ComOS® 3.7 Release Note

Livingston Enterprises, Inc.

Introduction

The new Livingston Enterprises ComOS® 3.7 software release is now available for all PortMaster® products. This release is provided at no charge to all Livingston customers. This release note documents commands and features added between ComOS release 3.5 and 3.7. There is no ComOS release 3.6.

Note – You must use PMconsole(TM) 3.5.3 when upgrading to ComOS 3.7; see "Upgrade Instructions" below. If you are running Windows 95 or Windows NT 4.0 you must use PMconsole for Windows 3.5.1.4. Read "MemoryRequirements" and "Upgrade Instructions" thoroughly before upgrading.

Note – ComOS 3.7 requires that setting the directory numbers on BRI ports; to do so use the "set S10 directory Number" command where S10 is the port and Number is the directory number.

Contents

New Features in ComOS 3.7

PortMaster 3 Channelized T1

The PortMaster 3 now supports dial-in over channelized T1 using standard 56k "robbed-bit" lines. The PM-3 supports E&M wink start, E&M immediate start, or FXS (foreign exchange station) loop start signaling. See "Channelized T1 Configuration" below. Note that because channelized T1 uses 56K channels and PRI uses 64K channels, connect rates for modems over channelized T1 may be lower than over PRI.

Dial-out over channelized T1 is not supported in this release.

Channelized E1 will be supported in a future release.

Sessions are now fully cleaned up or properly disconnected for dial-in users that disconnect abnormally from a PortMaster 3 configured for FXS loop start.

K56flex

The PortMaster 3 now supports the Livingston "True Digital 56K Card" (MDM-56K-8 and MDM-56K-10) with support for K56flex modems. It continues to support the older "True Digital V.34 Card" (MDM-PM3-8 and MDM-PM3-10) at 28800bps and below. See "Support for K56flex" below for more information. See **http://www.livingston.com/** for information on upgrades.

Compression

On the PortMaster Office Router, support has been added for software STAC LZS compression over the PPP link at speeds of 128Kbps and below. Software compression should not be used on links faster than 128Kbps.

ComOS 3.7 supports the new hardware STAC compression module (PM3-CMP) on the PortMaster 3. STAC compression is automatically enabled when the compression card is detected. This compression can be configured on all types of PPP connections

supported by the PM-3. This includes dial-in via modem, ISDN or ISDN V.120 and leased line operation over fractional T1/E1 or clear channel T1/E1. The PM-3 disables STAC compression on a dial-in modem connection which is already running V.42bis or MNP5 compression.

Compression can be enabled on network hardwired ports with the "set S1 compress on|off|vj|stac" command, and for dialout locations with the "set location Locname compress on|off|vj|stac" command.

on	Use both kinds of compression
off	no compression
vj	use Van Jacobson TCP/IP Header Compression
stac	use Stac LZS data compression

Stac LZS compression does not need to be configured for dial-in users; if requested during PPP negotiations and available, it is used.

BGP Routing

The PortMaster IRX and PortMaster 3 now support BGP (Border Gateway Protocol) routing. For more information on configuring BGP see "Configuring BGP" on Livingston's web site **http://www.livingston.com/**or the upcoming revision of the "Configuration Guide for PortMaster Products" and "Command Line Administrator's Guide".

A full BGP routing table for the entire Internet (44,000 routes) requires seven (7) megabytes of memory, so before using BGP for that you should upgrade your IRX or PM-3 to 16 megabytes of memory. Additional routing peers will require about 2 megabytes per additional peer beyond the first one. For more information on upgrading memory consult the Installation Guide for your product, or see "Memory Requirements" below.

Leased Line ISDN

This is a new feature targeted at the European market. In Europe there exists a facility called Leased Line ISDN. Actually there is no ISDN involved as there is no signaling involved and hence the term leased. You can use any of the following configurations.

1.   A single hardwired B channel (64Kbps)

2.   Two separate hardwired B channels (2 X 64Kbps)

3.   One hardwired B1 + B2 channel (128Kbps)

ISDN BRI ports may now be configured as network hardwired. You will have to do a save all and reboot for changes to take affect. BRI ports now support a line speed of 128000 (128Kbps). For example:

set s1 speed 1 128000

Only the first port on a given BRI line may be configured for 128Kbps and when configured for 128Kbps the second port is still there but placed into the NO_SERVICE state. Since in our BRI products the ports are created and assigned at boot time, you will have to do a save all and reboot for changes to take affect. Also for the same reason in the case of 128Kbps on the first port, the remaining port can not be removed without renumbering all ports, so it is placed in the NO_SERVICE state.

One noticeable difference on the OR products is the operation of the LEDs.

- NT1   This LED acts as before, tracking physical L1 state
- S1-S2   These act differently for leased hardwired channels
    - If the L1 is down they are OFF
    - If the L1 is up but the associated port is not ESTABLISHED they FLASH
    - If L1 is up and associated port is ESTABLISHED then LED in ON

```
Command> show isdn d0
D00 status-------------------------------------BRI_NI1
Interface state:   F7-        active    Layer1 state:    active
Init count:        1          uptime:   4days           last state     4days
                                                         change:
recv count:        75159      xmit:     79418           errors:        0
numberplan         0          type:     Local           plan:          ISDN E.164
S1-------------------------------------------------------------------------------
Cess state:        Leased    64         last change:    0 Port State:   ESTABLISHED
```

The "**show isdn D0**" command was enhanced to make it easy to track the status of Leased ISDN connections. The Ces state reflects the hardwired or leased configuration as

- Leased 64
- Leased 128

and you can monitor the port state as before. To set leased line ISDN port destinations to negotiated, use these commands:

set S1 network hardwired

set S1 destination 255.255.255.255

Route Propagation Control

The PortMaster IRX and PortMaster 3 now have commands to control how routes are propagated between routing protocols. For more information see Livingston's web site **http://www.livingston.com/** or the upcoming revision of the "Configuration Guide for PortMaster Products" and "Command Line Administrator's Guide".

