Chapter 4
Software Overview

This chapter provides an overview of the software features supported on HP routing switches.

Configuration details for these features are found in **Chapters 7-14** of this manual. A detailed CLI command summary is found in **Appendix B**.

For an overview of the chassis hardware, please refer to **Chapter 5**.

Feature Summary

HP routing switches support the following features, described in this chapter:

- Domain Name Server (DNS) Resolver
- Dynamic configuration
- Executable boot command
- Integrated-switch routing (ISR)
- IP multicast routing
- IP tunneling
- IP multicast routing-PIM and DVMRP
- Layer 2, Layer 3 IP/IPX and Layer 4 hardware switching
- Layer 2 MAC filtering
- Layer 3 and layer 4 filtering
- Monitoring tools
- Multiple levels of access control
- Multi-homing
- Multiple network management applications-CLI and Web browser-based
- Policy-based VLANs
- Redundant router support (SRP)
- Routing protocol support-IP/RIP, IP/OSPF, IPX, AppleTalk
- Selectable Class of Service (CoS)
- Support for Simplified Network Time Protocol (SNTP) as a clock reference

- Spanning Tree Protocol (STP)
- Static entry support
- Trunk groups
- UDP helper

Domain Name Server (DNS) Resolver

DNS allows a user to use a host name to perform Telnet, ping and trace route commands. For example, if a domain of newyork.com is defined on a routing switch and a user wishes to initiate a ping to a host, NYC01, on that domain, the user would only need to reference the host name in the command versus the host name and its domain name as shown below:

HP9300# ping nyc01 will yield the same result as HP9300# ping nyc01.newyork.com

The user can also define a DNS domain on a routing switch and thereby recognize all hosts within that domain. The routing switch will then automatically append the appropriate domain to the host and forward it to the domain name server.

Up to four DNS servers can be defined for each DNS entry with the first entry serving as the primary default address. Should a query to the primary address fail to be resolved after three attempts, the next gateway address will be queried for three times as well. This process will continue for each defined gateway address until a query is resolved.

Executable Boot Command

The user can use boot commands to immediately initiate software boots from a software image stored in primary or secondary flash on a routing switch or from a BootP or TFTP server.

The user can use boot commands to test new versions of code on a system or choose the preferred boot source from the console boot prompt without requiring a system reset.

For more details on the boot commands, and copying software to and from HP routing switches, refer to **Chapter 3**.

Integrated Switch Routing (ISR)

Integrated switch routing allows a routing switch to assign and support VLANs on its interfaces as would a **switch**. In addition, it is able to provide **routing** between its VLANs–all within a single device.

This combined logical switch and router operation within a single device is what defines a router as an **ISR** as seen in **Figure 4.1**.

Routing between the VLANs is done without dedicating physical ports by using **virtual interfaces.** These virtual interfaces serve as a link between the configured VLANs and the routing core of the routing switches.

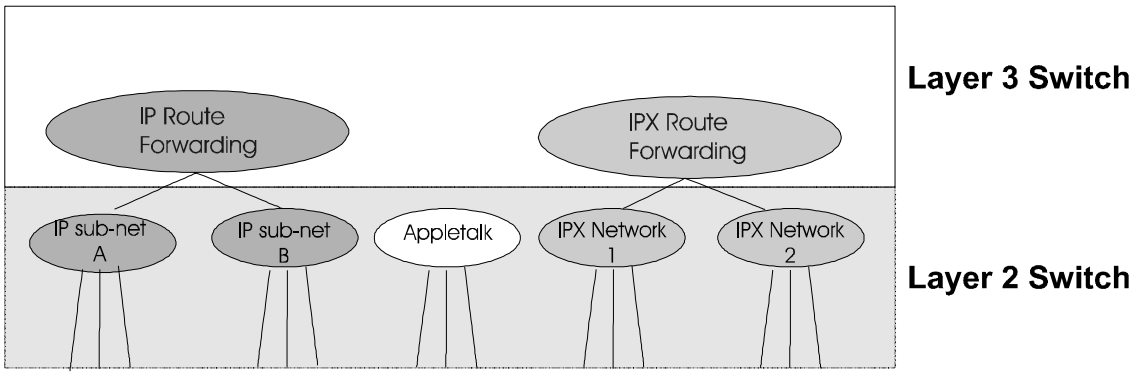

Figure 4.1 Logical representation of ISR within HP routing switches

The ISR architecture provides the platform for support of policy-based VLANs within routing switches.

IP Multicast Routing

Routing switches provide support for IP multicasting with the Protocol Independent Multicast (PIM) protocol, the Distance Vector Multicast Routing Protocol (DVMRP) and the Internet Group Membership Protocol (IGMP).

