



**Networkforyou**

Subscribe to our  
**You Tube Channel**

**Welcome  
To  
Network for you  
IP SLA**

Networkforyou

Email us:  
[networkforyou4@gmail.com](mailto:networkforyou4@gmail.com)

1 of 11

WhatsApp Us : +918143809578



## IP SLA (Service-Level Agreement):

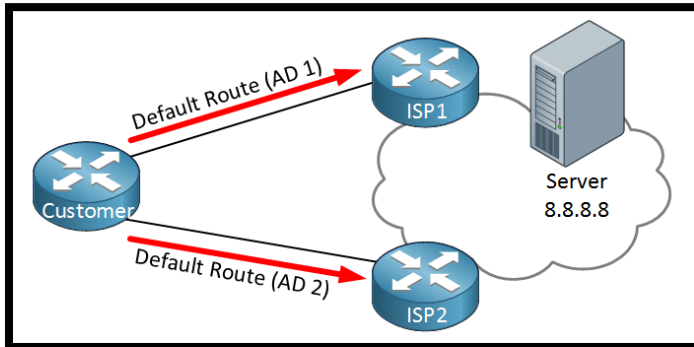
- Internet Protocol SLA is a term which stands for Service Level Agreement.
- Service Level Agreement is a formal or informal contract between two parties.
- IP SLA uses active traffic monitoring to monitor continuous traffic on the network.
- With IP SLAs, the Cisco routers and Cisco switches perform periodic measurements.
- IP Service Level Agreement is feature of Cisco IOS that allows collecting information.
- IP SLA is a feature to collect info about the performance of network in the real time.
- **IP SLA (Service-Level Agreement) is a great feature on Cisco IOS devices that can be used to “measure” network performance.**
- **This can be something simple like a ping where we check the round-trip time.**
- **Measuring network performance is pretty cool but what makes IP SLA even more powerful is that you can combine it with static routes, policy based routing.**
- IP SLA is a cisco IOS feature, which can be used to measure network performance.
- IP Service-Level Agreements (SLA) measure the current performance of the network.
- **IP SLA continuously collect data about latency, packet loss, jitter & response time.**
- IP SLA responder is the IOS software, which responds to the SLA request packet.
- IP Service Level Agreement consist of two components source and target router.
- IP Service Level Agreement (SLA) source is where the IP SLA operation is defined.
- Operations is type of packet that will be sent from the source to the destination.
- IP Service Level Agreement each measurement that we do is called an operation.
- In IP SLA the routers will collect the data and can be used for tracking.
- For example, you can use SLA to view the status of static routes or for PBR.
- The destination router is referred to as IP Service Level Agreement Responder.
- Types of traffic IP SLA can use **ICMP, RTP, TCP, UDP, DNS, DHCP, and HTTP & FTP.**
- IP SLAs ICMP Echo operation to monitor end-to-end response time between devices.
- ICMP Echo is useful for troubleshooting network connectivity issues.
- ICMP Echo operation measures end-to-end response time between devices.

Let me give you some example:

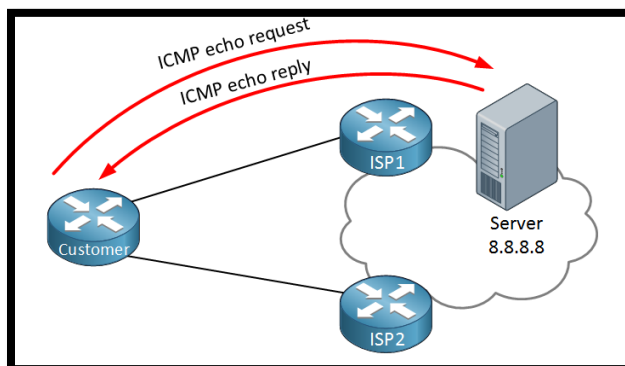
Email us:  
[networkforyou4@gmail.com](mailto:networkforyou4@gmail.com)

2 of 11

WhatsApp Us : +918143809578



- Above we have a customer router connected to two ISPs.
- Somewhere on the Internet there's a server we'd like to reach.
- In a scenario like this, typically we use two default routes with different ADs.
- Whenever ISP1 fails, we switch over to ISP2.
- The problem with this setup is that it's not very reliable.
- The default route will be in the routing table as long as the interface is up and/or the next hop is reachable.
- It's possible that ISP1 is having connectivity issues and unable to reach that remote server but we still use them for all our traffic.
- To prevent this from happening we can combine default routes with IP SLA.



