جامعة الأهرام الكندية
AHRAM CANADIAN UNIVERSITY

Network II Lab 06
Static Routing

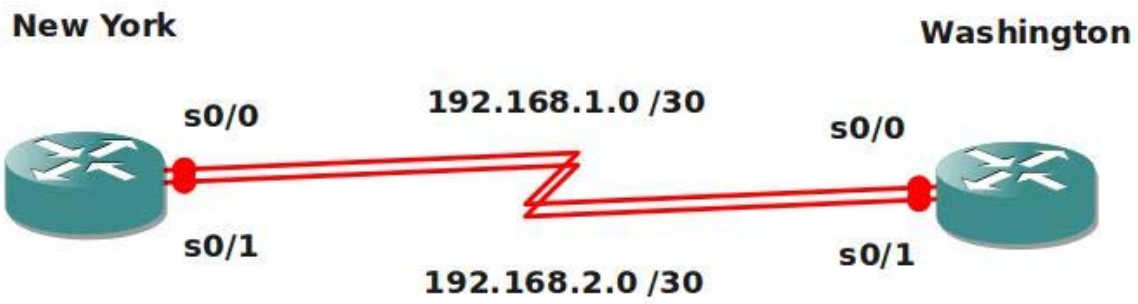
Scenario:

You are working as a networking specialist at a company called "Networks4All". One of their customers has 2 dedicated links to connect their New York site to the Washington site. You are not allowed to use routing protocols because they are paying for every single bit that's sent on these links. You need to do use static routing to get the job done and keep the customer happy

Goal:

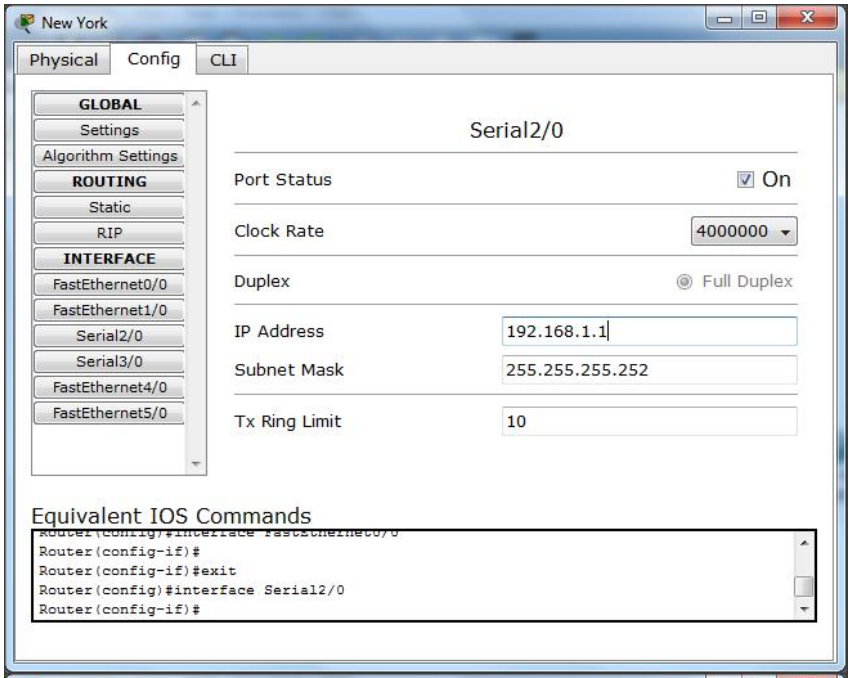
- All IP addresses are preconfigured as shown in the topology picture.
- There is a Loopback0 interface on the Washington router: IP Address 2.2.2.2/30.
- There is a Loopback0 interface on the New York router: IP Address 1.1.1.1/30.
- New York: create a static route pointing to the Loopback0 network on Washington, traffic should pass the 192.168.1.0 network.
- Washington: create a default route pointing to the Loopback0 network on New York, traffic should pass the 192.168.2.0 network. In the routing table you should see a 0.0.0.0 entry.
- New York: create a backup static route pointing to the Loopback0 network on Washington, administrative distance should be 100.
- Washington: change the default route so it stays in the routing table even when the interface goes down