Multicast protocols allow a group or channel to be accessed over different networks by multiple stations (clients) for the receipt and transmit of multicast routing. Distribution of stock quotes, video transmissions, such as news services or remote classrooms and video conferences, are all examples of multicast routing.

DVMRP and PIM can concurrently operate on different ports of a routing switch.

For more details on configuring these features please refer to **Chapter 10**.

IP Tunneling

This feature is used to send traffic through routers that do not support either PIM or DVMRP multicasting. IP multicast datagrams are encapsulated within an IP packet using IP in IP encapsulation. They are then sent to the remote address. An IP tunnel must be configured with the remote IP on each end of the tunnel.

When the destination router receives an encapsulated packet, it strips off the encapsulation and forwards it.

NOTE: For IP tunneling to work, the remote routers must be reachable via an IP routing protocol. The same unicast routing protocol that is being used by the intermediate, non-multicast capable nodes must be operating on both the origination and destination routers.

Multiple tunnels configured on a router cannot share the same remote address.

Layer 2, Layer 3 IP/IPX and Layer 4 Hardware Switching

HP routing switches support:

- Layer 2 ASIC forwarding and aging.
- Layer 3 IP and IPX Ethernet 802.2 and 802.3 ASIC forwarding and aging.

Layer 2 MAC Filtering

Layer 2 MAC filtering is supported on all HP routing switches. Filters can be defined by the destination MAC address (DA) and the source MAC address (SA).

Layer 3 Protocol Filtering

Filtering of IP, IP/RIP and IPX/RIP/SAP routes or by protocol type (e.g. IP, ARP) for enhanced network security is supported on all HP routing switches.

NOTE: For details on IP and IP/RIP filtering and their configuration, please refer to **Chapter 8**.

NOTE: For details on IPX filtering and its configuration, please refer to **Chapter 12**.

Monitoring Tools

HP routing switches support a number of monitoring tools that allow the user to review additives for diagnostic purposes. A highlight of the monitoring tools is summarized below. For a more detailed listing and configuration specifics, please refer to **Appendix A** except as noted.

- Mirror port
- RMON
- SNMP system log
- Trace route support

Mirror Port

The mirror port feature supports direct connection of an external protocol analyzer to a router port (monitored port). This provides easier segment and port diagnostics by allowing local monitoring of the traffic. The user can select any of the base system ports or expansion ports to act as a mirror port. Only one mirror port can be active on a router at a time. By default, no mirror port is assigned.

NOTE: For more details on the mirror port and its configuration, please refer to **Chapter 7**.

RMON

All HP routing switches come standard with an RMON agent that supports the following groups:

- Statistics (RMON Group 1)
- History (RMON Group 2)
- Alarm (RMON Group 3)
- Event (RMON Group 9)

SNMP System Log

Up to 100 SNMP traps can be saved locally on a routing switch for later review by the CLI.

Trace Route Support

A route can be traced for diagnosis purposes on both HP routing switches.

Multi-homing

Routing switches support multi-homing for IP and IPX.

Multiple IP Sub-nets per Interface

Up to 16 IP sub-nets can be defined per port. IP/RIP and OSPF can be assigned to these multi-homed interfaces.

Multiple IPX Frame Type Support per Interface

Up to four different IPX network numbers and frame encapsulation types can be defined for each IPX interface. This allows a user to define and receive traffic from four separate IPX networks on a single interface. Each of the networks must have a distinct network number and encapsulation type (Ethernet SNAP, Ethernet 802.2, Ethernet 802.3 and Ethernet II).

Multi-level Access Control

Three levels of password protection offer a range of access points for various users within the network. The three levels are:

Super user: This setting allows a user unlimited access to all levels of the CLI. This level is generally reserved for system administrators within the network. The super user is also the only one who can assign a password access level to another user.

Configure port: This level allows a user to configure interface parameters only and to view any show command displays.

Read only: A user at this password level will only be able to view show command displays within the CLI. No configuration is allowed at this password level.

Network Management

HP routing switches can be managed via the CLI or Web management interface. The CLI and Web management interface come standard on HP routing switches.

CLI

CLI comes standard on all HP routing switches. The CLI is a text-based operator interface that allows users to configure a system with a PC or terminal without special software.

Up to five read-access Telnet sessions can operate concurrently on a routing switch. Write access via Telnet is limited to one session.

Web Management Interface

A Web management interface is supported on web browsers Netscape Navigator™ versions 2.0 or later, and Microsoft Internet Explorer™ versions 3.0 or later. No application software is required. It comes standard on all routing switches.

Policy-based VLANs

Policy-based VLANs allow users to assign VLANs on a protocol (IP, IPX, Decnet, AppleTalk, NetBIOS, others), sub-net (IP sub-net and IPX network), port or 802.1Q tagged basis on a routing switch in any combination of port-based or protocol-based VLANs.