Idle Time special value

In ComOS 3.5, setting an idle time of 1 second on a port times out the username, password or host prompt in 5 minutes, but imposes no timeout once the user is logged in. In previous releases an idle time of 1 minute was used for this purpose, but since many customers would like to have a real 1 minute idle timeout for ISDN, the special setting has been changed from 1 minute to 1 second.

If the port has modem control off, the idle timer is ignored. If a port is in COMMAND state (an administrator is logged onto the command line interface of the PortMaster through that port), the idle timer is ignored.

Note that setting the RADIUS Idle-Timeout reply-item to 0 uses the default idle timeout on the port. A future release will change this behavior, so you should not use Idle-Timeout = 0 for now.

Multiple Subscriber Network

ComOS 3.7 on the PortMaster Office Router (OR-ST) with BRI S/T interfaces now supports the Multiple Subscriber Network (MSN) ISDN feature used in Europe and Japan to attach multiple ISDN devices to the same BRI line. This feature is not supported on the PortMaster 2. For more information on the "set isdn-msn on" command see "Multiple Subscriber Network for S/T Interfaces" below.

Improved ISDN BRI debugging

The ISDN BRI debugging commands may now be given for individual D channels, making it easier to isolate problems. For details see "New BRI Debugging Commands" below.

Note – ComOS 3.7 requires setting the directory numbers on ISDN BRI ports. If you have any BRI ports that have not had their directory number set, they will go into the NO-SERVICE state after you upgrade to ComOS 3.7. To set directory numbers, use the "set S10 directory Number" command where S10 is the port and Number is the directory number. You can set the directory numbers either before or after upgrading to ComOS 3.7.

Improved Synchronous Port Performance

Performance improvements have been implemented in the synchronous port device driver on the PortMaster IRX, PortMaster 2ER, and PortMaster Office Router. Previously, small gaps between frames on heavily loaded interfaces running at speeds of 1.544Mb/s or higher caused aggregate throughput to be slower than the full interface speed. This has been enhanced to keep single flag spacing between frames to achieve 100 percent line utilization.

Improved Routing

OSPF has been enhanced to support the OSPFv2 specification of 'Point-to-Multipoint' as described in RFC 2178. This feature is especially useful over Frame Relay connections that are not fully meshed. For more information see "OSPF and Frame Relay" below.

OSPF link state exchanges have been enhanced so that large link state databases can now be transferred in a few seconds instead of several minutes. The time required for OSPF to achieve full adjacency with a neighbor that has more than one thousand routes to give to the PortMaster has been significantly reduced.

When IPX is enabled on the Ethernet interface the PortMaster will automatically enable IPX RIP even if RIP is configured off. This feature allows IPX to be used successfully on networks that are using only OSPF for IP routing.

Easier-to-manage Frame Relay DLCI lists

The "**add dlci**" and "**delete dlci**" commands now work with ports as well as locations, using the port name in place of the location name.

In addition to the "**set S1 dlci Dlci_list**" command, you can now add a DLCI on a synchronous port configured for Frame Relay by using the "**add dlci S1 Dlci [Ipaddress]**" command and delete a DLCI with the "**delete dlci S1 Dlci**" command. Note that the list of DLCIs used on a port will always include both those created with "set S1 dlci" command AND those created with "**add dlci s1**". To avoid confusion, Livingston recommends using either one or the other method of setting DLCIs.

For more information see the "DLCI Table Configuration" section in the "Location Table" chapter of the Command Line Administrator's Guide.

Frame Relay Subinterfaces Increased

ComOS 3.7 supports Frame Relay subinterfaces on all PortMaster products, including the PM-2R, PM-2ER, OR-LS, OR-HS, IRX, and PM-3. In releases before ComOS 3.7, these were only supported on the IRX.

In ComOS 3.7, each Frame Relay port can now have up to 32 subinterfaces. In releases before ComOS 3.7, a synchronous port configured for Frame Relay could have one primary interface and one secondary subinterface configured on it, splitting DLCIs between the two interfaces.

There is a limit of 512 total active interfaces, further limited by available memory.

For more information see the "DLCI Table Configuration" section in the "Location Table" chapter of the Command Line Administrator's Guide.

Improved Multilink PPP

Enhancements to Multilink PPP negotiation have been implemented to match the latest proposed standard, improving interoperability with other vendors.

Simultaneous Multilink PPP (MP) session establishment is now supported. Previously, if multiple MP connections were being established for the same end point before the first authentication was completed, the additional links appeared to be separate users. Thisbehavior has been corrected.

MP is supported for ISDN on the PortMaster 2 and PortMaster 3. It is not currently supported for analog MP.

New attributes in RADIUS for the PortMaster 3

The PortMaster 3 now includes the Called-Station-Id and Calling-Station-Id attributes in RADIUS Access-Request packets. These attributes can be used as check items in the RADIUS users file.

The PortMaster 3 now includes the Connect-Info Attribute in both RADIUS Access-Request and Accounting-Request packets, providing information on the connect speed and modem protocols used. To use Connect-Info, add the following line to the RADIUS /etc/raddb/dictionary file, kill and restart radiusd:

ATTRIBUTE   Connect-Info   77   string

Previous beta releases used Attribute 65 for this; update your dictionary file to use 77 now instead. If you are using the Connect-Rate check-item in Livingston RADIUS Server 2.0.1, you must also edit the radius.h file and change PW_CONNECT_INFO from 65 to 77, then recompile. If you are not using Connect-Rate, then no recompilation is required, just change the dictionary file.

Improved Packet Tracing

The "ptrace Filtername extended" command will show each packet that matches the filter as it enters the PortMaster, and as it leaves the PortMaster, and the interface used for entry and exit. "ptrace Filtername" operates the same as earlier releases, and does not show the interface.

ChoiceNet® Debugging

You can now enable and disable ChoiceNet® debugging with the "**set debug choicenet on|off**" command.

The alternate ChoiceNet server is not actually used in this release or any previous release, but will be available in a future release.

Packet Filtering

Packet filters in this and all previous releases can have a maximum of 115 rules.

Packet filters have been enhanced to allow any IP protocol to appear in the filter rules. This change allows PortMaster filters to permit or deny packets according to their protocol number. A complete list of protocolnumbers appears in RFC 1700, "Assigned Numbers."