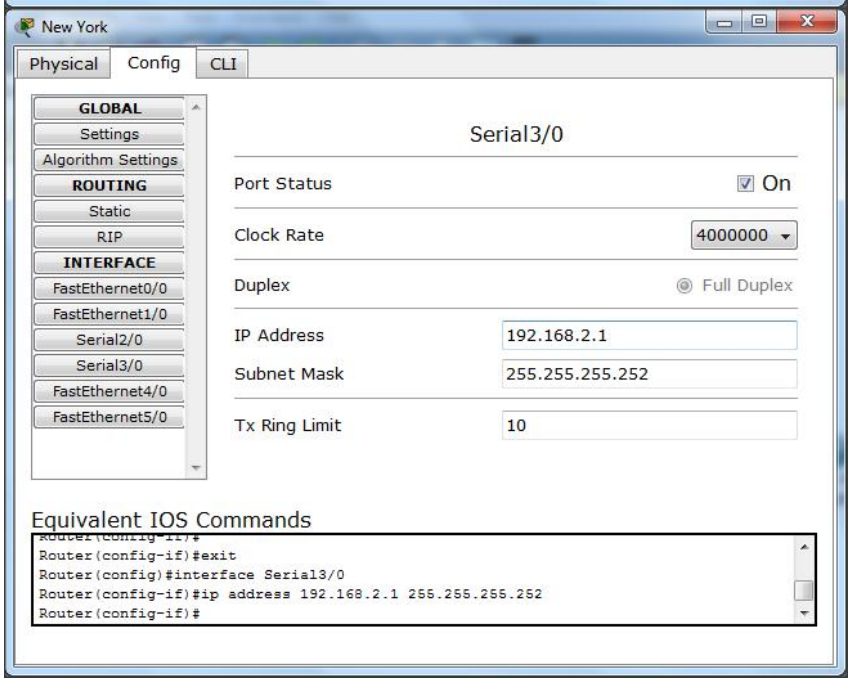
Topology:



Steps

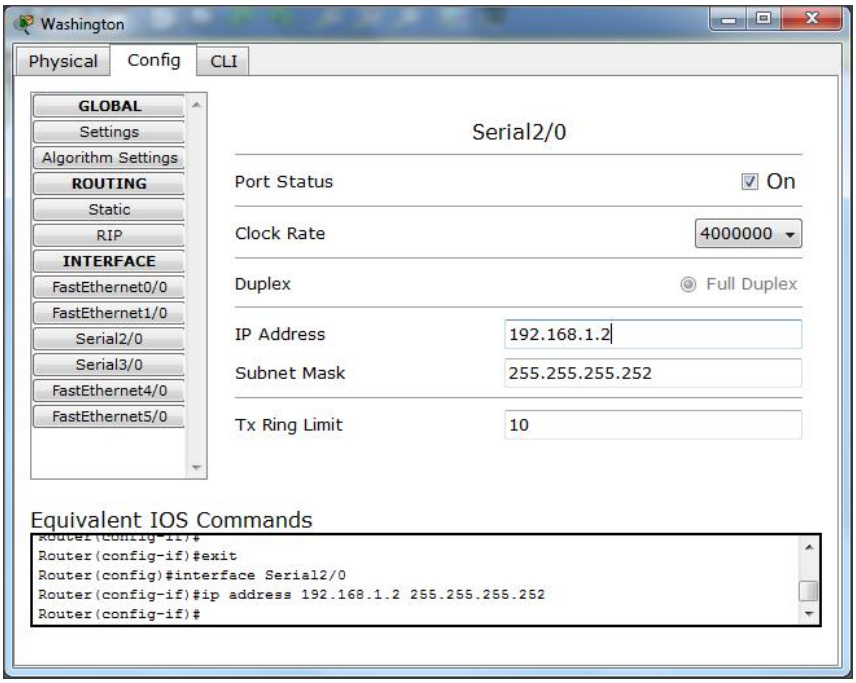
1. Configure New York router serial interfaces

