Introduction to Cisco Prime IP Express

Cisco Prime IP Express is a full featured, scalable Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP) implementation for medium to large IP networks. It provides the key benefits of stabilizing the IP infrastructure and automating networking services, such as configuring clients and provisioning cable modems. This provides a foundation for policy-based networking.

Enterprise users can better manage their networks to integrate with other network infrastructure software and business applications.

Target Users

Cisco Prime IP Express is designed for these users:

- **Enterprises**—Helps meet the needs of single- and multisite enterprises (small-to-large businesses) to administer and control network functions. Cisco Prime IP Express automates the tasks of assigning IP addresses and configuring the Transport Control Protocol/Internet Protocol (TCP/IP) software for individual network devices. Forward-looking enterprise users can benefit from class-of-service and other features that help integrate with new or existing network management applications, such as user registration.

Regional and Local Clusters

The regional cluster acts as an aggregate management system for up to a hundred local clusters. Address and server administrators interact at the regional and local clusters through the regional and local web-based user interfaces (web UIs), and local cluster administrators can continue to use the command line interface (CLI) at the local cluster. The regional cluster consists of a Central Configuration Management (CCM) server, Tomcat web server, servlet engine, and server agent (see Management Components). The license management is now done at the regional cluster and hence the local server has to be registered to a regional server to avail

the necessary services. See the *"Overview "* chapter in *Cisco Prime IP Express Installation Guide* for more details.

Figure 1: Cisco Prime IP Express User Interfaces and Server Clusters
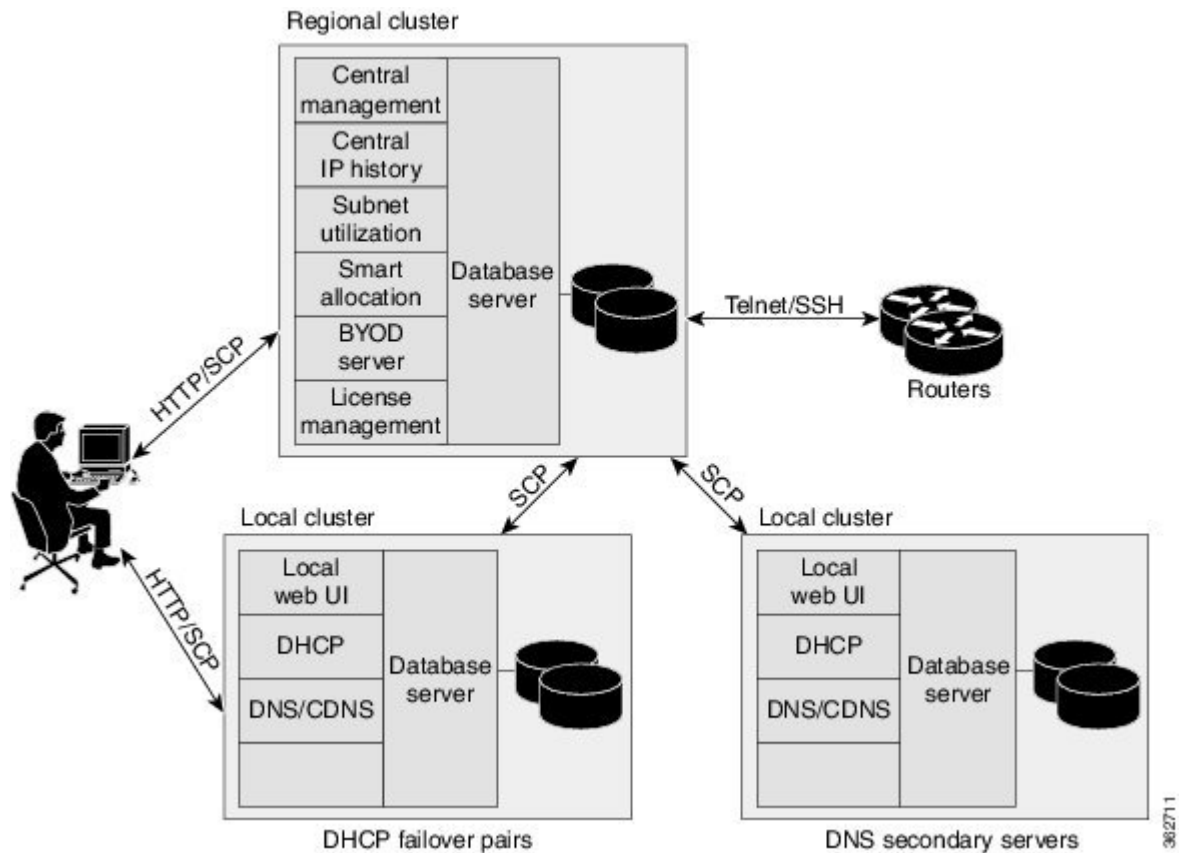
A typical deployment is one regional cluster at a customer network operation center (NOC), the central point of network operations for an organization. Each division of the organization includes a local address management server cluster responsible for managing a part of the network. The System Configuration Protocol (SCP) communicates the configuration changes between the servers.

