IPv6 Rapid Deployment

The IPv6 rapid deployment feature allows a service provider to provide a unicast IPv6 service to customers over its IPv4 network by using encapsulation of IPv6 in IPv4.

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Information About IPv6 Rapid Deployment

IPv6 Rapid Deployment Tunnels

The 6RD feature is an extension of the 6to4 feature. The 6RD feature allows a service provider (SP) to provide a unicast IPv6 service to customers over its IPv4 network by using encapsulation of IPv6 in IPv4.

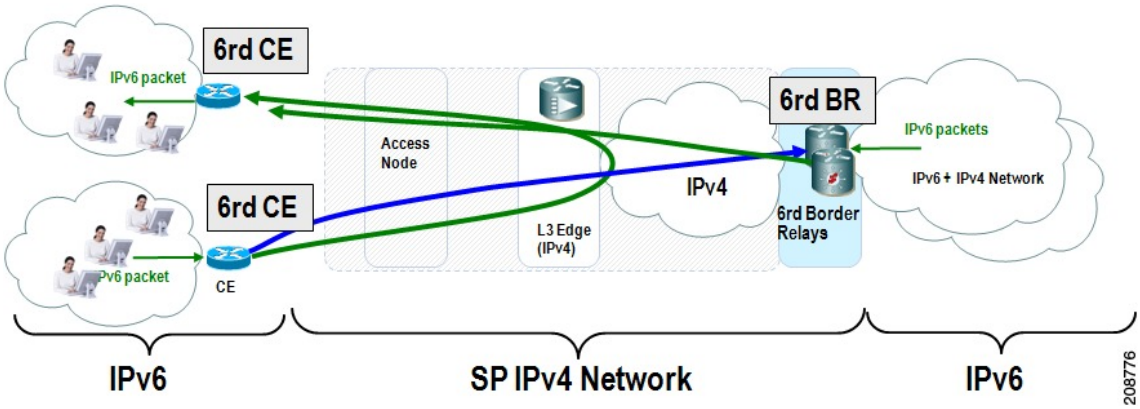
The main differences between 6RD and 6to4 tunneling are as follows:

- 6RD does not require addresses to have a 2002::/16 prefix; therefore, the prefix can be from the SP's own address block. This function allows the 6RD operational domain to be within the SP network. From the perspective of customer sites and the general IPv6 internet connected to a 6RD-enabled SP network, the IPv6 service provided is equivalent to native IPv6.

- All 32 bits of the IPv4 destination need not be carried in the IPv6 payload header. The IPv4 destination is obtained from a combination of bits in the payload header and information on the router. Furthermore, the IPv4 address is not at a fixed location in the IPv6 header as it is in 6to4.

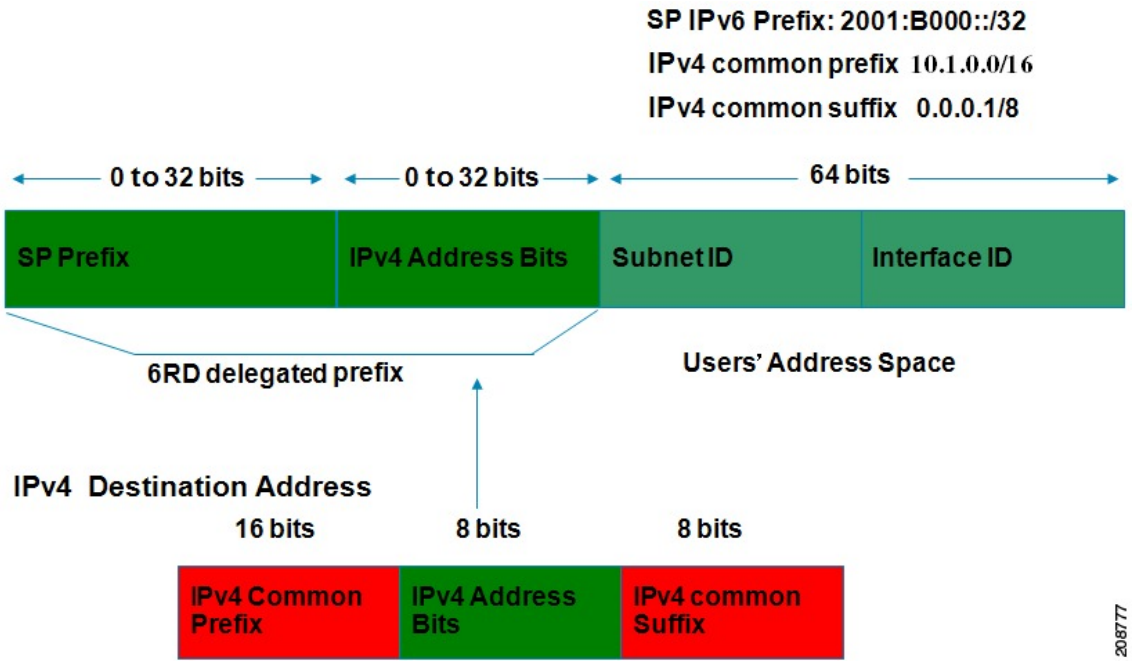
The 6RD SP prefix was selected by the SP for the IPv6 deployment shown in the figure below. The 6RD delegated prefix is derived from the SP prefix and the IPv4 address bits, and is used by the CE for hosts within its site.

