00',SYSTEM=(7060,1)
        CHPID PATH=(FC),TYPE=EIO
        CHPID PATH=(FD),TYPE=DSD
        CNLUNIT CUNUMBR=FD00,PATH=(FD),CUADD=00,UNITADD=((00,16)), *
        UNIT=3990-2
        IODEVICE ADDRESS=(AA0,16),CUNUMBR=FD00,UNIT=3390,UNITADD=00
        CNLUNIT CUNUMBR=FC10,PATH=(FC),UNITADD=((10,001),UNIT=CTC
        CNLUNIT CUNUMBR=FC11,PATH=(FC),UNITADD=((11,001),UNIT=CTC
        CNLUNIT CUNUMBR=FC12,PATH=(FC),UNITADD=((12,001),UNIT=CTC
        IODEVICE ADDRESS=E20,CUNUMBR=FC10,UNIT=CTC,UNITADD=10
        IODEVICE ADDRESS=E21,CUNUMBR=FC11,UNIT=CTC,UNITADD=11
        IODEVICE ADDRESS=E40,CUNUMBR=FC12,UNIT=CTC,UNITADD=12
        CNLUNIT CUNUMBR=FC70,PATH=(FC),UNITADD=((70,001)),UNIT=3174
        CNLUNIT CUNUMBR=FC71,PATH=(FC),UNITADD=((71,001)),UNIT=3174
        CNLUNIT CUNUMBR=FC72,PATH=(FC),UNITADD=((72,001)),UNIT=3174
        .....
        CNLUNIT CUNUMBR=FC7F,PATH=(FC),UNITADD=((7F,001)),UNIT=3174
        IODEVICE ADDRESS=700,MODEL=X,UNITADD=70,CUNUMBR=(FC70), *
        UNIT=3270
        IODEVICE ADDRESS=701,MODEL=X,UNITADD=71,CUNUMBR=(FC71), *
        UNIT=3270
        IODEVICE ADDRESS=702,MODEL=X,UNITADD=72,CUNUMBR=(FC72), *
        UNIT=3270

```

²⁸ You can also specify TYPE=3172. In most cases, IOCDs treats the TYPE field as a comment.

We used ADDRESS E40 for the SNA connection because our OS/390 system already had this address generated for this purpose.

2.5.0.4 IPL Verification

After you build the new IOCDS and POR, you can verify that the SNA device exists after you IPL.

```
du,,,E40
10.02.54          IEE457I 10.02.54 UNIT STATUS 939
UNIT TYPE      STATUS
0E40 CTC       O
```

If the address is not online (or cannot be varied online), there is a problem in your MPTS, DEVMAP, or IOCDS (or IODF).

2.5.0.5 VTAM Definition

General VTAM definitions are beyond the scope of this document. However, the key information required is that the ADAPNO value in the VTAM Major node definition corresponds to the MPTS adapter number. For example:

```
SL3172  VBUILD TYPE=XCA
SLPORT  PORT  ADAPNO=1,
          CUADDR=E40,
          MEDIUM=RING,
          .....
```

Chapter 3. Additional Tips

A number of additional descriptions and tips for emulated I/O planning and customization are included in this chapter.

3.1 Review: TCP/IP Choices

Why would you want to use both OS/2 TCP/IP and OS/390 TCP/IP? This can be a very important question and you need to understand the considerations involved. For earlier P/390-based systems, most system owners used both types of connection, and we suggest that this is the best situation.

OS/2 TCP/IP (via the AWS3274 and LAN3274 device managers) transforms actual TCP/IP connections (tn3270 sessions) into local, non-SNA 3270 terminals. OS/390 sees only local, non-SNA 3270 terminals and is completely unaware that TCP/IP is involved. The use of local, non-SNA 3270 terminals has these advantages for OS/390:

- They can be used for MVS master consoles
- They have simple VTAM definitions that are likely to work when more complex connections (SNA or OS/390 TCP/IP) has not been configured correctly. You need a working TSO terminal in order to correct definitions in VTAM and/or OS/390 TCP/IP. Local 3270 terminals are the most likely to be operational in this situation.
- You do not need OS/390 TCP/IP at all (if you are not interested in it).

The primary disadvantage of OS/2 TCP/IP connections is that they are limited to tn3270. You cannot connect ftp, nfs, Web servers, or any advanced function to OS/390 this way.

OS/390 TCP/IP (via the LCS3172 device manager) has the primary advantage that all the advanced TCP/IP application functions are available to and from OS/390, including ftp, nfs, telnet to OpenEdition, and so forth.

OS/390 TCP/IP has the primary disadvantage that it does not work until it is configured properly. To configure it, you need a working TSO terminal (which cannot be through OS/390 TCP/IP, of course).

If both OS/2 TCP/IP and OS/390 TCP/IP are operational, there is no significant difference to TSO users (or CICS users). When a user wants a session, he can select which interface he wants by using the appropriate IP address as the target for his tn3270 session. The two TCP/IPs have separate LAN adapters and separate IP interfaces. In our examples, a user has these choices:

- IP address 9.12.17.170, port 7490 to connect via OS/2 TCP/IP. This connection will appear to OS/390 as a local, non-SNA 3270. The normal USSTAB logo screen will be displayed. The user cannot use any additional TCP/IP applications, such as ftp, to communicate with OS/390.
- IP address 9.12.17.171, port 23 to connect to OS/390 TCP/IP. Assuming OS/390 TCP/IP is operational and configured in a normal way, the user has many choices. A tn3270 session (at port 23) is normally passed to VTAM and can be used for TSO or CICS work²⁹. A telnet session to another port (often

²⁹ A telnet connection (as opposed to a tn3270 connection) to port 23 will evoke TSO's line mode operation. This is seldom used.

1023) might connect to Unix System Services as an ASCII terminal. FTP, nfs, and other applications can be used if they are enabled.

3.2 LANTRAN.LOG

After OS/2 is started, open an OS/2 window and examine the file C:\IBMCOM\LANTRAN.LOG. You can also view the same log using the SE Console Actions icon for Network Diagnostic Information. If significant errors are noted in this file, you must resolve these errors before proceeding with your OS/2 TCP/IP configuration or other LAN utilization.

You can also examine D:\P390\AWS3172.ERR for error messages. Some errors reported in this file are acceptable. The return codes and module names reported here are not readily available in routine Multiprise 3000 documentation.

3.3 PCOM Keyboard Customization

The basic Multiprise 3000 includes IBM's eNetwork Personal Communications product, commonly known as PCOM. This provides a 3270 emulator for the system console and other 3270 sessions on the main system display. For the Multiprise 3000, this is already configured to start three 3270 sessions, using a single icon on the OS/2 desktop. Typically, one of these sessions is used for the OS/390 master console and the other two for VTAM applications such as TSO or CICS.

As distributed, these PCOM sessions use the large keyboard Enter key and the right Cntl key to both produce the 3270 *enter* function. This is not what most 3270 users expect. Normal 3270 usage is for the large Enter key on a keyboard to produce the 3270 *new line* function. You can use the keyboard any way you like, but having the expected new line key perform the 3270 enter function can be very disconcerting to an experienced ISPF user.

You can change the key assignments easily. The following steps outline the procedure:

1. Start or select any PCOM session.
2. Select the **Assist** menu item, and the **Keyboard Setup** option from the pull-down menu.
3. Examine the next display carefully. You will see that the current keyboard is User Defined and that a Keyboard File Name is shown. Select the **Customize** button on this display.
4. This should display a map of the keyboard. Using the mouse, select the large **Enter** key. This will show that the Base assignment of the key is [enter]. Change this to [newline] and then click the **Change Key** button.
5. Double click the small tab in the upper left of the window to exit. This should produce a pop-up message offering to save the changes. Select YES.
6. The same keyboard file is used for all three predefined emulator sessions, so a single change will affect all sessions.

To enter square brackets from the PCOM keyboard, you will need to again remap the keyboard. To do this:

1. Return to the **Keyboard Setup** customization function previously described.
2. On the keyboard map displayed, select (mouse, click) the key that should have a left square bracket.
3. In the Base box (toward lower right corner), type “apl ad” (without the quote marks).
4. Click **Change Key**.
5. On the keyboard map, select the key that should have a right square bracket.
6. In the Base box, type “apl bd”.
7. Click **Change Key**.
8. Exit by double clicking the top left-hand icon. Save the modified workstation file.

3.4 Displaying Square Brackets From Under ISPF

The problem of the “C characters” or “UNIX characters” within traditional MVS environments (including TSO) is complicated because many components are involved. There is no central function in OS/390 that manages character sets.

If you are using PCOM to provide tn3270 sessions for TSO and OMVS, you can solve part of the “square bracket” problem, this way. In your ISPF session, go to option 0. In your TERMINAL TYPE definition you probably have 3278. Change this to 3278A. (This probably means changing the selection from 3 to 4). Exit from option 0.

This simple change may help display square brackets properly, if they have the bit codes most commonly used for square brackets. (These are codes X’ad’ and X’bd’.)

3.5 More Than One Ethernet Adapter

If you have more than one Ethernet adapter, additional setup steps are needed in MPTS.³⁰ The basic requirement is that you identify which slot is used for each Ethernet adapter you define. Unfortunately, the slot numbers used for this identification do not match the physical adapter slot numbers; furthermore, we have not found a definitive description of how to map the slot numbers.³¹ Therefore, we used a trial-and-error method.

In MPTS, double-click on the adapter name in the Current Configuration window. This displays a popup window with a few additional parameters, including a *slot* parameter. If there is more than one Ethernet adapter, you will need to place a value in this *slot* parameter--however, at this point, we do not know what value to use.

Click **OK** to end MPTS configuration. After clicking **OK** and **Exit**, MPTS will update OS/2 CONFIG.SYS parameters. You must reboot OS/2 to make the changes effective. During the reboot there will be error messages about no slot

³⁰ More complete step-by-step instructions for setting up LAN adapters for P/390 systems are given in the *New User's Cookbook*. Setup for the Multiprise 3000 is the same, except for case of multiple Ethernet adapters.

³¹ The slot numbers listed in the next paragraphs were valid for all the Multiprise 3000 systems we encountered, but it is possible these might change under future circumstances. If you do not want to bother with the trial-and-error method described here, we suggest you use the slot numbers listed and carefully monitor any error messages during your next OS/2 reboot.

numbers in PROTOCOL.INI (if you have more than one Ethernet adapter). The error messages will list all the slot numbers that contain Ethernet adapters. *Copy these numbers.* In our case, the numbers were:

```
000B    The integrated Ethernet adapter
0064    Ethernet adapter in physical adapter slot 9
0065    Ethernet adapter in physical adapter slot 10
0066    Ethernet adapter in physical adapter slot 11
0067    Ethernet adapter in physical adapter slot 12
```

Press Enter to continue the booting process. (The error messages will be displayed twice if you have defined two adapters in MPTS.) It appears that the integrated adapter is always considered to be in slot 000B. The other slot numbers may be different on your system. (We later, by experimentation, found which logical slot number (0066 or 0067) was associated with which physical adapter slot number.)

After OS/2 is running, start MPTS again and double-click on the first Ethernet adapter name in the Current Configuration window. In the pop-up screen, enter the logical slot number of the adapter. Do the same for the second adapter. In our case, we entered 000B for the first adapter (which is the integrated INTEL(R) PRO adapter) and selected 0066 for the second adapter we defined. Reboot again to activate the changes.

The OS/2 file C:\IBMCOM\LANTRAN.LOG should be examined for errors, or reports that the LAN adapters started normally. This file often contains valuable information for debugging LAN problems. When using Ethernet adapters, the LANTRAN messages appear to contain token ring information. This is not an error; it is merely the terminology used to present the MAC addresses in another format (in "token ring" format).

3.6 DIX and IEEE802.3

There are two slightly different Ethernet protocols in use today. These are DIX Ethernet and IEEE 802.3 ethernet. These different low-level protocols apply to all higher-level protocols that might be sent over Ethernet. For example, there you might have:

TCP/IP with DIX	(commonly used)
TCP/IP with IEEE802.3	(rarely used)
SNA with DIX	(sometimes used)
SNA with IEEE802.3	(more commonly used)

Furthermore, the IEEE802.3 or DIX selection for an OS/2 Ethernet adapter may be specified in two places: in MPTS or in the OS/2 TCP/IP configurator. The choice you set for the 802.2 protocol via MPTS is used by the LCS3172 device manager (for OS/390 TCP/IP) and the LAN3172 device manager (for OS/390 SNA, which we will not further discuss here). MPTS defaults to IEEE 802.3. If you have an existing (non-IBM) IP network and you are not certain which Ethernet form you use, you are probably using the DIX form. (If this is confusing to you, then select DIX for your first try.)

To change your MPTS 802.2 ethernet protocol to DIX:

1. In the MPTS Current Configuration window, double click (with the mouse) on the IEEE 802.2 protocol line associated with the appropriate adapter. For example:

