
# Configuring IP Addressing and IP Services Features

This chapter provides information about configuring IP addressing and IP services features for the Cisco 800M Series ISR and contains the following sections:



## Configuring DHCP

Dynamic Host Configuration Protocol (DHCP) is based on the Bootstrap Protocol (BOOTP), which provides the framework for passing configuration information to hosts on a TCP/IP network. DHCP adds the capability to automatically allocate reusable network addresses and configuration options to Internet hosts. DHCP consists of two components: a protocol for delivering host-specific configuration parameters from a DHCP server to a host and a mechanism for allocating network addresses to hosts. DHCP is built on a client/server model, where designated DHCP server hosts allocate network addresses and deliver configuration parameters to dynamically configured hosts. DHCP provides a framework for passing configuration information dynamically to hosts on a TCP/IP network. A DHCP client is an Internet host that uses DHCP to obtain configuration parameters such as an IP address.A DHCP relay agent is any host that forwards DHCP packets between clients and servers. Relay agents are used to forward requests and replies between clients and servers when they are not on the same physical subnet.

For more information on configuring DHCP, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipaddr_dhcp/configuration/15-mt/dhcp-15-mt-book.html

# Configuring DNS

The Domain Name System (DNS) is a distributed database in which you can map host names to IP addresses through the DNS protocol from a DNS server. Each unique IP address can have an associated hostname. The Cisco IOS software maintains a cache of hostname-to-address mappings for use by the connect, telnet, and ping EXEC commands, and related Telnet support operations. This cache speeds the process of converting names to addresses.

For more information about configuring DNS, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipaddr_dns/configuration/15-mt/dns-15-mt-book/dns-config-dns.html

# Configuring NAT

Network Address Translation (NAT) enables private IP inter networks that use nonregistered IP addresses to connect to the Internet. NAT operates on a device, usually connecting two networks, and translates the private (not globally unique) addresses in the internal network into legal addresses before packets are forwarded onto another network. NAT can be configured to advertise to the outside world only one address for the entire network. This ability provides additional security by effectively hiding the entire internal network behind that one address.NAT is also used at the enterprise edge to allow internal users access to the Internet and to allow Internet access to internal devices such as mail servers

For more information on configuring NAT, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipaddr_nat/configuration/15-mt/nat-15-mt-book/iadnat-addr-consv.html

# Configuring NHRP

Next Hop Resolution Protocol (NHRP) is an Address Resolution Protocol (ARP)-like protocol that dynamically maps a non-broadcast multiaccess (NBMA) network. With NHRP, systems attached to an NBMA network can dynamically learn the NBMA (physical) address of the other systems that are part of that network, allowing these systems to directly communicate.

NHRP is a client and server protocol where the hub is the Next Hop Server (NHS) and the spokes are the Next Hop Clients (NHCs). The hub maintains an NHRP database of the public interface addresses of each spoke. Each spoke registers its real address when it boots and queries the NHRP database for real addresses of the destination spokes to build direct tunnels.

For more information on configuring NHRP, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/qos_plcshp/configuration/15-mt/qos-plcshp-15-mt-book/qos-plcshp-class-plc.html

# Configuring RIP

Routing Information Protocol (RIP) is a commonly used routing protocol in small to medium TCP/IP networks. It is a stable protocol that uses a distance-vector algorithm to calculate routes.

For more information on configuring RIP, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/qos_plcshp/configuration/15-mt/qos-plcshp-15-mt-book/qos-plcshp-class-plc.html

# Configuring EIGRP

Enhanced Interior Gateway Routing Protocol (EIGRP) is an enhanced version of the Interior Gateway Routing Protocol (IGRP) developed by Cisco. The convergence technology of EIGRP is based on an algorithm called the Diffusing Update Algorithm (DUAL). The algorithm guarantees loop-free operation at every instant throughout a route computation and allows all devices involved in a topology change to synchronize. Devices that are not affected by topology changes are not involved in recomputations.

For more information about configuring EIGRP, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/iproute_eigrp/configuration/15-mt/ire-15-mt-book/ire-enhanced-igrp.html

# Configuring OSPF

Open Shortest Path First (OSPF) is an Interior Gateway Protocol (IGP) developed by the OSPF working group of the Internet Engineering Task Force (IETF). OSPF was designed expressly for IP networks and it supports IP subnetting and tagging of externally derived routing information. OSPF also allows packet authentication and uses IP multicast when sending and receiving packets.