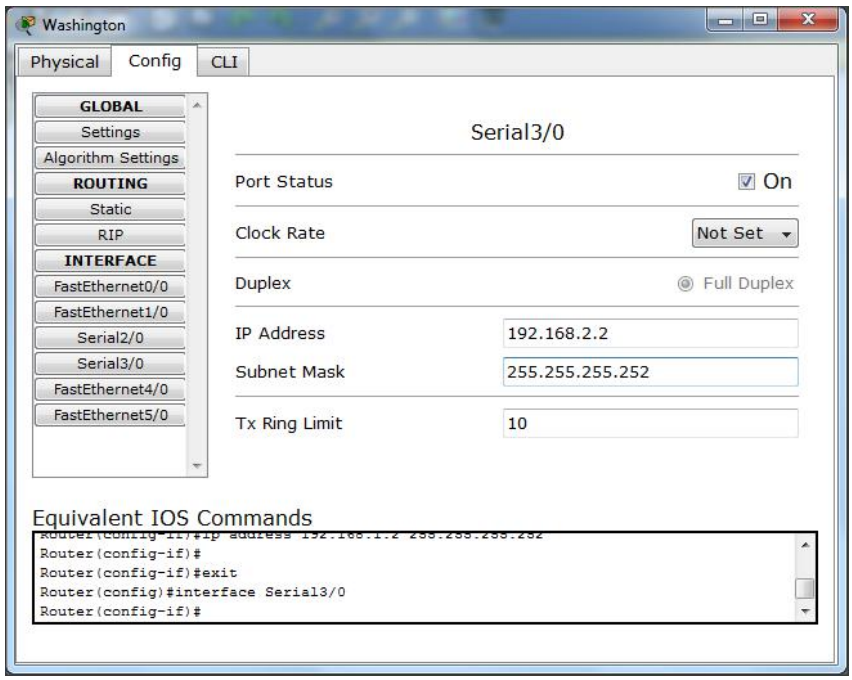




CLI	configure terminal interface Serial2/0 ip address 192.168.1.1 255.255.255.252 interface Serial0/1 ip address 192.168.2.1 255.255.255.252

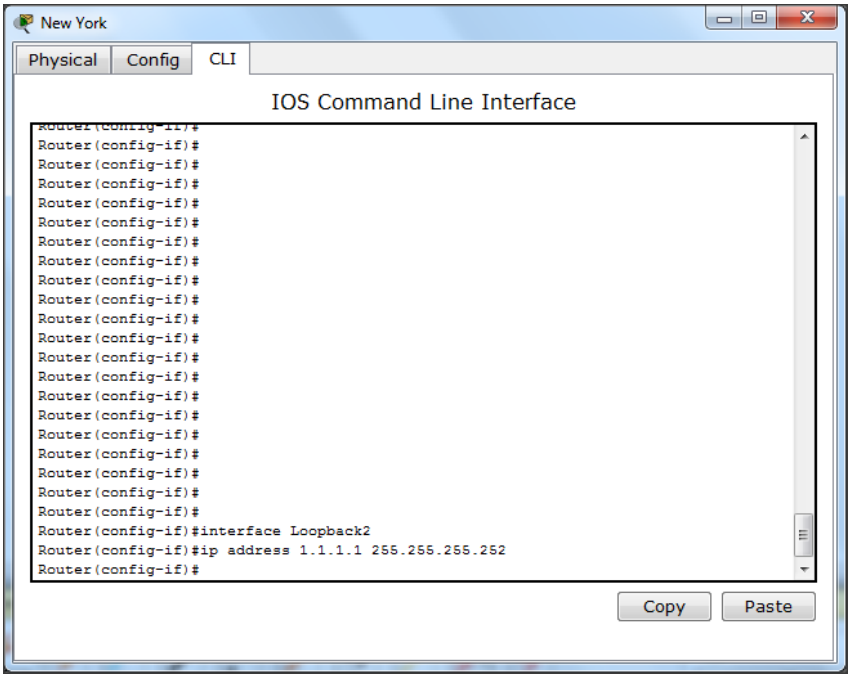
2. Configure Washington router serial interfaces





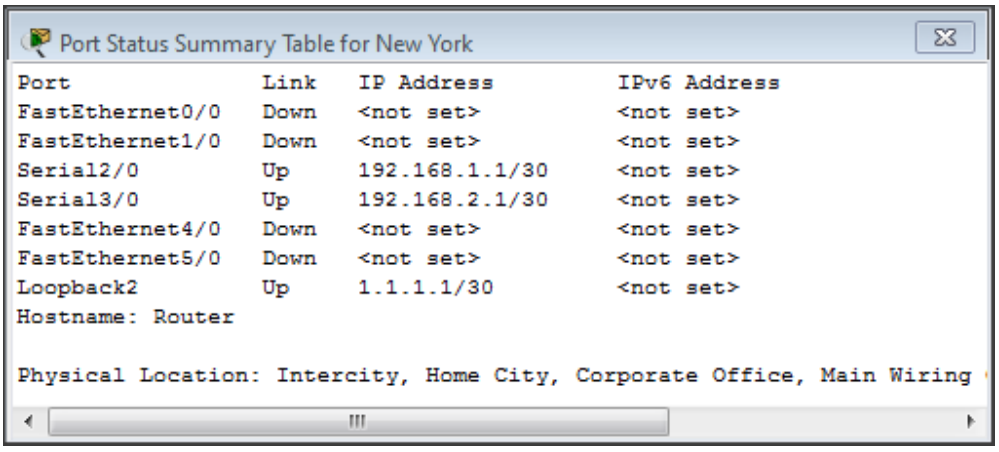
CLI	configure terminal interface Serial2/0 ip address 192.168.1.2 255.255.255.252 interface Serial3/0 ip address 192.168.2.2 255.255.255.252