```

Intel(R) PRO PCI Adapter
  0 - IBM IEEE 802.2          <---- double click this line
  0 - IBM TCP/IP
IBM 100/10 Ethernet PCI Adapter
  1 - IBM IEEE 802.2

```

2. This should produce a large display (scrollable) titled *Parameters for IEEE 802.2*. This display contains lines such as:

```

* ..... (more options)

*network adapter address      ____

*Type ethernet driver         I      <-- find this line

*System key value             ____

* ..... (more options)

```

3. Find the indicated line and change the value from **I** to **D**.
4. Do not change any other parameters in this panel unless you have a specific requirement and understand what you are changing.
5. Click **OK** to exit.
6. Repeat this change for any other adapter that is used with OS/2 TCP/IP. (Remember: an adapter is used with OS/2 TCP/IP if it has the *IBM TCP/IP* protocol assigned to it.)

3.7 Multiple OS/2 TCP/IP LAN Interfaces

If you want multiple OS/2 TCP/IP LAN interfaces³² you must relate the TCP/IP interface numbers to the MPTS adapter numbers. This can be confusing and is best explained with an example:

MPTS Adapter	OS/2 TCP/IP Interface

Intel(R) PRO PCI ADAPTER	
0 - IBM IEEE 802.2	
0 - IBM TCP/IP	Interface 0
IBM 100/10 Ethernet PCI Adapter	
1 - IBM IEEE 802.2	
IBM PCI Token-Ring Adapter	
2 - IBM IEEE 802.2	
2 - IBM TCP/IP	Interface 1
IBM PCI Token-Ring Adapter	
3 - IBM IEEE 802.2	

In this example, four LAN adapters are defined. The first two are Ethernet and the last two are token ring--although the LAN types are irrelevant to the numbering scheme. The MPTS adapter numbers are 0 - 3 (These numbers are

³² For example, one might be token ring and one Ethernet.

used later by OS/390 TCP/IP and VTAM.) The OS/2 TCP/IP interface numbers are assigned, starting with TCP/IP interface 0, only to adapters having the (OS/2).

The only normal situation where you might want two OS/2 TCP/IP adapters would be if you need to connect OS/2 TCP/IP to both token ring and Ethernet LANs.

Chapter 4. LPARs and HMCs

Thus far, this document has completely ignored the use of an HMC, or of direct use of a LAN by the SE application, or the use of emulated I/O by multiple LPARs.

These topics are a little more complex and we will discuss them without using detailed examples like we used earlier.

4.1 Hardware Management Console

An HMC can be attached to your Multiprise 3000. This can be an HMC that you ordered as a feature for your Multiprise 3000 or an existing HMC that is already connected to other S/390 systems.

You can use a single LAN adapter for both an HMC connection and OS/2 TCP/IP for LAN3274 devices. Furthermore, this same adapter can be used for LAN3274 connections for multiple LPARs. (If it is a token ring adapter, it could also be used for SNA connections; see Chapter 4.3.1, “How Many LAN Adapters Do I Need?” on page 38 for limitations in this area.)

The HMC connection to the Multiprise 3000 can be defined in a number of ways. We suggest one way here, although knowledgeable users may elect to use other configuration techniques. We think our suggestions may provide the simplest path.

Your decision to define an HMC connection should be made before you start configuring other LAN connections for emulated devices. You need to configure an MTPS definition for the adapter that will be used for your HMC connection. We suggest you configure this adapter as MTPS adapter number zero.³³ You need to configure three protocols of the adapter. For example, assuming we want to use the integrated Ethernet adapter for our HMC connection, the MPTS Current Configuration window should contain:

