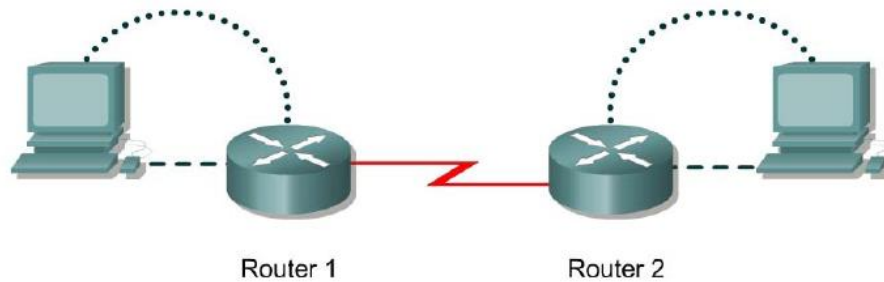


Lab – Topic 5

The **answer sheet URL** is posted on OLE. Please login to your OUHK Google Gmail account (gxxxxxxx@study.ouhk.edu.hk) and submit your answer online. **Due date:** **Wed, 21 Apr 2021, 23:59**

Lab 4.1.6 Using CDP Commands



Router Designation	Router Name	Interface type	Serial clock rate	Serial 0/0/0 Address	Serial 0/0/1 Address	Gigabit Ethernet 0/0 Address	Subnet mask for all interfaces
Router 1	GAD	DCE	56000	192.168.15.1	No address	192.168.14.1	255.255.255.0
Router 2	BHM	DTE	Not set	No address	192.168.15.2	192.168.16.1	255.255.255.0

Straight-through cable	—————
Serial cable	————— ⚡
Console (Rollover)
Crossover cable	- - - - -

Objective

- Use CDP commands to obtain information about neighboring networks and devices.
- Display information on how CDP is configured for its advertisement and discovery frame transmission.
- Display CDP updates received on the local router.

Background/Preparation

CDP discovers and shows information about directly connected Cisco devices, including routers and switches. CDP is a Cisco proprietary protocol that runs at the data link layer of the OSI model. The data link layer is Layer 2 of the OSI model. This allows devices that may be running different network Layer 3 protocols, such as IP or IPX, to learn about each other. CDP begins automatically upon a device system startup. CDP may be enabled globally using the **cdp run** command. It may be enabled on any interface as required using the **cdp enable** command. CDP is enabled on all interfaces by default. Using the command **show cdp interface** gathers the information that CDP uses for its advertisement and discovery frame transmission. Use **show cdp neighbors** and **show cdp neighbors detail** to display the CDP updates received on the local router.

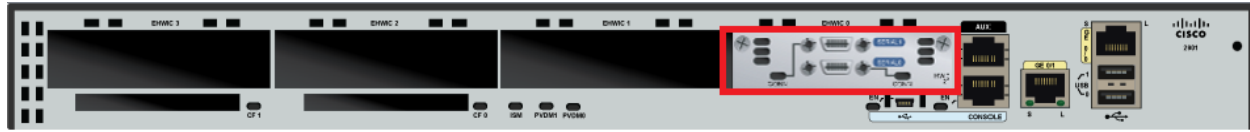
For users of CISCO router:

- **Note:** Go to the “Erasing and reloading the router” instructions. Perform those steps on all routers in this lab assignment before continuing.
- Start HyperTerminal session:
 1. Download putty.
 2. Choose “Serial” as the Connection type.
 3. Click “Open” button.

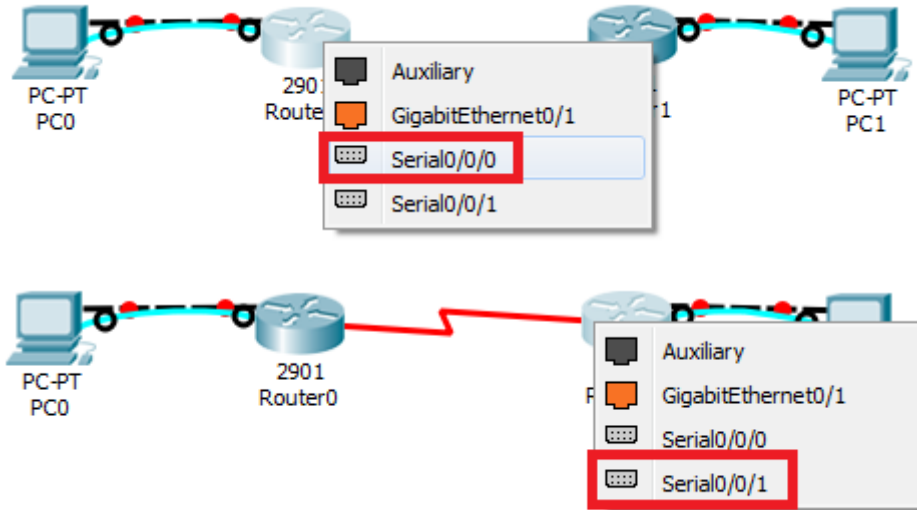
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For users of CISCO Packet Tracer:

- Place **two 2901 routes** (with **one HWIC-2T module** installed as below on each route) as Router 1 and Router 2.



