Cisco Routing (Packet Tracer 6)

**Note: underlined commands can be negated/disabled by adding “no” before them**

**Ex: login: turn on login requirement**

**No login: turn off login requirement**

**Configurations:**

**1- erase-startup-config:** Remove any existing configurations (usually followed by **reload**)

**2- show-running-config**: Display information about the currently running configuration

**3- copy-running-config startup-config**: Set the currently running configuration as the startup configuration

**Mode Switching:**

**1- enable:** privileged exec commands

**2- configure terminal**: global router configuration commands

**3- interface name**: access specific interface (F1/0, G1/1, S0/1/0, etc..)

**4- exit**: go back to previous mode

**Enable Commands (Exec):**

**1- hostname name:** name the router

**2- banner motd**: add “Message of the day”

**3- ip domain-lookup:** enable DNS

**4- enable password pass:** set password on enable mode

**5- enable secret pass**: set encrypted password on enable mode

**Terminal Commands:**

**1- line console port**: enter config mode for console port (ports start at 0, add one for any additional console port)

1. **password pass:** add password on console access to this port
2. **login:** enables login as a requirement

**2- line vty 0 4**: similar to console except that we are configuring the virtual console ports of a router which are the ports a user accesses when accessing the console of a router wirelessly through the “**telnet IP**” command. vty has same command as console.

1. **logging synchronous**: enable synchronous logging of messages

**Interface Commands:**

**1- ip address IP mask**: set up IP on current port

**2- shutdown**: turn off connections to/from current port (**no shutdown** is important as ports are down by default)

**3- description**: describe what the port is used for

**4- clock rate number**: set up clock rate (only for S/X/X/X interfaces)

**Static Routing:**

**1- ip route target\_Network\_IP target\_Network\_Mask next\_Hop\_IP or next\_Hop\_Port** : manually tell the router where to go to reach a distant network

**2- ip route 0.0.0.0 0.0.0.0 next\_Hop\_IP or next\_Hop\_Port** : default route when the router doesn’t have any information about the target network

A **recursive static route** (**next\_Hop\_IP**) relies on the next hop router in order for packets to be sent to it so it requires two routing table lookups. It must first look in the routing table for the destination network and then look up the exit interface/direction of the network for the next hop router. A **directly attached static route** (**next\_Hop\_Port**) relies on its exit port in order for packets to be sent to its destination so it needs one lookup. A **fully specified route** (**Port IP**)[in that order] takes both.

**Dynamic Routing:**

A- RIP (Distance Vector Algorithm): Routers will periodically (30 seconds usually) send out to their neighbor data about all the networks connected to them. They will store any data received from their neighbors in their routing tables. Soon after a few rounds every router will have the IP, mask, and next hop to any router reachable from it. Routers send out a hop counter (capped at 15) for other routers to use when calculating the best route.

**1- router rip**: enter RIP configuration mode

**a- version 2**: enable RIPv2

**b- network IP**: add network (must be directly reachable by a port) as a RIP neighbor

**c- no auto-summary**: prevent the automatic summarization of networks at major boundaries

**d- passive-interface port**: port won’t receive RIP data about other networks (useful on ports connected to LANs)

**e- default-information originate**: send default static route alongside RIP updates

B- OSPF (Link State Algorithm): OSPF creates a topology of the entire reachable system. Routers will send out to their neighbor data only when a network change is detected with no hop limit.

**1- router ospf ID**: enter OSPF configuration mode (ID is local and not needed but must be included, usually 1)

**a- network IP Mask area 0**: add network as OSPF neighbor (area is local but must be included, usually 0)

**Note: A router in OSPF has an OSPF ID in the form of an IP address assigned to it either manually:**

**b- router-id IP** : set OSPF ID

**c- clear ip ospf process**: reset OSPF routes

**Or as the highest IP on its loopback ports if the above isn’t available:**

**d- interface lo0**: access configuration mode on loopback port 0

1. **ip add IP WildCard\_Mask**: assign loopback IP

**Note: Wildcard Mask is (255.255.255.255 minus original mask)**

**ii- no shutdown**: turn on loopback port

**Or as the highest IP on its standard ports if neither of the above is provided.**

**If you add a loopback port IP, the router will not change its OSPF ID immediately. You must first save your work by saving the running config as startup config then resetting the router with the reload command.**