```
Intel (R) PRO PCI ADAPTER
  0 - IEEE802.2
  0 - IBM OS/2 NETBIOS
  0 - TCP/IP
```

You need all three protocols shown here for the adapter used for an HMC.

Do not configure this adapter in the OS/2 TCP/IP configuration panels. The SE panels used to define the HMC interface will also create the OS/2 TCP/IP definitions. You cannot see these definitions from the OS/2 TCP/IP configuration panels. Assuming you also want to use 3270 sessions on the Multiprise 3000 console, you would enable the loopback interface by using the OS/2 TCP/IP configuration functions.

If you have another adapter (in addition to the one used for your HMC) that will be used for OS/2 TCP/IP, you would need to configure this additional adapter through the OS/2 TCP/IP configuration functions. This additional adapter would be interface 1; the first adapter (used for HMC) would be adapter 0 in the OS/2 TCP/IP configuration screens.

³³ You can manipulate the MTPS adapter numbers by using the **Change Number** button on the MPTS configuration screen. In particular, there is no reason the integrated Ethernet adapter needs to be adapter number zero.

The HMC needs to be configured through an SE function. Before doing this, be certain the MPTS definitions (with all three protocols) are complete. Then log onto the SE as user ACDADMIN (default password is PASSWORD). In the View window, select Console Actions, then select Support Element Settings. This should produce a screen something like that shown in Figure 18.

Figure 18. Support Element Settings (HMC) Definition

Click on the **Enable LAN Connection** box on this screen. This should produce the secondary screen shown in Figure 19. Enter 0 (or whatever MPTS adapter number you are using for your HMC) in the First MPTS Adapter field in this screen and click **Apply**.

Figure 19. Secondary Screen for HMC Definition

You must have defined all three protocols in your MPTS definition in order for this process to work. After this apply finishes, you should be back to the primary Support Element Settings screen (Figure 18), and the TCP/IP Information fields (for the first interface) should be available now. Enter your IP address in this field and the appropriate submask. If you plan to share this adapter with LAN3274, both will have the same IP address. We did not enable the **Routed** option in our work, but you will need this if you are attached to a large network.

The SNA Information data in the Support Element Settings screen was automatically completed, and we did not change any part of it.

As one of the messages noted, you will need to stop and restart the SE application in order for the changes to be effective.

4.2 Web Interface

We used the SE function for remote Web interfaces. This causes a Web Server to be started in OS/2, using OS/2 TCP/IP. We had no difficulties with this Web Server sharing OS/2 TCP/IP with LAN3274.

A simple process for setting up the Web server is described on page 58 of *Multiprise 3000 Technical Introduction* (SG24-5633).

4.3 Multiple LPARs and Emulated I/O

The Multiprise 3000 can have up to 15 LPARs. Emulated I/O can be used with multiple LPARs, but there are some rules you must follow. *The primary rule is that no emulated device can be connected to more than one LPAR.* An emulated device is a device defined on one line in your DEVMAP. For example, each emulated 3270 session (via the AWS3274 and LAN3274 device managers) is a device. Each emulated disk drive is a device. An OS/390 TCP/IP interface is a device.³⁴ A LAN SNA interface is a device.

For the brief discussion here, we assume you know how to define LPARs in your SE profiles, and how to produce an IOCDs suitable for your LPARs. We assume you have two LPARs named MVS1 and MVS2.

Your DEVMAP must contain all the emulated devices used by all your LPARs. Each device must have a different unit address in the DEVMAP. You can use IOCDs definitions to readdress the devices to whatever is needed by your operating systems.

For the key emulated I/O device managers, the rules are:

- **AWS3274 and LAN3274:** These device managers typically have multiple entries in the DEVMAP (especially LAN3274). In an LPAR environment, every DEVMAP entry should contain the /R= parameter. For example:

Addr	Device	Label	Atype	Size	Mgr	FN/P
70	3278				3	/R=MVS1OP
71	3278				3	/R=MVS2OP
73	3278				3	/R=MVS1
74	3278				3	/R=MVS2
75	3278				4	/R=MVS1
76	3278				4	/R=MVS1
77	3278				4	/R=MVS1
78	3278				4	/R=MVS2
79	3278				4	/R=MVS2
7A	3278				4	/R=MVS2

Here we assume device managers 3 and 4 are AWS3274 and LAN3274. In this example we have two LPARs. The LPAR names and the LU names (and

³⁴ In this case, it is two devices because an even/odd pair of CTC addresses are required. For the purposes of this discussion, treat the even/odd pair as a single device.

the /R names) do not need to be the same, but using the same names makes the examples easier to follow. The only purpose of the LU name (in a 3270 emulator) and the /R name in the DEVMAP is to match the two ends of a session. (In this context, the LU name is not related to any SNA function.)

In this example, the IOCDS would assign chpid X'FC' unit addresses 70, 73, and 75-77 to MVS1 and unit addresses 71, 74, and 78-7A to MVS2. Every client tn3270 session must contain an LU name with the value MVS1 or MVS2 (or MVS1OP or MVS2OP, allowing these two connections to be controlled separately; they might be the master console addresses).

The use of an LU name permits the user to determine which LPAR he wants to access, by changing the LU name parameter in his emulator before connecting his tn3270 session. Continuing with the IP address used in previous examples, an end user would set his target IP address to 9.12.17.170 and his target LU name to either MVS1 or MVS2 before initiating his tn3270 connection. (If an HMC is also sharing this adapter, the remote HMC would also have this target address.)

- **LAN3172:** This device is used for LAN SNA connections. You must have a separate DEVMAP definition (line) for each LPAR. However, multiple LPARs (DEVMAP definitions) can share the same physical adapter *if they use different VTAM SAP numbers.*³⁵ This sharing is done by referencing the same ADAPNO number in the VTAM major node definitions. If all your VTAMs use the same SAP number (the most normal case), then you will need separate LAN adapters for each LPAR.
- **LCS3172:** This device (with its two device addresses addresses) cannot be shared. You can define multiple LCS3172 devices (each with two addresses) if you have enough physical LAN adapters; you can define only one LCS3172 device (with two addresses). Each would have different software device numbers (such as E20/E21 for the MVS1, and E22/E23 for MVS2). Each would be defined in IOCDS and assigned to the appropriate LPAR. The OS/390 TCP/IP profile in each LPAR would address the appropriate interface and reference the appropriate MPTS adapter number in its LINK statement.
- **AWS34XX:** This group of device managers connects to SCSI tape drives. A given tape drive can be attached to only one LPAR.
- **AWS2821:** This device manager can be used for multiple emulated printer definitions. A given emulated printer can be attached to only one LPAR.
- **AWS2540:** This device manager emulates a card reader, using an OS/2 file fir input. Only one AWS2540 device can be defined in the Multiprise 3000 system, can be attached to only one LPAR.
- **AWSCKD:** Each emulated disk drive must be assigned to a single LPAR. Different emulated drives can be assigned to different LPARs. *Shared DASD (between partitions) is not possible for emulated disk drives.*

4.3.1 How Many LAN Adapters Do I Need?

This is a simple question with complex answers. For the following discussion, we need several assumptions:

³⁵ Additional considerations are involved if you use Ethernet adapters. See Chapter 4.3.1, "How Many LAN Adapters Do I Need?" on page 38 for more discussion.

- We assume that an HMC connection requires a separate adapter that is not shared with other functions. (This may not be true in the future, but, at the time of writing, it was a reasonable assumption.)
- We assume that any Ethernet TCP/IP connection uses DIX frames. This is the most common case.
- We assume than any Ethernet SNA connection uses IEEE802.3 frames. This is the most common case.
- We assume that SNA connections (VTAM) will use their “normal” SAP 4 connection.
- No OS/2 driver functions are available that permit multiple TCP/IP “stacks” to share the same adapter.

Given these assumptions, *we require one LAN adapter for every TCP/IP that is running*. For example, if we have OS/2 TCP/IP and two OS/390 TCP/IPs (in separate LPARs), we require three LAN adapters. This is correct for both Ethernet and token ring.

An emulated SNA connection (LAN3172 device manager) can share the same token ring adapter with a TCP/IP function. An emulated SNA connection cannot share the same Ethernet adapter with a TCP/IP function.³⁶

Multiple SNA connections (from different LPARs) cannot share the same adapter (and share it with TCP/IP, if it is a token ring adapter), unless the different VTAMs use different SAP addresses. This is quite possible, but it violates our assumptions for a “normal” situation.

The Multiprise 3000 is limited to four active LAN adapters. This should not present a problem with a basic mode system. If multiple LPARs are used, the number of LAN adapters becomes a critical planning factor.

³⁶ This is true if our assumptions about DIX and IEEE802.3 are correct.

Appendix A. IOCDs and DEVMAP Listings

The administrator of a Multiprise 3000 system can establish any device configuration and device addresses that are appropriate for his system. This appendix lists the complete DEVMAP and IOCDs are discussed in the main text of this redbook.

4.3.1.1 Unit Address Plan for DEVMAP

We organized our unit addresses as follows:

Unit Addresses	Usage
00-0F	Unit record devices
10-1F	Channel-to-channel devices
20-2F	Tape devices
30-3F	3380 drives
40-5F	3390 drives
60-6F	Any other devices that do not fit elsewhere
70-FF	3270 terminals

There are no requirements to use this organization. However, we found that a simple design for unit addresses made our administration much easier. Note that any unit address can be mapped to any "UCB address" by appropriate IOCDs statements.

4.3.1.2 DEVMAP

We used the following DEVMAP for both the A0 IOCDs. That is, this DEVMAP was stored in both D:\IOCP\AWSMAPA0.DVM.

Addr	Device	Label	Atype	Size	Mgr	FN/P	
0C	2540				7	G:\RDR*.JCL	(AWS2540)
0E	1403				6		(AWS2821)
0F	1403				6		
10	3088				9		(LCS3172)
11	3088				9		
*12	3088				8		(LAN3172)
20	3480				E		(AWS34X0)
21	3420				D		(AWSTAPE)
22	3420				D		
40	3390	OS39R8	CKD	3339C	2	G:\OS39R8_1.A80	(AWSCKD)
41	3390	OS3R8A	CKD	3339C	2	G:\OS3R8A.A81	
42	3390	OS39M1	CKD	3339C	2	G:\OS39M1_1.A82	
43	3390	OS39P8	CKD	2226C	2	G:\OS39P8.A83	
44	3390	OS3P8A	CKD	2226C	2	G:\OS3P8A.A84	
45	3390	OS39D8	CKD	2226C	2	G:\OS39D8.A85	
46	3390	OS3D8A	CKD	2226C	2	G:\OS3D8A.A86	
47	3390	OS39H8	CKD	2226C	2	G:\OS39H8.A87	
48	3390	OS3HUS	CKD	2226C	2	G:\OS3HUS.A88	
70	3278				3	/R=OP	(AWS3274)
71	3278				3		
72	3278				3		
73	3278				4		(LAN3274)
74	3278				4		
75	3278				4		
76	3278				4		
77	3278				4		
78	3278				4		
79	3278				4		

The device manager names (in parentheses) are not part of the DEVMAP. The OS/2 file names used for the emulated disks are part of a particular preloaded system.

A.0.0.1 IOCDS

The following is our A) IOCDS. This listing also shows chpid definitions for two ESCON channels and additional definitions for 3390s at addresses 300-33F. These lines are commented out, but you could use them or modify them as required. The two chpid definitions might be used to define external control units. The additional logical volumes (starting at OS/390 address 300) might be used for the 390ADS system. Note that these definitions start at UNITADD=10 (hex). This assumes that the first sixteen logical volume unit addresses (00-0F) are used for the IODEVICES defined for OS/390 addresses AA0-AAF. You must coordinate unit addresses of logical volumes (that you define via SE panels) with the IOCDS definitions that use them. You could, for example, define less than 16 addresses for the first set of logical volumes (targeted for OS/390 addresses AAx) and start the set set (targeted for OS/390 address 3xx) at a lower unit address.

