

HP-UX 11i IPv6 Release Notes

HP-UX Servers and Workstations



Manufacturing Part Number: T1306-90004

December 2001

U.S.A.

© Copyright 2001 Hewlett-Packard Company.

Legal Notices

The information in this document is subject to change without notice.

Hewlett-Packard makes no warranty of any kind with regard to this manual, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be held liable for errors contained herein or direct, indirect, special, incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Warranty

A copy of the specific warranty terms applicable to your Hewlett-Packard product and replacement parts can be obtained from your local Sales and Service Office.

Restricted Rights Legend

Use, duplication or disclosure by the U.S. Government is subject to restrictions as set forth in subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 for DOD agencies, and subparagraphs (c) (1) and (c) (2) of the Commercial Computer Software Restricted Rights clause at FAR 52.227-19 for other agencies.

HEWLETT-PACKARD COMPANY
3000 Hanover Street
Palo Alto, California 94304 U.S.A.

Use of this manual and flexible disk(s) or tape cartridge(s) supplied for this pack is restricted to this product only. Additional copies of the programs may be made for security and back-up purposes only. Resale of the programs, in their present form or with alterations, is expressly prohibited.

Copyright Notices

Copyright © 2001 Hewlett-Packard Company. All rights reserved. Reproduction, adaptation, or translation of this document without prior written permission is prohibited, except as allowed under the copyright laws.

iCOD and iCOD CPU Agent Software are products of Hewlett-Packard

Company, and all are protected by copyright.

Copyright © 1979, 1980, 1983, 1985-93 Regents of the University of California. This software is based in part on the Fourth Berkeley Software Distribution under license from the Regents of the University of California.

Copyright © 1988 Carnegie Mellon University

Copyright © 1990-1995 Cornell University

Copyright © 1986 Digital Equipment Corporation

Copyright © 1997 Isogon Corporation

Copyright © 1985, 1986, 1988 Massachusetts Institute of Technology.

Copyright © 1991-1997 Mentat, Inc.

Copyright © 1996 Morning Star Technologies, Inc.

Copyright © 1990 Motorola, Inc.

Copyright © 1980, 1984, 1986 Novell, Inc.

Copyright © 1989-1993 The Open Software Foundation, Inc.

Copyright © 1996 Progressive Systems, Inc.

Copyright © 1989-1991 The University of Maryland

Copyright © 1986-1992 Sun Microsystems, Inc.

Trademark Notices

UNIX® is a registered trademark in the United States and other countries, licensed exclusively through The Open Group.

1 HP-UX 11i IPv6 Software

New and Changed Features

IPv6 is the next generation Internet Protocol. It provides the infrastructure for the next wave of Internet devices, such as PDAs, mobile phones and appliances; it also provides greater connectivity for existing devices such as laptop computers.

IPv6 requires support from hosts and routers. HP-UX 11i IPv6 software provides host support for IPv6.

HP-UX 11i IPv6 supports the following features:

- IPv4/IPv6 Dual Stack support: HP-UX 11i IPv6 supports both IPv4 and IPv6 applications. Programmers can write IPv6 applications that communicate with both IPv6 and IPv4 peers. Existing IPv4 applications continue working.
- IPv6 tunneling enables IPv6/IPv4 hosts and routers to connect with other IPv6/IPv4 hosts and routers over the existing IPv4 Internet. IPv6 tunneling encapsulates IPv6 datagrams within IPv4 packets. The encapsulated packets travel across an IPv4 Internet until they reach their destination host or router. The IPv6-aware host or router decapsulates the IPv6 datagrams, forwarding them as needed. IPv6 tunneling eases IPv6 deployment by maintaining compatibility with the large existing base of IPv4 hosts and routers.
- HP-UX 11i IPv6 fully supports Ethernet Links
- IPv6 Stateless address autoconfiguration
- IPv6 Neighbor Discovery (which includes Router Discovery and Duplicate Address Detection)
- TCP/UDP over IPv6, PMTUv6, ICMPv6, IPv6 MIBs, Sockets APIs