Port-based VLANs

Port-based VLANs allow users to group specific port traffic into different broadcast domains, eliminating the risk of broadcast storms by maintaining separate spanning tree domains.

Protocol and sub-net based VLANs

Protocol and sub-net based VLANs increase network performance and provide managers with a high degree of network flexibility.

With sub-net VLANs, devices with a common sub-net can be resident across multiple ports of an HP routing switch. This increases performance by providing a greater pool of bandwidth for all devices.

Protocol VLANs enable managers to easily and transparently group like protocols into a defined VLAN. This reduces the number of non-essential broadcasts on other ports and allows a port to belong to multiple VLANs without VLAN tagging.

The following Layer 3 VLANs are supported:

- IP protocol
- IPX protocol
- IP sub-net
- IPX network number
- AppleTalk
- Decnet
- NetBIOS
- Other

NOTE: For more details on the value and configuration of VLANs, refer to **Chapter 14**.

Routing Between VLANs

In addition to supporting the assignment of VLANs, routing switches support routing between VLANs via virtual interfaces.

VLAN Tagging

VLAN tagging (802.1Q) extends the boundaries of the VLAN by allowing creation of VLANs that cross switch boundaries. This eases network management and ensures interoperability with other devices.

Protocol Support

Below is a summary of all of the protocols that are supported on routing switches.

- IP
- RIPV 1
- RIPV 2
- IGMP
- DVMRP
- PIM
- AppleTalk
- SRP (Standby Router Protocol)
- IRDP (ICMP Router Discovery Protocol)
- RARP
- IPX/RIP/SAP
- OSPF

NOTE: For more details on these protocols and their configuration, refer to their individual chapters.

Redundant Router Support for IP

Routing switch provide support for redundant router configurations by using the proprietary Standby Router Protocol (SRP). The protocol provides alternate paths for hosts to prevent them from losing access to the network due to a loss of connectivity to a default router.

NOTE: For more details on SRP and its configuration, please refer to **Chapter 11**.

Selectable Class of Service (CoS)

Selectable CoS is a hierarchy of features that allows the user to better manage bandwidth and traffic priority within the network.

Level One

Level one provides automatic flow control and configurable port priority in local switch and router environments to minimize the impact of queueing delays.

Flow Control

All HP routing switches provide support for the *Full Duplex Flow Control* specification, 802.3X.

Priority

HP routing switches support the assignment of a higher priority to traffic operating on a given port, MAC or VLAN address basis. This feature helps manage traffic flow during periods of high contention in the network.

Level Two

Level two provides 802.1Q CoS benefits beyond the local router by supporting and recognizing standard-based virtual LAN (VLAN) tagging, in addition to providing support for flow control, port priority and IP multicast traffic reduction.

Level Three

All HP routing switches provide Layer 4 capabilities to prioritize applications and optimize server performance. Users can manage and prioritize TCP and UDP traffic on all platforms. Backbone platforms provide additional Layer 4 capabilities such as server load balancing, the ability to detect failed servers, hot standby redundancy for re-directing traffic from a failed server, and multiple levels of password protection for increased security.

SNTP Clocking

HP routing switches can define an SNTP server as an external reference clock. This will allow a router to automatically retrieve clock references from the designated SNTP server. This function serves as a backup for the system clock that can be set on the system.

Spanning Tree Protocol

STP (IEEE 802.1d bridge protocols) is supported on all HP routing switches. When active, STP will detect and eliminate logical loops in the network on either a system or VLAN basis. It will also ensure that the most efficient path is taken when multiple paths exist between ports. Should the selected path fail, STP will search for and then establish an alternate path to prevent or limit retransmission of data. By default, this feature is disabled on routers and enabled on switches.

NOTE: For more details on configuring this feature, please refer to **Chapter 7**.

Static Entry Support

Static entries can be assigned for MAC addresses, IP routes, ARP and RARP entries.

NOTE: For more details on configuring static MAC addresses, please refer to **Chapter 7**. For more details on configuring static routes, ARP or RARP entries, please refer to **Chapter 8**.

Trunk Groups

The trunk group feature allows multiple high-speed, load-sharing links to be established between two routing switches or a server. This feature allows two or four ports to be configured as a trunk group, supporting transfer rates of up to 4 Gbps of bi-directional traffic.

In addition to enabling load sharing of traffic, trunk groups provide redundant, alternate paths for traffic, should any of the segments fail. Up to four trunk groups can be established per system. The default value for this feature is disabled.

NOTE: For details on trunk groups and their configuration, please refer to **Chapter 7**.

UDP Helper

HP routing switches support the relay of UDP packets to their destination for a specific application (e.g. bootps, domain, and tftp) for cases when the destination server is not on the local LAN segment.

NOTE: For details on UDP helper and its configuration, please refer to **Chapter 8**.