3. creating loopback on New Your router

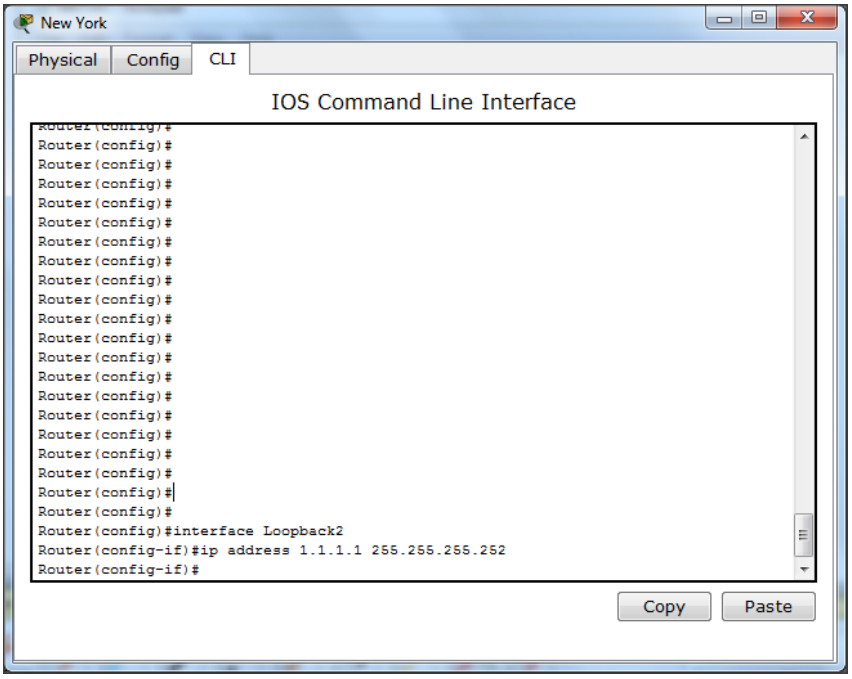


CLI	interface Loopback2 ip address 1.1.1.1 255.255.255.252

4. check router "port status summery" using inspection tool



5. create loopback on Washington router



CLI	interface Loopback1 ip address 2.2.2.2 255.255.255.252

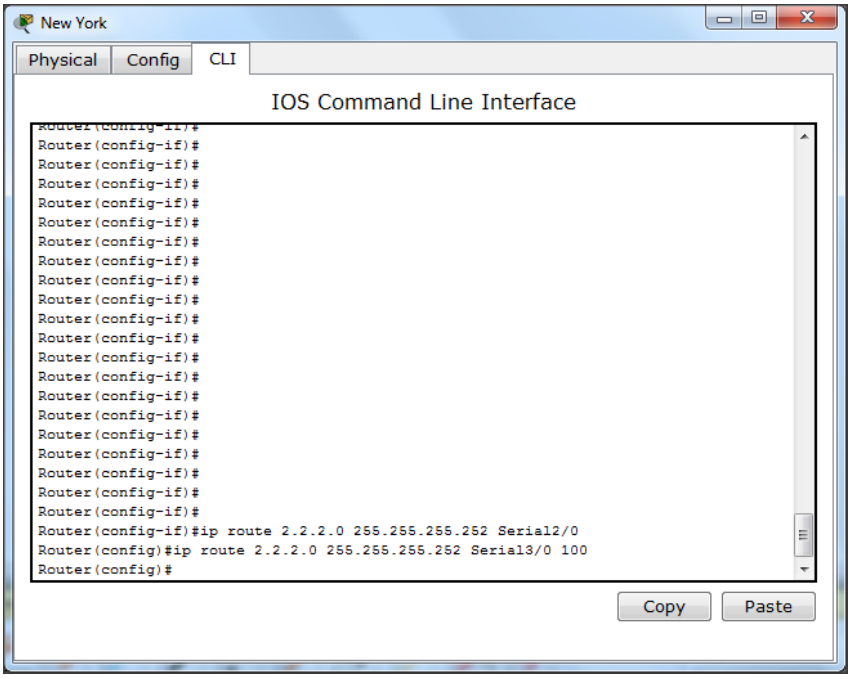
6. check router “port status summery” using inspection tool

