

AN NINH MÁY TÍNH

Lab01 – Thiết lập và cấu hình mạng LAN

Sinh viên:

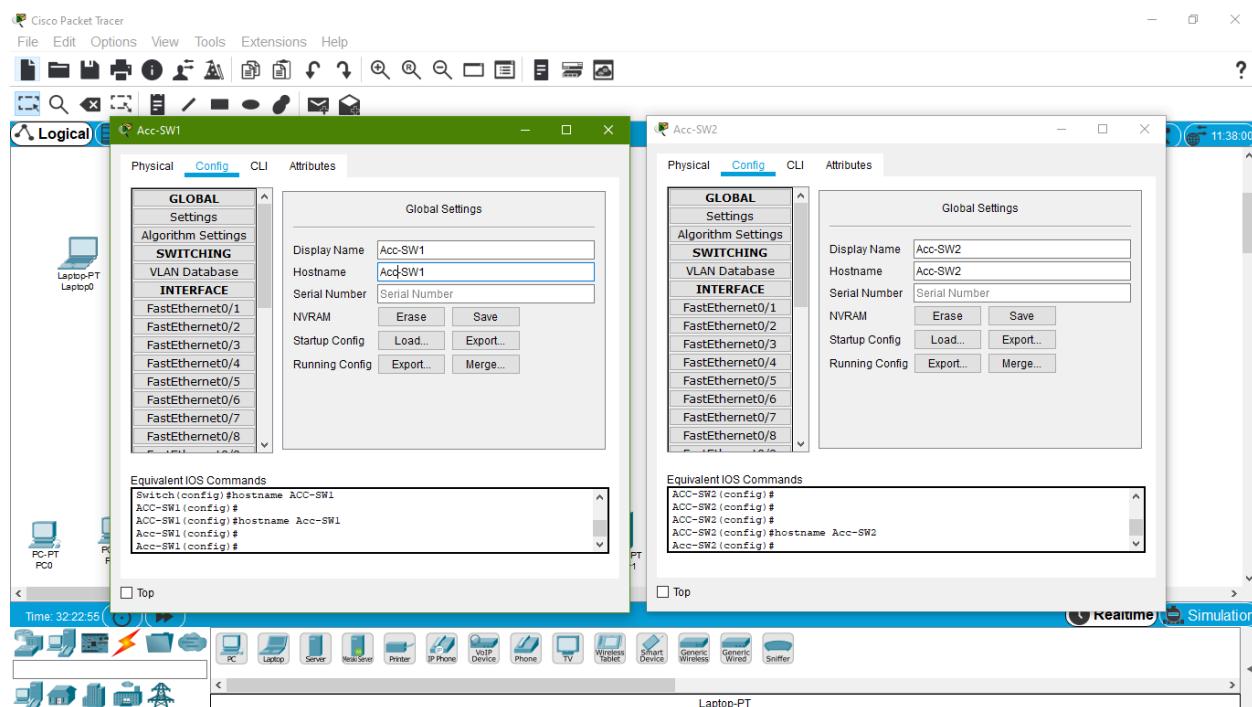
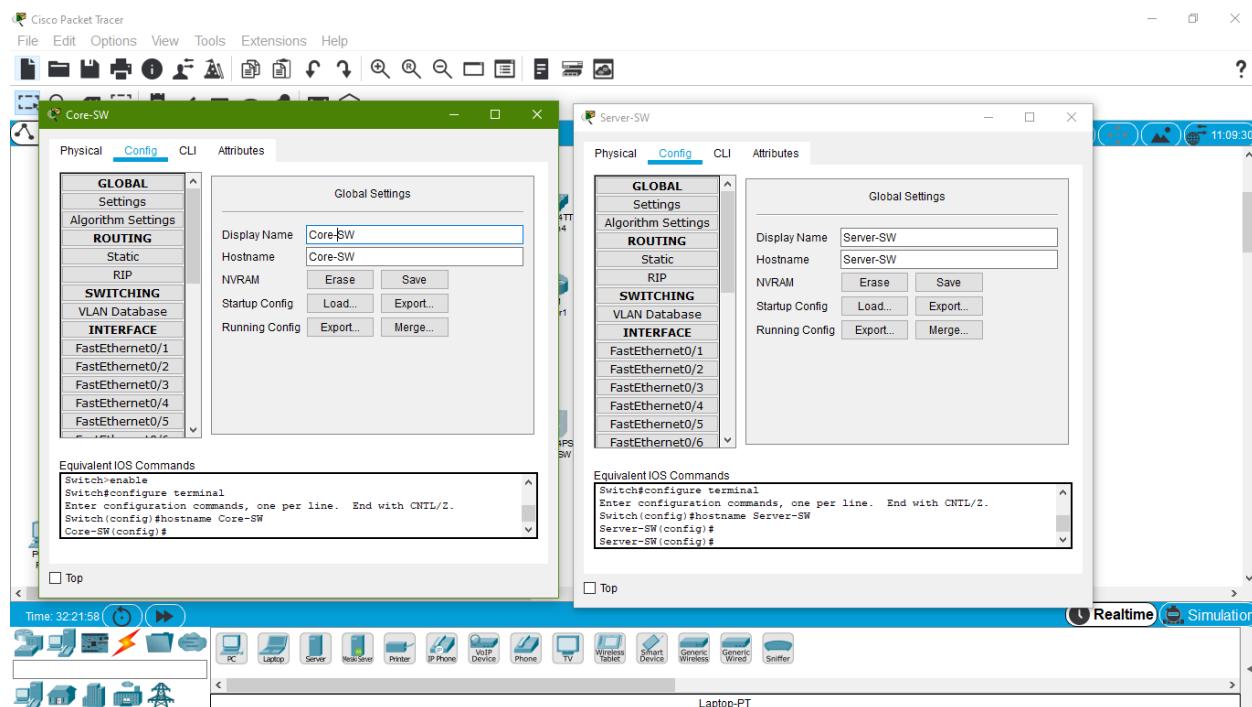
Đỗ Trọng Nghĩa - 18120477