You may specify the keyword "protocol" followed by a number, or use the keywords tcp, udp, esp, ah, or ipip. ipip is protocol type 4, esp is protocol type 50, ah is protocol type 51.

set filter Filtername RuleNumber permit|deny [Ipaddress/NM

  Ipaddress(dest)/NM] protocol Number [log] [notify]

set filter Filtername RuleNumber permit|deny [Ipaddress/NM

  Ipaddress(dest)/NM] esp|ah|ipip [log] [notify]

SNMP improvements

Livingston's SNMP Enterprise Management Information Base (MIB) has been enhanced to deliver the most requested extensions, including showing which users are currently active. Check the new MIB file on**: //ftp.livingston.com/pub/le/snmp/livingston.mib** for a complete listing.

Improved V.42bis in PortMaster 3

ComOS 3.7 on the PortMaster 3 increases the V.42bis data dictionary from 512 bytes to 2048 bytes for the "True Digital V.34 Cards", which should improve ping times. The "True Digital 56K Cards" use a 1024 byte V.42bis data dictionary with performance superior to the 2048 byte data dictionary on the older cards.

This release does not address any 33.6Kbps modem connection issues in "True Digital V.34 Cards". However, the new "True Digital 56K Cards" do support 33.6Kbps in this release.

Non-standard Traceroute supported

ComOS 3.7 now supports Microsoft Windows 95 tracert function. While this version of traceroute is not RFC compliant many users still rely on it to determine network connectivity. Standard traceroute is still supported as well.

Office Router now supports itr4

The OR-ST now supports ISDN switch type itr4.

Bugs Fixed in ComOS 3.7

Users with 56K Modems no longer need to disable 56K support to connect to the PortMaster 3 at V.34 rates and below when using the "True Digital V.34 Cards".

A problem with telnet negotiation for the administrative telnet session has been fixed.

A problem with administrative logins and syslog has been fixed.

Idle timer, Directory, SPID, and OSPF port settings that sometimes had to be saved twice with "save all" in ComOS 3.5 are now correctly saved the first time.

Previous releases with ISDN Switch configured for 5ess-ptp had a problem that occurred when the telco took the line out of service for "routine exercise": switch connectivity would not be re-established on the D channel after the Telco placed the line back into service. This problem is fixed in ComOS 3.7.

Static routes stored in the PortMaster configuration in releases before ComOS 3.5 are now properly added to the Variable Length Subnet Mask (VLSM) routing table after upgrading.

The PortMaster no longer reboots when trying to deliver IPX RIP routes over Frame Relay.

Guaranteed delivery of LMI (Local Management Interface) sequence exchanges on Frame Relay interfaces now keeps links from terminating and restarting when loading is heavy.

A previous release on the PM-2R, PM-2ER, IRX, OR-LS, OR-HS (but not the PM-3) had a problem with Frame Relay where it appeared to lose LMI responses from the Frame Relay switch over time, eventually causing the PortMaster to send full status inquiries instead of normal status inquiries. Some switches would stop providing service in that situation. Rebooting the PortMaster appeared to fix the problem. The problem could also appear after a burst of noise causing errors following a long period of normal operation. The problem was caused by a failure to clear the status indicator associated with the 64-frame circular queue, so that over time more and more frames would be falsely indicated as bad. This problem is now fixed in ComOS 3.7.

The PortMaster 3 now interoperates with V.32bis modems at 14.4 Kbps.

Static routes are now properly injected into OSPF if RIP route injection has been disabled. The behavior of the "ospf accept-rip" command on Ethernet interfaces has been corrected. The intended behavior of this command has always been to control whether RIP routes learned on this Ethernet interface were propagated into the OSPF link state database so that OSPF could advertise these RIP-learned routes to its OSPF neighbors. However, before release 3.7, the command also had the undesirable effect of determining if static routes whose next hop gateways were reached via this Ethernet interface were propagated into the OSPF link state database. This release ensures that static routes are always propagated into OSPF independent of the setting of the "ospf accept-rip" command.

In ComOS 3.5, when simple OSPF passwords were used on the PortMaster, Cisco routers would syslog a warning about OSPF Checksums every 15 seconds. This is fixed in ComOS 3.7.

A netbuf memory leak that occurred on the PortMaster 3 when a port was reset with queued packets on a fractional T1 line has been fixed.

The Telnet echo bug has been fixed. Now when you use Telnet to log in to the PortMaster as the administrator, the PortMaster properly echoes all your keystrokes.

The "attach" command has been fixed to allow access to IDLE ports only.

The "set all host default" command now works correctly.

The PortMaster now guarantees delivery of LCP Echo Replies for systems that use this mechanism to verify link quality.

SNMP now properly reports interface speeds.

V.25bis dialing now works correctly with the new synchronous device driver.

On the PortMaster 3, large numbers of Multichassis PPP (MCPPP) broadcasts on reboot have been eliminated. In addition, new sanity checking code has been implemented to assure convergence between MCPPP peers.

ComOS now limits unassembled fragments and disallows large packet fragments to minimize the amount of buffer space consumed when the PortMaster is under various types of flooding denial of service attacks.

ComOS now properly identifies the source of a route when reporting routing table information via SNMP.

ComOS now disallows outbound dial operation on Channelized T1 since dialout is not available on Channelized T1.

ComOS now disallows outbound dial operation on ISDN lines that are out of service.

A bug in the asynchronous dialer scripting was fixed. Non-printing characters can be specified in octal notation using "\010" to be output from the port. This feature was previously not sending the octal character out the port. This feature now works properly on asynchronous serial lines.

V.25bis scripts now support octal escapes such as "\007".

The reset port command for ports in the range of 50-55 now works on the PortMaster 3.

Channelized T1 Configuration

The following commands configure the PortMaster 3 to support a channelized T1 circuit. Replace Line0 in commands with either line0 or line1. A vertical bar (|) means one of the keywords on either side of it must be chosen, based on the telephone company line parameters. New commands are described below; framing and encoding are described in the Command Line Administrator's Guide, available in printed form from Livingston, or in PostScript and Adobe Acrobat PDF from **ftp://ftp.livingston.com/pub/le/doc/manuals/**.

