

Introduction to Oracle® Solaris 11.2 Network Services

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Using This Documentation

- **Overview** – Provides an overview of the network services supported by the Oracle Solaris operating system.
- **Audience** – System administrators.
- **Required knowledge** – Basic and some advanced network administration skills.

Product Documentation Library

Late-breaking information and known issues for this product are included in the documentation library at <http://www.oracle.com/pls/topic/lookup?ctx=E36784>.

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Introduction to Network Services

This chapter provides the list of key tasks used to manage the network services in Oracle Solaris 11.2.

Network Services in Oracle Solaris 11.2

Select one of the following network services to see the list of key tasks:

- [“LDAP” on page 8](#) – The Lightweight Directory Access Protocol (LDAP) service enables you to access directory servers for distributed naming service.
- [“DNS and NIS” on page 9](#) – The Domain Name System (DNS) service enables the system to look up IP addresses for host names and host names for IP addresses. The Network Information System (NIS) service enables you to manage network information such as machine names and addresses, users, and network services.
- [“DHCP and IPQoS” on page 11](#) – The Dynamic Host Configuration Protocol (DHCP) service enables systems to automatically configure the network. The IP Quality of Service (IPQoS) service enables you to prioritize, control, and gather network accounting statistics.
- [“NFS” on page 11](#) – The network file system (NFS) service enables you to access file systems over a network.
- [“SMB” on page 12](#) – The Server Message Block (SMB) service enables you to share files between an Oracle Solaris system and a Windows system.
- [“NTP and PTP” on page 13](#) – The Network Time Protocol (NTP) and Precision Time Protocol (PTP) services enable you to synchronize system clocks within a network.
- [“sendmail” on page 14](#) – The sendmail service enables you to set up and maintain an email service.
- [“FTP”](#) – The File Transfer Protocol (FTP) service enables you to transfer file between two systems over a network.
- [“UUCP and PPP” on page 15](#) – The Point-to-Point Protocol (PPP) service enables two systems in different physical locations to communicate with each other. The UNIX-to-UNIX CoPy (UUCP) service enables two systems in different physical locations to transfer files and exchange mail with each other.
- [“SLP” on page 16](#) – The Service Location Protocol (SLP) provides you with a framework to discover and provision network services in a network.

Key Tasks for Managing LDAP services

You can use the following tasks to manage LDAP service:

- Configure Oracle directory server enterprise edition for the LDAP naming service. For more information, see [“How to Configure Oracle Directory Server Enterprise Edition for the LDAP Naming Service”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).
- Populate the LDAP server with data. For more information, see [“How to Populate the Server With Data”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).
- Populate the directory server with additional profiles. For more information, see [“How to Populate the Directory Server With Additional Profiles by Using the ldapclient Command”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).
- You can use the following tasks to administer the LDAP client:
 - Initialize an LDAP client. For more information, see [“Initializing an LDAP Client”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).
 - Modify an LDAP client configuration. For more information, see [“Modifying an LDAP Client Configuration”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).
 - Uninitialize an LDAP client. For more information, see [“Uninitializing an LDAP Client”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).
- You can use the following tasks to monitor LDAP client status:
 - Verify that the `ldap_cachemgr` daemon is running. For more information, see [“Verifying That the ldap_cachemgr Daemon Is Running”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).
 - Check the current profile information. For more information, see [“Checking the Current Profile Information”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).
 - Verify basic client-server communication. For more information, see [“Verifying Basic Client-Server Communication”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).
 - Check server data from a non-client machine. For more information, see [“Checking Server Data From a Non-Client Machine”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).
- Transition from NIS to LDAP. For more information, see [“Transitioning From NIS to LDAP \(Task Map\)”](#) in [“Working With Oracle Solaris 11.2 Directory and Naming Services: LDAP ”](#).

Key Tasks for Managing DNS and NIS services

You can use the following tasks to manage DNS and NIS services:

- You can use the following tasks to configure name service switch:
 - Change the source for a database. For more information, see [“How to Change the Source for a Database”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Configure a search criterion for a database. For more information, see [“How to Configure a Search Criterion for a Database”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Change the source for all naming databases. For more information, see [“How to Change the Source for All Naming Databases”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Use a legacy `nsswitch.conf` file. For more information, see [“How to Use a Legacy nsswitch.conf File”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
- You can use the following tasks to administer DNS server and client services:
 - Install a DNS package. For more information, see [“How to Install the DNS Package”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Configure a DNS server. For more information, see [“How to Configure a DNS Server”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Create configuration file for remote control access of DNS server daemon. For more information, see [“How to Create an rmdc.conf File”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Run the DNS service as an alternative user. For more information, see [“How to Run the DNS Service as an Alternative User”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Enable a DNS client. For more information, see [“How to Enable a DNS Client”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Verify DNS configuration. For more information, see [“How to Verify the DNS Configuration”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
- Enable Multicast DNS and DNS service discovery. For more information, see [“How to Enable mDNS and DNS Service Discovery”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
- Configure the `nss_ad` module to set up Oracle Solaris active directory clients. For more information, see [“How to Configure the nss_ad Module”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
- You can use the following tasks to set up and configure NIS service:

- Prepare the master server. For more information, see [“Preparing the Master Server \(Task Map\)”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
- Start and stop NIS services on an NIS server. For more information, see [“Starting and Stopping NIS Services on an NIS Server \(Task Map\)”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
- Set up NIS slave servers. For more information, see [“Setting Up NIS Slave Servers \(Task Map\)”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
- Administer NIS clients. For more information, see [“Administering NIS Clients \(Task Map\)”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
- You can use the following tasks to administer NIS service:
 - Add a new NIS user to an NIS domain. For more information, see [“How to Add a New NIS User to an NIS Domain”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Change a NIS map's master server. For more information, see [“How to Change a Map's Master Server”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Modify configuration file to update the security and supported map information. For more information, see [“How to Modify Configuration Files”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Modify Makefile entries. For more information, see [“How to Modify /var/yp/Makefile to Use Specific Databases”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Update and modify existing maps. For more information, see [“How to Update Maps Supplied With the Default Set”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - Work with the NIS server to modify the NIS configuration. For more information, see [“How to Configure Machine Host Name and Address Lookup Through NIS and DNS”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
- You can use the following information to troubleshoot NIS:
 - NIS problems affecting one client. For more information, see [“NIS Problems Affecting One Client”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).
 - NIS problems affecting many clients. For more information, see [“NIS Problems Affecting Many Clients”](#) in [“Working With Oracle Solaris 11.3 Directory and Naming Services: DNS and NIS ”](#).

