Cisco IOS IP Service Level Agreements (SLAs) are a portfolio of technology embedded in most devices that run Cisco IOS software that allows Cisco customers to analyze IPv4 and now IPv6 service levels for IPv6 applications and services, to increase productivity, to lower operational costs, and to reduce the frequency of network outages. IP SLAs uses active traffic monitoring--the generation of traffic in a continuous, reliable, and predictable manner--for measuring network performance.

IP SLAs has a large portfolio of operations created originally for IPv4. Today, the following Cisco IOS IP SLAs operations are supported for IPv6:

- Internet Control Message Protocol **(ICMP) echo** operation -- Used to monitor end-to-end response time between a Cisco router and devices using IPv4 or IPv6. ICMP Echo is useful for troubleshooting network connectivity issues, but cannot be trusted for accurate performance measurement.
- **TCP connect** operation -- Used to measure the response time taken to perform a TCP Connect operation between a Cisco router and devices using IPv4 or IPv6. Ideal to verify if a remote port / service is up and running.
- User Datagram Protocol **(UDP) echo** operation -- Used to monitor end-to-end response time between a Cisco router and devices using IPv4 or IPv6.
- **UDP jitter** operation -- Used to analyze round-trip delay, one-way delay, one-way jitter, one-way packet loss, and connectivity in networks that carry UDP traffic in IPv4 or IPv6 networks. Can also proactively monitor VoIP quality levels in your network, allowing you to guarantee VoIP quality levels to your users in IPv4 or IPv6 networks. This is by far the best operation for serious performance measurement.

Contents

Before you begin

Verify if the router image supports both IP SLAs and IPv6

First, make sure the version of Cisco IOS and your platform both support IP SLAs for IPv6. To complete this verification, you can use Cisco Feature Navigator. Cisco Feature Navigator is located at the following URL: http://www.cisco.com/go/fn.

Enabling IPv6 Routing and Configuring IPv6 Addressing

By default, IPv6 routing is disabled in the Cisco IOS software. To enable IPv6 routing, you must first enable

the forwarding of IPv6 traffic globally on the router and then you must assign IPv6 addresses to individual interfaces in the router.

To enable the forwarding of IPv6 traffic globally on the router, use the following command in global configuration mode:

```
Router(config)# ipv6 unicast-routing
```

The following example shows how to configure an IPv6 address on an interface. This example starts in global configuration mode.

```
interface Ethernet0
ipv6 address autconfig
```

To learn more about IPv6 routing and address configuration, see the Cisco IOS IPv6 Configuration Guide.

Note: At least one interface with an IPv6 address must be configured before configuring the IPv6 options in IP SLAs.

Configuring IP SLAs

When at least one IPv6 address is configured, the IPv6 options of IP SLAs will become available.

```
Router(config)# ip sla 1
Router(config-ip-sla)# udp-jitter ?
 Hostname or X:X:X:X::X
 Hostname or A.B.C.D Destination IP/IPv6 address or hostname
```

All the operations are entirely identical to their IPv4 equivalent, and are configured the same way. There is no functional, performance, scalability or accuracy difference between IPv4 and IPv6.

Turning on the Responder

Some operations such as UDP Echo and UDP Jitter will require a responder. The responder is configured the same way as with IPv4:

```
Router(config)# ip sla responder
```

The responder is automatically enabled for both IPv4 and IPv6. There is no option to enable it only for one protocol, but this can still be done with access-lists.

Configuration Examples

Configuration example of an ICMP Echo operation:

```
ip sla 1
 icmp-echo 2001::214:A8FF:FE7A:ED70
ip sla schedule 1 start-time now
```

Configuration example of a TCP connect operation:

```
ip sla 1
 tcp-connect 2001::214:A8FF:FE7A:ED70 5566
ip sla schedule 1 start-time now
```

Configuration example of an UDP Echo operation:

```
ip sla 1
 udp-echo 2001::214:A8FF:FE7A:ED70 5566
ip sla schedule 1 start-time now
```

Configuration example of a UDP Jitter operation:

```
ip sla 1
 udp-jitter 2001::214:A8FF:FE7A:ED70 5566
ip sla schedule 1 start-time now
```

Configuration Examples using SNMP

IP SLAs for IPv6 can be configured by SNMP using both CISCO-RTTMON-MIB and CISCO-RTTMON-IP-EXT-MIB together.

```
snmpset -v2c -c public 10.48.164.20
  rttMonCtrlAdminStatus.1 i 5
  rttMonCtrlAdminRttType.1 i 6
  rttMonEchoAdminProtocol.1 i 24
  rttMonCtrlAdminNvgen.1 i true
  rttMonEchoAdminTargetPort.1 i 23
  crttMonIPEchoAdminTargetAddrType.1 i ipv6
  crttMonIPEchoAdminTargetAddress.1 s "11:23:45:67:00:08:00:09:00:00:00:00:00:00:00:02"
  crttMonIPEchoAdminSourceAddrType.1 i ipv6
  crttMonIPEchoAdminSourceAddress.1 s "00:11:00:00:00:00:00:00:00:00:00:00:00:00:00:02"
```

Here is the detail of what was configured:

```
CISCO-RTTMON-MIB::rttMonCtrlAdminStatus.1 = INTEGER: createAndWait(5)
CISCO-RTTMON-MIB::rttMonCtrlAdminRttType.1 = INTEGER: tcpConnect(6)
CISCO-RTTMON-MIB::rttMonEchoAdminProtocol.1 = INTEGER: ipTcpConn(24)
CISCO-RTTMON-MIB::rttMonCtrlAdminNvgen.1 = INTEGER: true(1)
CISCO-RTTMON-MIB::rttMonEchoAdminTargetPort.1 = INTEGER: 23
CISCO-RTTMON-IP-EXT-MIB::crttMonIPEchoAdminTargetAddrType.1 = INTEGER: ipv6(2)
CISCO-RTTMON-IP-EXT-MIB::crttMonIPEchoAdminTargetAddress.1 = STRING: "11:23:45:67:00:08:00:09:00:0
CISCO-RTTMON-IP-EXT-MIB::crttMonIPEchoAdminSourceAddrType.1 = INTEGER: ipv6(2)
CISCO-RTTMON-IP-EXT-MIB::crttMonIPEchoAdminSourceAddress.1 = STRING: "00:11:00:00:00:00:00:00:00:0
```

And the operation configuration created on the router:

```
 ip sla 1
    tcp-connect 3131:3A32:333A:3435:3A36:373A:3030:3A30 23 source-ip 3030:3A31:313A:3030:3A30:303A
 ip sla schedule 1 start-time pending
```

Additional Notes and Caveats

- Performance numbers might be slightly less accurate with IPv6 tests, primarily because for the moment the IPv4 microseconds timestamps cannot be used for IPv6. This problem affects both the sender and responder. CSCtd50484 and CSCte00862 are tracking these issues and we are working on it.
- VRF-aware operations over IPv6 are not supported.

- Auto IP SLAs and auto-registration do not support IPv6.
- Multicast or anycast addresses are not supported.

Additional Resources

- Cisco IOS IP Service Level Agreements User Guide
- Measuring Delay, Jitter, and Packet Loss with Cisco IOS SAA and RTTMON