To permit 56K modem operation with the new "True Digital 56K Cards," Channelized T1 circuits should be provisioned for trunk-side termination. If line-side termination is provisioned, usually 33.6Kbps (V.34) will be the maximum speed possible. FXS Loop provisioning means you have line-side termination and 56K modem operation is not possible.

The new command "**set line0 signaling wink|fxs|immediate**" command sets one of the following signaling protocols:

wink   Trunk E&M wink start, inbound calls only

fxs   FXS loop start, inbound calls only

immediate   Trunk E&M immediate start, inbound calls only

Obtain channelized T1 line parameters from the telephone company, then

enter commands on the PortMaster in this order:

Command> **set Line0 inband**

Command> **set Line0 signaling wink|fxs|immediate**

Command> **set Line0 framing esf|d4**

Command> **set Line0 encode b8zs|ami**

Command> **save all**

(Now insert the line connector (RJ-48c) from the telephone company into the line0 or line1 jack.)

Command> **reboot**

Here is an example of the output from the "**show line0**" command for line0 configured for channelized T1 with trunk E&M wink start, ESF framing, and B8ZS encoding:

```
Command> show line0
---------------------  line0 - T1 Inband DS0       -------------
--
Status: UP      Framing: ESF           Encoding:       PCM: ulaw
                                        B8ZS

Signaling:      Trunk E&M wink         Options:        inbound calls
                start                                   only

Received        +2dB to -7.5dB
Level:

Alarms                                 Violations
----------                             ------------
                                       --
Blue            0                      Bipolar         0
Yellow          1                      CRC Errors      0
Recieve Carrier 0                      Multiframe      0
Loss                                   Sync
Loss of Sync    0
```

Frequently Asked Questions on Channelized T1 on the PortMaster 3

Q. What Type of Channelized T1 signaling does Livingston support on the PM-3?

A. Livingston supports three types of Channelized T1 signalling as follows:

– E&M Wink Start

– E&M Immediate Start

– FXS Loop Start

Q. Does the PM-3 support Ground Start circuits?

A. No.

Q. Can the PM-3 be configured for FXO operation?

A. No.

Q. Does the PM-3 support NFAS?

A. Not in this release.

Q. Does the PM-3 support pulse dialing.

A. No, it supports Dual Tone Multi-Frequency (DTMF). DTMF also is
   referred to as Touch Tone Dialing.

Q. What framing and Encoding mechanisms does the PM-3 support?

A. The PM-3 supports D4 or ESF framing and B8ZS or AMI encoding.

Q. Does Livingston support ISDN connections over channelized T1 circuit?

A. The PM-3 will support 56K Voice-ISDN connections, V.120

Q. Can PRI and Channelized-T1 be configured on the same PM-3?

A. On a PM-3 with two T1 lines, one line could be configured for PRI
   and the other line for Channelized T1, or both lines configured the same.

Q. Does the PM-3 support DNIS (Dial Network Information Services)?

A. No, have the telco configured the circuit to send 0 or 1 digit

Q. Do you have to set the ISDN switch type when configuring for
   channelized T1?

A. No, ISDN switch type is not configured for channelized operation.

Q. Will the PM-3 accept less than 24 timeslots per line as supplied by
   your telco? For example, 10 timeslots.

A. Yes, you can have as little as 1 timeslot up to 24 timeslots per line
   and in any combination, up to 48 timeslots total for a two T1 PM-3.

Q. Can the timeslots be configured for different signalling schemes
   supplied by the telco. For example, timeslots 1 - 10 configured for
   FXS, timeslots 11 - 24 configured for Wink Start.

A. No, the same signalling is required on all timeslots for a given T1.

Q. Can the PM-3 be trunk side terminated or line side terminated or both?

A. The PM-3 will support either trunk side termination or line side

 termination. Generally higher performance will be achieved if the

PM-3 is trunk side terminated. Note that the K56flex modem cards

almost always require trunk side termination, since line side

termination usually involves an extra analog to digital conversion.

Q. Are 56k and 64k ISDN connections supported through a channelized T1

circuit?

A. No, 56k ISDN connections only.

Support for K56flex

ComOS 3.7 on the PortMaster 3 now supports the Livingston "True Digital56K Card" (MDM-56K-8 and MDM-56K-10) with support for K56flex modems, as well as the older "True Digital V.34 Card" (MDM-PM3-8 and MDM-PM3-10).

See http://www.livingston.com/Marketing/Products/56Krules.shtml for information on upgrades and K56flex performance.

For K56flex modem operation, the client-side modem must be operating with K56flex v1.0 software or higher. In many cases this will mean that the client-side modem will require a flash upgrade, and in a small base of modems, a hardware exchange may be necessary.

To determine if a client-side modem is K56flex operational, a user canplace the modem in the command mode, and communicate directly with the modem using the AT command syntax. To enter AT commands you must attach your modem to a computer's serial port and enter commands directly from terminal emulation software such as Windows 95's HyperTerminal program. To use AT commands in terminal mode to verify software version, do the following:

1. Start your data communications program.
2. At the screen prompt type in ATi3 followed by a carriage return (or ENTER).
3. Note the modem's response.
4. If the modem responds with V1.0-56K_DLS (or higher), a K56flex modem connection is possible. The DLS part of the ATi3 output designates a flash upgradable modem. 5.
5. If the modem responds with an earlier version of software (such as V0.519-K56_DLS), please contact the modem vendor's web site for the latest firmware upgrade. (See section: How can I get my K56flex client modem upgraded?)

Livingston's PortMaster 3 is compatible with any client modem supporting K56flex1.1. Some client modems may require a flash upgrade to get to K56flex1.1 compatibility. Customers must contact the client modem manufacturer to obtain the most current

version of their software. Livingston will list on our web site versions of client software known to work well with K56flex1.1; this release note includes the first such list below.