Table 1-1 IPv6 RFCs Supported

| RFCs | Description |
|-------------|---|
| RFC 1981 | IPv6 Path MTU Discovery |
| RFC 2373 | IPv6 Addressing |
| RFC 2374 | IPv6 Aggregatable Global Unicast Address Format |
| RFC 2375 | IPv6 Multicast |
| RFC 2452 | IPv6 MIB for TCP |
| RFC 2454 | IPv6 MIB for UDP |
| RFC 2460 | IPv6 Specification |
| RFC 2461 | Neighbor Discovery for IPv6 |
| RFC 2462 | Stateless Autoconfiguration |
| RFC 2463 | ICMPv6 Specification |
| RFC 2464 | Transmission of IPv6 Packets over Ethernet Networks |
| RFC 2465 | MIB for IPv6: Textual Conventions and General Group |
| RFC 2466 | MIB for IPv6: ICMPv6 Group |
| RFC 2893 | Transition Mechanisms for IPv6 Hosts and Routers |
| RFC 3056 | Connection of IPv6 Domains over IPv4 Clouds (6to4) |

- HP-UX 11i IPv6 Sockets APIs are based upon RFC2553, Basic Socket Interface Extensions for IPv6. HP-UX 11i IPv6 supports all functions from RFC 2553: IPv6 socket interfaces, address structures, address testing macros, hostname-to-address and address-to-hostname translation functions, and address conversion functions.
- Advanced Socket API features from RFC 2292, such as Routing

Header, Hop-by-Hop, and Destination Option processing. The `inet6_rth_*`() and `inet6_opt_*`() functions provide these features. The `inet6_rth_*`() and `inet6_opt_*`() functions are in `/usr/lib/libip6.1`.

Network-Interface Administration Commands

HP-UX 11i IPv6 ships the following Network Configurations and Troubleshooting Utilities for both **IPv4** and **IPv6**:

- `ifconfig`
- `netstat`
- `ping`
- `route`
- `ndd`
- `ndp`, neighbor-discovery command for IPv6 only
- `traceroute`

New `netconf-ipv6` File Stores IPv6 Settings

The `/etc/rc.config.d/netconf-ipv6` configuration file stores IPv6 configuration information similar to IPv4's `netconf` file.

`/etc/hosts` Supports IPv4 and IPv6 Addresses

The `/etc/hosts` file contains IP addresses and corresponding host names. The file can contain IPv4 and IPv6 addresses for the same host. For example:

```
15.15.15.15    hpindon
3ffe:1111::1234 hpindon          hpindon6
```

Lookup policies are identical to IPv4.

IPv6 Name/Address Resolution for Name Service Switch

`/etc/nsswitch.conf` (`nsswitch.conf(4)`) is a configuration file for the name service switch. A new entity, `ipnodes`, specifies which name services resolve IPv6 addresses and host names.

How IPv6 Name Service Switch Resolves Names and Addresses

For HP-UX 11i IPv6, the new keyword “ipnodes” specifies the resolver policy for the library functions `getnameinfo(3N)` and `getaddrinfo(3N)` for both IPv4 and IPv6 addresses. The existing keyword “hosts” specifies the resolver policy for the library functions `gethostbyname()` and `gethostbyaddr()` for IPv4 addresses.

If `/etc/nsswitch.conf` is not configured, the default ipnodes policy is

```
dns [NOTFOUND=return] files
```

This default policy implies that `dns` is the authoritative source of information. `Files` is used only if `dns` is down.

If `/etc/nsswitch.conf` is configured, but the “ipnodes” entry is missing in `/etc/nsswitch.conf`, then address resolution for IPv6 commands or services will often fail. To properly configure the name service switch, see the *Installing and Configuring HP-UX 11i IPv6 Software* manual on <http://www.docs.hp.com>.

Internet Services Shipping with HP-UX 11i IPv6

The following IPv6-capable Internet Services products ship with HP-UX 11i IPv6.