Key Tasks for Managing DHCP and IPQoS services

- You can use the following tasks to manage DHCP service:
 - Grant user access to DHCP commands. For more information, see [“How to Grant User Access to DHCP Commands”](#) in [“Working With DHCP in Oracle Solaris 11.2”](#).
 - Configure an ISC DHCP Server. For more information, see [“How to Configure an ISC DHCP Server”](#) in [“Working With DHCP in Oracle Solaris 11.2”](#).
 - Modify the Configuration of the DHCP Service. For more information, see [“How to Modify the Configuration of the DHCP Service”](#) in [“Working With DHCP in Oracle Solaris 11.2”](#).
 - Enable a DHCP Client. For more information, see [“How to Enable a DHCP Client”](#) in [“Working With DHCP in Oracle Solaris 11.2”](#).
 - Disable a DHCP Client. For more information, see [“How to Disable a DHCP Client”](#) in [“Working With DHCP in Oracle Solaris 11.2”](#).
 - Enable a DHCPv4 Client to Request a Specific Host Name. For more information, see [“How to Enable a DHCPv4 Client to Request a Specific Host Name”](#) in [“Working With DHCP in Oracle Solaris 11.2”](#).
- You can use the following tasks to manage the IPQoS service:
 - Plan the QoS policy. For more information, see [“QoS Policy Planning Task Map”](#) in [“Managing IP Quality of Service in Oracle Solaris 11.2”](#).
 - Define a QoS policy in the IPQoS configuration file. For more information, see [“Defining a QoS Policy Task Map”](#) in [“Managing IP Quality of Service in Oracle Solaris 11.2”](#).
 - Administer IPQoS. For more information, see [“Administering IPQoS”](#) in [“Managing IP Quality of Service in Oracle Solaris 11.2”](#).
 - Set up flow accounting. For more information, see [“How to Create a File for Flow-Accounting Data”](#) in [“Managing IP Quality of Service in Oracle Solaris 11.2”](#).

Key Tasks for Managing NFS Service

You can use the following tasks to manage network file systems:

- Set up the NFS service. For more information, see [“Setting Up the NFS Service”](#) in [“Managing Network File Systems in Oracle Solaris 11.2”](#).
- Mount NFS file system. For more information, see [“Mounting File Systems \(Task Map\)”](#) in [“Managing Network File Systems in Oracle Solaris 11.2”](#).
- You can use the following tasks to manage automatic file system sharing:
 - Set up automatic file system sharing. For more information, see [“How to Set Up Automatic File System Sharing”](#) in [“Managing Network File Systems in Oracle Solaris 11.2”](#).

- Administer automatic file system sharing. For more information, see [“Autofs Administration”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
- Administer the secure NFS system. For more information, see [“How to Set Up a Secure NFS Environment With DH Authentication”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
- You can use the following tasks to administer NFS referrals:
 - Create and access an NFS referral to connect to multiple NFS Version 4 server. For more information, see [“How to Create and Access an NFS Referral”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
 - Remove an NFS referral. For more information, see [“How to Remove an NFS Referral”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
- You can use the following tasks to administer Federated file system (FedFS):
 - Create a namespace database (NSDB). For more information, see [“How to Create a Namespace Database”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
 - Use a secured connection to the NSDB. For more information, see [“How to Use a Secured Connection to the NSDB”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
 - Create a FedFS referral. For more information, see [“How to Create a FedFS Referral”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
- You can use the following information to troubleshoot NFS and autofs:
 - Check connectivity issues on an NFS client. For more information, see [“How to Check Connectivity on an NFS Client”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
 - Check the NFS server remotely. For more information, see [“How to Check the NFS Server Remotely”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
 - Verify the NFS service on the server. For more information, see [“How to Verify the NFS Service on the Server”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
 - Verify options used with the mount command. For more information, see [“How to Verify Options Used With the mount Command”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
 - NFS error message description and solution. For more information, see [“NFS Error Messages”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).
 - Autofs error message description and solution. For more information, see [“Troubleshooting Autofs”](#) in [“Managing Network File Systems in Oracle Solaris 11.2 ”](#).

Key Tasks for Managing SMB and Windows Interoperability

You can use the following tasks to manage SMB service:

- You can use the following tasks to create identity mapping strategy:
 - Manage directory-based name mapping for users and groups. For more information, see [“Managing Directory-Based Name Mapping for Users and Groups”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).
 - Manage directory-based identity mapping by using identity management for UNIX. For more information, see [“Managing Directory-Based Identity Mapping by Using Identity Management for UNIX”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).
 - Managing rule-based identity mapping for users and groups. For more information, see [“Managing Rule-Based Identity Mapping for Users and Groups”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).
- Disable the samba service. For more information, see [“How to Disable the Samba Service”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).
- Configure the SMB server operation mode. For more information, see [“Configuring the SMB Server Operation Mode”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).
- Manage SMB shares. For more information, see [“Managing SMB Shares \(Task Map\)”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).
- Manage SMB groups. For more information, see [“Managing SMB Groups”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).
- Configure the WINS service. For more information, see [“How to Configure WINS”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).
- Configure the SMB print service. For more information, see [“How to Enable the SMB Print Service”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).
- You can use the following tasks to manage SMB mounts:
 - Manage SMB mounts in your local environment. For more information, see [“Managing SMB Mounts in Your Local Environment”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).
 - Manage SMB mounts in the global environment. For more information, see [“Managing SMB Mounts in the Global Environment”](#) in [“Managing SMB File Sharing and Windows Interoperability in Oracle Solaris 11.2”](#).