```

ID      MSG1='ITSO A0' ,                               *
        MSG2='SYS1.IODF00' , SYSTEM=(7060,1)
        CHPID PATH=(FC) , TYPE=EIO
        CHPID PATH=(FD) , TYPE=DSD
*      CHPID PATH=(04) , SWITCH=D1 , TYPE=CNC
*      CHPID PATH=(05) , SWITCH=D2 , TYPE=CNC
CNTLUNIT CUNUMBR=FD00 , PATH=(FD) , CUADD=00 , UNITADD=( (00,16) ) , *
        UNIT=3990-2
        IODEVICE ADDRESS=(AA0,16) , CUNUMBR=FD00 , UNIT=3390 , UNITADD=00
*      CNTLUNIT CUNUMBR=FD00 , PATH=(FD) , CUADD=00 , UNITADD=( (10,64) ) , *
        UNIT=3990-2
*      IODEVICE ADDRESS=(300,64) , CUNUMBR=FD00 , UNIT=3390 , UNITADD=10
        CNTLUNIT CUNUMBR=FC0C , PATH=FC , UNITADD=( (0C,001) ) , UNIT=2821
        CNTLUNIT CUNUMBR=FC0E , PATH=FC , UNITADD=( (0E,001) ) , UNIT=2821
        CNTLUNIT CUNUMBR=FC0F , PATH=FC , UNITADD=( (0F,001) ) , UNIT=2821
        CNTLUNIT CUNUMBR=FC10 , PATH=FC , UNITADD=( (10,001) ) , UNIT=CTC
        CNTLUNIT CUNUMBR=FC11 , PATH=FC , UNITADD=( (11,001) ) , UNIT=CTC
        CNTLUNIT CUNUMBR=FC12 , PATH=FC , UNITADD=( (12,001) ) , UNIT=CTC
        CNTLUNIT CUNUMBR=FC20 , PATH=FC , UNITADD=( (20,001) ) , *
        UNIT=3480
        CNTLUNIT CUNUMBR=FC21 , PATH=FC , UNITADD=( (21,001) ) , UNIT=3803
        CNTLUNIT CUNUMBR=FC22 , PATH=FC , UNITADD=( (22,001) ) , UNIT=3803
        CNTLUNIT CUNUMBR=FC30 , PATH=FC , UNITADD=( (30,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC31 , PATH=FC , UNITADD=( (31,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC32 , PATH=FC , UNITADD=( (32,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC33 , PATH=FC , UNITADD=( (33,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC34 , PATH=FC , UNITADD=( (34,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC35 , PATH=FC , UNITADD=( (35,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC36 , PATH=FC , UNITADD=( (36,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC37 , PATH=FC , UNITADD=( (37,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC38 , PATH=FC , UNITADD=( (38,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC39 , PATH=FC , UNITADD=( (39,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC40 , PATH=FC , UNITADD=( (40,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC41 , PATH=FC , UNITADD=( (41,001) ) , UNIT=3990-2
        CNTLUNIT CUNUMBR=FC42 , PATH=FC , UNITADD=( (42,001) ) , UNIT=3990-2

```

