

# Configuring and Troubleshooting PPP on the IMACS PM-IOR Card

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## Scope

This document pertains to the following products: Streamline and IMACS (600 800 and 900).

## Introduction

This document is a guide on how to configure and troubleshoot PPP using the PM-IOR IMACS Card. The PM-IOR Card gives the IMACS chassis the ability to handle layer 2 protocols (Frame Relay, PPP) and layer 3/4 protocols (TCP/IP and IPX/SPX). Note: It is important to keep in mind that the overall configuration requires two different terminal cables since the physical layer/T1 configuration is done through the IMACS Menu interface and the PM-IOR configuration is done through the CO port on the PM-IOR Card. Note: this particular example uses IP numbered interface routing. Future examples will contain unnumbered interface routing.

## Network Diagram



## Requirements

### Hardware:

- PM-IOR Card
- PM-IOR Terminal Cable (to connect into the CO port on the PM-IOR Card)
- IMACS Terminal Cable (to connect into interface card)

## Software:

- If using a Streamline must be running Host Rev. 1.1 or higher
- If using an IMACS (600, 800 or 900) must be running Host Rev. 3.8 or higher

## Configuration Steps

### 1. Configure the physical layer (T1) from the IMACS interface card

- 1a. Connect the IMACS terminal cable into the Term port on the IMACS Interface card.  
From the Main Menu you should see something similar to this:

Slot	Installed	Status
C1	CPU XCON	ssss
C2		
P1/U1	PM-IORx1	s
P2/U2		
P3/U3		
U4/U4		
W1/U5	CSU+CSU	ss
W2/U6		
W3/U7		
W4/U8		
IF	INTF+modem	
S1	PS1	
S2	RI	

Arrow down to the CSU that will be used for the PPP T1 and enable it. You can locate the CSUs on the Main menu by looking at slots W1,W2,W3,W4. Above you can see that there is a WAN card in slot W1 (CSU+CSU indicates that there are two CSUs). In this example we are using W1-1. Here are the settings:

CSU	
STATE	actv
MODE	xcon
FORMAT	esf
LINE CODE	b8zs
PULSE	n/a
LINE LEN	0
SLIP LIM	126
AIS/ALM	none
LINE LB	off
LOCAL LB	off
CH LB	off
LB ADDR	01
LB GEN	off
LB DET	w/to
ESF/NMS RP	at&t
EER THRHD	10e-4
RDNT RULES	none
GROUP	none

**1b.** Now you need to set the IMACS chassis to take network timing from the T1 carrier. If you are still in the CSU menu then save your changes (type 's'), then go back to the Main Menu (type 'm'). Arrow down to the Interface card is in Slot IF. Hit enter and you will see:

```
PRIMARY CLOCK      INT
EXT1 RATE          n/a
EXT1 FORMAT        n/a
EXT1 FRAME         n/a
```

```
SECONDARY CLOCK   INT
EXT2 RATE         n/a
EXT2 FORMAT       n/a
EXT2 FRAME        n/a
```

```
CURRENT CLK       INT
```

Change the Primary and Secondary clock so that it takes timing from the T1 port that is being turned up. So now it should look like this:

```
PRIMARY CLOCK      w1-1
EXT1 RATE          n/a
EXT1 FORMAT        n/a
EXT1 FRAME         n/a
```

```
SECONDARY CLOCK   w1-2
EXT2 RATE         n/a
EXT2 FORMAT       n/a
EXT2 FRAME        n/a
```

```
CURRENT CLK       w1-1
```

Notice that Current Clock is only a status box. If your T1 is turned up and active and you make the appropriate configuration changes (as indicated above) then the Current Clock will reflect the source of network timing.