- Use Serial (DCE) cable to connect Router 1 (**Serial 0/0/0**) first and then Router 2 (**Serial 0/0/1**).



Step 1 Log on to Router 1 (GAD) and Router 2 (BHM)

Step 2 Configure the routers

- Configure the routers according to the information in the table above in order for CDP to be able to collect information about them. Refer to prior labs on configuring serial and Ethernet interfaces and making changes to configurations if you need help.

Note: **Do not use** the **no shutdown** command on either of the router interfaces at this time.

- What is the clock rate to be set to? _____
 - Which interface is it set on? _____

Step 3 Gather information about the router interfaces on Router 1 (GAD)

- Enter **show interface** command at either the user EXEC or the privileged EXEC router prompt.

Document the following information about the router.

- What is the name of the router? _____
- List operational status of each interface

Interface	Interface Up or Down? (Carrier Detect Signal)	Line Protocol Up/Down? (Keep Alives Being received)
(i) g0/0		
(ii) g0/1		
(iii) s0/0/0		
(iv) s0/0/1		

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Step 4 Enable the interfaces on Router 1 (GAD)

```
GAD(config)#interface Serial0/0/0
GAD(config-if)#no shutdown
GAD(config-if)#exit
GAD(config)#interface GigabitEthernet0/0
GAD(config-if)#no shutdown
GAD(config-if)#exit
GAD(config)#exit
```

Step 5 Gather information about the router interfaces on Router 1 (GAD)

- a. Enter **show interface** command at either the user EXEC or the privileged EXEC router prompt.

Document the following information about the router.

- b. What is the name of the router? _____
- c. List operational status of each interface

Interface	Interface Up or Down? (Carrier Detect Signal)	Line Protocol Up/Down? (Keep Alives Being received)
(i) g0/0		
(ii) g0/1		
(iii) s0/0/0		
(iv) s0/0/1		

Step 6 Display the values of the CDP timers, the interface status, and encapsulation used

- a. Enter **show cdp interface** command at the router prompt.
- b. How often is the router sending CDP packets? _____
- c. What is the holdtime value? _____
- d. Global CDP settings can be seen using the **show cdp** command by itself.
- e. What information is not shown in the **show cdp** command (compare with **show cdp interface**)?
- _____

Step 7 Display the CDP updates received on the local router

- a. Enter **show cdp neighbors** command at the router prompt.
- b. Fill in the following table

Device	Local Interface	Hold Time	Capability	Platform	Port ID
(i)	(ii)	(iii)	(iv)	(v)	(vi)

Step 8 Enable serial 0/0/1 interface on router 2 (BHM)

- a. Enter the **no shutdown** command on the Serial0/0/1 and GigabitEthernet0/0 interface of Router 2. Return to Router 1 (GAD) and repeat Step 7. Notice how the router now appears in the **cdp neighbor** command display.
- b. Fill in the following table

Device	Local Interface	Hold Time	Capability	Platform	Port ID
(i)	(ii)	(iii)	(iv)	(v)	(vi)

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Step 9 Display details about CDP updates received on the local router

- Enter **show cdp neighbors detail** from the router prompt.
- Fill in the following table:

Information Gathered:	On GAD	On BHM
i) Neighbor device name (Device ID)		
ii) Neighbor device type (Capabilities)		
iii) IP address of interface attached to your router		
iv) Port ID of your router that the neighbor is on		
v) Port ID of neighbor router that your router is on		
vi) IOS version of neighbor router		

Step 10 Display information for specific neighbor entry

- Enter the **show cdp entry *** command from the router prompt.
 - What information is provided by this command?
-

Step 11 Check Point: Send your screen capture to the instructor by email.

- Take **one** screen capture with the following items. (Sample capture is on next page).
 - CLI of the routers showing the prompt and the output on Step 9.
 - ~~The Computer name and Domain.~~
 - The date and time of your capture.
- Save the screen capture to a Word file with filename “your_8_digit_student_number-topic5.docx”. (Eg. **12345678-topic5.docx**).
- Email your saved file to **thluk@ouhk.edu.hk** (subject: **topic 5**).

