

CO1507 Introduction to Networking

Revision drop-in

There is no new material in this lab it is simply a reference for guided revision.

Task 1 - Build topology

Begin by constructing the following topology in CISCO packet tracer

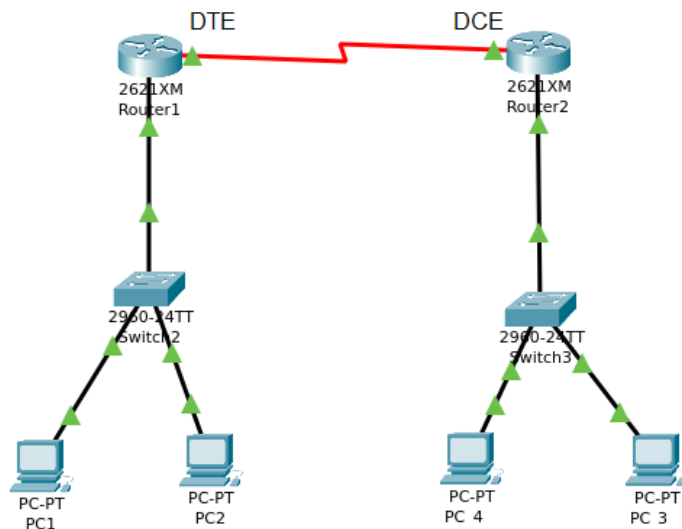


Fig 1. Topology with 3 subnets and two routers

IMPORTANT: 2621XM router by default does not have serial ports - you need to power off the router and add the WIC-2T eHWIC module to the router and then power back on

DCE and DTE

One side of a serial link (DCE), has to transmit the clock signal, which controls the data rate, and the other side (DTE) receives the clock signal

DCE stands for data carrier equipment, DTE stands for data terminal equipment; generally a terminal or computer

With the DCE cable, (red zigzag with clock) the side you click first will be the DCE, the second will be DTE

With the DTE cable (red zigzag no clock) the side you click first will be DTE, the second will be DCE

Configure network

Configure and test the network using the following addressing requirements. **Note:** It will NOT yet be possible to ping from PCs 1 & 2 to 3 & 4.

Addressing table:

Device	Interface	IP Address	Subnet Mask	Default Gateway
Router 1	f0/0	192.168.0.1	255.255.255.224	N/A
Router 1	S0/0	10.1.1.1	255.255.255.252	N/A

Router 2	f0/0	192.168.0.33	255.255.255.224	N/A
Router 2	S0/0	10.1.1.2	255.255.255.252	N/A
PC 1	NIC	192.168.0.2	255.255.255.224	192.168.0.1
PC 2	NIC	192.168.0.3	255.255.255.224	192.168.0.1
PC 3	NIC	192.168.0.34	255.255.255.224	192.168.0.33
PC 4	NIC	192.168.0.35	255.255.255.224	192.168.0.33

Configure IP settings on the routers.

Configure the R1 and R2 interfaces with IP addresses according to the Addressing Table.

Basic router configuration commands:

```
Router>enable
Router#configure terminal
Router(config)#interface {interface goes here e.g. f0/0}
Router(config-if)#ip address {ip address here} subnet mask here}
Router(config-if)#description link to subnet A
Router(config-if)#no shutdown
```

Save the configuration

```
Router(config-if)#exit
Router(config)#exit
Router#copy running-config startup-config
```

The S0/0 connection is the DCE connection and requires the clock rate command. The Router 2 S0/0 configuration is displayed below.

```
R3(config)# interface s0/0
R3(config-if)# ip address 10.1.1.2 255.255.255.252
R3(config-if)# clock rate 128000
R3(config-if)# no shutdown
```

Verify connectivity of the LANs.

Test connectivity by pinging from each PC to the default gateway that has been configured for that host.

From PC1 and PC2, is it possible to ping the default gateway?

From PC3 and PC4, is it possible to ping the default gateway?

Test connectivity by pinging between the directly connected routers.

From Router 1, is it possible to ping the S0/0 interface of Router 2?

Task 2

A router uses a routing table to determine where to send packets. The routing table contains a set of routes that describe which gateway or interface the router uses to reach a specified network. Initially, the routing table contains only directly connected networks. To communicate with distant networks, routes must be specified and added to the routing table. In this lab, you will manually configure a static route to a specified distant network based on a next-hop IP address or exit interface. You will also configure a static default route. A default route is a type of static route that specifies a gateway to use when the routing table does not contain a path for the destination network.