Key Tasks for Managing Network Caching and Time-Related Services

You can use the following tasks for managing network caching and time-related services:

- You can use the following tasks to administer network caching:
 - Enable caching of web pages. For more information, see [“How to Enable Caching of Web Pages”](#) on page 22.

- Disable caching of web pages. For more information, see [“How to Disable Caching of Web Pages”](#) on page 24.
- Enable or disable Network Cache Accelerator (NCA) logging. For more information, see [“How to Enable or Disable NCA Logging”](#) on page 25.
- Load the socket utility library for NCA. For more information, see [“How to Load the Socket Utility Library for NCA”](#) on page 25.
- Add a new port to the NCA service. For more information, see [“How to Add a New Port to the NCA Service”](#) on page 26.
- You can use the following tasks to manage NTP:
 - Set up an NTP server. For more information, see [“How to Set Up an NTP Server”](#) on page 33.
 - Set up an NTP client. For more information, see [“How to Set Up an NTP Client”](#) on page 33.
 - Enable NTP logging. For more information, see [“How to Enable NTP Logging”](#) on page 34.
 - Display the SMF properties associated with the NTP service. For more information, see [“How to Display the SMF Properties Associated With the NTP Service”](#) on page 34.
- You can use the following tasks to manage PTP:
 - Set up an interface as a PTP master. For more information, see [“How to Set Up an Interface as a PTP Master”](#) on page 35.
 - Set up an interface as a PTP slave. For more information, see [“How to Set Up an Interface as a PTP Slave”](#) on page 36.
 - Enable the PTP service to use the PTP hardware in the NIC. For more information, see [“How to Enable the PTP Service to Use the PTP Hardware in a NIC”](#) on page 37.
 - Enable PTP logging. For more information, see [“How to Enable PTP Logging”](#) on page 37.

Key Tasks for Managing sendmail Services

You can use the following tasks to manage sendmail service:

- Set up the mail services. For more information, see [“Setting Up Mail Services \(Task Map\)”](#) in [“Managing sendmail Services in Oracle Solaris 11.2 ”](#).
- Change the sendmail configuration. For more information, see [“Changing the sendmail Configuration \(Task Map\)”](#) in [“Managing sendmail Services in Oracle Solaris 11.2 ”](#).
- Administer mail alias files. For more information, see [“Administering Mail Alias Files \(Task Map\)”](#) in [“Managing sendmail Services in Oracle Solaris 11.2 ”](#).
- Administer the queue directories. For more information, see [“Administering the Queue Directories \(Task Map\)”](#) in [“Managing sendmail Services in Oracle Solaris 11.2 ”](#).

- Administer `.forward` files. For more information, see [“Administering `.forward` Files \(Task Map\)”](#) in [“Managing sendmail Services in Oracle Solaris 11.2 ”](#).
- Troubleshoot mail services. For more information, see [“Troubleshooting Procedures and Tips for Mail Services \(Task Map\)”](#) in [“Managing sendmail Services in Oracle Solaris 11.2 ”](#).

Key Tasks for Managing Remote Systems

You can use the following tasks to manage file transfer between two systems:

- Start a FTP Server using SMF. For more information, see [“How to Start an FTP Server Using SMF”](#) in [“Managing Remote Systems in Oracle Solaris 11.2 ”](#).
- Stop a FTP server using SMF. For more information, see [“How to Shut Down the FTP Server Using SMF”](#) in [“Managing Remote Systems in Oracle Solaris 11.2 ”](#).
- Shut down the FTP connection. For more information, see [“How to Shut Down the FTP Connection”](#) in [“Managing Remote Systems in Oracle Solaris 11.2 ”](#).
- Change the FTP service configuration. For more information, see [“How to Change the ProFTPD Configuration”](#) in [“Managing Remote Systems in Oracle Solaris 11.2 ”](#).
- Access a remote system by using Secure Shell (ssh). For more information, see [“Accessing a Remote System by Using Secure Shell”](#) in [“Managing Remote Systems in Oracle Solaris 11.2 ”](#).
- You can use the following tasks to transfer files between a local system and a remote system by using `sftp`:
 - Open and close an `sftp` connection to a remote system. For more information, see [“How to Open and Close an sftp Connection to a Remote System”](#) in [“Managing Remote Systems in Oracle Solaris 11.2 ”](#).
 - Copy files from a remote system. For more information, see [“How to Copy Files From a Remote System \(sftp\)”](#) in [“Managing Remote Systems in Oracle Solaris 11.2 ”](#).
 - Copy files to a remote system. For more information, see [“How to Copy Files to a Remote System \(sftp\)”](#) in [“Managing Remote Systems in Oracle Solaris 11.2 ”](#).
- Transfer files between remote systems by using the `scp` command. For more information, see [“Remote Copying With the scp Command”](#) in [“Managing Remote Systems in Oracle Solaris 11.2 ”](#).

Key Tasks for Managing Serial Networks Using UUCP and PPP

You can use the following tasks to manage UUCP and PPP services:

- Set up a dial-up PPP link. For more information, see [“Major Tasks for Setting Up the Dial-up PPP Link \(Task Map\)”](#) in [“Managing Serial Networks Using UUCP and PPP in Oracle Solaris 11.2 ”](#).
- Set up a leased-line PPP link. For more information, see [“Setting Up a Leased Line \(Task Map\)”](#) in [“Managing Serial Networks Using UUCP and PPP in Oracle Solaris 11.2 ”](#).
- Set up PPP authentication. For more information, see [“Configuring PPP Authentication \(Task Map\)”](#) in [“Managing Serial Networks Using UUCP and PPP in Oracle Solaris 11.2 ”](#).
- Set up PPP over Ethernet (PPPoE) tunnel. For more information, see [“Major Tasks for Setting Up a PPPoE Tunnel \(Task Maps\)”](#) in [“Managing Serial Networks Using UUCP and PPP in Oracle Solaris 11.2 ”](#).
- Troubleshoot PPP-related and PPPoE-related problems. For more information, see [“Solving PPP Problems \(Task Map\)”](#) in [“Managing Serial Networks Using UUCP and PPP in Oracle Solaris 11.2 ”](#).
- Administer UUCP. For more information, see [“UUCP Administration \(Task Map\)”](#) in [“Managing Serial Networks Using UUCP and PPP in Oracle Solaris 11.2 ”](#).
- You can use the following tasks to troubleshoot UUCP:
 - Check for faulty modems. For more information, see [“How to Check for Faulty Modems or ACUs”](#) in [“Managing Serial Networks Using UUCP and PPP in Oracle Solaris 11.2 ”](#).
 - Debug transmissions. For more information, see [“How to Debug Transmissions”](#) in [“Managing Serial Networks Using UUCP and PPP in Oracle Solaris 11.2 ”](#).