Deployment Scenarios

The Cisco Prime IP Express regional cluster web UI provides a single point to manage any number of local clusters hosting DNS, CDNS or DHCP servers. The regional and local clusters also provide administrator management so that you can assign administrative roles to users logged in to the application.

This section describes two basic administrative scenarios and the hardware and software deployments for two different types of installations—a small-to-medium local area network (LAN), and a large-enterprise or service-provider network with three geographic locations.

Related Topics

Small-to-Medium-Size LANs

In this scenario, low-end Windows or Linux servers are acceptable. You can also use systems with EIDE disks, although we recommend you use Ultra-SCSI disks for dynamic DNS update. The image below shows a configuration that would be adequate for this network.

Note Regional server is MUST in deployment for small and medium sized LANs.

Figure 2: Small-to-Medium LAN Configuration
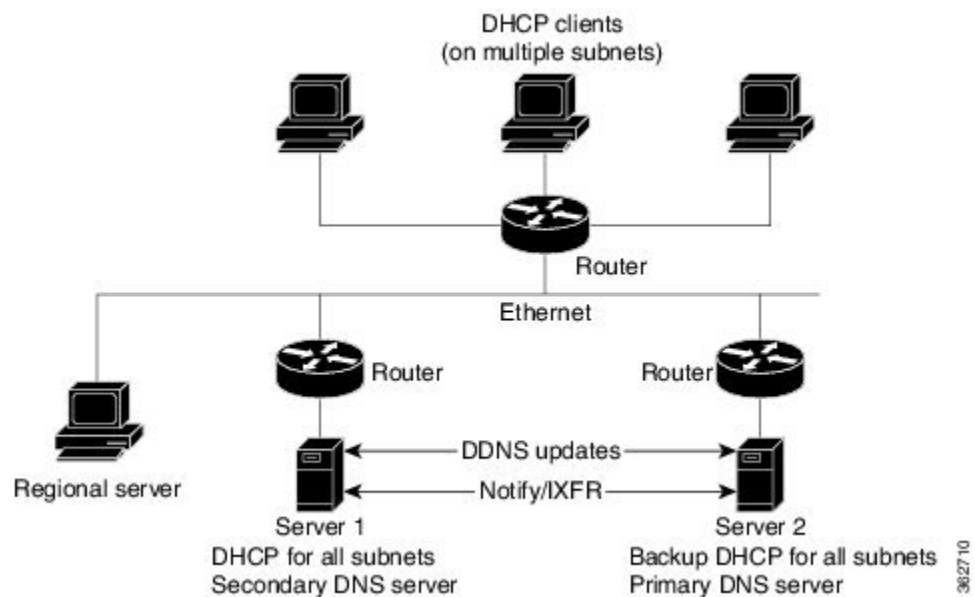
Large Enterprise Networks

In a large enterprise network serving over 500,000 DHCP clients use mid-range Windows or Linux servers. Put DNS and DHCP servers on different systems. The image below shows the hardware that would be adequate for this network.

When supporting geographically dispersed clients, locate DHCP servers at remote locations to avoid disrupting local services if wide-area connections fail. Install the Cisco Prime IP Express regional cluster to centrally manage the distributed clusters.