**1c.** Arrow down to the PM-IOR card on the IMACS menu and hit enter. You should see something like this:

```
Version #:1.3
STATE                stdby
WAN/SRV              w1-1
MODE                 dce
TS                   table
RATE                 56k
Tx CLOCK             int
Tx CLOCK PLRTY      norm
DATA PLRTY           norm
CTS                  perm
CTS DELAY            0
LOCAL LB             off
LB GEN MODE          dds
LB GEN               off
LB DET               w/to
ISDN CONN            no
```

The card is currently set to standby mode which means that it is not in use. Here is what the screen should look like for the PPP T1 being brought up:

```
STATE                actv
WAN/SRV              w1-1
MODE                 dce
TS                   table
RATE                 64k          * Please see note below
Tx CLOCK             int
Tx CLOCK PLRTY      norm
DATA PLRTY           norm
CTS                  perm
CTS DELAY            0
LOCAL LB             off
LB GEN MODE          dds
LB GEN               off
LB DET               w/to
ISDN CONN            no
```

\*Note: The data rate per DS0 must match up on the remote end. It is a common configuration mistake for one end to set the data rate to 56K per DS0 and the other end to set the data rate to 64K per DS0.

Look above at the parameter TS (timeslot table), select the parameter, hit enter and you will need to select the number of DS0s needed for the PPP T1 connection. In this example we are selecting the first 6 timeslots on the T1 span so our TS table will look like this:

```
          1 1 1 1 1 1 1 1 1 2 2 2 2 2
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4
x x x x x x
```

You select each of the timeslots one at a time by hitting the space bar under the timeslot to be selected. A 'x' under the timeslot means that the timeslot has been selected for use.

## 2. Configure the upper layer protocols (PPP and IP) from the IOR Card

**2a.** Terminal into the PM-IOR card. You will need to use the specific terminal cable that comes with the PM-IOR card. If you do not have this cable then you can pin one out by looking at the FAQ titled 'What are the PM-IOR Card Terminal Cable Pin-outs'.

**2b.** Log into the PM-IOR card. You will see:

```
PortMaster Console login:  ← Type !root and hit the enter key
Password:                  ← Hit the enter key and then you will see:
```

```
Command>                  ← This is the command prompt
```

From this point you are ready to configure the PM-IOR Card. Consult the network diagram. We are configuring the PM-IOR Card at Site A. After each command below hit the enter key.

```
Command>set ether0 add 1.1.1.1
Command>set ether0 netmask 255.255.255.0
```

```
Command>set w1 network hardwire
Command>set w1 address 2.2.2.1
Command>set w1 netmask 255.255.255.0
Command>set w1 destination 2.2.2.2
Command>set w1 modem on
Command>set w1 protocol ppp
Command>set w1 rip on
Command>set w1 mtu 1500
Command>save all
Command>reset w1
```

Now we are going to configure the PM-IOR Card at Site B. It is assumed that for Site B that all of the steps covered in section 1 of the document have been taken care of (configuring the T1 circuit and assigning DS0s to the PM-IOR card). Here is the PM-IOR config for Site B:

```
Command>set ether0 add 3.3.3.1
Command>set ether0 netmask 255.255.255.0
Command>set w1 network hardwire
Command>set w1 address 2.2.2.2
Command>set w1 netmask 255.255.255.0
Command>set w1 destination 2.2.2.1
Command>set w1 modem on
Command>set w1 protocol ppp
Command>set w1 rip on
Command>set w1 mtu 1500
Command>save all
Command>reset w1
```

If the network is fully up and running then you should be able to ping from Site A to Site B. So from the Site A PM-IOR card type:

```
Command>ping 3.3.3.1
3.3.3.1 is alive
```

From the Site B PM-IOR card type:

```
Command>ping 1.1.1.1
1.1.1.1 is alive
```

If the above does not work then it is time to go to the troubleshooting section of this guide.

## Troubleshooting

This troubleshooting procedure starts at the physical layer and works its way up to the higher layers. So, you may be able to skip ahead to the layer in question.

### 1. Checking the physical T1 network layer

- Are there any T1 carrier alarms?

To check for T1 carrier alarms terminal into the IMACS Interface card and you will see the alarms on the right hand side of the screen. Here is the terminal output on a downed T1 that is in a Red Alarm state which means that the CSU is not seeing any framing/encoding or electrical signaling. Again, it is important to look at the right hand side of the terminal to see the alarms if there are any:

CGA\_RED W1-1  
NOS W1-1

To clear the above Red Alarm you will need to check your cabling: too often a network is up and running and someone who happens to be onsite near your equipment will brush up against the cabling or remove it by accident. The above condition most often is caused though by a problem in the T1 carrier's network. This leaves a lot of territory to cover and a lot of possibilities: a bad line card in the Central Office, bad equipment sitting between the line card in the CO and the IMACS CSU, or possibly the classic case of someone disrupting the cabling by cutting the cable pairs in the ground. Regardless, if you are in a T1 alarm condition then the alarm must be cleared before moving ahead in the troubleshooting process. So, make sure to check your cabling, verify that the CSU is set to active, verify that the Framing/Coding is set properly, and verify that the IMACS is set to take clock from the carrier.