Key Tasks for Managing Service Location Protocol (SLP) Service

You can use the following tasks to manage SLP service:

- Monitor the SLP message traffic by using the snoop command. For more information, see [“How to Use snoop to Run SLP Traces”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
- Configure SLP properties to reduce network congestion. For more information, see [“How to Change Your SLP Configuration”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
- You can use the following procedures to modify Directory Agent (DA) access and discovery frequency:
 - Limit User Agents (UAs) and Service Agents (SAs) to statically configured DAs. For more information, see [“How to Limit UAs and SAs to Statically Configured DAs”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
 - Configure DA discovery for dial-up networks. For more information, see [“How to Configure DA Discovery for Dial-up Networks”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).

- Configure DA heartbeat for frequent partitions. For more information, see [“How to Configure DA Heartbeat for Frequent Partitions”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
- You can use the following tasks to accommodate different network media, topologies, or configurations:
 - Reduce SA reregistrations. For more information, see [“How to Reduce SA Reregistrations”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
 - Configure the multicast time-to-live property. For more information, see [“How to Configure the Multicast Time-to-Live Property”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
 - Configure the packet size. For more information, see [“How to Configure the Packet Size”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
 - Configure broadcast-only routing. For more information, see [“How to Configure Broadcast-Only Routing”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
- You can use the following tasks to modify timeouts on SLP discovery requests:
 - Change default timeouts. For more information, see [“How to Change Default Timeouts”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
 - Configure the random-wait bound. For more information, see [“How to Configure the Random-Wait Bound”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
- Deploy scopes to administer access to service advertisements. For more information, see [“How to Configure Scopes”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
- Deploy DAs to reduce the amount of multicast traffic. For more information, see [“How to Deploy DAs”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).
- Enable SLP proxy registration to advertise legacy services. For more information, see [“How to Enable SLP Proxy Registration”](#) in [“Managing Service Location Protocol Services in Oracle Solaris 11.2 ”](#).

Managing Web Cache Servers

This chapter provides an overview of the Network Cache and Accelerator (NCA) in the Oracle Solaris 11 release. Procedures for using NCA and reference material about NCA are included.

- [“Network Cache and Accelerator \(Overview\)”](#) on page 19
- [“Managing Web Cache Servers \(Task Map\)”](#) on page 20
- [“Administering the Caching of Web Pages \(Tasks\)”](#) on page 22
- [“Caching Web Pages \(Reference\)”](#) on page 26

To improve security between two applications, you may want to look at [Chapter 3, “Web Servers and the Secure Sockets Layer Protocol,”](#) in [“Securing the Network in Oracle Solaris 11.2”](#).

Network Cache and Accelerator (Overview)

The Network Cache and Accelerator (NCA) increases web server performance by maintaining an in-kernel cache of web pages that are accessed during HTTP requests. This in-kernel cache uses system memory to significantly increase performance for HTTP requests that are normally handled by web servers. Using system memory to hold web pages for HTTP requests increases web server performance by reducing the overhead between the kernel and the web server. NCA provides a sockets interface through which any web server can communicate with NCA with minimal modifications.

In situations where the requested page is retrieved from the in-kernel cache (cache hit), performance improves dramatically. In situations where the requested page is not in the cache (cache miss) and must be retrieved from the web server, performance is also significantly improved.

This product is intended to be run on a dedicated web server. If you run other large processes on a server that runs NCA, problems can result.

NCA provides logging support in that NCA logs all cache hits. This log is stored in binary format to increase performance. The `ncab2clf` command can be used to convert the log from binary format to common log format (CLF).

The Oracle Solaris release includes the following enhancements:

- Sockets interface.
- Support for vectored sendfile, which provides support for AF_NCA. See the [sendfilev\(3EXT\)](#) man page for more information.
- New options for the `nca2clf` command that support the ability to skip records before a selected date (-s) and to process a specified number of records (-n).
- `logd_path_name` in `nca.logd.conf` can specify either a raw device, a file, or a combination of the two.
- Support for a web server to open multiple AF_NCA sockets. With multiple sockets, you can have different web servers that run on one server.
- A new configuration file that is called `/etc/nca/ncaport.conf`. The file can be used to manage the IP addresses and ports that NCA uses. Your web server might not provide native support of the AF_NCA socket. If your server lacks this support, use this file and the NCA socket utility library to convert an AF_INET socket to an AF_NCA socket.

Managing Web Cache Servers (Task Map)

The following table describes the procedures that are needed to use NCA.

| Task | Description | For Instructions |
|--------------------------------|---|---|
| Planning for NCA | A list of issues to be resolved before you enable the use of NCA. | “Planning for NCA” on page 20 |
| Enabling NCA | Steps to enable in-kernel caching of web pages on a web server. | “How to Enable Caching of Web Pages” on page 22 |
| Disabling NCA | Steps to disable in-kernel caching of web pages on a web server. | “How to Disable Caching of Web Pages” on page 24 |
| Administering NCA logging | Steps to enable or disable the NCA logging process. | “How to Enable or Disable NCA Logging” on page 25 |
| Loading the NCA socket library | Steps to use NCA if the AF_NCA socket is not supported. | “How to Load the Socket Utility Library for NCA” on page 25 |

Planning for NCA

The following sections cover the issues that need to be resolved before starting the NCA service.