**ANY WORK DONE PRIOR TO THE RELOAD COMMAND WILL BE LOST, SAVE A COPY OF YOUR PACKETTRACER FILE FIRST!**

**e- passive-interface port**: port won’t receive OSPF data about other networks (useful on ports connected to LANs)

**f- passive-interface default**: all ports are passive by default

**g- no passive-interface**: undo any passive interface status assigned

**The default bandwidth cap on OSPF is 100Mb/s or 100,000Kb/s which means that:**

**100,000+ have a cost of 1, 10,000 has a cost of 10, 1,000 has a cost of 100, etc..**

**To change it we use:**

**h- auto-cost reference-bandwidth value**: set the bandwidth of default cost 1 (in Kb/s)

For testing purposes we can manually change values inside any interface/port with:

**1- bandwidth value**: set the bandwidth of this ports connection

**2- ip ospf cost value**: manually set the OSPF cost

|  |  |  |
| --- | --- | --- |
| Attribute | RIP | OSPF |
| Convergence | Slow | Fast |
| Network Size | For small to medium networks | For large and small networks |
| Need of Device Resources | Much less memory and CPU intensive than OSPF | Memory and CPU intensive |
| Need of Network Resources | Bandwidth consuming; whole routing table is sent | Less than RIP; only small updates are sent |
| Metric | Based on hop count | Based on bandwidth |
| Design | Flat network | Hierarchical network possible |
| Hop limit | 15 | Unlimited |

**Troubleshooting Commands:**

**1- show ip route**: Displays the entire routing table

**2- show ip route ospf**: Displays only OSPF routes

**3- show ip protocols**: Show information about all dynamic connections made

**4- show ip interface brief**: Displays a summary of all interfaces including IP and status

**5- show ip ospf neighbor**: Displays connected OSPF neighbors

**6- ping target\_IP**: attempt to contact the target IP

**7- tracert target\_IP**: trace a path to the target IP

VLAN [Virtual LAN]: VLANs allow an admin to segment networks based on custom factors without regard for the physical location of the user or device. These VLANs are defined by global VLAN IDs. VLAN Trunks are pathways between switches that carry more than one VLAN.

Broadcasts sent by VLAN devices only go to devices of the same VLAN.

1. **vlan ID**: enter configuration mode for this VLAN
   1. **name name:** name the VLAN (locally. Globally the VLAN is still referenced by its ID)
   2. **end**
2. **no vlan ID**: removes the VLAN

**Note: All ports are set to the default VLAN initially (VLAN 1)**

1. **inteface port**
   1. **switchport mode access**
   2. **switchport access vlan ID**: set port to specified VLAN

**Note: - Ports set to an unnamed VLAN will create it with a generated name**

**- Ports on VLANs that were deleted won’t transfer traffic till set to a new VLAN or reset to default with the no switchport access vlan command**

1. **inteface VLAN ID**: enter configuration mode for all ports on this VLAN
   1. **no ip address**:remove IP address on this port
   2. **ip address IP Mask**:set up IP address on VLAN
2. **show VLAN brief**: display information about currently running VLANs

**Managing VLAN Trunks:**

1. **Dynamic (done on one port only):**

**inteface port**

**switchport mode dynamic desirable**

**Note: - Trunked interfaces won’t show up on the vlan table so we use show interfaces trunk**

**- By default all VLANs have access to the trunk. We can change this with switchport trunk**

1. **Static (done on both ends):**

**inteface port**

**switchport mode trunk**

**VLAN Database:**

1. **Show flash**: view flash to determine if vlan.dat exists
2. **Delete vlan.dat**: removes the VLAN file and reset the VLAN settings to default

**A second method of providing routing and connectivity for multiple VLANs is through the use of an 802.1Q trunk between one or more switches and a single router interface. This method is also known as router-on-a-stick inter-VLAN routing. In this method, the physical router interface is divided into multiple subinterfaces that provide logical pathways to all VLANs connected.**

**Switches are configured the same (we can’t use a dynamic trunk when connecting a switch to a router though)**

**For routers:**

**inteface port.VLAN\_ID ex: g0/1.10 for VLAN 10**

**encapsulation dot1Q VLAN\_ID**

**ip address IP Mask**

**Repeat for every VLAN that should pass through this port**

**Note: don’t forget to no shutdown the port itself (without VLAN extenion) at the end**

**ex: interface g0/1**

**no shutdown**