With 56K modem technology, the negotiation of connect speed is driven by the client modem. Not all client modems are created equal, but all have the task of identifying various network limitations and compensating to achieve the highest data rate for a given connection. That means while the PortMaster 3 has the ability to connect at the highest possible speed allowed, connection speed still has to be negotiated by the client modem which might dictate a slower speed.

Data Modulations are:

- K56flex
- ITU V.34 Annex 12 - 33,600 bps et al.
- ITU V.34 - 28,800 bps et al.
- ITU V.8 - V.34 capabilities negotiations
- ITU V.32bis - 14,400, 12,000, 9600, and 7200 bps with trellis encoding
- ITU V.32 - 9600 and 4800 bps
- ITU V.22bis 2400 bps
- V.42 or MNP 5 error correction
- V.42bis,LAPM or MNP data compression

The following client modems have successfully connected and transferred data with the PortMaster 3 (not necessarily using K56flex). The output of their "ati3" version numbers is included. An updated list of modems is available on Livingston's web site at the URL mentioned above.

SuperExpress 288 PnP

Firmware V1.200-07-V34_DS Built July 18 1995

Practical Peripherals

PM28800MT Firmware 1.63

Zoom V.34 plus

Firmware V.1500 -V34_DS -a Z201

Practical Peripherals PM14400FXMT

Firmware 2.17

BocaModem V.34+

Firmware V1.510-V34_DS

Gateway 2000 Telepath 14.4k, Made by USR

Firmware Supervisor 4.1, 6/27/94, DSP 10, 4/20/94

USR sportster 28.8

Firmware Supervisor 6.0, 12/19/94, DSP 11.4 12/09/94

MicromCom 33.6k OfficePorte Voice

Firmware V2.011-V34_ACF_DS1

Zoltrix V.34+ Fax Modem

Firmware V2.061 US001-V34_ACF_DP1

USR 33600 Fax modem Internal

Firmware EPROM 10.0.23 12/10/96 DSP 10.0.23 12/10/96

Cardinal Internal V34+

Firmware V1.50-V34+DP Data/Fax

USR Sportster 14.4

Firmware Supervisor 4.1, 6/27/94, DSP 10, 4/20/94

Firmware Supervisor 4.1, 11/16/93,DSP 10, 11/16/93

Gateway Telepath Internal

Firmware 1.5 000

Intel 144, 144e, Internal 14.4k as well

Firmware V1.7 Rockwell RC144DP

USR V34+ Internal

Firmware EPROM 3.12 8/16/96 DSP 3.12 8/16/96

Gateway 2000 Telepath II 14.4k/Fax V5.2 / USR

Firmware Supervisor 5.2 12/09/94 DSP 11.2 09/07/94

USR 33.6 V32bis, VFC, V.34+

Firmware 2.0 1/11/96

Texas Instruments RK 33600 Internal / USR Modem

Firmware EPROM 1.4 11/22/95 DSP 1.4 11/22/95

Prometheus 14.4k RC140DPi Rev CA

Firmware CES-03B- 940315

SupraExpress 336 PC

Firmware V1.440-16-V34_DS Built: July 22, 1996 11:15:10

Microcom DeskPorte Fast ES 28.8

Firmware V1.000-CS39 VFC RC288Dpi Rev 05BA

(Fastest connect rate was 14.4k, V.FC not supported)

Motorola UDS

Firmware 1.03.03

IBM Mwave Internal modem

New Termination Codes for True Digital 56K Card

The following termination codes have been added to ComOS 3.7 in support of the new True Digital 56K Card. The first two words are the RADIUS termination code which will be reported in RADIUS accounting. The entire string will be sent to syslog. All of these except "User Request - Call Circuit Closed" are generated by the new modems.

Port Error - Exceeded MNP retransmission limit

Port Error - Exceeded LAPM retransmission limit

Port Error - Inactivity timer expired

Service Unavailable - Failed to detect V.42 remote

User Error - Bad parameter in MNP lr negotiation

User Error - Failed to complete V.42 negotiation

User Error - LAPM negotiation timeout

User Error - Non LR received in MNP init

User Error - local link rates do not match remote

User Request - Call Circuit Closed

User Request - Normal LAPM Disconnect

Detailed descriptions follow:

Exceeded MNP retransmission limit

This error is caused when the timer expires while waiting for Link Request (1 second) or Link Acknowledge (5 seconds) during MNP negotiation, or after MNP connection is established and MNP retransmissions exceed 12 or more times.

Inactivity timer expired

Currently, the inactivity timer is disabled, so you should not see this message.

Bad parameter in MNP lr negotiation

This error is caused during MNP Link Request negotiation, once Link Request frame is received, if the parameter following is incompatible or unknown to the receiver. This error applies to both originator and answerer.

Failed to complete V.42 negotiation

V.42 negotiation failed to establish MNP or LAPM for a reason other than ODP, ADP, XID, or SABME timeout.

LAPM negotiation timeout

This occurs when the timer expires while trying to detect XID or SABME command. The timeout value is 30 seconds for K56flex connection, and 5 seconds otherwise.

Non LR received in MNP init

During initial negotiation of MNP, the initiator should send Link Request frame to the answerer prior to sending other frames. If other frames (not unknown frame or incompatible frame) are received first, then this error would result. This error applies only to the answerer.

local link rates do not match remote

This is caused when just prior to initial connection, the rate negotiated for downstream is smaller than the minimum connection speed parameter specified by the host. The call is disconnected.

Call Circuit Closed

This could be generated by any of the following reasons.

 - Remote modem, on-hook condition.

 - Three invalid login attempts.

 - Sudden phone line termination.

 - Remote modem powered off.

Normal LAPM Disconnect

This reason indicates a normal V.42 disconnect packet was received, and is a normal call tear down.

Lost Carrier

Modem detected a loss of carrier while the circuit was still active.