System Requirements for NCA

To support NCA, the system must meet these requirements:

- 256 Mbytes RAM must be installed.
- The Oracle Solaris release must be installed.
- Support for a web server which has native support for NCA or a web server whose startup script has been modified to use the Socket Utility Library for NCA:
 - Apache web server, ships with the Oracle Solaris release
 - Sun™ Java System Web Server
 - Zeus web server available from Zeus Technology, <http://www.zeus.com>

This product is intended to be run on a dedicated web server. The running of other large processes on a server that runs NCA can cause problems.

NCA Logging

The NCA service can be configured to log web activity. Generally, NCA logging should be enabled if the web server logging is enabled.

Interpositioning Library for Daemon Support of the Door Server

Many web servers use AF_INET sockets. By default, NCA uses AF_NCA sockets. To correct this situation, an interpositioning library is provided. The new library is loaded in front of the standard socket library, `libsocket.so`. The library call `bind` is interposed by the new library, `ncad_addr.so`. Suppose that the status is enabled in `/etc/nca/ncakmod.conf`. The version of Apache that is included with the Solaris 9 and Solaris 10 release is already set up to call this library. If you are using IWS or Netscape servers, see “[How to Load the Socket Utility Library for NCA](#)” on page 25 to use the new library.

Multiple Instance Support

Systems that have NCA installed often need to run multiple instances of a web server. For instance, a single server might need to support a web server for outside access as well as a web administration server. To separate these servers, you would configure each server to use a separate port.

Administering the Caching of Web Pages (Tasks)

The following sections cover the procedures to enable or disable parts of the service.

▼ How to Enable Caching of Web Pages

1. Become an administrator.

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. Register the interfaces.

Type the names of each of the physical interfaces in the `/etc/nca/nca.if` file. See the [`nca.if\(4\)`](#) man page for more information.

```
# cat /etc/nca/nca.if
hme0
hme1
```

Each interface must have an accompanying `hostname.interface-name` file and an entry in `/etc/hosts` file for the contents of `hostname.interface-name`. To start the NCA feature on all interfaces, place an asterisk, `*`, in the `nca.if` file.

3. Enable the `ncakmod` kernel module.

Change the status entry in `/etc/nca/ncakmod.conf` to `enabled`.

```
# cat /etc/nca/ncakmod.conf
#
# NCA Kernel Module Configuration File
#
status=enabled
httpd_door_path=/system/volatile/nca_httpd_1.door
nca_active=disabled
```

See the [`ncakmod.conf\(4\)`](#) man page for more information.

4. (Optional) Enable NCA logging.

Change the status entry in `/etc/nca/ncalogd.conf` to `enabled`.

```
# cat /etc/nca/ncalogd.conf
#
# NCA Logging Configuration File
#
status=enabled
logd_path_name="/var/nca/log"
```

```
logd_file_size=1000000
```

You can change the location of the log file by changing the path that is indicated by the `logd_path_name` entry. The log file can be a raw device or a file. See the following examples for samples of NCA log file paths. See the [ncalogd.conf\(4\)](#) man page for more information about the configuration file.

5. (Optional) Define ports for multiple instance support.

Add the port numbers in the `/etc/nca/ncaport.conf` file. This entry causes NCA to monitor port 80 on all configured IP addresses.

```
# cat /etc/nca/ncaport.conf
#
# NCA Kernel Module Port Configuration File
#
.
.
ncaport=*/80
```

6. For x86 only: Increase the virtual memory size.

Use the `eeeprom` command to set the `kernelbase` of the system.

```
# eeeprom kernelbase=0x90000000
# eeeprom kernelbase
kernelbase=0x90000000
```

The second command verifies that the parameter has been set.

Note - By setting the `kernelbase`, you reduce the amount of virtual memory that user processes can use to less than 3 Gbytes. This restriction means that the system is not ABI compliant. When the system boots, the console displays a message that warns you about noncompliance. Most programs do not actually need the full 3-Gbyte virtual address space. If you have a program that needs more than 3 Gbytes, you need to run the program on a system that does not have NCA enabled.

7. Reboot the server.

Example 2-1 Using a Raw Device as the NCA Log File

The `logd_path_name` string in `ncalogd.conf` can define a raw device as the place to store the NCA log file. The advantage to using a raw device is that the service can run faster because the overhead in accessing a raw device is less.

The NCA service tests any raw device that is listed in the file to ensure that no file system is in place. This test ensures that no active file systems are accidentally written over.

To prevent this test from finding a file system, run the following command. This command destroys part of the file system on any disk partition that had been configured as a file system. In this example, `/dev/rdisk/c0t0d0s7` is the raw device that has an old file system in place.

```
# dd if=/dev/zero of=/dev/rdisk/c0t0d0s7 bs=1024 count=1
```

After running `dd`, you can then add the raw device to the `ncalogd.conf` file.

```
# cat /etc/nca/ncaLogd.conf
#
# NCA Logging Configuration File
#
status=enabled
logd_path_name="/dev/rdisk/c0t0d0s7"
logd_file_size=1000000
```

Example 2-2 Using Multiple Files for NCA Logging

The `logd_path_name` string in `ncaLogd.conf` can define multiple targets as the place to store the NCA log file. The second file is used when the first file is full. The following example shows how to select to write to the `/var/nca/log` file first and then use a raw partition.

```
# cat /etc/nca/ncaLogd.conf
#
# NCA Logging Configuration File
#
status=enabled
logd_path_name="/var/nca/log /dev/rdisk/c0t0d0s7"
logd_file_size=1000000
```

▼ How to Disable Caching of Web Pages

1. Become an administrator.

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. Disable the `ncakmod` kernel module.

Change the status entry in `/etc/nca/ncakmod.conf` to `disabled`.

```
# cat /etc/nca/ncakmod.conf
# NCA Kernel Module Configuration File
#
status=disabled
httpd_door_path=/system/volatile/nca_httpd_1.door
nca_active=disabled
```

See the [`ncakmod.conf\(4\)`](#) man page for more information.