Port	Link	IP Address	IPv6 Address	MAC Address
FastEthernet0/0	Down	<not set>	<not set>	0030.F254.2852
FastEthernet1/0	Down	<not set>	<not set>	00D0.BA3C.9DCB
Serial2/0	Down	192.168.1.2/30	<not set>	<not set>
Serial3/0	Down	192.168.2.2/30	<not set>	<not set>
FastEthernet4/0	Down	<not set>	<not set>	000B.BEA8.D3B2
FastEthernet5/0	Down	<not set>	<not set>	00D0.D3D4.3474

Hostname: Router

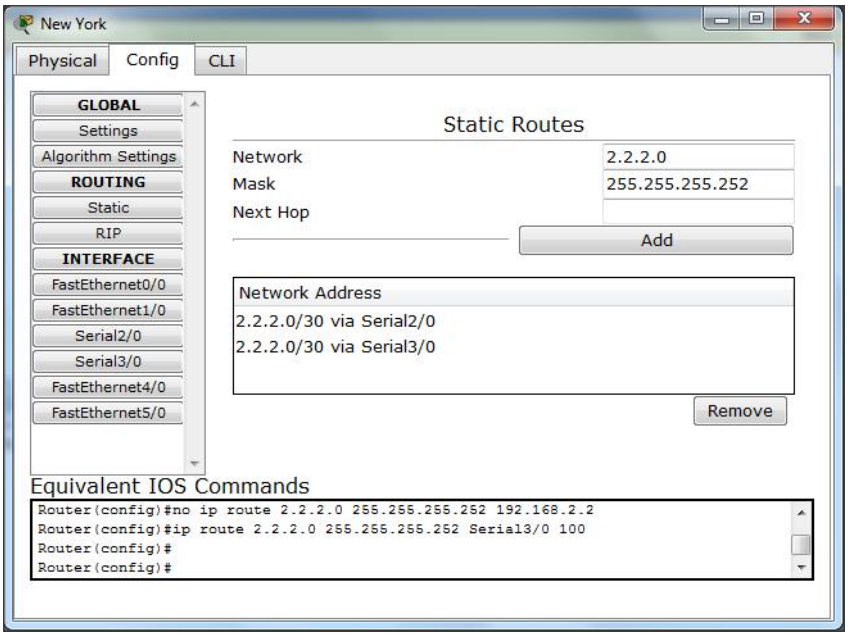
Physical Location: Intercity, Home City, Corporate Office, Main Wiring Closet

7. Build routing table of New York router

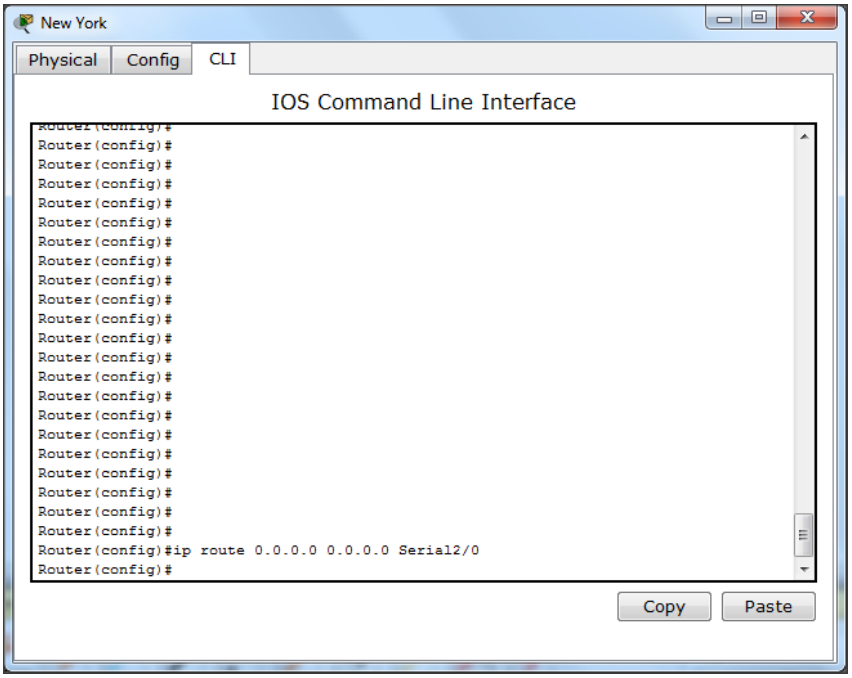


CLI	ip route 2.2.2.0 255.255.255.252 Serial2/0 ip route 2.2.2.0 255.255.255.252 Serial3/0 100