- **inetd**, internet daemon.
- **telnet**
- **r*** commands
- name and address resolution **resolver** routines
- `inetd.sec` over IPv6 is also supported

WU-FTPD 2.6.1, BINDv9.1.3, and Sendmail 8.11.1 Shipping Separately

WU-FTPD 2.6.1, BINDv9.1.3, and Sendmail 8.11.1 fully support HP-UX 11i IPv6. They are available only as separate web releases from <http://www.software.hp.com>.

Additions to Network Tracing and Logging

Use `nettl` to trace network traffic through new IPv6 subsystems or use

nettladm.

Table 1-2 New Network Trace Subsystems

| Description | Subsystem Name |
|-----------------------|-----------------|
| IPv6 Packets | NS_LS_IPV6 |
| ICMPV6 Packets | NS_LS_ICMPV6 |
| IPv6 Loopback packets | NS_LS_LOOPBACK6 |

Use `netfmt` to format new IPv6 subsystem trace-records captured by `nettl`. Also use `netfmt` to filter `nettl` output according to the following IPv6 criteria:

Table 1-3 New IPv6 Network Filter Criteria

| Filter Description | Entry in netfmt config. file |
|--------------------------------------|--|
| IPv6 Packets | NS_LS_IPV6 |
| ICMPV6 Packets | NS_LS_ICMPV6 |
| IPv6 Source Address | <code>filter ip6_saddr:abcd</code> where <code>::abcd</code> is the source address |
| IPv6 Destination Address | <code>filter ip6_daddr ::fedc</code> where <code>::fedc</code> is the source address |
| Connection per port and IPv6 address | <code>filter connection6</code> <code><local_IPv6addr> <port></code> <code><remote_IPv6addr port</code> |

DCE Client for HP-UX 11i IPv6

DCE Client supports HP-UX 11i IPv6.

System Requirements

- Hewlett-Packard server or workstation running HP-UX operating system version 11i, either 32-bit or 64-bit environment
- HP-UX 11i IPv6 Release Depot
- IPv6 Early Release software *removed* from system
- 90MBytes free disk space

Installation

This section shows how to install HP-UX 11i IPv6. It also lists steps for installing BINDv9.1.3, WU-FTP 2.6.1, or Sendmail 8.11.1 with IPv6.

Installing HP-UX 11i IPv6

1. Save the *netconf-ipv6* settings file, if present:

```
cp /etc/rc/config.d/netconf-ipv6
   /etc/rc.config.d/netconf-ipv6.old
```

2. Remove IPv6 Early Release Software, if present:

```
swremove -x autoreboot=true IPV6AA InetSvcIPV6
```

3. Download HP-UX 11i IPv6 software from

<http://www.software.hp.com> (keyword "IPv6") into /tmp/IPv6.depot.

4. Register the software depot:

```
swreg -l depot /tmp/IPv6.depot
```

5. Install HP-UX 11i IPv6. The system reboots automatically when `swinstall` completes without errors:

```
swinstall -x autoreboot=true -s /tmp/IPv6.depot IPv6NCF11i
```

6. Ensure HP-UX 11i IPv6 software is installed:

```
swlist -l bundle IPv6NCF11i
IPv6NCF11i B.11.11.0109.5D IPv6 product bundle
```

Installing BINDv9.1.3, WU-FTP 2.6.1 or Sendmail 8.11.1

NOTE

The directions below describe instructions necessary to configure IPv6 with BINDv9.1.3, WU-FTP 2.6.1, or Sendmail 8.11.1. For a full description of the IPv6 features for these products, refer to their respective Release Notes on <http://www.docs.hp.com>.

BINDv9.1.3, WU-FTP 2.6.1 and Sendmail 8.11.1 ship separately from

HP-UX 11i IPv6. Download BINDv9.1.3, WU-FTP 2.6.1, or Sendmail 8.11.1 from <http://www.software.hp.com>. Follow the installation instructions to install these products on your system.

Enabling a BINDv9.1.3 named daemon to Listen on IP sockets

To enable a BINDv9.1.3 named to listen on IPv4 or IPv6 sockets, you must edit the *named.conf* file.