OSPF and Frame Relay

Frame Relay networks now have three choices for OSPF connectivity inComOS 3.7. The new option is a parameter to the command used to enable OSPF on a synchronous WAN interface:

set W1 ospf on nbma | point-to-multipoint | wan-as-stub-ptmp

For example:

  Command> set s1 ospf on cost 5 hello 10 dead 40 point-to-multipoint

nbma - is used when there is full mesh connectivity, and all OSPF speakers on the Frame Relay network can communicate with each other. In these cases, a designated router is elected on the Frame Relay network, and overall OSPF traffic overhead is reduced. 'nbma' stands for 'non-broadcast, multi-access', a standard term to describe a Frame Relay network. This is the default setting, and is the only behavior available in the previous release, ComOS 3.5.

point-to-multipoint - is used when there is partial mesh connectivity, or when all OSPF speakers on the Frame Relay network cannot communicate with each other. In these cases, the partial mesh Frame Relay network is modelled as a series of point-to-point interfaces.

To determine whether to set point-to-multipoint instead of nbma, use the "show route" and "show ospf links" commands. If the output of "show route" shows no routes learned over the Frame Relay interface, and "show ospf links" shows a large number of links that have been available for more than one minute, configure the interface for

point-to-multipoint.

wan-as-stub-ptmp - is used when interoperating with routers from other vendors which implement a variant of point-to-multipoint where the Frame Relay network is advertised as a stub network in the router link state advertisement (LSA), instead of as a host route. (The host route is the IETF draft behavior.)

To determine whether to configure a Frame Relay interface as point-to-multipoint or wan-as-stub-ptmp, use the "show ospf links" command to look at the Router LSAs of your neighbors on the Frame Relay cloud. If the LSAs show stub link entries with the Frame Relay network, with a netmask that is not 255.255.255.255, configure the interface as wan-as-stub-ptmp. If the LSAs show single host addresses on the Frame Relay network with a mask of 255.255.255.255, configure the interface as point-to-multipoint.

Multiple Subscriber Network for S/T Interfaces

ComOS 3.7 on the PortMaster Office Router (OR-ST) now supports the Multiple Subscriber Network (MSN) ISDN feature available in Europe and Japan. This feature is not supported on the PortMaster 2.

Background

When a PortMaster receives an ISDN call on a BRI or PRI, it tries to find a port to accept the call on. The PortMaster builds a list of all possible ports allocated to that ISDN line interface:

BRI   2 ports

PRI   24 for T1, 30 for E1

The PortMaster attempts to find a port to accept the call on, as follows:

1. Using the number called, as set in the CalledParty Information Element (IE), the list of ports associated with that ISDN interface is traversed. If a match is found with a port Directory Number and the port can accept a call, the search ends and that port is used to accept the call.

2. If no match is found in the first pass, the list is again traversed. This time the first port that can accept the call is selected.

Once a port is found, the call may still be rejected due to unsupported call type, such as unrestricted digital, voice, etc.

If no port is found to accept the call on, the PortMaster rejects the call with an appropriate cause code.

MSN

The Multiple Subscriber Network (MSN) feature is available in countries that use the S/T BRI interface for ISDN. The S/T interface can be thought of as a bus as opposed to the BRI U interface which is point-to-point. Multiple ISDN devices (such as a phone, fax, computer with ISDN card, or PortMaster) may be connected to the S/T bus at thesame time. They all share the D signaling channel and have separate addresses on it, called Terminal Endpoint Identifiers (TEI). When an incoming call arrives, its Setup message is broadcast on the D channel of the S/T bus to all listening devices. Each device on the S/T bus looks at the call to decide if it is for them.

With MSN the criteria used by a device to decide if the call is intended for it is:

*   The Called Party IE matches the device's Directory Number, OR

*   The Called service (from Bearer Capabilities IE) matches my device type, such as voice, unrestricted data, etc.

If neither criteria is met, the listening device silently ignores the incoming call. Devices can have the same Directory Number or separate Directory Numbers as each other.

By default, the PortMaster always tries to accept a call regardless of the Directory Number set (because of its second pass), and if it can't accept the call, rejects it. Therefore, when there are multiple devices on a S/T bus including a PortMaster, the PortMaster always accepts or rejects all incoming calls, and the other devices can never receive calls.

To change this behavior, ComOS 3.7 adds a new global configuration command called "set isdn-msn on" is available on the PortMaster 2 and PortMaster Office Router when they have a BRI S/T interface.

set isdn-msn on|off

When set to off, the PortMaster always accepts the call.

When set to on, the PortMaster only accepts the call if the port Directory Number matches the CalledParty IE. If no port is found that matches the CalledParty IE, the PortMaster silently ignores the call (instead of rejecting it), so that other devices on the S/T bus may accept it. If the Directory Number matches but the call type is not supported, the call is not rejected, so that other devices of that type sharing the Directory number may accept the call.

The current MSN setting may be seen by using the "show global" command. Any change to the ISDN-MSN setting requires a "save all" to be saved to the nonvolatile configuration memory of the PortMaster. The change takes affect immediately, no reboot is required.

New BRI Debugging Commands

The "show isdn" command for BRI now provides more information, and can be limited to a given D channel by specifying that as an argument. The PRI "show isdn" does not support parameters and is the same as before. Show isdn with no parameters:

```
Command> show isdn
D        Ports     Bri         Init   Uptime   Change   In     Out    Er
------   -------   Layer1      s      ------   ------   ---    ---    r
--       -         ---------   ----                                  --
                   -           -                                     -
D00      (S01/02   F7-active   1      4days    4days    7497   7922   0
         )                                              4      1
D                  D channel or BRI port number (DSL)
ports              Associated ports
bri                ST or NT1 Layer 1 states F0-8
                   F0: interface not active
                   F3: deactivated
                   F4: awaiting signal
                   F5: identifying input
                   F6: synchronized
                   F7: active
                   F8: temp framing lost
Layer              lignalling layer 1 state
1
```

```
                   down
                   pending
                   active
inits              layer 1 activation's
uptime             if active, current layer 1 uptime
change             time since last layer 1 uptime
in                 d channel packets in
out                d channel packets out
err                d channels errors, all types summed
```

You can now get a comprehensive status display for an individual BRI port by specifying either a port associated with it or its D channel number.

show isdn S0

or

show isdn D0

If you specify an invalid port number or D channel number you will get a message specifying the valid range of ports for the model of PortMaster you are on.