8. Open config/Routing/static

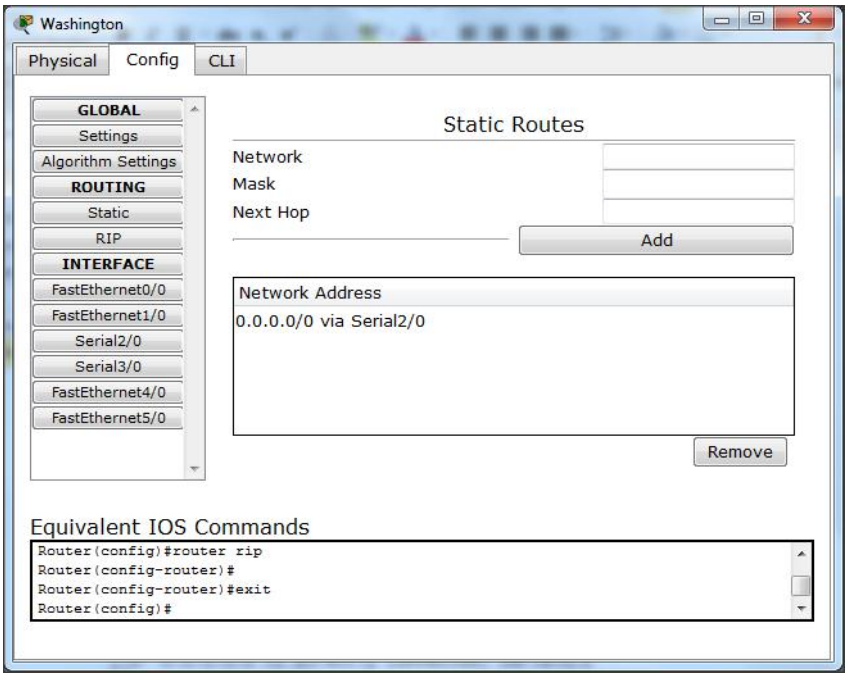


9. Build static routing for Washington router

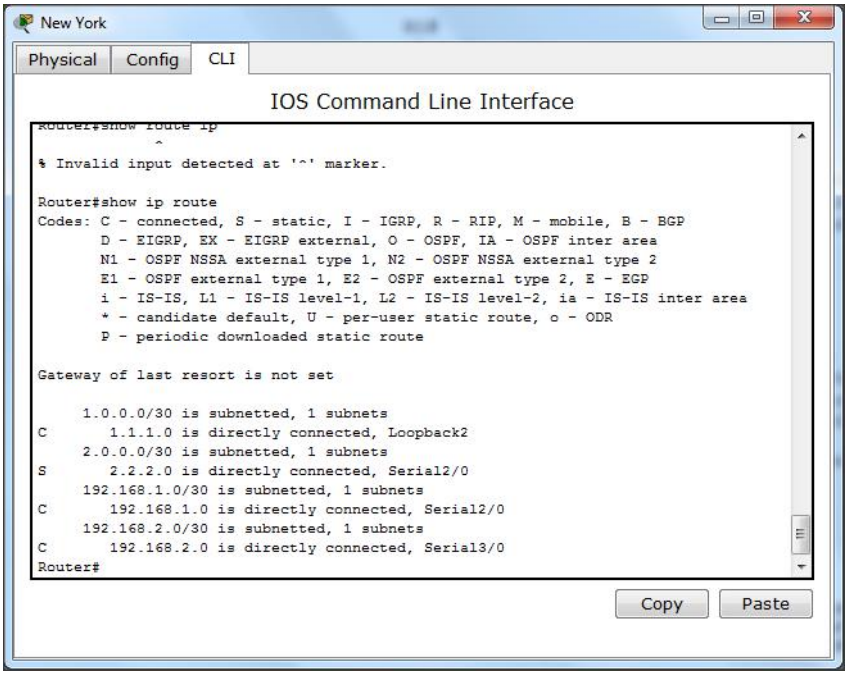


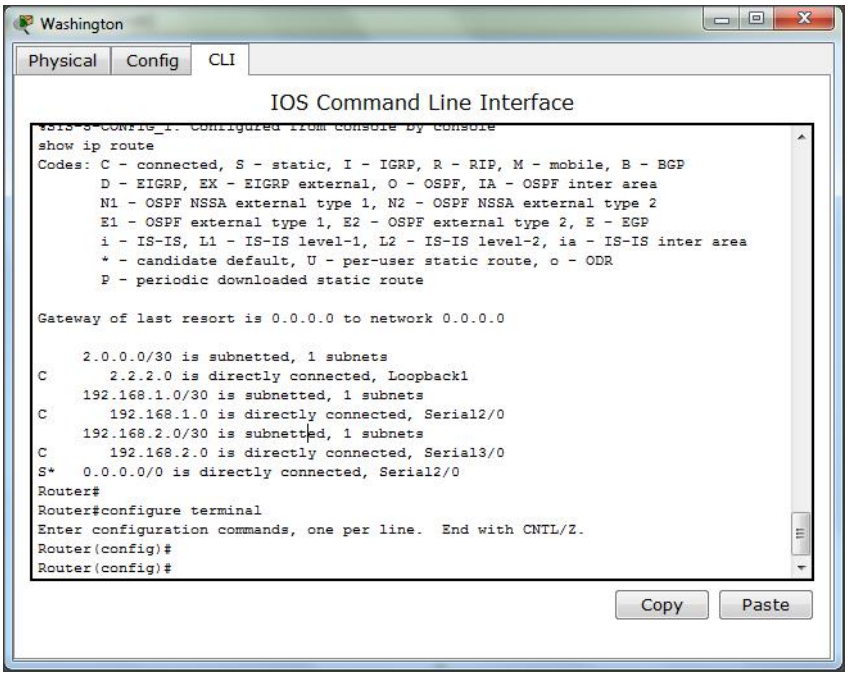