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PC0

Physical Config **Desktop** Programming Attributes

Terminal

```
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID      Local Intrfce  Holdtme  Capability  Platform  Port ID
GAD#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

GAD#sh cdp nei
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone
Device ID      Local Intrfce  Holdtme  Capability  Platform  Port ID
BHM            Ser 0/0/0      157      R           C2900     Ser 0/0/1
GAD#
GAD#
GAD#sh cdp nei ?
    detail  Show detailed information
    <cr>
GAD#sh cdp nei d

Device ID: BHM
Entry address(es):
  IP address : 192.168.15.2
Platform: cisco C2900, Capabilities: Router
Interface: Serial0/0/0, Port ID (outgoing port): Serial0/0/1
Holdtime: 134

Version :
Cisco IOS Software, C2900 Software (C2900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2012 by Cisco Systems, Inc.
Compiled Thurs 5-Jan-12 15:41 by pt_team

advertisement version: 2
Duplex: full
GAD#
```

☐ Top

```
BHM#
BHM#sh cdp nei d

Device ID: GAD
Entry address(es):
  IP address : 192.168.15.1
Platform: cisco C2900, Capabilities: Router
Interface: Serial0/0/1, Port ID (outgoing port): Serial0/0/0
Holdtime: 156

Version :
Cisco IOS Software, C2900 Software (C2900-UNIVERSALK9-M), Version 15.1(4)M4, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2012 by Cisco Systems, Inc.
Compiled Thurs 5-Jan-12 15:41 by pt_team

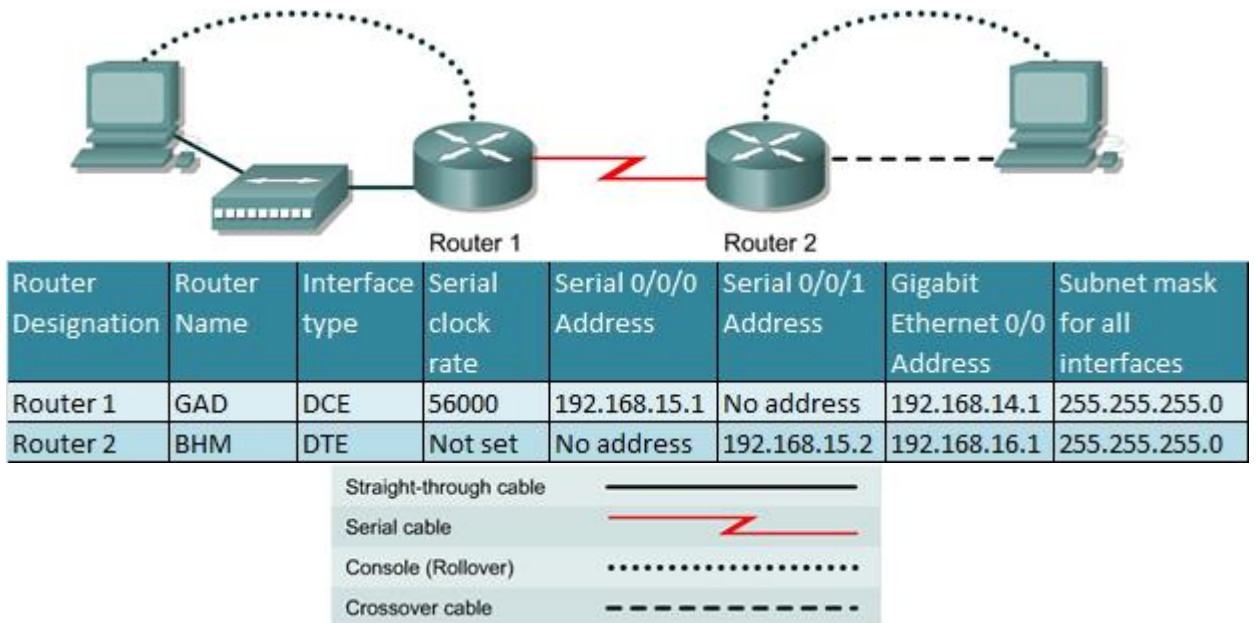
advertisement version: 2
Duplex: full
BHM#
```

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EN 6:41 PM 02/Mar/2020

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Lab 6.1.6 Configuring Static Routes



Objective

- Configure static routes between routers to allow data transfer between routers without the use of dynamic routing protocols.

Background/Preparation

Setup a network similar to the one in the diagram.

Step 1 Configure both routers

- Enter the global configuration mode and configure the hostname as shown in the chart.

Step 2 Configure the workstations

Configure the workstation with the proper IP address, subnet mask, and default gateway.