- Our customer router is now using IP SLA to ping the remote server.
- As long as we get a reply, we will keep using ISP1 as our main route.
- When the ping fails, we switch over to ISP2.
- This method is far more reliable as we check end-to-end connectivity.

Let do One Basic Lab for this.

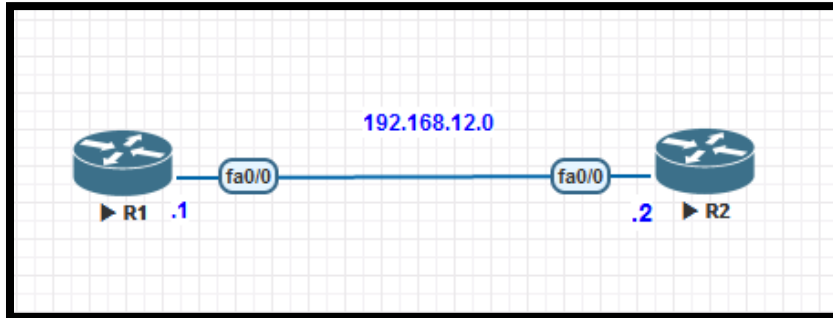
**Email us:**  
**networkforyou4@gmail.com**

3 of 11

**WhatsApp Us : +918143809578**



Lab time:



R1 Configuration	R2 Configuration
<pre>en config t hostname R1 int f0/0 ip add 192.168.12.1 255.255.255.0 no sh</pre> <p>R1#config t Enter configuration commands, one per line. End with CNTL/Z. R1(config)#ip sla 1 R1(config-ip-sla)#?</p> <p>IP SLAs entry configuration commands:</p> <ul style="list-style-type: none"><li>dhcp DHCP Operation</li><li>dns DNS Query Operation</li><li>ethernet Ethernet Operations</li><li>exit Exit Operation Configuration</li><li>frame-relay Frame-relay Operation</li><li>ftp FTP Operation</li><li>http HTTP Operation</li><li>icmp-echo ICMP Echo Operation</li><li>icmp-jitter ICMP Jitter Operation</li><li>mpls MPLS Operation</li><li>path-echo Path Discovered ICMP Echo Operation</li><li>path-jitter Path Discovered ICMP Jitter Operation</li><li>tcp-connect TCP Connect Operation</li></ul>	<pre>en config t hostname R2 int f0/0 ip add 192.168.12.2 255.255.255.0 no sh</pre>

**Email us:**  
[networkforyou4@gmail.com](mailto:networkforyou4@gmail.com)

4 of 11

**WhatsApp Us : +918143809578**



udp-echo UDP Echo Operation  
udp-jitter UDP Jitter Operation  
voip Voice Over IP Operation

First we have to choose an operation number, let's pick number 1. You can see that there are a lot of different operations we can choose from. Let's start with the icmp echo:

```
R1(config-ip-sla)#icmp-echo 192.168.12.2  
R1(config-ip-sla-echo)#?
```

IP SLAs echo Configuration Commands:

default Set a command to its defaults  
exit Exit operation configuration  
frequency Frequency of an operation  
history History and Distribution Data  
no Negate a command or set its defaults  
owner Owner of Entry  
request-data-size Request data size  
tag User defined tag  
threshold Operation threshold in milliseconds  
timeout Timeout of an operation  
tos Type Of Service  
verify-data Verify data  
vrf Configure IP SLAs for a VPN Routing/Forwarding instance

Let's send ICMP echos to 192.168.12.2. There are a lot of optional parameters you can configure for an operation, for example let's change the frequency:

```
R1(config-ip-sla-echo)#frequency 10
```

We'll send an ICMP echo every 10 seconds. The only thing left to do is to start our IP SLA operation. This

**Email us:**  
**networkforyou4@gmail.com**

5 of 11

**WhatsApp Us : +918143809578**



is how we do it:

R1(config)#ip sla schedule 1 ?

ageout How long to keep this Entry when inactive  
life Length of time to execute in seconds  
recurring Probe to be scheduled automatically every day  
start-time When to start this entry  
<cr>

You have to use the ip sla schedule command to start your operation. You can schedule it but we will start our operation right now and let it run forever:

R1(config)#ip sla schedule 1 start-time ?

after Start after a certain amount of time from now  
hh:mm Start time (hh:mm)  
hh:mm:ss Start time (hh:mm:ss)  
now **Start now**  
pending Start pending

R1(config)#ip sla schedule 1 start-time now ?

ageout How long to keep this Entry when inactive  
**life Length of time to execute in seconds**  
recurring Probe to be scheduled automatically every day  
<cr>

R1(config)#ip sla schedule 1 start-time now life ?