- Are there any clock slips or line errors?  
It is possible that the T1 does not have any carrier alarms but that there are synchronization errors that resulting from bad network clocking. To check for clock slips and other T1 layer errors you will need to terminal into the IMACS Interface card. Arrow down on the Main Menu to the Slot and CSU in question. Hit the enter key so that you are looking at the CSU Configuration screen. Highlight the column of the CSU in question and type 'p' to go into Performance mode. Look at the terminal output below:

```
Unit 2 PERFORMANCE USER REGISTERS Sec. 384 of 900
      ES      UAS      SES      BES      LOFC      SLIP      DM
STATUS
CUR      3      0      0      0      0      3      2
01      -----
02      -----
03      -----
04      -----
05      -----
06      -----
07      -----
08      -----
09      -----
10      -----
11      -----
12      -----
.....
TOTAL    0      0      0      0      0      0      0
.....
```

STATUS: Y=YEL N=NOS T=Test L=LOS O=OOS B=BPV E=ERR

Look above at the Cur (Current Statistics) row. You can see that there are 3 errored seconds and 3 clock slips. This is an indication of lack of network timing. Verify that you have configured the IMACS Interface card to take network timing from the carrier on the T1. Typically you should not set the network timing to internal (unless you are doing back to back testing which would require one chassis to provide internal/source clock and the other chassis to take timing off of the T1).

## 2. Verifying that the PPP negotiation is established

You will need to terminal into the PM-IOR Card for this section of troubleshooting.

- Is the PPP session established? Type 'show w1' and verify that the status is established and that there are input and output packets. Below is the output from the sample network. You can see that everything is up and running smoothly:

From Site A:

```

Command>show w1
----- Current Status - Port W1 -----
Status: ESTABLISHED
Input:      177762          Abort Errors:    0
Output:     175342          CRC Errors:      0
Pending:    0              Overrun Errors:  0
TX Errors:  0              Frame Errors:    0
Modem Status: DCD+  CTS+

Active Configuration          Default Configuration
-----
Port Type: Netwrk            Netwrk (Hardwired)
Line Speed: Ext 384K         Ext Clock
Modem Control: on           on
Remote Host: 2.2.2.2         2.2.2.2
Local Address: 2.2.2.1      2.2.2.1
Netmask: 255.255.255.0     255.255.255.0
Interface: ptpW1 (PPP,Routing,VJ-Comp)
Mtu: 1500                    1500
Dial Group: 0

```

If the PPP session is not established then you may need to debug PPP to monitor the PPP conversation. At the PM-IOR Card command prompt type:

```

Command>set console          (then hit enter)
Command>set debug 0x51      (then hit enter)

```

At this point you will see the PPP conversation/negotiation in progress. Here is sample output from a PPP negotiation that is successfully established:

```

Command> set console
Setting CONSOLE to port S0
Command> set debug 0x51
Setting debug value to 0x51
Command>
Command> Enabling port W1 (DMA)

Sending LCP_CONFIGURE_REQUEST to port W1 of 10 bytes
containing:
01 01 00 0a 05 06 40 8a df d7

Received LCP_CONFIGURE_REQUEST on port W1 of 10 bytes
containing:
01 02 00 0e 05 06 8c f4 55 0f 07 02 08 02

Sending LCP_CONFIGURE_ACK to port W1 of 14 bytes
containing:
02 02 00 0e 05 06 8c f4 55 0f 07 02 08 02