1. Open the */etc/named.conf* file in a text editor. Superuser capability is required.
2. Add the `listen-on-v6` entry in the options statement

```
listen-on-v6 {any;};
```
3. Save the */etc/named.conf* file. Exit the text editor.
4. Stop then restart the Name Server.

Read the BINDv9.1.3 Release Notes completely before attempting to configure BINDv9.1.3 over IPv6. Refer to the BINDv9.1.3 Release Notes on <http://www.docs.hp.com>.

Enabling WU-FTP 2.6.1 over IPv6

By default, `ftp` connects using IPv4 addresses. To enable `ftp` over IPv6:

1. Open the */etc/inetd.conf* file using a text editor. Superuser capability is required.
2. Find the `ftpd` entry:

```
ftp stream tcp nowait root /usr/lbin/ftpd ftpd -l
```
3. Append the numeral “6” (six) to the protocol “tcp.” The result is “tcp6:”

```
ftp stream tcp6 nowait root /usr/lbin/ftpd ftpd -l
```
4. Save the */etc/inetd.conf* file. Exit the text editor.
5. Stop, then restart the internet daemon (`inetd`). Superuser capability required.

```
inetd -k  
inetd -s
```

`ftpd` can now connect using IPv6 or IPv4 addresses. If you don't add `tcp6` to */etc/inetd.conf*, `ftpd` continues to initiate connections to hosts using IPv4 addresses.

Read the WU-FTP 2.6.1 Release Notes completely before attempting to configure WU-FTP 2.6.1 for IPv6. They are on <http://www.docs.hp.com>.

Enabling Sendmail 8.11.1 over IPv6

By default, Sendmail 8.11.1 uses IPv4. To enable Sendmail 8.11.1 over IPv6, set the `DaemonPortOptions` family field to `inet6` in the `sendmail.cf` configuration file.

To enable Sendmail 8.11.1 over IPv6, edit the `sendmail.cf` file:

1. Open the `sendmail.cf` file using a text editor. Superuser capability is required.
2. Set the family field to `inet6`
 - `DaemonPortOptions=Port=smtp, Name=MTA, Family=inet6`
 - `DaemonPortOptions=Port=587, Name=MSA,M=E, Family=inet6`
3. Save the `sendmail.cf` file. Exit the text editor.
4. Restart the Sendmail daemon

Read the Sendmail 8.11.1 Release Notes completely before attempting to configure Sendmail 8.11.1 over IPv6. They are on <http://www.docs.hp.com>

Documentation

For usage information, refer to the *Installing and Configuring HP-UX 11i IPv6 Software* manual on <http://www.docs.hp.com..>

For programming considerations, refer to the *IPv6 Porting Guide* on <http://www.docs.hp.com..>

Known Problems

This section provides information about known problems and limitations related to IPv6.

who -R, last -R, and finger -R Commands

Symptom:

The `who -R` and `last -R` command output displays a truncated IP address when:

- HP-UX 11i IPv6 is installed, and
- The user logs in remotely using an IP address instead of a host name.
 For example:

```
# who -R
root      console      Jul 21 19:06 (hpindhi)
root      pts/ta       Jul 23 21:45 (hpindon.cup.hp.c)
root      pts/tc       Jul 24 12:43 (::ffff:15.13.185)
```

The `finger -R` command-outputs displays a local host name, not the remote host name, when HP-UX 11i IPv6 is installed. For example, the Where output for TTY *ta should be a remote host name below:

```
# finger -R
Login      Name          TTY Idle      When      Where
root      ???          con 020: Sat 19:06 hpindhi
root      ???          *ta       Mon 21:45 hpindhi
```

Cause:

These commands are not enhanced for IPv6.

Solution:

HP plans to enhance these commands in a future release.

Transport Patch PHNE_24211 Problem

Symptom:

After installing this patch (included in the HP-UX 11i IPv6 product

bundle) the Glance and Measureware applications will no longer show network data statistics on IPv4 interfaces.

NOTE

At this time, Glance and Measureware have not been enhanced to show network data statistics on IPv6 interfaces.

Cause:

This problem occurs because of changes in `libnm*`.