The "show isdn" command shows which D channels go with which ports. Here is an example of the new "show isdn" command's output:

```
Command> show isdn d0
D00 status-------------------------------------------------------------BRI_NI1
Interface    F7-          active     Layer1        active
state:                               state:
Init count:  1            uptime:    4days         last state       4days
                                                   change:
recv count:  75159        xmit:      79418         errors:          0
numberplan   0            type:      Local         plan:            ISDN E.164
S1-----------------------------------------------------------------------
Cess state:  Conneected               last change:  4days Port State:  ESTABLISHED

Directory:   510555777    SPID:         51055577700   regs:         1
             0                          0
Called:      7771         Caller                     Flags:        0x00
Connects:    1            last connect:  4days        b channel:    1
Setup:       00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
             00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

S2-----------------------------------------------------------------------

Cess state:  Connected                last change:  4days Port State:  ESTABLISHED

Directory:                SPID:         5105557771    regs:         1
                                        01
Called:      5557771      Caller                     Flags:        0x00
Connects:    1            last connect:  4days        b channel:    2
Setup:       04 03 08 00 10 18 02 01 02 34 01 4f 70
             09 04 01 35 35 35 37 37 37 31 04 02 88 90 18 01 8a 34 01

S2-----------------------------------------------------------------------
```

271: msg 19 SPID Register ERROR, cause 1 Unassigned Number

Command>

line1

D00 status -- BRI_NI1

D00   d channel number

BRI_NT1 switch type setting currently active

Interface state this is the layer 1 interface state as reported by the MWAC F3 or F4 is
normal on a S/T interface, but on a U interface normally means that the cable is
missing.

F0: interface not active
F3: deactivated
F4: awaiting signal
F5: identifying input
F6: synchronized
F7: active
F8: temp framing lost

BRI Debug Improvements

The ISDN BRI debug commands have been extended.

All of these commands toggle between on and off states.ISDN BRI signaling code
session layer tracing

```
set debug isdn                          same as before
set debug isdn D0                       new, selects a single BRI

Command> set debug isdn d0
Enabling isdn tracing d0
isdn_dial; S1 CRN7770
isdn_dodial S1 (0:1) Sending Call Request - 7770
0: Received Call Sent
07 00 01 80
S1 (0:1) DISCONNECT Unassigned Number
S1 (0:1) CALL_CLEAR
S1: Redialing at alternate 56Kbps rate
isdn_dodial S1 (0:1) Sending Call Request - 7770
0: Received Call Sent
07 00 01 80
S1 (0:1) DISCONNECT Unassigned Number
S1 (0:1) CALL_CLEAR
Command> set debug isdn d0
Disabling isdn tracing d0
```

ISDN BRI signaling code D channel tracing

```
set debug isdn-d                            same as before
set debug isdn-d D0                         new, selects a single BRI

Enabling isdn  D tracing d0
D0: send 00 f3 01 03
D0: recv 00 f3 01 03
D0: send 00 f1 01 0f
D0: recv 00 f1 01 0b
(etc...)
Command> set debug isdn-d d0
Disabling isdn  D tracing d0
```

ISDN BRI signaling code layer 1 activation tracing

This command is intended for use by Livingston Technical Support, to trace layer 1 activity on a BRI.

```
Set debug isdn-l1 D0 new, selects a single BRI

Command> set debug isdn-l1 d0

Enabling isdn l1 tracing d0

isdn_l1_event(): dsl 0, sbri 46, state 1

isdn_l1_event(): dsl 0, sbri 193, state 1

isdn_l1_event: dsl 0 active to inactive

l1_F3(): dsl 0, ISDN_BRI_L1_IDLE

(etc...)

Command> set debug isdn-l1 d0

Disabling isdn l1 tracing d0
```

Memory Requirements

The PortMaster 2, 2R, IRX, and Office Router only require one megabyte of memory. At least 4 MB of memory is recommended for ComOS 3.7 on the PortMaster 2E or 2ER. Some configurations may be able to run in 1 MB of memory. Future releases may require 4 MB of memory on the PortMaster 2E and 2ER. For the PortMaster 2E and PortMaster 25 use the following guidelines to estimate memory usage.

Model	Base Memory (KB)	
PM-25	780	
PM-2E-30	850	
PM-2E-20 + 1 5BRI	940	4MB Recommended
PM-2E-10 + 2 5BRI		
PM-2ER-30	890	

PM-2ER-20 + 5BRI	980	4MB Strongly Recommended
PM-2ER-10 + 2 5BRI	935	4MB Recommended
PM-2Ei-30	830	

If SNMP is enabled, an additional 35KB is required.

If IPX is enabled, an additional 20KB is required, plus memory for SAP and RIP.

If RIP is used, and additional 5KB for every 100 RIP routes is required.

If OSPF is enabled, an additional 55KB is required, plus 5KB for every 40 routes.

If any other tables are used, such as the User Table or Location Table, those require additional memory.

A full BGP routing table for the entire Internet (44,000 routes) requires seven megabytes of memory, so before using BGP for that you should upgrade your IRX or PortMaster 3 to 16 megabytes of memory.

Memory Upgrade Instructions

To expand the memory in a PortMaster 2, 25 or IRX, replace the four 256KB by 9 (parity) 30-pin 70ns SIMMs with four 1MB SIMMs (providing 4MB of memory) or four 4MB SIMMs (providing 16MB of memory). Mixing SIMMs is not supported. The PortMaster will auto-detect the amount ofmemory at boot time. You can use either 3 chip or 9 chip SIMMs.

The PortMaster 3 uses one 72-pin 70ns (parity) SIMM, and comes with 4MB installed, expandable to 16MB or 32MB.

The PortMaster Office Router comes with 1MB of non-upgradable memory. For more detailed instructions on upgrading memory refer to the Installation Guide for your product.

Upgrade Instructions

WARNING! YOU MUST USE PMINSTALL VERSION 3.5.3 OR LATER TO PERFORM THIS UPGRADE!

If you are upgrading using PMconsole for Windows, you must use PMconsole for Windows version 3.5.1.4 or later.