- The configuration for the host connected to the GAD router is:

IP Address: 192.168.14.2
 IP subnet mask: 255.255.255.0
 Default gateway: 192.168.14.1

- The configuration for the host connected to the BHM router is:

IP Address: 192.168.16.2
 IP subnet mask: 255.255.255.0
 Default gateway: 192.168.16.1

- Check connectivity between the workstations using **ping**. From the workstation attached to the GAD router, ping the workstation attached to the BHM router.

```
C:\>ping 192.168.16.2
Pinging 192.168.16.2 with 32 bytes of data:
Reply from 192.168.14.1: Destination host unreachable.
Reply from 192.168.14.1: Destination host unreachable.
Reply from 192.168.14.1: Destination host unreachable.
Reply from 192.168.14.1: Destination host unreachable.
Ping statistics for 192.168.16.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

- Was the **ping** successful? _____
- Why did the **ping** fail? _____

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Step 3 Check interface status

- Check the interface on both routers with the command **show ip interface brief**.
- Are all the necessary interfaces up? _____

Step 4 Check the routing table entries

- Using the command **show ip route**, view the IP routing table for GAD.

```
GAD>show ip route
```

output eliminated

Gateway of last resort is not set

```

      192.168.14.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.14.0/24 is directly connected, GigabitEthernet0/0
L       192.168.14.1/32 is directly connected, GigabitEthernet0/0
      192.168.15.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.15.0/24 is directly connected, Serial0/0/0
L       192.168.15.1/32 is directly connected, Serial0/0/0
```

- Use the command **show ip route**, view the IP routing table for BHM.

```
BHM>show ip route
```

output eliminated

Gateway of last resort is not set

```

      192.168.15.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.15.0/24 is directly connected, Serial0/0/1
L       192.168.15.2/32 is directly connected, Serial0/0/1
      192.168.16.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.16.0/24 is directly connected, GigabitEthernet0/0
L       192.168.16.1/32 is directly connected, GigabitEthernet0/0
```

- Are all of the routes needed in the routing tables? _____
- Based on the output from the **show ip route** command on the GAD and BHM routers, can a host on network 192.168.16.0 connect to a host on network 192.168.14.0? _____

Note: If a route is not in the routers to which the host is connected, the host cannot reach the destination host.

Step 5 Adding static routes

- How can this situation be changed so that the hosts can **ping** each other?

- In global configuration mode, add a static route on Router 1 to network 192.168.16.0 and on Router 2 to network 192.168.14.0

```
GAD(config)#ip route 192.168.16.0 255.255.255.0 192.168.15.2
```

```
BHM(config)#ip route 192.168.14.0 255.255.255.0 192.168.15.1
```
- Why is a static route needed on both routers? _____

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Step 6 Verify the new routes

- a. Using the command **show ip route**, view the IP routing table for GAD.

```
GAD>show ip route
```

output eliminated

Gateway of last resort is not set

```

      192.168.14.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.14.0/24 is directly connected, GigabitEthernet0/0
L       192.168.14.1/32 is directly connected, GigabitEthernet0/0
      192.168.15.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.15.0/24 is directly connected, Serial0/0/0
L       192.168.15.1/32 is directly connected, Serial0/0/0
S       192.168.16.0/24 [1/0] via 192.168.15.2
```

- b. Use the command **show ip route**, view the IP routing table for BHM.

```
BHM>show ip route
```

output eliminated

Gateway of last resort is not set

```

S       192.168.14.0/24 [1/0] via 192.168.15.1
      192.168.15.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.15.0/24 is directly connected, Serial0/0/1
L       192.168.15.2/32 is directly connected, Serial0/0/1
      192.168.16.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.16.0/24 is directly connected, GigabitEthernet0/0
L       192.168.16.1/32 is directly connected, GigabitEthernet0/0
```

- c. Are all of the routes needed in the routing tables? _____
- d. Can a host on subnet 192.168.16.0 see a host on network 192.168.14.0? _____

Step 7 ping host to host again

- a. Check connectivity between the workstations using **ping**. From the workstation attached to the GAD router, ping the workstation attached to the BHM router.

```
C:\>ping 192.168.16.2
```

Pinging 192.168.16.2 with 32 bytes of data:

```
Reply from 192.168.16.2: bytes=32 time=20ms TTL=254
```

```
Reply from 192.168.16.2: bytes=32 time=20ms TTL=254
```

```
Reply from 192.168.16.2: bytes=32 time=20ms TTL=254
```

```
Reply from 192.168.16.2: bytes=32 time=20ms TTL=254
```

Ping statistics for 192.168.16.2:

```
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
```

```
Approximate round trip times in milli-seconds:
```

```
Minimum = 20ms, Maximum = 20ms, Average = 20ms
```

- b. If the **ping** was not successful, check routing table to make sure static routes are entered correctly.

Upon completion of the previous steps, logoff by typing **exit**. Turn the router off.