Solution:

The transport patch which *supersedes* the current patch (PHNE_24211) will fix this problem. To find the number for this patch, when it is released:

1. Go to the ITRC site <http://ITresourcecenter.hp.com>
2. Click "individual patches" under "maintenance and support"
3. login as usual; this will bring you to the "main" website page
4. Scroll to the bottom of the "main" page
5. Enter "PHNE_24211" in the "specific patch" field
6. Click the blue search arrow button, or press the return key. The results of this search will show PHNE_24211 *and the superseding patch number, if any.*
7. You may want to make a written note of the patch number(s) show as the result of the previous search, for use in the next step
8. Go to Hewlett-Packard's free FTP server: <ftp://ftp.itrc.hp.com> to get the new patch found in the previous step

Oracle 8.0.5 Problem

Symptom:

If Oracle-8.0.5 is installed/relinked on an HP-UX 11i system with HP-UX 11i IPv6 installed, then Oracle dumps core when it attempts a `getpwnam()` call.

Cause:

Oracle version 8.0.5, was built on HP-UX 11.0 and compiled using *libc.a* (archived *libc*). Oracle uses `getpwnam()` to retrieve `passwd`. However, in the specific case of Oracle 8.0.5, this mechanism was used and has led to a specific issue when running the HP-UX 11.0 compiled Oracle 8.0.5 on HP-UX 11.11 with IPv6 installed.

A defect repair in 11.11 `getpwnam()` call, changed the call graph in the backend implementation. This causes unresolved symbols when Oracle is relinked. This problem was not evident until the IPv6 patch, because, *libnss_dns.1* was linking into *libnsl.1*, which was resolving the extra symbols references in *libnss_files.1*. With this bundle, *libnss_dns.1* is not linking into *libnsl.1* anymore. This was done to improve performance of the `gethostbyname()` set of calls.

Solution:

If this problem is experienced, then customers need to add the following line to the `/$ORA_HOME/lib/sysliblist`, before doing a relinking:

```
-l:libnsl.sl
```

DCE Problems

Boot Problem

Symptom: When an IPv6 system boots up, it might not boot with an IPv6 address configured for the primary LAN interface. So, the DCE daemon, `rpcd`, boots up with IPv4 interfaces, instead.

Cause: `RPCD` checks for a configured V6 address when it starts up. Since no IPv6 addresses are configured for a primary interface, `RPCD` starts up with the IPV4 address.

Solution: To enable the `rpcd` to listen on an IPv6 interface, restart `rpcd` after configuring the IPv6 interface.

Start/Stop Problem

Symptom: In an IPv6 configured machine, the DCE Client configuration is not restored during a reboot.

Cause: The DCE startup script uses the following DCE admin

command:

```
clock show -inetd 137.146.210.46
```

This command fails, resulting in the *dce start* to also fail at bootup.

During IPv6 code changes, part of the IPv4 code was also changed resulting in a misaligned functional block. This resulted in an incorrect code path. Code changes were made to correct this problem.

Solution: To resolve this problem, go to the Atlanta patch hub and obtain the latest DCE patch (PHSS_25710, or later).

Audio Server (Aserver) Problem

Symptom: The Audio server daemon Aserver doesn't start correctly on an IPv6 configured machine.

Cause: This problem occurs because, in the previous IPv4 environment, the DCE library had used unused portions of the `sockaddr` structure `sin_zero`. Now, the IPv6 `sockaddr` structure does not have `sin_zero` as a structure member. DCE for IPv6 was redesigned to handle the data that previously was held in the `sin_zero` structure of `sockaddr` for IPv4 applications.

Solution: To resolve this problem, go to the Atlanta patch hub and obtain the latest DCE patch (PHSS_25710, or later).

SOCKS Problem

Symptom: Unexpected program aborts can occur when using the SOCKS client library.

Cause: For IPv6, specific code additions were done in the DCE library and not in the `libd4r` library. When the application links only to `libd4r`, the application fails with unresolved symbols. IPv6 code changes were also made in the `libd4r` library so that it can function independently of the DCE library (`libdce`).