You will employ multiple ways to implement static and default routes, you will confirm that the routes have been added to the routing tables of R1 and R3, and you will verify connectivity based on the introduced routes.

Configure a recursive static route.

With a recursive static route, the next-hop IP address is specified. Because only the next-hop IP is specified, the router must perform multiple lookups in the routing table before forwarding packets. To configure recursive static routes, use the following syntax:

```
Router(config)# ip route network-address subnet-mask ip-address
```

On Router 1, configure a static route to the 192.168.1.0 network using the IP address of the Serial 0/0 interface of Router 2 as the next-hop address. Write down the command you used in your notes.

View the routing table to verify the new static route entry. How is this new route listed in the routing table?

From host PC-1, is it possible to ping the host PC-3?

```
show ip route
```

These pings should fail. If the recursive static route is correctly configured, the ping arrives at PC-3. PC-3 sends a ping reply back to PC-1. However, the ping reply is discarded at Router 2 because it does not have a return route to the 192.168.0.0 network in the routing table.

Configure a directly connected static route.

With a directly connected static route, the exit-interface parameter is specified, which allows the router to resolve a forwarding decision in one lookup. A directly connected static route is typically used with a point-to-point serial interface. To configure directly connected static routes with an exit interface specified, use the following syntax:

```
Router(config)# ip route network-address subnet-mask exit-intf
```

On Router 2, configure a static route to the 192.168.0.0 network using S0/0 as the exit interface. Write down the command you used in your notes.

View the routing table to verify the new static route entry. How is this new route listed in the routing table?

From host PC-1 (or 2), is it possible to ping the host PC-3 (or 4)?

This ping should be successful. Troubleshoot if this is not the case and seek your tutors help if you cannot rectify the problems.

Configure and Verify a Default Route

You will now implement a default route, confirm that the route has been added to the routing table, and verify connectivity based on the introduced route. A default route identifies the gateway to which the router sends all IP packets for which it does not have a learned or static route. A default static route is a static route with 0.0.0.0 as the destination IP address and subnet mask. In a default route, either the next-hop IP address or exit interface can be specified. To configure a default static route, use the following syntax:

```
Router(config)# ip route 0.0.0.0 0.0.0.0 {ip-address or exit-intf}
```

Configure Router 1 with a default route using the exit interface of S0/0 Write the command you used in your notes.

View the routing table to verify the new static route entry. How is this new route listed in the routing table?

Click on the router and goto the CLI tab

If you see it booting up (text scrolling up the screen) wait a minute

If it is asking you if you wish to enter initial configuration dialogue type 'n' for no followed by pressing Return

You should arrive at a prompt that says **Router>**

enter the following commands to configure the f0/0 interface:

Ping between all PCs on the network ensuring full connectivity. Troubleshoot if there are problems

Task 2 - Further router configuration

At this point we have done enough to basically enable interfaces and set IP addresses, however there are other things we may wish to configure:

Setting the router name to Preston (or anything you like really):

```
Router(config)#hostname Preston
```

Enabling passwords: (in this case "cisco" but you can use whatever you want)

```
Router(config)#enable secret cisco
Router(config)#line console 0
```

```
Router(config-line)#password cisco
Router(config-line)#login
```

Setting a message of the day banner:

```
Router(config)#banner motd # no un-authorised access to Preston router is permitted #
```

Disable DNS lookup: this is important as otherwise IOS will attempt to treat mistaken commands as domain names and attempt to resolve:

```
Router(config)#no ip domain-lookup
```

Task 3 - DHCP server

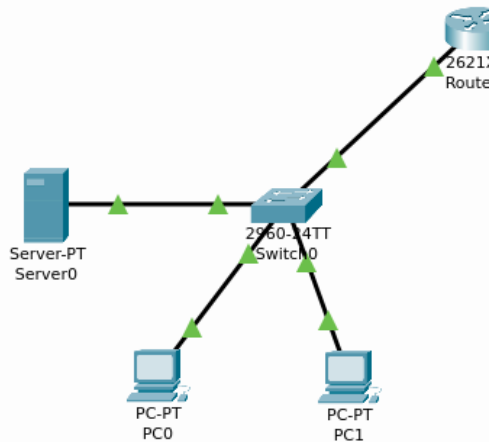


Fig 5. WAN with server

Assign the server the **LAST valid host address** on the network.