<0-2147483647> Life seconds (default 3600)  
**forever continue running forever**

R1(config)#**ip sla schedule 1 start-time now life forever**

It should now be up and running. You can check

**Email us:**  
**networkforyou4@gmail.com**

6 of 11

**WhatsApp Us : +918143809578**



your IP SLA configuration as given below:

**R1#sh ip sla configuration**

IP SLAs Infrastructure Engine-II

Entry number: 1

Owner:

Tag:

**Type of operation to perform: icmp-echo**

Target address/Source address:

192.168.12.2/0.0.0.0

Type Of Service parameter: 0x0

Request size (ARR data portion): 28

Operation timeout (milliseconds): 5000

Verify data: No

Vrf Name:

Schedule:

Operation frequency (seconds): 10 (not considered if randomly scheduled)

Next Scheduled Start Time: Start Time already passed

Group Scheduled : FALSE

Randomly Scheduled : FALSE

Life (seconds): Forever

Entry Ageout (seconds): never

Recurring (Starting Everyday): FALSE

Status of entry (SNMP RowStatus): Active

Threshold (milliseconds): 5000 (not considered if react RTT is configured)

Distribution Statistics:

Number of statistic hours kept: 2

Number of statistic distribution buckets kept: 1

Statistic distribution interval (milliseconds): 20

History Statistics:

Number of history Lives kept: 0

Number of history Buckets kept: 15

History Filter Type: None

Enhanced History:

**Email us:**  
**networkforyou4@gmail.com**

7 of 11

**WhatsApp Us : +918143809578**



Above you can see the details of our IP SLA operation. A lot of parameters are configured by default.

This is how you can check if it's running or not:

### R1#show ip sla statistics

IPSLAs Latest Operation Statistics

IPSLA operation id: 1

Type of operation: icmp-echo

Latest RTT: 7 milliseconds

Latest operation start time: \*23:56:34.991 UTC

Thu May 6 2021

**Latest operation return code: OK**

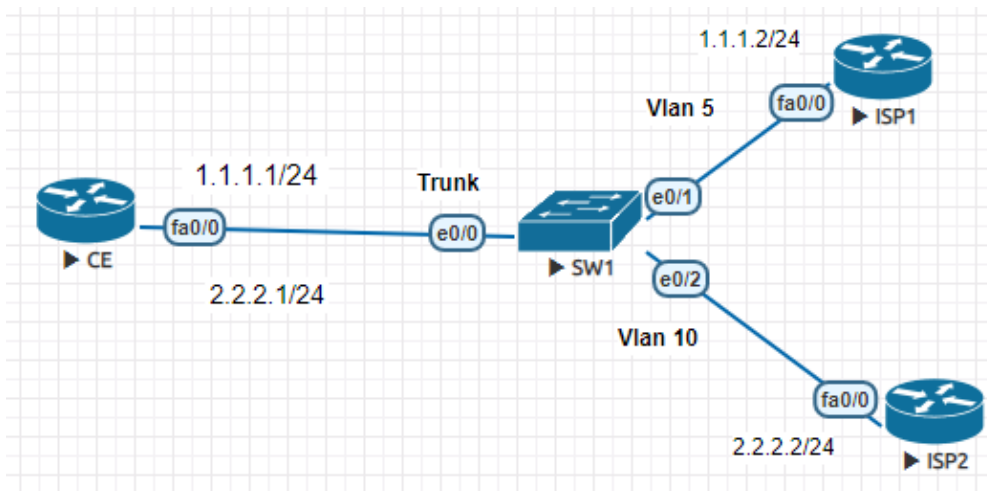
**Number of successes: 11**

Number of failures: 1

Operation time to live: Forever

Use the show ip sla statistics command to see the results. You can see my pings are successful and our round trip time is only 7 ms.