3. Disable NCA logging.

Change the status entry in `/etc/nca/ncalogd.conf` to disabled.

```
# cat /etc/nca/ncalogd.conf
#
# NCA Logging Configuration File
#
status=disabled
logd_path_name="/var/nca/log"
logd_file_size=1000000
```

See the [ncalogd.conf\(4\)](#) man page for more information.

4. Reboot the server.**▼ How to Enable or Disable NCA Logging**

NCA logging can be turned on or turned off, as needed, after NCA has been enabled. See [“How to Enable Caching of Web Pages” on page 22](#) for more information.

1. Become an administrator.

For more information, see [“Using Your Assigned Administrative Rights” in “Securing Users and Processes in Oracle Solaris 11.2”](#).

2. Change NCA logging.

To permanently disable logging, you need to change the status in `/etc/nca/ncalogd.conf` to disabled and reboot the system. See the [ncalogd.conf\(4\)](#) man page for more information.

a. Stop logging.

```
# /etc/init.d/ncalogd stop
```

b. Start logging.

```
# /etc/init.d/ncalogd start
```

How to Load the Socket Utility Library for NCA

Follow this process only if your web server does not provide native support of the AF_NCA socket.

In the startup script for the web server, add a line that causes the library to be preloaded. The line should resemble the following:

```
LD_PRELOAD=/usr/lib/ncad_addr.so /usr/bin/httpd
```

▼ How to Add a New Port to the NCA Service

1. Become an administrator.

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. Add a new port.

Add a new port entry to `/etc/nca/ncaport.conf`. This example adds port 8888 on IP address 192.168.84.71. See [ncaport.conf\(4\)](#) for more information.

```
# cat /etc/nca/ncaport.conf
#
# NCA Kernel Module Port Configuration File
#
.
.
ncaport=*/80
ncaport=192.168.84.71/8888
```

3. Start a new web instance.

An address needs to be in the file that contains the NCA port configurations before a web server can use the address for NCA. If the web server is running, it must be restarted after the new address is defined.

Caching Web Pages (Reference)

The following sections cover the files and the components that are needed to use NCA. Also, specifics about how NCA interacts with the web server are included.

NCA Files

You need several files to support the NCA feature. Many of these files are ASCII, but some of the files are binary. The following table lists all of the files.

TABLE 2-1 NCA Files

| File Name | Function |
|-----------------------------------|---|
| /dev/nca | The path name for the NCA device. |
| /etc/hostname.* | File that lists all physical interfaces that are configured on the server. |
| /etc/hosts | File that lists all host names that are associated with the server. Entries in this file must match entries in /etc/hostname.* files for NCA to function. |
| /etc/init.d/ncakmod | Script that starts the NCA server. This script is run when a server is booted. |
| /etc/init.d/ncaalogd | Script that starts NCA logging. This script is run when a server is booted. |
| /etc/nca/nca.if | File that lists the interfaces on which NCA is run. See the nca.if(4) man page for more information. |
| /etc/nca/ncakmod.conf | File that lists configuration parameters for NCA. See the ncakmod.conf(4) man page for more information. |
| /etc/nca/ncaalogd.conf | File that lists configuration parameters for NCA logging. See the ncaalogd.conf(4) man page for more information. |
| /etc/nca/ncaport.conf | File that lists the IP addresses and the ports for NCA. See the ncaport.conf(4) man page for more information. |
| /system/volatile/nca_httpd_1.door | The door path name. |
| /usr/bin/ncab2clf | Command that is used to convert data in the log file to the common log format. See the ncab2clf(1) man page for more information. |
| /usr/lib/net/ncaconfd | Command that is used to configure NCA to run on multiple interfaces during boot. See the ncaconfd(1M) man page for more information. |
| /usr/lib/nca_addr.so | Library that uses AF_NCA sockets instead of AF_INET sockets. This library must be used on web servers that use AF_INET sockets. See the ncad_addr(4) man page for more information. |
| /var/nca/log | File that holds the log file data. The file is in binary format, so do not edit it. |

NCA Architecture

The NCA feature includes the following components.

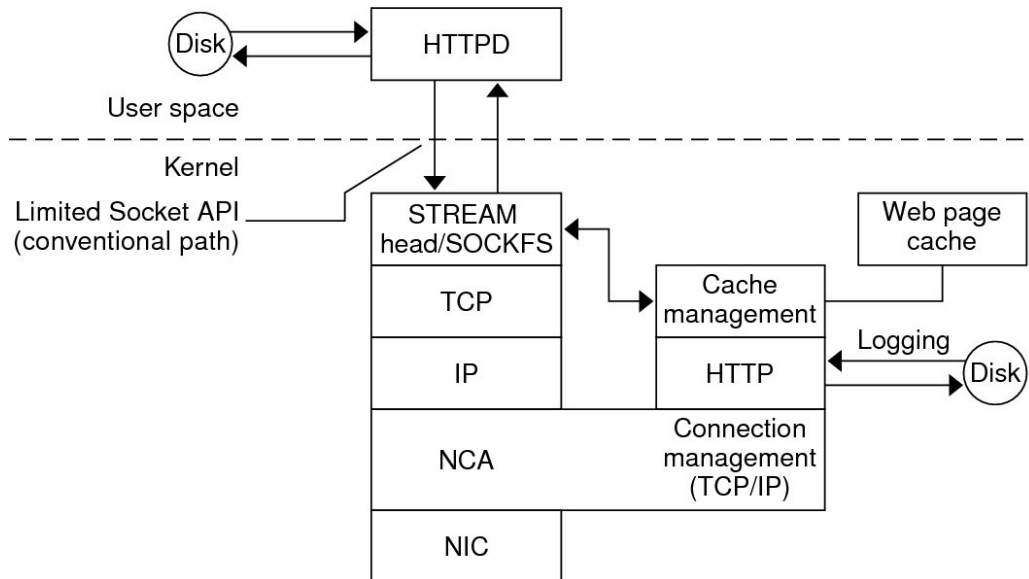
- Kernel module, ncakmod
- Web server, httpd

The kernel module ncakmod maintains the cache of web pages in system memory. The module communicates with a web server, httpd, through a sockets interface. The family type is PF_NCA.