Test to see you can PING the server from the local area PCs

Click on the server and navigate to the 'Services' tab and choose 'DHCP' down the left hand side of the panel

Within this panel you need to first check the Service "on" radio button.

Next set the default gateway which should be the IP address of your router i.e. the first valid host address.

Next set the start IP address, this will be the beginning of the range from which the DHCP service will allocate addresses, you have ALREADY USED the first valid host address on the network, so you need to start from at least the second.

Next set the subnet mask which will be 255.255.255.224

Finally set the maximum number of users. Set this to 10. This might seem very small but there are actually only 2 other hosts on our network so far so this is enough.

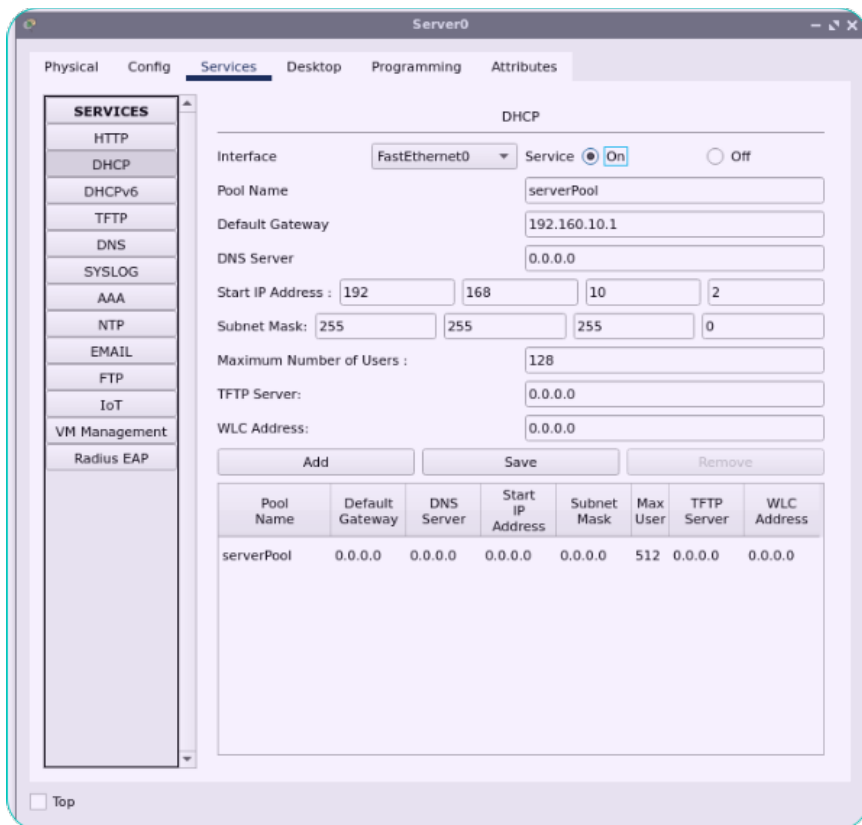


Fig 6. DHCP config in Packet Tracer

Next reconfigure the 2 PCs in the local area network to attain their IP address via DHCP rather than being statically assigned

By now you should have 2 PCs assigned their address over DHCP, the server itself which is statically assigned, and the router which is statically assigned