Figure 3: Large Enterprise Network Configuration
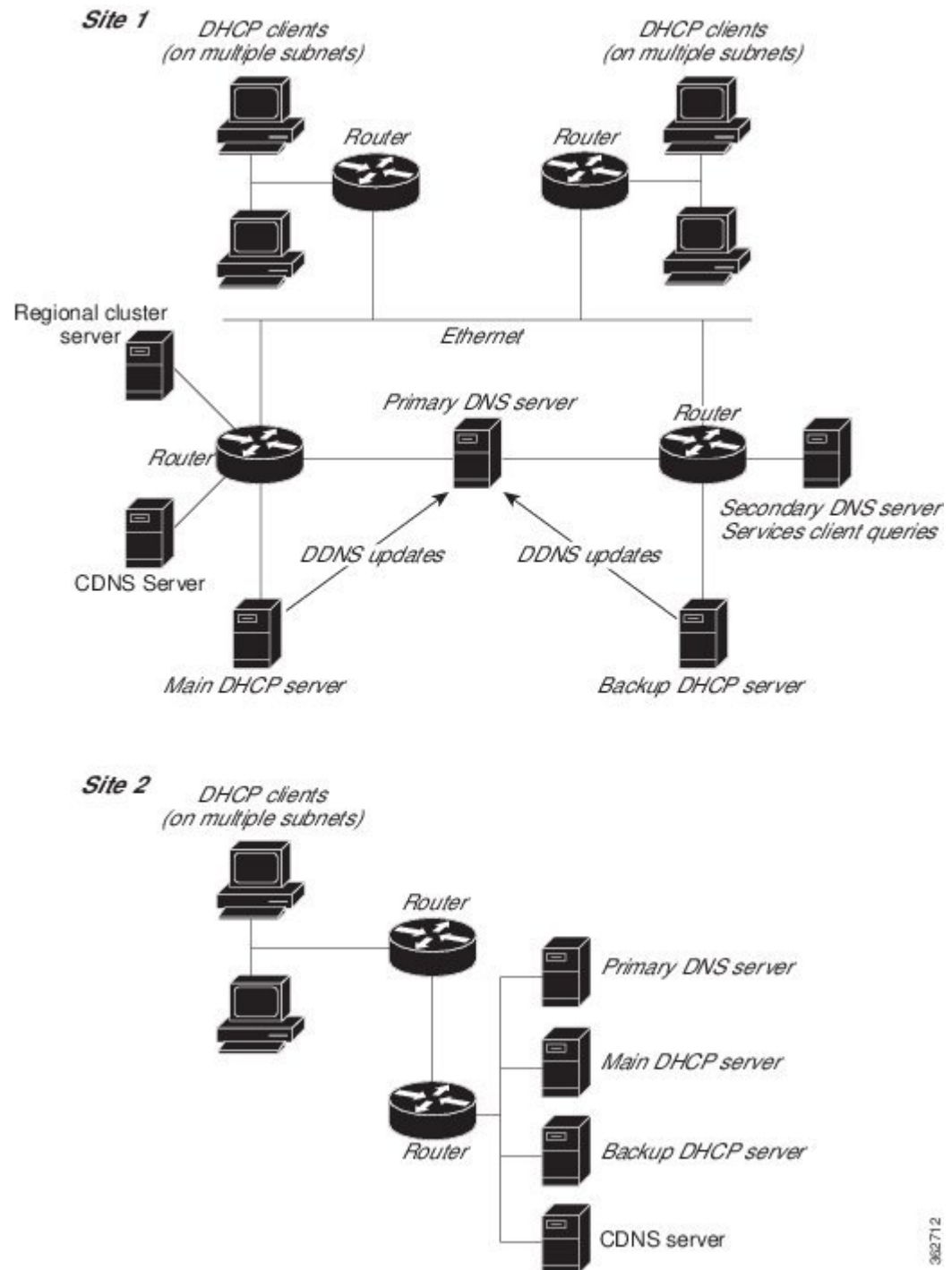
Configuration and Performance Guidelines

Cisco Prime IP Express is an integrated DHCP and DNS server cluster capable of running on a Windows, or Linux workstation or server.

Because of the wide range of network topologies for which you can deploy Cisco Prime IP Express, you should first consider the following guidelines. These guidelines are very general and cover most cases. Specific or challenging implementations could require additional hardware or servers.