For more information about configuring OSPF, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/sec_usr_tacacs/configuration/15-mt/sec-usr-tacacs-15-mt-book/sec-cfg-tacacs.html

# Configuring BGP

Border Gateway Protocol (BGP) is an interdomain routing protocol designed to provide loop-free routing between separate routing domains that contain independent routing policies (autonomous systems). The Cisco software implementation of BGP version 4 includes support for 4-byte autonomous system numbers and multiprotocol extensions to allow BGP to carry routing information for IP multicast routes and multiple Layer 3 protocol address families including IP Version 4 (IPv4), IP Version 6 (IPv6), Virtual Private Networks Version 4 (VPNv4), Connectionless Network Services (CLNS), and Layer 2 VPN (L2VPN).

For more information about configuring BGP, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/sec_usr_ssh/configuration/15-mt/sec-usr-ssh-15-mt-book/sec-usr-ssh-sec-shell.html

# Configuring Performance Routing v3

Performance Routing v3 (PfRv3) delivers a set of solutions on automatic prefix and Service Level Agreement (SLA) discovery through an intelligent framework. It provides easier application performance management controls including path optimization, managing over-subscription intelligently in the network for P2P, multi-site deployments, optimizing network infrastructure usage, policy distribution and enforcement and network based bandwidth management.

PfRv3 is an intelligent path control for improving application delivery and WAN efficiency. PfRv3 protects critical application and increases bandwidth utilization and servers as an integral part of the overall Cisco Intelligent WAN (IWAN) solution.

For more information about configuring PfRv3, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/pfrv3/configuration/15-mt/pfrv3-15-mt-book/pfrv3.html

# Configuring IP Multicast

IP multicast is a bandwidth-conserving technology that reduces traffic by delivering a single stream of information simultaneously to potentially thousands of businesses and homes. Applications that take advantage of multicast include video conferencing, corporate communications, distance learning, and distribution of software, stock quotes, and news.IP multicast routing enables a host (source) to send packets to a group of hosts (receivers) anywhere within the IP network by using a special form of IP address called the IP multicast group address. The sending host inserts the multicast group address into the IP destination address field of the packet and IP multicast routers and multilayer switches forward incoming IP multicast packets out all interfaces that lead to the members of the multicast group. Any host, regardless of whether it is a member of a group, can send to a group. However, only the members of a group receive the message.

For more information about configuring PfRv3, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipmulti_pim/configuration/imc-pim-15-mt-book.html

# Configuring BFD

Bidirectional Forwarding Detection (BFD) provides a consistent failure detection method for network administrators, in addition to fast forwarding path failure detection. Because the network administrator can use BFD to detect forwarding path failures at a uniform rate, rather than the variable rates for different routing protocol hello mechanisms, network profiling and planning will be easier, and reconvergence time will be consistent and predictable.

For more information about configuring BFD, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/iproute_bfd/configuration/15-mt/irb-15-mt-book/irb-bi-fwd-det.html

# Configuring Multi VRF

The Multi-VRF feature enables a service provider to support two or more Virtual Private Networks (VPNs), where the IP addresses can overlap several VPNs. The Multi-VRF Support feature uses input interfaces to distinguish routes for different VPNs and forms virtual packet-forwarding tables by associating one or more Layer 3 interfaces with each virtual routing and forwarding (VRF) instance. Interfaces in a VRF can be either physical, such as FastEthernet ports, or logical, such as VLAN switched virtual interfaces (SVIs), but a Layer 3 interface cannot belong to more than one VRF at any one time. The Multi-VRF Support feature allows an operator to support two or more routing domains on a customer edge (CE) device, with each routing domain having its own set of interfaces and its own set of routing and forwarding tables. The Multi-VRF Support feature makes it possible to extend the label switched paths (LSPs) to the CE and into each routing domain that the CE supports.

For more information about configuring Multi-VRF, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/iproute_pi/configuration/15-mt/iri-15-mt-book/mp-multi-vrf-vrf-lite.html

# Configuring IPv6 Features

Internet Protocol version 6 (IPv6) expands the number of network address bits from 32 bits (in IPv4) to 128 bits, which can provide enough globally unique IP addresses for every networked device. The unlimited address space provided by IPv6 allows Cisco to deliver more and newer applications and services with reliability, improved user experience, and increased security.

For more information about configuring IPv6 addressing and basic connectivity, see the following web link:

http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipv6_basic/configuration/15-mt/ip6b-15-mt-book.html