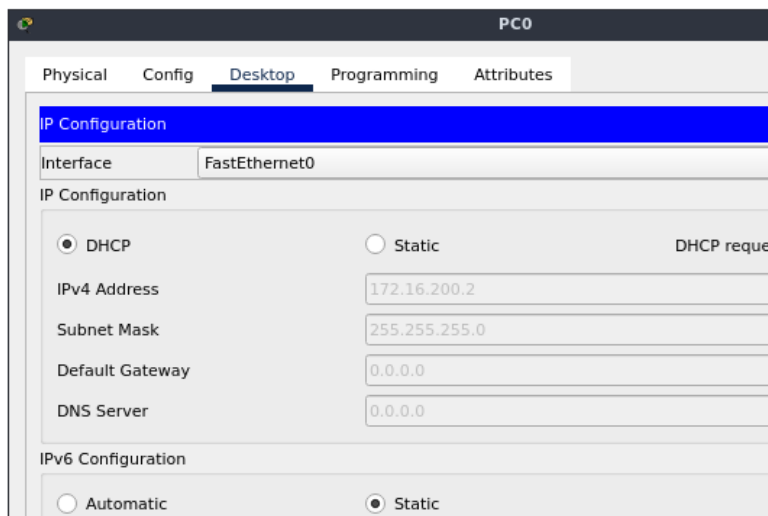


Fig 7. PC set to DHCP in Packet Tracer

FINALLY: when you have all this working. Add a secondary server to the other side (e.g. LAN B) to provide DHCP service there as well on the appropriate address ranges. Ask your tutor for help if you do not understand.

Task 4 - Wireless access point and laptops

Add a device AccessPoint-PT device to the topology - this can be found under "wireless devices" in the device selection tray.

Connect the access point directly to the switch in subnet A



Fig 2. AP-PT access point wired to a switch

Now add a laptop to your topology. You may wonder how we can connect this to the network. One solution would be to connect it to the switch with an ethernet cable. However, a more common solution would be to join wirelessly

Click on the laptop, and navigate to the "Physical" tab

You need to remove the ethernet NIC card and replace it with a wireless card. Follow these steps:

1. Click the power button to turn the laptop off
2. Drag the ethernet card from the laptop to the side panel on the left
3. Now drag WPC300N from the left into the vacant slot
4. Click the power button to turn the laptop back on again