Related Topics

General Configuration Guidelines

The following suggestions apply to most Cisco Prime IP Express deployments:

- Configure a separate DHCP server to run in remote segments of the wide area network (WAN).
  Ensure that the DHCP client can consistently send a packet to the server in under a second. The DHCP protocol dictates that the client receive a response to a DHCPDISCOVER or DHCPREQUEST packet within four seconds of transmission. Many clients (notably early releases of the Microsoft DHCP stack) actually implement a two-second timeout.

- In large deployments, separate the secondary DHCP server from the primary DNS server used for dynamic DNS updates.
  Because lease requests and dynamic DNS updates are persisted to disk, server performance is impacted when using a common disk system. So that the DNS server is not adversely affected, run it on a different cluster than the DHCP server.

- Include a time server in your configuration to deal with time differences between the local and regional clusters so that aggregated data at the regional server appears in a consistent way. See the Polling Lease History Data.

- Set DHCP lease times in policies to four to ten days.
  To prevent leases from expiring when the DHCP client is turned off (overnight or over long weekends), set the DHCP lease time longer than the longest period of expected downtime, such as seven days. See *"Managing Leases" section in Cisco Prime IP Express 8.3 DHCP User Guide*.

- Locate backup DNS servers on separate network segments.
  DNS servers are redundant by nature. However, to minimize client impact during a network failure, ensure that primary and secondary DNS servers are on separate network segments.

- If there are high dynamic DNS update rates in the network, configure separate DNS servers for forward and reverse zones.

- Use NOTIFY/IXFR.
  Secondary DNS servers can receive their data from the primary DNS server in two ways: through a full zone transfer (AXFR) or an incremental zone transfer (NOTIFY/IXFR, as described in RFCs 1995 and 1996). Use NOTIFY/IXFR in environments where the name space is relatively dynamic. This reduces the number of records transferred from the primary to the secondary server. See the *"Enabling Incremental*

Zone Transfers (IXFR)" section in *Cisco PrimeIP Express 8.3 Authoritative and Caching DNS User Guide.*

Special Configuration Cases

The following suggestions apply to some special configurations:

- When using dynamic DNS updates for large deployments or very dynamic networks, divide primary and secondary DNS and DHCP servers across multiple clusters.
  Dynamic DNS updates generate an additional load on all Cisco Prime IP Express servers as new DHCP lease requests trigger dynamic DNS updates to primary servers that update secondary servers through zone transfers.

- During network reconfiguration, set DHCP lease renewal times to a small value.
  Do this several days before making changes in network infrastructure (such as to gateway router and DNS server addresses). A renewal time of eight hours ensures that all DHCP clients receive a changed DHCP option parameter within one working day. See the *"Managing Leases" section in Cisco PrimeIP Express 8.3 Authoritative and Caching DNS User Guide*

Interoperability with Earlier Releases

The following table shows the interoperability of Cisco Prime Network Registrar / Cisco Prime IP Express features on the regional CCM server with versions of the local cluster.

Table 1: CCM Regional Feature Interoperability with Server Versions

Feature	Local Cluster Version				
	7.2 (CPNR)	**8.0 (CPNR)**	**8.1 (CPNR)**	**8.2 (CPNR/CPIPE)**	**8.3 (CPNR/CPIPE)**
Push and pull: Address space	x	x	x	x	x
IPv6 address space	x	x	x	x	x
Scope templates, policies, client-classes	x	x	x	x	x
IPv6 prefix and link templates	x	x	x	x	x
Zone data and templates	x	x	x	x	x
Groups, owners, regions	x	x	x	x	x
Resource records (RRs)	x	x	x	x	x
Local cluster restoration	x	x	x	x	x
Host administration	x	x	x	x	x
Extended host administration	x	x	x	x	x
Administrators and roles	x	x	x	x	x
Zone Views				x	x

Feature	Local Cluster Version				
	7.2 (CPNR)	**8.0 (CPNR)**	**8.1 (CPNR)**	**8.2 (CPNR/CPIPE)**	**8.3 (CPNR/CPIPE)**
Administrator: Single sign-on Password change	x x	x x	x x	x x	x x
IP history reporting: Lease history Detailed lease history	x x	x x	x x	x x	x x
Utilization reporting: Subnet utilization history Subnet and scope utilization IPv6 prefix utilization	x x x	x x x	x x x	x x x	x x x