Let do one Lab on this.



Email us:  
networkforyou4@gmail.com

8 of 11

WhatsApp Us : +918143809578



Let consider we have 2 ISP that is ISP1 and ISP2 we connect to switch and we put ISP1 in Vlan 5 and ISP2 in Vlan 10 and switch interface connect to our Customer Edge router put in trunk and for Customer Edge router we will do Subinterface like f0/0.5 for ISP 1 and f0/0.10 for ISP2 as show in the above figure.

CE Configuration	SW1 Configuration	ISP1 Configuration	ISP2 Configuration
<pre>en config t hostname CE  int f0/0 no sh  int f0/0.5 encapsulation dot1Q 5 ip add 1.1.1.1 255.255.255.0 no sh  int f0/0.10 encapsulation dot1Q 10 ip add 2.2.2.1 255.255.255.0 no sh  ip sla 1  icmp-echo 1.1.1.2 source-ip 1.1.1.1 frequency 10 timeout 5000 exit ip sla schedule 1 start- time now life forever  track 1 ip sla 1  ip router 0.0.0.0 0.0.0.0 1.1.1.2 track 1 ip router 0.0.0.0 0.0.0.0 2.2.2.2 10</pre>	<pre>en config t hostname SW1  int e0/0 switchport trunk encapsulation dot1q switchport mode trunk  int e0/1 switchport access vlan 5 switchport mode access  int e0/2 switchport access vlan 10 switchport mode access</pre>	<pre>en config t hostname ISP1  int f0/0 ip add 1.1.1.2 255.255.255.0 no sh  int lo 0 ip add 8.8.8.8 255.255.255.0</pre>	<pre>en config t hostname ISP2  int f0/0 ip add 2.2.2.2 255.255.255.0 no sh  int lo 0 ip add 8.8.8.8 255.255.255.0</pre>

**Email us:**  
[networkforyou4@gmail.com](mailto:networkforyou4@gmail.com)

**WhatsApp Us : +918143809578**



```
CE#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
+ - replicated route, % - next hop override

Gateway of last resort is 1.1.1.2 to network 0.0.0.0

S* 0.0.0.0/0 [1/0] via 1.1.1.2
    1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      1.1.1.0/24 is directly connected, FastEthernet0/0.5
L      1.1.1.1/32 is directly connected, FastEthernet0/0.5
    2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      2.2.2.0/24 is directly connected, FastEthernet0/0.10
L      2.2.2.1/32 is directly connected, FastEthernet0/0.10
```

```
ISP1(config)#int f0/0
ISP1(config-if)#sh
ISP1(config-if)#
*Aug 24 11:05:40.655: %LINK-5-CHANGED: Interface FastEthernet0/0, changed state
to administratively down
*Aug 24 11:05:41.655: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthern
et0/0, changed state to down
```

```
CE#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2
i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
ia - IS-IS inter area, * - candidate default, U - per-user static route
o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
+ - replicated route, % - next hop override

Gateway of last resort is 2.2.2.2 to network 0.0.0.0

S* 0.0.0.0/0 [10/0] via 2.2.2.2
    1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      1.1.1.0/24 is directly connected, FastEthernet0/0.5
L      1.1.1.1/32 is directly connected, FastEthernet0/0.5
    2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      2.2.2.0/24 is directly connected, FastEthernet0/0.10
L      2.2.2.1/32 is directly connected, FastEthernet0/0.10
```

Email us:  
networkforyou4@gmail.com

10 of 11

WhatsApp Us : +918143809578



```
CE#sh ip sla statistics
IPSLAs Latest Operation Statistics

IPSLA operation id: 1
    Latest RTT: NoConnection/Busy/Timeout
Latest operation start time: 11:11:28 UTC Tue Aug 24 2021
Latest operation return code: Timeout
Number of successes: 61
Number of failures: 22
Operation time to live: Forever
```

### IP SLA Troubleshooting:

- IP SLA is feature on Cisco devices that can be used to measure network performance.
- IP SLA is a feature to collect info about the performance of network in the real time.
- Ensure and verify that the destination IP address is reachable and correctly defined.
- Ensure that source IP address is reachable from the destination and correctly defined.
- If the operation needs an IP SLA responder, one must be configured and reachable.
- Ensure, check and verify that any necessary port numbers are correctly identified.