CLI	ip route 0.0.0.0 0.0.0.0 Serial2/0

10. check config/Routing/static



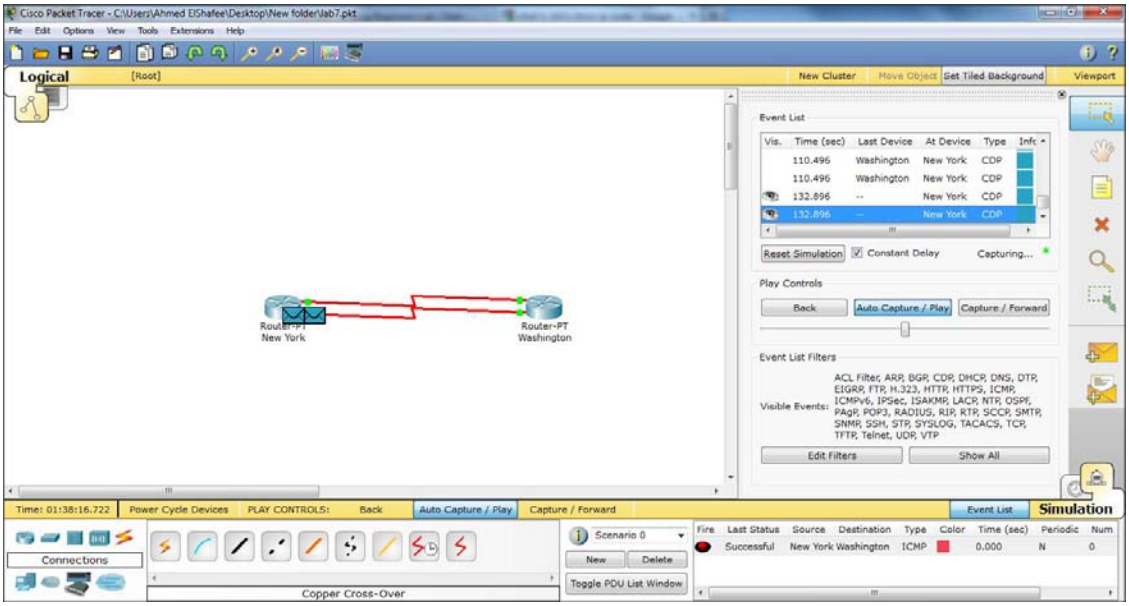
11. exit configuration mode, show ip route command for each routers