The kernel module also provides a logging facility that logs all HTTP cache hits. NCA logging writes HTTP data to the disk in binary format. NCA provides a conversion utility for converting binary log files to common log format (CLF).

The following figure shows the flow of data for the conventional path and the path that is used when NCA is enabled.

FIGURE 2-1 Data Flow With the NCA Service



NCA to Httpd Request Flow

The following list shows the request flow between the client and the web server.

1. An HTTP request is made from the client to the web server.
2. If the page is in cache, the in-kernel cache web page is returned.

3. If the page is not in cache, the request goes to the web server to retrieve or update the page.
4. Depending on the HTTP protocol semantics that are used in the response, the page is cached or not. Then the page is returned to the client. If the Pragma: No-cache header is included in the HTTP request, the page is not cached.

Time-Related Services

Keeping system clocks synchronized within a network is required for many databases and authentication services. The following topics are covered in this chapter.

- [“Clock Synchronization \(Overview\)” on page 31](#)
- [“Managing Network Time Protocol \(Tasks\)” on page 33](#)
- [“Managing the Precision Time Protocol” on page 35](#)
- [“Using Other Time-Related Commands \(Tasks\)” on page 38](#)
- [“Network Time Protocol \(Reference\)” on page 39](#)

Clock Synchronization (Overview)

Oracle Solaris uses the Network Time Protocol (NTP) and the Precision Time Protocol (PTP) to synchronize the system clock. You can also use `rdate` while using `cron` to synchronize the clocks.

Network Time Protocol (NTP)

The NTP public domain software from the University of Delaware is included in the Oracle Solaris software. The `ntpd` daemon sets and maintains the system time of day. The `ntpd` daemon is a complete implementation of the version 4 standard, as defined by RFC 5905.

The `ntpd` daemon reads the `/etc/inet/ntp.conf` file at system startup. See the `ntp.conf(4)` man page for information about configuration options.

Remember the following when using NTP in your network:

- The `ntpd` daemon uses minimal system resources.
- An NTP client synchronizes automatically with an NTP server when it boots. If the client becomes unsynchronized, the client resynchronizes again when the client contacts a time server.

Precision Time Protocol (PTP)

The PTP software is used to synchronize system time across multiple systems in a broadcast domain, such as a Local Area Network (LAN). Oracle Solaris 11.2 PTP software is implemented as the `ptpd` daemon which is based on the public domain software available at <http://ptpd.sourceforge.net>. It implements PTP Version 2 as defined in the IEEE standard 1588-2008.

The `ptpd` daemon can use the hardware assistance capability provided by any compatible Network Interface Card (NIC) and its driver to timestamp the PTP packets.

You can use the `svc:/network/ptp:default` service to start the `ptpd` daemon. You can configure a system as a PTP slave or a PTP master.

- **PTP slave:** Runs the `ptpd` daemon in slave mode. A PTP slave synchronizes the system clock to a master clock present in the subnet.
- **PTP master:** Runs the `ptpd` daemon in master mode. Other systems in the slave mode can synchronize their clock to the PTP master.

The state of the `ptpd` daemon can be `slave`, `master`, or `initializing`.

By default, the service management facility starts the PTP service as a slave and binds the PTP service to the first interface that is up and running. For more information about the Service Management Facility, see the [smf\(5\)](#) man page.

The `ptpd` daemon uses the `/var/log/ptp.log` file to record the following information:

- Timestamp of the PTP log entry
- State of the `ptpd` daemon
- Clock ID

About NTP in the Oracle Solaris 11 Release

The following changes are available in the Oracle Solaris release:

- The `xntpd` daemon, which was based on the version 3 standard, has been replaced with a `ntpd` daemon, which is based on the version 4 standard.
- Additional documentation for the NTP service can be found at `/usr/share/doc/ntp/index.html` on a system running the Oracle Solaris 11 release.

Managing Network Time Protocol (Tasks)

The following procedures show how to set up and use the NTP service.

▼ How to Set Up an NTP Server

1. Become an administrator.

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. Create the `ntp.conf` file.

To ensure proper execution of the `ntpd` daemon, the `ntp.conf` file must first be created. The `ntp.client` file can be used as a template.

```
# cd /etc/inet
# cp ntp.client ntp.conf
```

3. Read the `ntp.server` file.

If needed, add more information to the `ntp.conf` file.

4. Edit the `ntp.conf` file.

Make site specific changes to this file as needed.

5. Start the `ntpd` daemon.

```
# svcadm enable ntp
```

▼ How to Set Up an NTP Client

1. Become an administrator.

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. Create the `ntp.conf` file.

To activate the `ntpd` daemon, the `ntp.conf` file must first be created.

```
# cd /etc/inet
# cp ntp.client ntp.conf
```

3. Edit the `ntp.conf` file.

Make site specific changes to this file as needed.

4. Start the `ntpd` daemon.

```
# svcadm enable ntp
```

▼ How to Enable NTP Logging

1. Become an administrator.

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. Enable logging.

```
# svccfg -s svc:/network/ntp:default setprop config/verbose_logging = true
```

See the [`svccfg\(1M\)`](#) man page for more information.

3. Update the SMF repository and restart the service.

```
# svcadm refresh svc:/network/ntp:default
# svcadm restart svc:/network/ntp:default
```

4. Verify that logging has been enabled.

```
# svcprop -p config/verbose_logging svc:/network/ntp:default
true
```

▼ How to Display the SMF Properties Associated With the NTP Service

● **List the SMF properties.**

- To list all of the properties associated with the NTP service, type:

```
# svcprop svc:/network/ntp:default
```

- To list all of the properties in the `config` property group, type:

```
# svcprop -p config svc:/network/ntp:default
```

Managing the Precision Time Protocol

You can use the PTP service, `svc:/network/ptp:default`, to set up an interface as a PTP master or a PTP slave. The procedures in this section describe how to set up the PTP service for clock synchronization.