```

CNTLUNIT CUNUMBR=FC43, PATH=FC, UNITADD= ( (43, 001) ), UNIT=3990-2
CNTLUNIT CUNUMBR=FC44, PATH=FC, UNITADD= ( (44, 001) ), UNIT=3990-2
CNTLUNIT CUNUMBR=FC45, PATH=FC, UNITADD= ( (45, 001) ), UNIT=3990-2
CNTLUNIT CUNUMBR=FC46, PATH=FC, UNITADD= ( (46, 001) ), UNIT=3990-2
CNTLUNIT CUNUMBR=FC47, PATH=FC, UNITADD= ( (47, 001) ), UNIT=3990-2
CNTLUNIT CUNUMBR=FC48, PATH=FC, UNITADD= ( (48, 001) ), UNIT=3990-2
CNTLUNIT CUNUMBR=FC49, PATH=FC, UNITADD= ( (49, 001) ), UNIT=3990-2
CNTLUNIT CUNUMBR=FC70, PATH= (FC), UNITADD= ( (70, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC71, PATH= (FC), UNITADD= ( (71, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC72, PATH= (FC), UNITADD= ( (72, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC73, PATH= (FC), UNITADD= ( (73, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC74, PATH= (FC), UNITADD= ( (74, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC75, PATH= (FC), UNITADD= ( (75, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC76, PATH= (FC), UNITADD= ( (76, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC77, PATH= (FC), UNITADD= ( (77, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC78, PATH= (FC), UNITADD= ( (78, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC79, PATH= (FC), UNITADD= ( (79, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC7A, PATH= (FC), UNITADD= ( (7A, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC7B, PATH= (FC), UNITADD= ( (7B, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC7C, PATH= (FC), UNITADD= ( (7C, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC7D, PATH= (FC), UNITADD= ( (7D, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC7E, PATH= (FC), UNITADD= ( (7E, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC7F, PATH= (FC), UNITADD= ( (7F, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC80, PATH= (FC), UNITADD= ( (80, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC81, PATH= (FC), UNITADD= ( (81, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC82, PATH= (FC), UNITADD= ( (82, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC83, PATH= (FC), UNITADD= ( (83, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC84, PATH= (FC), UNITADD= ( (84, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC85, PATH= (FC), UNITADD= ( (85, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC86, PATH= (FC), UNITADD= ( (86, 001) ), UNIT=3174
CNTLUNIT CUNUMBR=FC87, PATH= (FC), UNITADD= ( (87, 001) ), UNIT=3174
IODEVICE ADDRESS=00C, MODEL=1, CUNUMBR=FC0C, UNIT=2540R
IODEVICE ADDRESS=00E, MODEL=N1, CUNUMBR=FC0E, UNIT=1403
IODEVICE ADDRESS=00F, MODEL=N1, CUNUMBR=FC0F, UNIT=1403
IODEVICE ADDRESS=E20, CUNUMBR=FC10, UNIT=CTC, UNITADD=10
IODEVICE ADDRESS=E21, CUNUMBR=FC11, UNIT=CTC, UNITADD=11
IODEVICE ADDRESS=E40, CUNUMBR=FC12, UNIT=CTC, UNITADD=12
IODEVICE ADDRESS=560, CUNUMBR=FC20, UNIT=3480, UNITADD=20
IODEVICE ADDRESS=550, MODEL=8, CUNUMBR= (FC21), UNIT=3420,      *
    UNITADD=21
IODEVICE ADDRESS=551, MODEL=8, CUNUMBR= (FC22), UNIT=3420,      *
    UNITADD=22
IODEVICE ADDRESS=120, CUNUMBR=FC30, UNIT=3380, UNITADD=30
IODEVICE ADDRESS=121, CUNUMBR=FC31, UNIT=3380, UNITADD=31
IODEVICE ADDRESS=122, CUNUMBR=FC32, UNIT=3380, UNITADD=32
IODEVICE ADDRESS=123, CUNUMBR=FC33, UNIT=3380, UNITADD=33
IODEVICE ADDRESS=124, CUNUMBR=FC34, UNIT=3380, UNITADD=34
IODEVICE ADDRESS=125, CUNUMBR=FC35, UNIT=3380, UNITADD=35
IODEVICE ADDRESS=126, CUNUMBR=FC36, UNIT=3380, UNITADD=36
IODEVICE ADDRESS=127, CUNUMBR=FC37, UNIT=3380, UNITADD=37
IODEVICE ADDRESS=128, CUNUMBR=FC38, UNIT=3380, UNITADD=38
IODEVICE ADDRESS=129, CUNUMBR=FC39, UNIT=3380, UNITADD=39
IODEVICE ADDRESS=A80, CUNUMBR=FC40, UNIT=3390, UNITADD=40
IODEVICE ADDRESS=A81, CUNUMBR=FC41, UNIT=3390, UNITADD=41
IODEVICE ADDRESS=A82, CUNUMBR=FC42, UNIT=3390, UNITADD=42
IODEVICE ADDRESS=A83, CUNUMBR=FC43, UNIT=3390, UNITADD=43
IODEVICE ADDRESS=A84, CUNUMBR=FC44, UNIT=3390, UNITADD=44
IODEVICE ADDRESS=A85, CUNUMBR=FC45, UNIT=3390, UNITADD=45

```