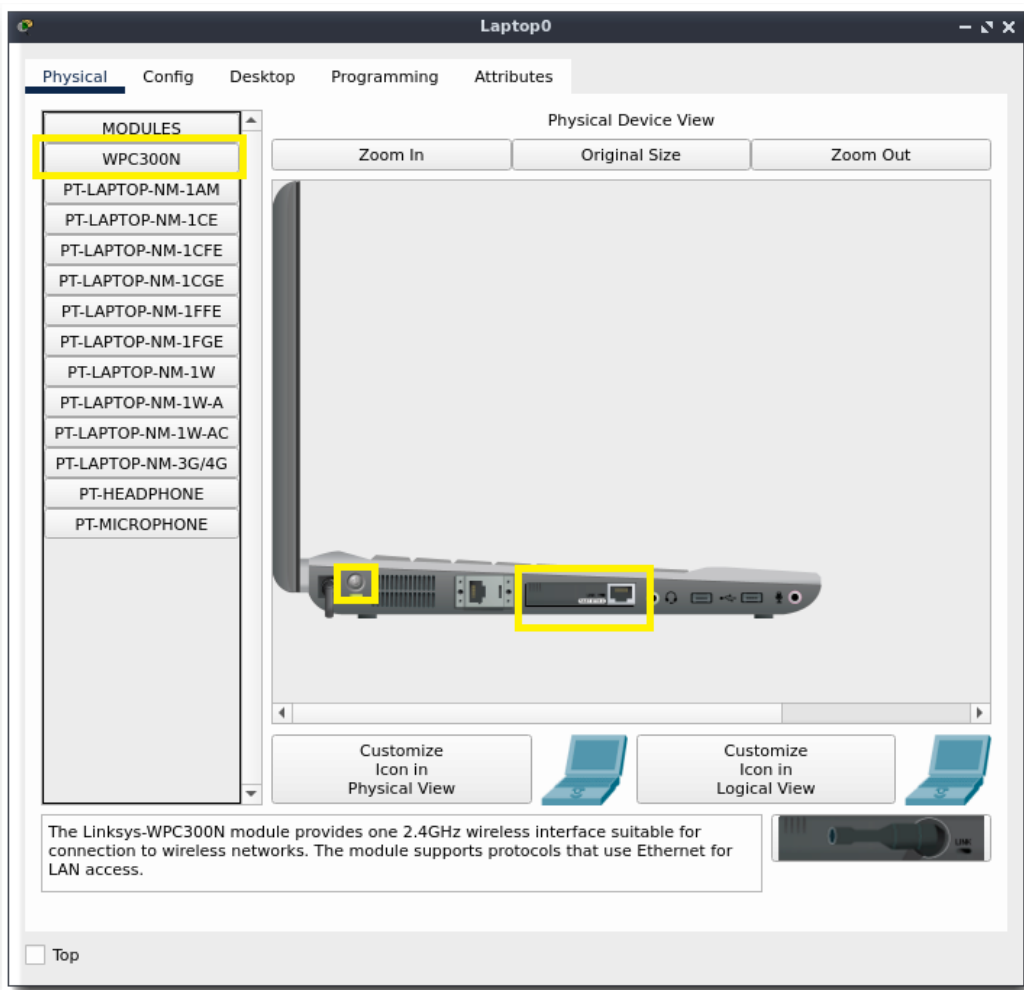


Fig 3. Laptop config physical tab showing original fastEthernet interface card

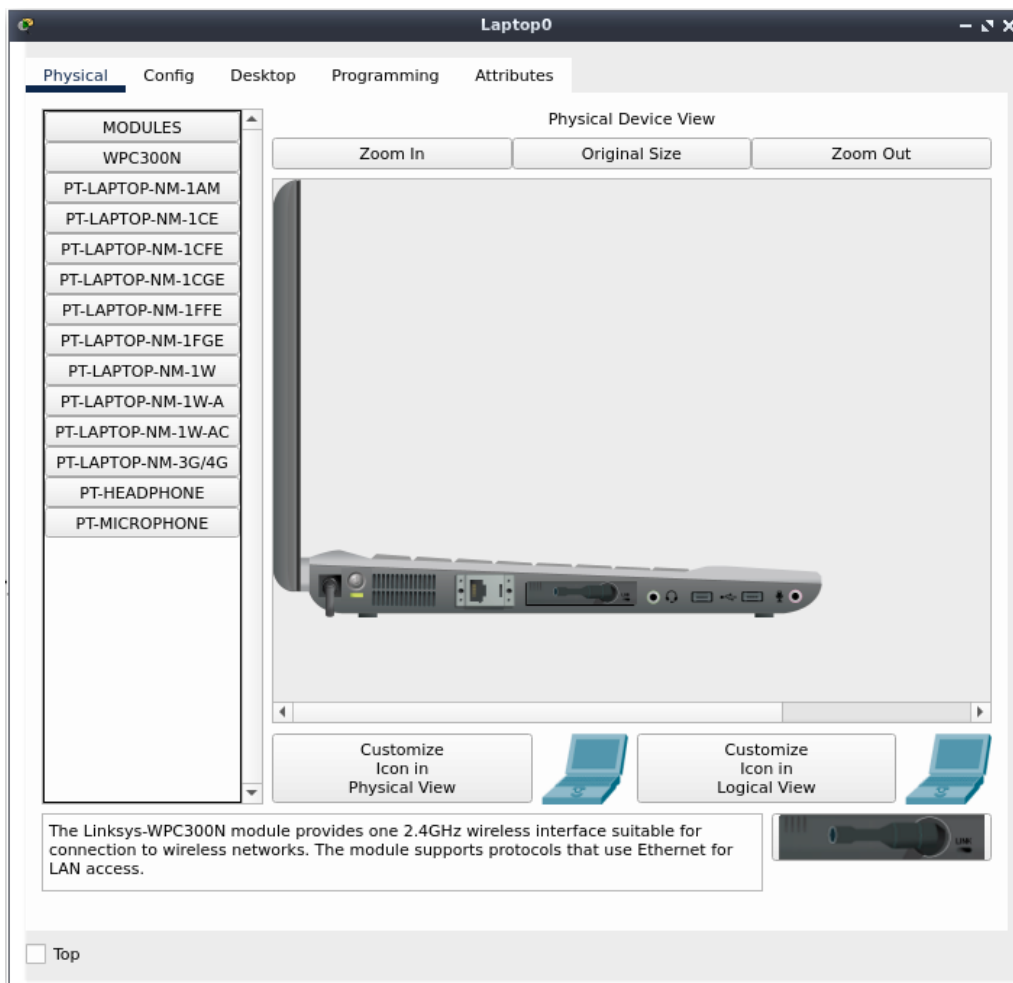


Fig 4. Laptop config physical tab showing replacement with WPC300N wireless NIC

If you have done everything correctly you should see the laptop connect to the access point.