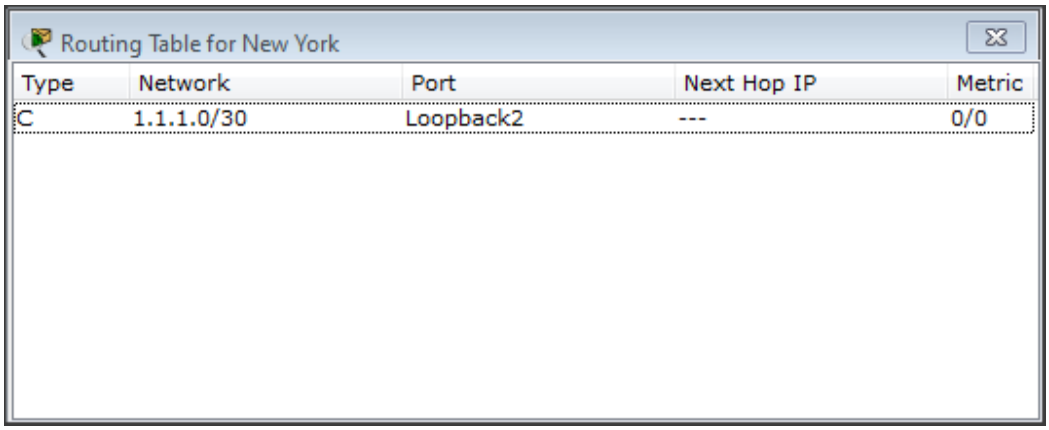


CLI	ctrl/Z show ip Route

12. send ping from each router, trace it using simulation mode



13. check routing table of each router using inspection tool



Terminologies:

Loopback: is a virtual interface on a router that really doesn't go "down." There's no such thing as a physical circuit failure for something for which there is no physical presence. So, this makes loopback interfaces quite reliable.

Administrative Distance: Administrative distance is the feature that routers use in order to select the best path when there are two or more different routes to the same destination from two different routing protocols. Administrative distance defines the reliability of a routing protocol. Each routing protocol is prioritized in order of most to least reliable (believable) with the help of an administrative distance value.

Note: The smaller the administrative distance value, the more reliable the protocol.

For example, if a router receives a route to a certain network from both Open Shortest Path First (OSPF) (default administrative distance - 110) and Interior Gateway Routing Protocol (IGRP) (default administrative distance - 100), the router chooses IGRP because IGRP is more reliable. This means the router adds the IGRP version of the route to the routing table.

Default Distance Value Table

Route Source	Default Distance Values
Connected interface	0
Static route	1
Enhanced Interior Gateway Routing Protocol (EIGRP) summary route	5
External Border Gateway Protocol (BGP)	20
Internal EIGRP	90
IGRP	100
OSPF	110
Intermediate System-to-Intermediate System (IS-IS)	115
Routing Information Protocol (RIP)	120
Exterior Gateway Protocol (EGP)	140
On Demand Routing (ODR)	160
External EIGRP	170
Internal BGP	200
Unknown*	255

CDP: Cisco Discovery Protocol: was developed by Cisco Systems. It's primarily used to obtain the protocol addresses of neighboring devices and also to discover the platform of those devices. It can also be used to show information about the interfaces your router uses. CDP is media and protocol-independent, and runs on all Cisco-manufactured equipment including routers, bridges, access servers, and switches. CDP runs only over the data link layer enabling two systems that support different network-layer protocols to learn about each other. CDP Version-2 (CDPv2) is the most recent release of the protocol and provides more intelligent device tracking features.

Default route: A default route, also known as the gateway of last resort, is the network route used by a router when no other known route exists for a given IP packet's destination address. All the packets for destinations not known by the router's routing table are sent to the default route. This route generally leads to another router, which treats the packet the same way: If the route is known, the packet will get forwarded to the known route. If not, the packet is forwarded to the default-route of that router which generally leads to another router. And so on. Each router traversal adds a one-hop distance to the route.

Once the router with a known route to a host destination is reached, the router determines which route is valid by finding the "most specific match". The network with the longest subnet mask that matches the destination IP address wins.

The default route in IPv4 (in CIDR notation) is 0.0.0.0/0, often called the quad-zero route. Since the subnet mask given is /0, it effectively specifies no network, and is the "shortest" match possible. A route lookup that doesn't match anything will naturally fall back onto this route.
Ex:

```
ip route 0.0.0.0 0.0.0.0 serial 0/0
```