```

IODEVICE ADDRESS=A86,CUNUMBR=FC46,UNIT=3390,UNITADD=46
IODEVICE ADDRESS=A87,CUNUMBR=FC47,UNIT=3390,UNITADD=47
IODEVICE ADDRESS=A88,CUNUMBR=FC48,UNIT=3390,UNITADD=48
IODEVICE ADDRESS=A89,CUNUMBR=FC49,UNIT=3390,UNITADD=49
IODEVICE ADDRESS=700,MODEL=X,UNITADD=70,CUNUMBR=(FC70), *
    UNIT=3270
IODEVICE ADDRESS=701,MODEL=X,UNITADD=71,CUNUMBR=(FC71), *
    UNIT=3270
IODEVICE ADDRESS=702,MODEL=X,UNITADD=72,CUNUMBR=(FC72), *
    UNIT=3270
IODEVICE ADDRESS=900,MODEL=X,UNITADD=73,CUNUMBR=(FC73), *
    UNIT=3270
IODEVICE ADDRESS=901,MODEL=X,UNITADD=74,CUNUMBR=(FC74), *
    UNIT=3270
IODEVICE ADDRESS=902,MODEL=X,UNITADD=75,CUNUMBR=(FC75), *
    UNIT=3270
IODEVICE ADDRESS=903,MODEL=X,UNITADD=76,CUNUMBR=(FC76), *
    UNIT=3270
IODEVICE ADDRESS=904,MODEL=X,UNITADD=77,CUNUMBR=(FC77), *
    UNIT=3270
IODEVICE ADDRESS=905,MODEL=X,UNITADD=78,CUNUMBR=(FC78), *
    UNIT=3270
IODEVICE ADDRESS=906,MODEL=X,UNITADD=79,CUNUMBR=(FC79), *
    UNIT=3270
IODEVICE ADDRESS=907,MODEL=X,UNITADD=7A,CUNUMBR=(FC7A), *
    UNIT=3270
IODEVICE ADDRESS=908,MODEL=X,UNITADD=7B,CUNUMBR=(FC7B), *
    UNIT=3270
IODEVICE ADDRESS=909,MODEL=X,UNITADD=7C,CUNUMBR=(FC7C), *
    UNIT=3270
IODEVICE ADDRESS=90A,MODEL=X,UNITADD=7D,CUNUMBR=(FC7D), *
    UNIT=3270
IODEVICE ADDRESS=90B,MODEL=X,UNITADD=7E,CUNUMBR=(FC7E), *
    UNIT=3270
IODEVICE ADDRESS=90C,MODEL=X,UNITADD=7F,CUNUMBR=(FC7F), *
    UNIT=3270
IODEVICE ADDRESS=90D,MODEL=X,UNITADD=80,CUNUMBR=(FC80), *
    UNIT=3270
IODEVICE ADDRESS=90E,MODEL=X,UNITADD=81,CUNUMBR=(FC81), *
    UNIT=3270
IODEVICE ADDRESS=90F,MODEL=X,UNITADD=82,CUNUMBR=(FC82), *
    UNIT=3270
IODEVICE ADDRESS=910,MODEL=X,UNITADD=83,CUNUMBR=(FC83), *
    UNIT=3270
IODEVICE ADDRESS=911,MODEL=X,UNITADD=84,CUNUMBR=(FC84), *
    UNIT=3270
IODEVICE ADDRESS=912,MODEL=X,UNITADD=85,CUNUMBR=(FC85), *
    UNIT=3270
IODEVICE ADDRESS=913,MODEL=X,UNITADD=86,CUNUMBR=(FC86), *
    UNIT=3270
IODEVICE ADDRESS=914,MODEL=X,UNITADD=87,CUNUMBR=(FC87), *
    UNIT=3270
*IZP IZP061I **CAUTION** CONTROL UNITS ATTACHING TO TYPE=CNC CHPIDS
*IZP          EXIST WITH UNIT ADDRESS RANGES THAT DO NOT BEGIN WITH 00
*IZP          HEX
*IZP IZP067I ERRORS=NO, MESSAGES=YES, REPORTS PRINTED=NO,
*IZP          IOCDs WRITTEN=YES, IOCS WRITTEN=YES

```

Appendix B. Special Notices

This publication is intended to help customers and IBM personnel better understand the Multiprise 3000 product, including several of the specially packaged software offerings available for it. The information in this publication is not intended as the specification of any programming interfaces that are provided by OS/390, OS/2, or any software mentioned in this redbook.

References in this publication to IBM products, programs or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only IBM's product, program, or service may be used. Any functionally equivalent program that does not infringe any of IBM's intellectual property rights may be used instead of the IBM product, program or service.

Information in this book was developed in conjunction with use of the equipment specified, and is limited in application to those specific hardware and software products and levels.

IBM may have patents or pending patent applications covering subject matter in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to the IBM Director of Licensing, IBM Corporation, North Castle Drive, Armonk, NY 10504-1785.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact IBM Corporation, Dept. 600A, Mail Drop 1329, Somers, NY 10589 USA.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The information contained in this document has not been submitted to any formal IBM test and is distributed AS IS. The information about non-IBM ("vendor") products in this manual has been supplied by the vendor and IBM assumes no responsibility for its accuracy or completeness. The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate them into the customer's operational environment. While each item may have been reviewed by IBM for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere. Customers attempting to adapt these techniques to their own environments do so at their own risk.

Any pointers in this publication to external Web sites are provided for convenience only and do not in any manner serve as an endorsement of these Web sites.

Any performance data contained in this document was determined in a controlled environment, and therefore, the results that may be obtained in other operating environments may vary significantly. Users of this document should verify the applicable data for their specific environment.

This document contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples contain the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Reference to PTF numbers that have not been released through the normal distribution process does not imply general availability. The purpose of including these reference numbers is to alert IBM customers to specific information relative to the implementation of the PTF when it becomes available to each customer according to the normal IBM PTF distribution process.

The following terms are trademarks of the International Business Machines Corporation in the United States and/or other countries:

IBM ®	PR/SM
QMF	RACF
RMF	RS/6000
S/370	S/390
SP	VisualLift
VM/ESA	VSE/ESA
VTAM	WebSphere
XT	400

The following terms are trademarks of other companies:

C-bus is a trademark of Corollary, Inc. in the United States and/or other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and/or other countries.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States and/or other countries.

PC Direct is a trademark of Ziff Communications Company in the United States and/or other countries and is used by IBM Corporation under license.

ActionMedia, LANDesk, MMX, Pentium and ProShare are trademarks of Intel Corporation in the United States and/or other countries. (For a complete list of Intel trademarks see www.intel.com/tradmarx.htm)

UNIX is a registered trademark in the United States and/or other countries licensed exclusively through X/Open Company Limited.

SET and the SET logo are trademarks owned by SET Secure Electronic Transaction LLC.

Other company, product, and service names may be trademarks or service marks of others.

Appendix C. Related Publications

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

C.1 IBM Redbooks Publications

For information on ordering these ITSO publications see “How to get IBM Redbooks” on page 51.

- *P/390, R/390, S/390 Integrated Server: OS/390 New User's Cookbook*, SG24-4757-01 (the -00 version is obsolete)
- *P390plex: A Technology Demonstration*, SG24-5632
- *Multiprise 3000 Technical Introduction*, SG24-5633

