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Static Routes

Objective: We will configure eRouters 1, 2, and 4 with IP addresses and then add static routes for all routers.

Goals:

1) Set our hostname and get our interfaces up.

2) Ping our directly connected interfaces

3) Configure static routes for our topology

4) View our routing table

5) Verify that we can ping all routers

IP Addresses: Please set these IP addresses on the interfaces of your routers.

	eRouter1	eRouter2	eRouter4
Interface Ethernet 0	10.1.1.1 255.255.255.0	10.1.1.2 255.255.255.0	
Interface Serial 0	12.5.10.1 255.255.255.0		12.5.10.2 255.255.255.0

1. Configure the eRouters 1, 2, and 4 to the specifications outlined in the table above.

2. After you have configured your IP address on each interface verify that you can ping your directly connected neighbors. That means when you are on eRouter 1 you should be able to ping eRouter 2's Ethernet 0 interface and Router 4's Serial 0 interface.

3. Now that we have our IP addressing setup correctly lets get into configuring our static routes on each router. First connect to eRouter 1. Lets think about what we are doing. We will need to establish static routes to any location that is not directly connected. eRouter 1 is directly connected to both eRouter 2 and eRouter 4 so it will not need any static routes. Next connect to eRouter 4.

4. Now enter configuration mode and think about what the static route command will be. We know we currently cannot get to eRouter 2 because it is not directly connected. So now lets think about eRouter 4 and the network it is connected to. Off of its Serial interface is network 12.5.10.0 that is connected to eRouter 1. eRouter 1 is also connected to network 10.1.1.0 that we would also like to access. In this case we will need a static route for network 10.1.1.0. On eRouter 4 what command would you use to establish a static route to network 10.1.1.0?

eRouter4(config)#ip route 10.1.1.0 255.255.255.0 12.5.10.1

We established a route to network 10.1.1.0 on our router. Now whenever a packet of information is destined for network 10.1.1.0 it will be sent to the router with IP address 12.5.10.1 which in this case is eRouter 1.

5. Lets see what we accomplished. When we are on eRouter 4 and we know we can ping eRouter1's Serial interface but we could not ping eRouter1's Ethernet interface. Now that we have established a route to network 10.1.1.0 lets see if we can ping eRouter 2's Ethernet 0.

eRouter4#ping 10.1.1.2

6. Why couldn't we ping? If you think about a packet going through the network it leaves eRouter 4's S0 interface destined for 10.1.1.2. The packet knows this is on the 10.1.1.0 network so it is going to first go to 12.5.10.1 because of our static route. When it gets to 10.1.1.1 (eRouter 1) the Router looks at its Routing table and knows that it is directly connected to network 10.1.1.0 off its Ethernet interface, so it sends the packet out there. eRouter 2 picks up that packet and wants to respond back with a "Hey, You found me". It looks at the Source IP address and it is 12.5.10.2 (eRouter 4's Serial 0 interface). When it goes to send the packet it does not have a route to network 12.5.10.0 so it drops the packet. This is why you did not get the `!!!!!` as a successful response.

7. Just to make sure our static route worked view your routing table to see if it is in there.

eRouter1#show ip route

8. To get the static routes to work we need to connect to eRouter 2 and give a static route back to eRouter 4's network. What command will set a static route on eRouter 2 for the network 12.5.10.0?

eRouter2(config)#ip route 12.5.10.0 255.255.255.0 10.1.1.1

That means anything we are sending to network 12.5.10.0 will go to 10.1.1.1 first.

9. Now you should be able to ping all of the interfaces we have working.

eRouter1 Ethernet 0 : 10.1.1.1
eRouter1 Serial 0 : 12.5.10.1
eRouter4 Serial 0: 12.5.10.2

10. Lets look at the routing table on eRouter 2 and talk about its entry.

```
eRouter2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, * - candidate default
U - per-user static route

Gateway of last resort is not set

C 10.1.1.0/24  is directly connected, 10.1.1.2
S  12.5.10.0/24 [1/0] via 10.1.1.1
```

Looking at the second line we see the "`S`" denoting the Static route. Next we see the destination network and its subnet info. The `[1/0]` is showing the administrative distance (by default "1") and the metric (in this case hop count) which is 0. Via just says the address to go to which in this case is 10.1.1.1.