▼ How to Install PTP

1. **Become an administrator.**

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. **Verify whether the PTP package is installed.**

```
# pkg info ptp
```

3. **Install PTP package if it is not installed.**

```
# pkg install ptp
```

▼ How to Set Up an Interface as a PTP Master

1. **Become an administrator.**

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. **Set a system as the PTP master.**

```
# svccfg -s svc:/network/ptp:default setprop config/node_type=master
```

3. **Enable an interface to listen to the PTP packets.**

```
# svccfg -s svc:/network/ptp:default setprop config/listen_ifname=interface-name
```

4. **Enable the PTP service on the master system.**

```
# svcadm enable svc:/network/ptp:default
```

If the PTP service is already enabled, restart the PTP service.

```
# svcadm restart svc:/network/ptp:default
```

▼ How to Set Up an Interface as a PTP Slave

1. Become an administrator.

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. Enable an interface to listen to the PTP packets.

```
# svccfg -s svc:/network/ptp:default setprop config/listen_ifname=interface-name
```

3. Set the interface as a PTP slave.

```
# svccfg -s svc:/network/ptp:default setprop config/node_type=slave
```

4. Enable the PTP service on the slave system.

```
# svcadm enable svc:/network/ptp:default
```

Identifying Whether a NIC Provides PTP Hardware Assistance

PTP can use the hardware assistance capability provided by any compatible NIC to improve the clock synchronization accuracy.

To determine whether a NIC provides hardware assistance to the `ptpd` daemon, issue the following command:

```
# dladm show-linkprop -p ptp
```

If the `ptp` property value that is displayed in the `VALUE` field of the output is 1 (one), then the corresponding NIC provides hardware assistance to the `ptpd` daemon.

You can configure the `ptpd` daemon to use the hardware assistance that is provided by a NIC. For more information, see [“How to Enable the PTP Service to Use the PTP Hardware in a NIC”](#) on page 37.

EXAMPLE 3-1 Displaying the PTP Property of NICs in a System

```
# dladm show-linkprop -p ptp
LINK PROPERTY PERM VALUE EFFECTIVE DEFAULT POSSIBLE
net1 ptp r- 0 0 0 --
net2 ptp r- 0 0 0 --
net0 ptp r- 0 0 0 --
```

```
net3 ptp r- 0 0 0 --
net6 ptp r- 0 0 0 --
net7 ptp r- 0 0 0 --
net4 ptp r- 1 1 0 --
net5 ptp r- 0 0 0 --
```

This example displays the ptp property value for the interface cards in the system. The integer 1 in the VALUE field for net4 indicates that net4 can provide hardware assistance to the ptpd daemon.

▼ How to Enable the PTP Service to Use the PTP Hardware in a NIC

1. Become an administrator.

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. Ensure that the PTP service is enabled.

```
# svcs -l svc:/network/ptp:default
```

3. Check whether any of the NICs support PTP.

```
# dladm show-linkprop -p ptp
```

4. Configure the PTP service to use the PTP hardware.

```
# svccfg -s svc:/network/ptp:default setprop config/use_hw=true
```

5. Restart the PTP service.

```
# svcadm restart svc:/network/ptp:default
```

▼ How to Enable PTP Logging

1. Become an administrator.

For more information, see [“Using Your Assigned Administrative Rights”](#) in [“Securing Users and Processes in Oracle Solaris 11.2”](#).

2. Enable PTP logging.

```
# svccfg -s svc:/network/ptp:default setprop config/enable_logging=true
```

For more information, see the [svccfg\(1M\)](#) man page.

3. Restart the PTP service.

```
# svcadm restart svc:/network/ptp:default
```

Using Other Time-Related Commands (Tasks)

The following procedure can be used to update the current time when ever needed, without having to setup NTP.

▼ How to Synchronize Date and Time From Another System

1. Become an administrator.

For more information, see “[Using Your Assigned Administrative Rights](#)” in “[Securing Users and Processes in Oracle Solaris 11.2](#)”.

2. Reset the date and time to synchronize with another system, by using the `rdate` command.

```
# rdate another-system
```

another-system Name of the another system

3. Verify that you have reset your system's date correctly by using the `date` command.

The output should show a date and time that matches that of the other system.

Example 3-2 Synchronizing Date and Time From Another System

The following example shows how to use `rdate` to synchronize the date and time of one system with another. In this example, the system `earth`, running several hours behind, is reset to match the date and time of the server `starbug`.

```
earth# date
Tue Jun  5 11:08:27 MDT 2001
earth# rdate starbug
Tue Jun  5 14:06:37 2001
earth# date
Tue Jun  5 14:06:40 MDT 2001
```

Network Time Protocol (Reference)

The following files are needed for the NTP service to run.

TABLE 3-1 NTP Files

| File Name | Function |
|----------------------|--|
| /etc/inet/ntp.conf | Lists configuration options for NTP. |
| /etc/inet/ntp.client | Sample configuration file for NTP clients and servers. |
| /etc/inet/ntp.leap | Leap seconds configuration file. |
| /etc/inet/ntp.keys | Contains the NTP authentication keys. |
| /etc/inet/ntp.server | Contains additional configuration instructions for some NTP servers. |
| /usr/lib/inet/ntpd | NTP daemon. See the <code>ntpd(1M)</code> man page for more information. |
| /usr/sbin/ntp-keygen | Program used to generate public and private keys for NTP. See the <code>ntp-keygen(1M)</code> man page for more information. |
| /usr/sbin/ntpdc | NTP query program for the <code>ntpd</code> daemon. See the <code>ntpdc(1M)</code> man page for more information. |
| /usr/sbin/ntpdate | Utility to set the local date and time, based on NTP. See the <code>ntpdate(1M)</code> man page for more information. |
| /usr/sbin/ntpq | NTP query program. See the <code>ntpq(1M)</code> man page for more information. |
| /var/ntp/ntpstats | Directory for holding NTP statistics. |
| /usr/sbin/ntptime | Program to display or set the kernel time variables. See the <code>ntp(1M)</code> man page for more information. |
| /usr/sbin/ntptrace | Program to trace NTP hosts back to the master NTP server. See the <code>ntp(1M)</code> man page for more information. |
| /var/ntp/ntp.drift | Sets the initial frequency offset on NTP servers. |

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