Solution: To resolve this problem, go to the Atlanta patch hub and obtain the latest DCE patch (PHSS_25710, or later).

Timestamp Problem

Symptom: At startup, a DCE server and/or DCE client fails to start.

The execution of `/sbin/init.d/dce` produces a message similar to the following:

```
Checking node time against cell time...
ERROR: The difference in time exceeds 1000.
Press <RETURN> to continue. CTRL-C to exit:
```

Cause: The behavior only affects systems that are configured as DCE clients or DCE servers. To determine if a system is configured as a DCE client or a DCE server, type the following command:

```
/opt/dce/bin/dcecp -c cell show
```

If the command returns the following message, the system is not configured as a DCE client or a DCE server:

```
Error: Registry server './.:.' is unavailable.
```

If the command returns information that includes the host name, then the system is configured as a DCE client or DCE server, and this behavior may be observed.

Solution: For DCE clients requiring IPv6 support, apply patch **PHSS_24261**. Change line 341 of `/sbin/init.d/dce` to reference the DCE server's hostname, rather than its IP address. For example:

Change line 341 from: `TIME_SERVER=$server_ip`

to: `TIME_SERVER=<server_hostname>`

Where `<server_hostname>` is the specific hostname of the DCE server.

For DCE clients not requiring IPv6 support, the patch **PHSS_24261** should be removed, if it has been applied, and no change is required to `/sbin/init.d/dce`.

Measureware Problem

Symptom: The Measureware product does not start up on an IPv6 configured machine.

Cause: The RPC API in an IPv6 configured environment returns an RPC-data-structure which holds the IP address. Processing this structure results in an IPv6 address which is not understood by the IPv4 application, resulting in an application failure. The RPC API, which returns the particular data structure, was modified to return only IPv4 addresses for an IPv4 application.

Solution: To resolve this problem, go to the Atlanta patch hub and obtain the latest DCE patch (PHSS_25710, or later).

BINDv9.1.3 Problems and Limitations

NOTE

The version number for BIND is expected to change to BIND 9.2 in early January, 2002. The following information will still apply for the new version.

- Traditionally, BIND can listen on any specified addresses, whereas if the user wants to listen on IPv6 the flexibility of specifying the chosen addresses is not available. If the user needs to accept DNS queries over IPv6, the user must specify “listen-on-v6 { any; };” in the `named.conf` options statement.
- If `listen-on-v6` is not specified in the configuration file on an HP-UX 11i IPv6 system, `named` will not listen on any interface.
- The DNS resolvers (`res_*()`) implement only RFC 1886 that is, AAAA-based lookups.

The `hosts_to_named` configuration file migration script does not add the `listen-on-v6` option to the `named.conf` file on dual stack machine.

Limitations

Multihomed host Limitation

In the absence of a router that is advertising prefixes, no more than one interface should be configured with IPv6 addresses on a host with multiple physical network interfaces. If multiple physical interfaces are configured with IPv6 addresses, and if there is no Router Advertisement received on any interfaces, the host has no way of knowing which interface to send packets out on. If packets are sent out on the interface that is on a different link than the destination node, then communication will fail. This configuration is neither recommended nor supported.

Internet Services Limitations

- Secure internet services (Kerberos) is currently not supported
- `inetd` does not support IPv6 functionality for XTI.
- telnet port identification does not recognize IPv6 addresses
- Logging to `utmp` and `wtmp` is currently not supported
- `rwhod` over IPv6 is currently not supported
- DHCP over IPv6 will be supported in a future release

WU-FTP 2.6.1 Limitations

To enable `ftp` to connect using both IPv4 and IPv6 addresses, manually edit the `/etc/inetd.conf` file. Change the protocol family from `tcp` to `tcp6` in the `ftpd` entry. Then stop and restart the `inetd`. By default, `ftp` connects using IPv4 addresses.

IPSec/9000 Limitations

IPSec/9000 will be supported at a future release.

Distributed File System Limitations

NIS+, NIS, and NFS are currently not supported over IPv6.

HP-UX 11i IPv6 Software
Limitations