If you are upgrading from ComOS 2.3 or 2.4 to ComOS 3.7, you must first upgrade to ComOS 3.0.4, reboot, and then upgrade to ComOS 3.7.

If you have any port speeds set to 115200 and upgrade to ComOS 3.7. and then downgrade to any release before ComOS 3.3.2, you must set the port speeds again after downgrading.

Note – If the upgrade fails, do NOT reboot! Contact Livingston Technical Support without rebooting.

The upgrade process on the PM-3 will erase the configuration area from non-volatile memory and save the current configuration into the non-volatile memory. Never interrupt the upgrade process, or loss of configuration information can result.

Note – ComOS 3.7 requires setting the directory numbers on ISDN BRI ports.If you have any BRI ports that have not had their directory number set, they will go into the NO-SERVICE state after you upgrade to ComOS 3.7. To set directory numbers, use the "set S10 directory Number" command where S10 is the port and Number is the directory number. You can set the directory numbers either before or after upgrading to ComOS 3.7.

The upgrade does not otherwise affect your stored configuration in the PortMaster. If you want to back up your PortMaster configuration before upgrading, choose the Backup PortMaster button in PMconsole for Windows, or run pmreadconf on UNIX. The pmreadconf utility takes three arguments: the hostname or IP address of the PortMaster, the administrative password for the PortMaster, and the filename to place the configuration in. If you ever need to reload the configuration, move the backup file into the /usr/portmaster/data directory and run pminstall to reload it. Here is an example:

cd /usr/portmaster

pmreadconf Pmname Pmpassword data/Pmname.conf

chmod 600 data/pmname.conf

The installation software can be retrieved by FTP from **ftp://ftp.livingston.com/pub/le/software/system/tarfile.tar.Z**, replacing system and tarfile.tar.Z with the names of the files. You can retrieve the upgrade image at the same time. The following example shows an administrator retrieving the SunOS pminstall and PortMaster 3 upgrade image.

umask 22

mkdir /usr/portmaster

cd /usr/portmaster

ftp ftp.livingston.com

 (Enter anonymous)

 (Enter your email address; it will not echo.)

 binary

 cd /pub/le/software/sun4

 get pm_3.5.3_sun4.tar.Z pm.tar.Z

```
cd /pub/le/upgrades

get pm3_3.7

quit
```

uncompress pm.tar.Z

tar xvf pm.tar

rm pm.tar

mv pm3_3.7 data

pminstall

PMconsole 3.5.1.4 for Windows 95 and Windows NT 4.0 is available on **ftp://ftp.livingston.com/pub/le/software/pc/pmw3514.exe** in a self-extracting file. Transfer that file via FTP, run the file to install PMconsole for Windows, move the upgrade file into the data directory, run PMconsole for Windows, and click on the Upgrade icon.

PMconsole for the following operating systems can be found under **ftp://ftp.livingston.com/pub/le/software/**

bsdi/pm_3.5.3_BSDOS_2.0.tar.Z   BSD/OS 2.0 and 2.1

sgi/pm_3.5.3_IRIX_5.2.tar.Z   SGI Irix 5.2

linux/pm_3.5.3_Linux.tar.Z   Linux 1.2.13 ELF

rs6000/pm_3.5.3_RS6000_4.1.tar.Z   RS6000 AIX 4.1

alpha/pm_3.5.3_alpha_T3.0.tar.Z   Digital Alpha OSF/1 T3.0

hp/pm_3.5.3_hp9000_10.01.tar.Z   HP 9000 HP/UX 10.01

sun4/pm_3.5.3_sun4.tar.Z   SunOS 4.1.4, 5.5.1 on Sparc

sun86/pm_3.5.3_sun86_5.5.tar.Z   Solaris x86 2.5.1

pc/pmw3514.exe   Windows 95 and Windows NT 4.0

The following upgrade images are available at

ftp://ftp.livingston.com/pub/le/upgrades/

ComOS	Upgrade Image	Product
3.7	pm2_3.7	PortMaster 2, 2E, 2ER, 2R, 2i, 2E-10i
3.7	pm25_3.7	PortMaster 25

3.7	pm3_3.7	PortMaster 3
3.7R	irx_3.7R	IRX-111, 112, 114, 211
3.7L	or_3.7L	OR-M, U, ST, LS and HS

ComOS 3.7 adds one line to the RADIUS dictionary file from ComOS 3.5:

ATTRIBUTE   Connect-Info   77   string

An updated dictionary is available at
ftp://ftp.livingston.com/pub/le/radius/dictionary.

Previous beta releases used Attribute 65 for Connect-Info; update your dictionary file to use 77 now instead. If you are using the Connect-Rate check-item in Livingston RADIUS Server 2.0.1, you must also edit the radius.h file and change PW_CONNECT_INFO from 65 to 77, then recompile. If you are not using Connect-Rate, then no recompilation is required, just change the dictionary file. Future releases of the Livingston RADIUS server will use attribute 77 for Connect-Info.

Copyright and Trademarks

Copyright 1997 Livingston Enterprises, Inc. All rights reserved. The Livingston logo and the names Livingston, PortMaster, ComOS, RADIUS, ChoiceNet, PMconsole, IRX, True Digital, and RAMP are trademarks of Livingston Enterprises, Inc. ProVision is a service mark of Livingston Enterprises, Inc. All other marks are the property of their respective owners.

Notices

Livingston Enterprises, Inc. makes no representations or warranties with respect to the contents or use of this manual, and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. Further, Livingston Enterprises, Inc. reserves the right to revise this publication and to make changes to its content, any time, without obligation to notify any person or entity of such revisions or changes.

Contacting Livingston Technical Support

Livingston provides technical support via voice, FAX, and electronic mail. Technical support is available Monday through Friday from 6 a.m. through 5 p.m. Pacific Time (GMT-8). Please specify that you are running ComOS 3.7 if you are reporting problems with this release.

To contact Livingston Technical Support by voice, dial 1-800-458-9966 within the US or 1-510-737-2100 outside the US; by FAX, dial 1-510-737-2110; by electronic mail, send mail to support@livingston.com; and through the World Wide Web, access **http://www.livingston.com/**.