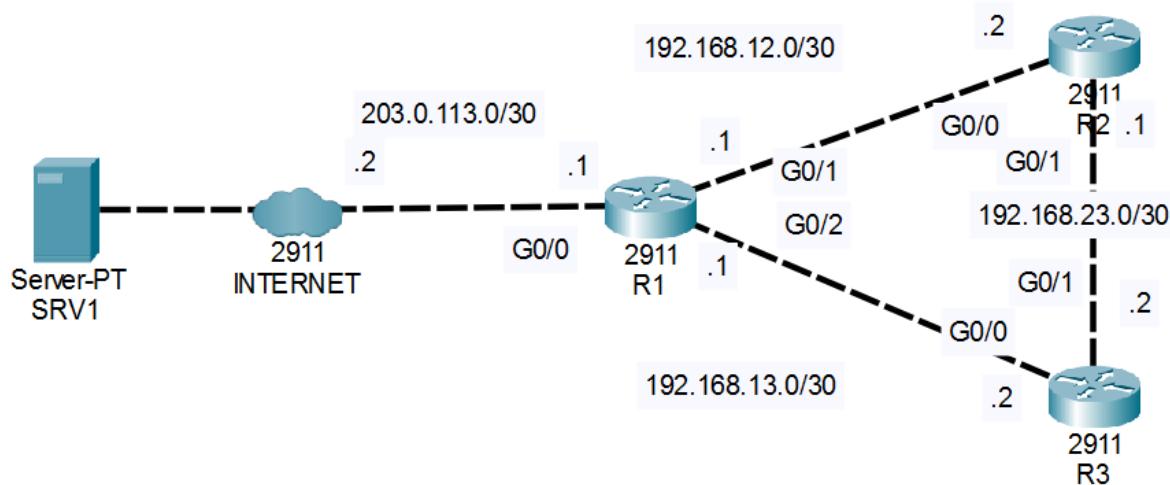


Network Topology:



Routing has been preconfigured. The default route on R1, OSPF on all routers with 'network 0.0.0.0 255.255.255.255 area 0'.

Instructions and Actions:

1. Configure the software clock on R1, R2, and R3 to 12:00:00 12 Jan 2026 (UTC).

Note: The Cisco Packet Tracer doesn't support calendar commands.

```
R3#clock set 12:00:00 13 Jan 2026
R3#show clock
12:0:3.278 UTC Tue Jan 13 2026
R3#
```

2. Configure the time zone of R1, R2, and R3 to match your own. I configured Indian Standard Time (IST), which is 5 hours and 30 minutes ahead of the default UTC (Coordinated Universal Time).

```
R3#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#clock timezone IST 5 30
R3(config)#
```

3. Configure R1 to synchronise to NTP server 1.1.1.1 over the Internet. What stratum is 1.1.1.1? What stratum is R1?

```

R1(config)#ntp server 1.1.1.1
R1(config)#do sh ntp ass

address          ref clock      st  when    poll   reach  delay
offset           disp
*~1.1.1.1       127.127.1.1   1   3        16     1     0.00
0.00             0.00
 * sys.peer, # selected, + candidate, - outlyer, x falseticker, ~
configured
R1(config)#do sh ntp status
Clock is synchronized, stratum 2, reference is 1.1.1.1
nominal freq is 250.0000 Hz, actual freq is 249.9990 Hz, precision is 2**24
reference time is E36B5064.0000001EB (10:16:4.491 UTC Thu Dec 31 2020)
clock offset is 0.00 msec, root delay is 0.00 msec
root dispersion is 94.45 msec, peer dispersion is 0.12 msec.
loopfilter state is 'CTRL' (Normal Controlled Loop), drift is - 0.000001193
s/s system poll interval is 4, last update was 12 sec ago.
R1(config)#

```

R1 is stratum 2

4. Configure R1 as a stratum 8 NTP master.

```

R1(config)#ntp master 8
R1(config)#do sh ntp associations

address          ref clock      st  when    poll   reach  delay
offset           disp
*~1.1.1.1       127.127.1.1   1   14      32     377   0.00
0.00             0.12
 ~127.127.1.1   .LOCL.        7   10      64     3     0.00
0.00             0.01
 * sys.peer, # selected, + candidate, - outlyer, x falseticker, ~
configured
R1(config)#

```

5. Synchronize R2 and R3 to R1 with authentication.

R1 CLI:

```

R1(config)#ntp authenticate
R1(config)#ntp authentication-key 1 md5 packettracer
R1(config)#ntp trusted-key
% Incomplete command.
R1(config)#ntp trusted-key 1
R1(config)#

```

R2 and R3 CLI:

```

R3(config)#ntp authenticate
R3(config)#ntp authentication-key 1 md5 packettracer
R3(config)#ntp trusted-key 1
R3(config)#ntp server 192.168.13.1 key 1
R3(config)#do sh ntp ass

address          ref clock      st  when    poll   reach  delay
offset           disp
 ~192.168.13.1  1.1.1.1       2   4        16     1     0.00
-158984174800.00 0.00
 * sys.peer, # selected, + candidate, - outlyer, x falseticker, ~
configured
R3(config)#

```

Why is R1 still stratum 2 and not stratum 8?

This behaviour will be shown when the 1.1.1.1 goes down, then R1 will become stratum 8 for R2 and R3.