```

```
Received IPCP_CONFIGURE_REQUEST on port W1 of 12 bytes
containing:
01 01 00 10 02 06 00 2d 0f 00 03 06 02 02 02 01
```

```
Sending LCP_CONFIGURE_REQUEST to port W1 of 10 bytes
containing:
01 02 00 0a 05 06 40 8a df d7
```

```
Received LCP_CONFIGURE_REQUEST on port W1 of 10 bytes
containing:
01 03 00 0e 05 06 8c f4 55 0f 07 02 08 02
```

```
Sending LCP_CONFIGURE_ACK to port W1 of 14 bytes
containing:
02 03 00 0e 05 06 8c f4 55 0f 07 02 08 02
```

```
Received LCP_CONFIGURE_ACK on port W1 of 6 bytes
containing:
02 02 00 0a 05 06 40 8a df d7
W1: LCP Open
```

```
Sending IPCP_CONFIGURE_REQUEST to port W1 of 10 bytes
containing:
01 01 00 0a 03 06 02 02 02 02
```

```
Received IPCP_CONFIGURE_REQUEST on port W1 of 12 bytes
containing:
01 01 00 10 02 06 00 2d 0f 00 03 06 02 02 02 01
```

```
Sending IPCP_CONFIGURE_ACK to port W1 of 16 bytes
containing:
02 01 00 10 02 06 00 2d 0f 00 03 06 02 02 02 01
```

```
Received IPCP_CONFIGURE_ACK on port W1 of 6 bytes
containing:
02 01 00 0a 03 06 02 02 02 02
W1: IPCP Open
LCP IPCP Open
Connection Succeeded
```

Above, you can see that there is a sequential progress in the PPP negotiation of first negotiating LCP (Link Control Protocol) options and then IPCP (Internet Protocol Configuration Protocol) options. Before IPCP can be negotiation LCP options must be negotiated. Although you may not understand all of the output above, you should be able to get an idea of at which stage the PPP negotiation may be failing. What is most important is that you see the 'Connection Succeeded' message which means that both ends of the wan link have successfully negotiated PPP. To turn off PPP debug do the following:

```
Command> set debug off
Command> reset console
```

### 3. Verifying IP Routing

You will need to terminal into the PM-IOR Card for this section of troubleshooting.

-Can you ping the local wan interface?

If you are at Site A the local wan interface is 2.2.2.1, if you are at Site B the local wan interface is 2.2.2.2. You will not be able to ping the wan interfaces until the t1 is active, and the PPP session has been established.

-Can you ping across the T1 to the remote wan interface?

If you are at Site A the remote wan interface is 2.2.2.2, if you are at Site B the remote wan interface is 2.2.2.1. If you cannot ping then either the T1 is down (check the IMACS for carrier alarms), the PPP layer is not established (at the PM-IOR Card issue the 'show w1' command to verify), or there may be an IP addressing issue (verify that you have input the proper IP addresses).

-Can you ping the local ethernet interface?

If you are at Site A try pinging 1.1.1.1. Verify that the address is alive. If not type:

```
Command> ifconfig
ether0: flags=16<IP_UP,IPX_DOWN,BROADCAST>
  inet 1.1.1.1 netmask ffffffff broadcast 1.1.1.255 mtu 1500
ptpW1: flags=35<IP_UP,IPX_DOWN,POINT_TO_POINT>
  inet 2.2.2.1 dest 2.2.2.2 netmask ffffffff mtu 1500
```

In the output above you can see that the ptpW1 interface is associated with the T1 PPP interface. You can also see that both ether0 and ptpW1 are up and have IP addresses assigned. If you see inet 0.0.0.0 for an address then it means that an IP address has not been assigned to an interface, you may have not issued the 'save all' command after entering configuration information.

To look at the routing table use the 'show route' command:

```
Command> show route
Destination  Mask Gateway Source  Flag Met  Interface
-----
3.3.3.0      24   3.3.3.1 local   NL    1   ether0
1.0.0.0      8    2.2.2.1 rip     ND    2   ptpW1
2.0.0.0      8    2.2.2.1 local   NL    1   ptpW1
```

In the table above you can see that the 1.0.0.0 route has been established by RIP updates from the remote router.

To troubleshoot RIP (Routing Internet Protocol) issues you can issue build a RIP filter and then run the filter as shown below:

```
Command> add filter rip (hit enter)
Command> set filter rip 1 permit udp src eq 520 (hit enter)
Command> set console (hit enter)
Command> ptrace rip (hit enter)
```