Figure 1: 6RD Deployment



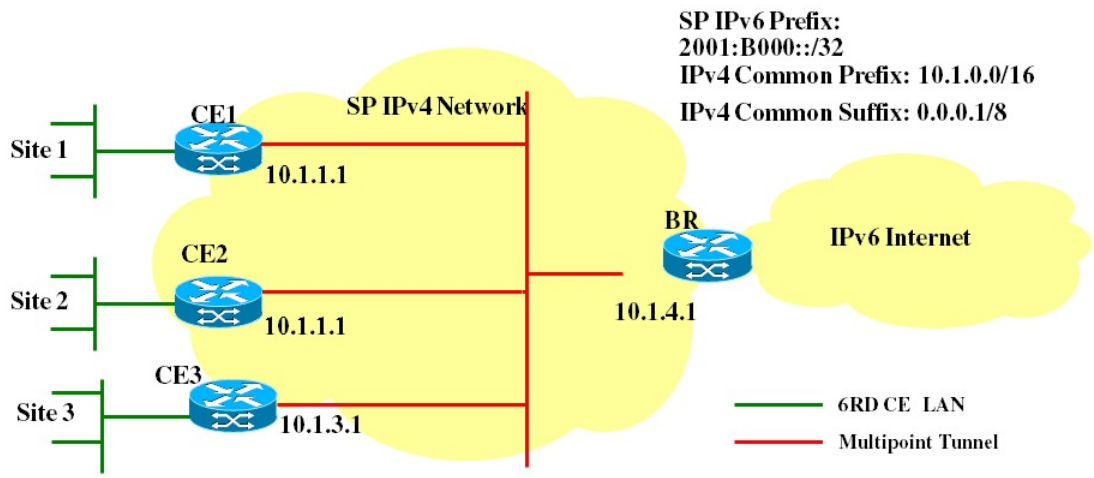
The figure below shows how 6RD prefix delegation works.

Figure 2: 6RD Prefix Delegation Explanation



The figure below shows a 6RD prefix delegation topology.

Figure 3: 6RD Prefix Delegation and Explanation



SP Prefix	2001:B000::/32
IPv4 Common Prefix	10.1.0.0/16
IPv4 Common Suffix	0.0.0.1/8
CE1: Delegated 6RD prefix	2001:B000:0100::/40
CE2: Delegated 6RD prefix	2001:B000:0200::/40
BR: Delegated 6RD prefix	2001:B000:0400::/40
CE1 (IPv4) tunnel transport source	10.1.1.1
CE2 (IPv4) tunnel transport source	10.1.2.1
BR (IPv4) tunnel transport source	10.1.4.1

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How to Configure IPv6 Rapid Deployment

Configuring 6RD Tunnels

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface tunnel** *tunnel-number*
4. **tunnel source** {*ip-address*| *interface-t ype interface-number*}
5. **tunnel mode ipv6ip** [**6rd** | **6to4** | **auto-tunnel** | **isatap**]
6. **tunnel 6rd prefix** *ipv6-prefix* / *prefix-length*
7. **tunnel 6rd ipv4** {**prefix-length** *length*} {**suffix-length** *length*}

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface tunnel** *tunnel-number* **Example:** `Router(config)# interface tunnel 1`	Specifies a tunnel interface and number, and enters interface configuration mode.
Step 4	**tunnel source** {*ip-address*| *interface-t ype interface-number*} **Example:** `Router(config-if)# tunnel source loopback 1`	Specifies the source interface type and number for the tunnel interface.
Step 5	**tunnel mode ipv6ip** [**6rd** | **6to4** | **auto-tunnel** | **isatap**] **Example:** `Router(config-if)# tunnel mode ipv6ip 6rd`	Configures a static IPv6 tunnel interface. • The **auto-tunnel** keyword is not supported on Cisco ASR 1000 series routers.
Step 6	**tunnel 6rd prefix** *ipv6-prefix* / *prefix-length* **Example:** `Router(config-if)# tunnel 6rd prefix 2001:B000::/32`	Specifies the common IPv6 prefix on IPv6 rapid 6RD tunnels.
Step 7	**tunnel 6rd ipv4** {**prefix-length** *length*} {**suffix-length** *length*} **Example:** `Router(config-if)# tunnel 6rd ipv4 prefix-length 16 suffix 8`	Specifies the prefix length and suffix length of the IPv4 transport address common to all the 6RD routers in a domain.

Configuration Examples for IPv6 Rapid Deployment

Example: Configuring 6RD Tunnels

The following example shows the running configuration of a 6RD tunnel and the corresponding output of the **show tunnel 6rd** command:

```
interface Tunnel1
 ipv6 address 2001:B000:100::1/32
 tunnel source loopback 1
 tunnel mode ipv6ip 6rd
 tunnel 6rd prefix 2001:B000::/32
 tunnel 6rd ipv4 prefix-len 16 suffix-len 8
end
Router# show tunnel 6rd tunnel 1
Interface Tunnel1:
  Tunnel Source: 10.1.1.1
  6RD: Operational, V6 Prefix: 2001:B000::/32
  V4 Common Prefix Length: 16, Value: 10.1.0.0
  V4 Common Suffix Length: 8, Value: 0.0.0.1
```

Additional References

Related Documents

Related Topic	Document Title
IPv6 addressing and connectivity	IPv6 Configuration Guide
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
IPv6 commands	Cisco IOS IPv6 Command Reference
Cisco IOS IPv6 features	Cisco IOS IPv6 Feature Mapping

Standards and RFCs

Standard/RFC	Title
RFCs for IPv6	IPv6 RFCs

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for IPv6 Rapid Deployment

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for IPv6 Rapid Deployment

Feature Name	Releases	Feature Information
IP Tunneling: 6RD IPv6 Rapid Deployment	Cisco IOS XE Release 3.1S	The 6RD feature allows a service provider to provide a unicast IPv6 service to customers over its IPv4 network by using encapsulation of IPv6 in IPv4. The following commands were introduced or modified: **tunnel 6rd ipv4**, **tunnel 6rd prefix**, **tunnel mode ipv6ip**, **tunnel source**.