Then you need to:

1. Set the name of the wireless network (SSID)
2. Choose the encryption mode as WPA2-PSK
3. Set the password

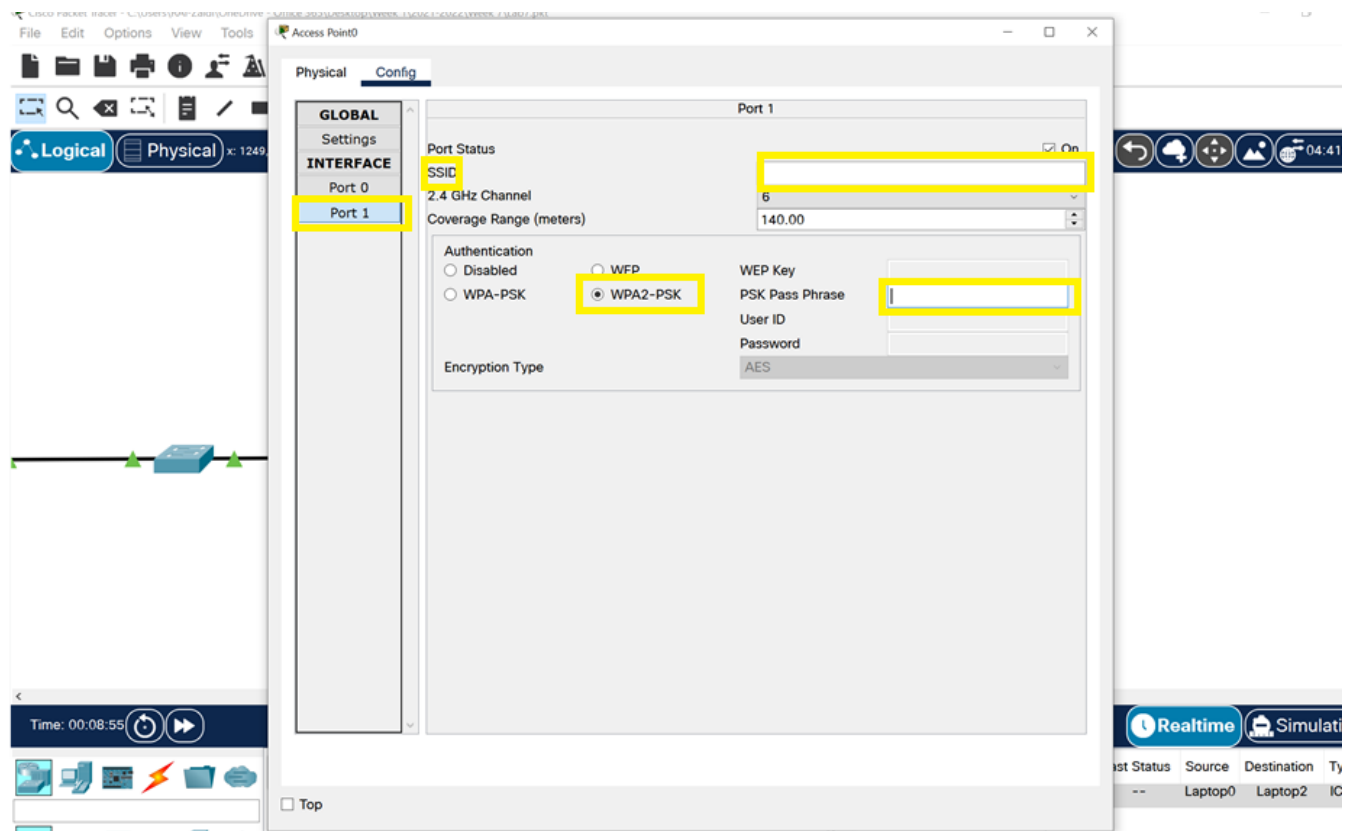


Fig 5. Wireless access point

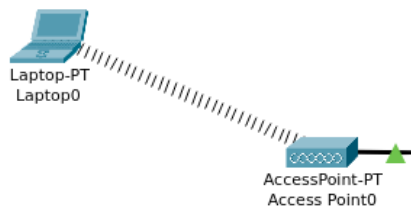


Fig 5. Laptop showing it is connected to the wireless access point

You should now be able to switch on DHCP on the laptop, and it will receive the full addressing requirements as PC0 and PC1 did.

Verify that this is the case and that the laptop can communicate with other hosts on both subnet A and subnet B

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