C.2 IBM Redbooks Collections

Redbooks are also available on the following CD-ROMs. Click the CD-ROMs button at <http://www.redbooks.ibm.com/> for information about all the CD-ROMs offered, updates and formats.

CD-ROM Title	Collection Kit Number
System/390 Redbooks Collection	SK2T-2177
Networking and Systems Management Redbooks Collection	SK2T-6022
Transaction Processing and Data Management Redbooks Collection	SK2T-8038
Lotus Redbooks Collection	SK2T-8039
Tivoli Redbooks Collection	SK2T-8044
AS/400 Redbooks Collection	SK2T-2849
Netfinity Hardware and Software Redbooks Collection	SK2T-8046
RS/6000 Redbooks Collection (BkMgr Format)	SK2T-8040
RS/6000 Redbooks Collection (PDF Format)	SK2T-8043
Application Development Redbooks Collection	SK2T-8037
IBM Enterprise Storage and Systems Management Solutions	SK3T-3694

C.3 Other Resources

These publications are also relevant as further information sources:

- *S/390 Multiprise 3000 System Overview*, GA22-1029
- *S/390 Multiprise 3000 Enterprise Server Emulated Input/Output Subsystem User's Guide and Reference*, GC38-0610
- *S/390 Stand-Alone Input/Output Configuration Program User's Guide*, GC38-0458

How to get IBM Redbooks

This section explains how both customers and IBM employees can find out about IBM Redbooks, redpieces, and CD-ROMs. A form for ordering books and CD-ROMs by fax or e-mail is also provided.

- **Redbooks Web Site** <http://www.redbooks.ibm.com/>

Search for, view, download, or order hardcopy/CD-ROM Redbooks from the Redbooks Web site. Also read redpieces and download additional materials (code samples or diskette/CD-ROM images) from this Redbooks site.

Redpieces are Redbooks in progress; not all Redbooks become redpieces and sometimes just a few chapters will be published this way. The intent is to get the information out much quicker than the formal publishing process allows.

- **E-mail Orders**

Send orders by e-mail including information from the IBM Redbooks fax order form to:

	e-mail address
In United States	usib6fpl@ibmmail.com
Outside North America	Contact information is in the "How to Order" section at this site: http://www.elink.ibm.ibm.com/pbl/pbl

- **Telephone Orders**

United States (toll free)	1-800-879-2755
Canada (toll free)	1-800-IBM-4YOU
Outside North America	Country coordinator phone number is in the "How to Order" section at this site: http://www.elink.ibm.ibm.com/pbl/pbl

- **Fax Orders**

United States (toll free)	1-800-445-9269
Canada	1-403-267-4455
Outside North America	Fax phone number is in the "How to Order" section at this site: http://www.elink.ibm.ibm.com/pbl/pbl

This information was current at the time of publication, but is continually subject to change. The latest information may be found at the Redbooks Web site.

IBM Intranet for Employees

IBM employees may register for information on workshops, residencies, and Redbooks by accessing the IBM Intranet Web site at <http://w3.itso.ibm.com/> and clicking the ITSO Mailing List button. Look in the Materials repository for workshops, presentations, papers, and Web pages developed and written by the ITSO technical professionals; click the Additional Materials button. Employees may access MyNews at <http://w3.ibm.com/> for redbook, residency, and workshop announcements.

Index

Symbols

(tn3270 sessions 29

Numerics

3088 23
3380 device 20
3390 device 20
3390 disk drives 2
3480 tape drive 2
4mm tape drive 18

A

A0 IOCDS 42
ACSADMIN 4
ADDRESS parameter 11
AWS2540 4, 38
AWS2821 4, 38
AWS3274 3, 12, 29
AWS3274 and LAN3274 37
AWS34XX 4, 38
AWSCKD 3, 38

C

chpid X'FC 2
CNTLUNIT and IODEVICE statements 10
CONFIG.SYS 19, 31
CONFIG.SYS Definition 23
CONSOL00 member 12
Cookbook (SG24-4757-01) 1
CTC 23
CTC devices 27

D

device managers 3
device number 11
DEVMAP 12
DEVMAP Definitions 8, 16, 23, 27
DEVMAP Entry 19
DIX 26, 39
DIX and IEEE802.3 32
DIX Ethernet 15
DSD 10

E

Emulated 3270 Sessions 5
Emulated Disk Drives 19
Emulated Disks and Tapes 18
Emulated I/O Configuration 8
Emulated I/O Definitions 3
eNetwork Personal Communications 11
Enter key 30
ESCON channels 42
Ethernet Adapter 31
Ethernet adapter 14

Ethernet TCP/IP 39

F

ftp 29

H

Hardware Management Console 35
HCD 2, 3
HMC 1, 39

I

IBM 3172 LAN Channel Station 2
IBM 3172 LAN SNA control unit 2
IEEE 802.3 32
IEEE802.2 protocol 15
IEEE802.3 26, 39
IEEE802.3 Ethernet 15
integrated Ethernet adapte 14
Intel(R) PRO PCI ADAPTER 14
IOCDS Definitions 10, 24, 27
IOCDS Entry 19
IOCDS files 2
IODF 2, 3
ISPF 31

K

Keyboard File Name 30

L

LAN Adapter 31
LAN Adapters 38
LAN3172 3, 38
LAN3274 3, 13, 29
LANTRAN.LOG 30, 32
LCS3172 3, 38
local, non-SNA 3270 29
logical volumes 42
loopback interface 8
LPAR mode 1
LPARs and Emulated I/O 37
LU name 11, 13

M

Maximum Transmission Unit Size 16
MPTS 32
MPTS Definitions 6, 14, 21, 26
MTPS definition, HMC 35
Multiprise 3000 Technical Introduction 1
MVS master console 2, 12, 13, 29

N

nfs 29
No Network Adapter 6

O

OS 21
OS/2 Desktop 4
OS/2 TCP/IP Definition 15
OS/2 TCP/IP Definitions 7
OS/2 TCP/IP LAN Interfaces 33
OS/390 TCP/IP 21
OS/390 TCP/IP Profile 25

P

PCOM 5, 30
PCOM Definitions 11
PCOM Keyboard Customization 30
PCOM port number (7490) 12
port number 7490 11
Power-On Reset (POR) function 2
PROTOCOL.INI 32

R

reboot 12
Routed option 36

S

Single Board Computer (SBC) 5
slot numbers 31
SNA connections 39
SNA operation 25
SNA With LANs 25
Square Brackets 31
subchannel addresses 2
SYSPROG 4

T

Token Ring Adapter 14
TSO definitions 18

U

unit addresses 42
UNITADD values 11

V

VM and VSE systems 1
VTAM 25, 39
VTAM Definition 28
VTAM Definitions 17
VTAM SAP numbers 38
VTAM TSO sessions 5
VTAMLST 12

W

WAN3172 4
Web interfaces 37
Web servers 29

IBM Redbooks evaluation

Multiprise 3000 Basic Emulated I/O Definitions
SG24-5669-00

Your feedback is very important to help us maintain the quality of IBM Redbooks. **Please complete this questionnaire and return it using one of the following methods:**

- Use the online evaluation form found at <http://www.redbooks.ibm.com/>
- Fax this form to: USA International Access Code + 1 914 432 8264
- Send your comments in an Internet note to redbook@us.ibm.com

Which of the following best describes you?

Customer **Business Partner** **Solution Developer** **IBM employee**
 None of the above

Please rate your overall satisfaction with this book using the scale:
(1 = very good, 2 = good, 3 = average, 4 = poor, 5 = very poor)

Overall Satisfaction _____

Please answer the following questions:

Was this redbook published in time for your needs? Yes___ No___

If no, please explain:

What other Redbooks would you like to see published?

Comments/Suggestions: (THANK YOU FOR YOUR FEEDBACK!)

SG24-5669-00

Printed in the U.S.A.