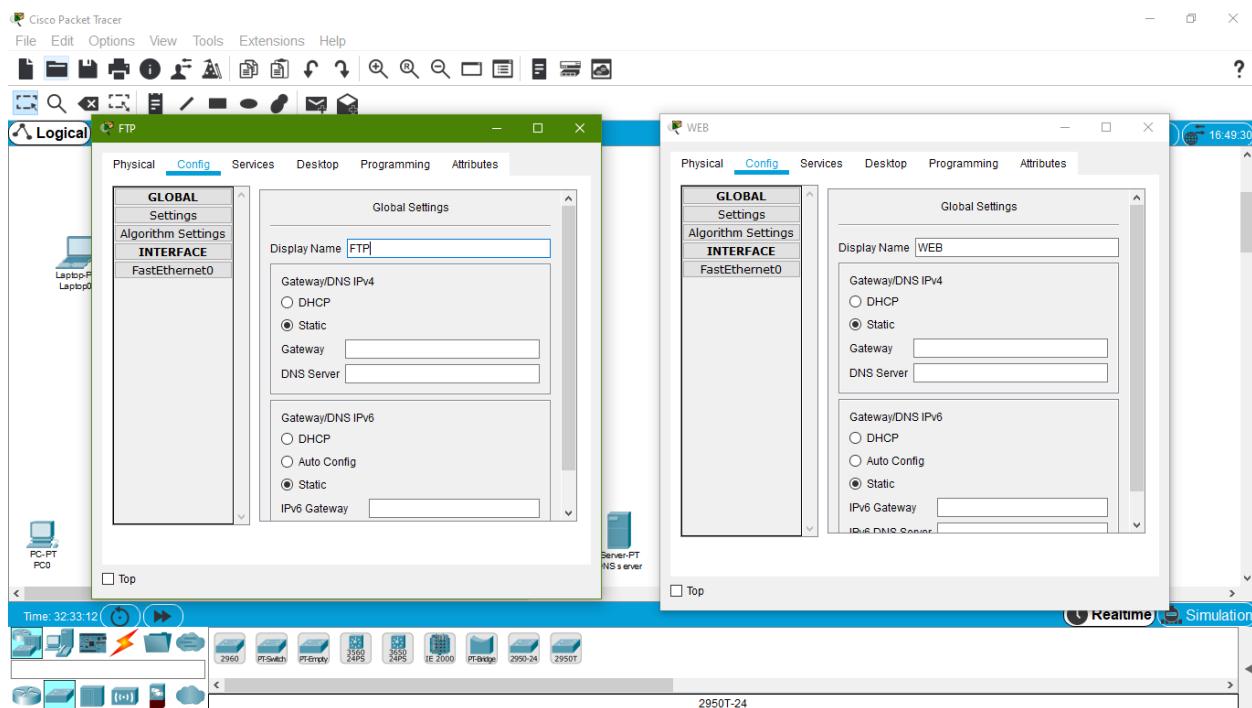
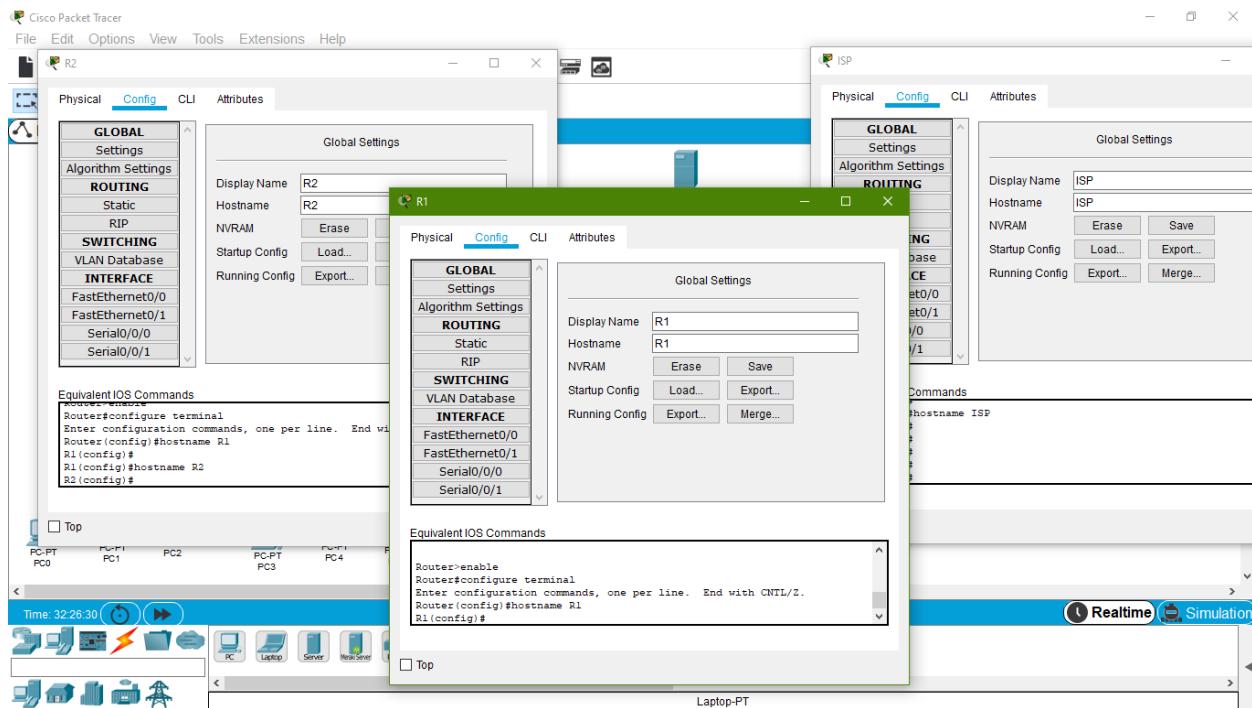


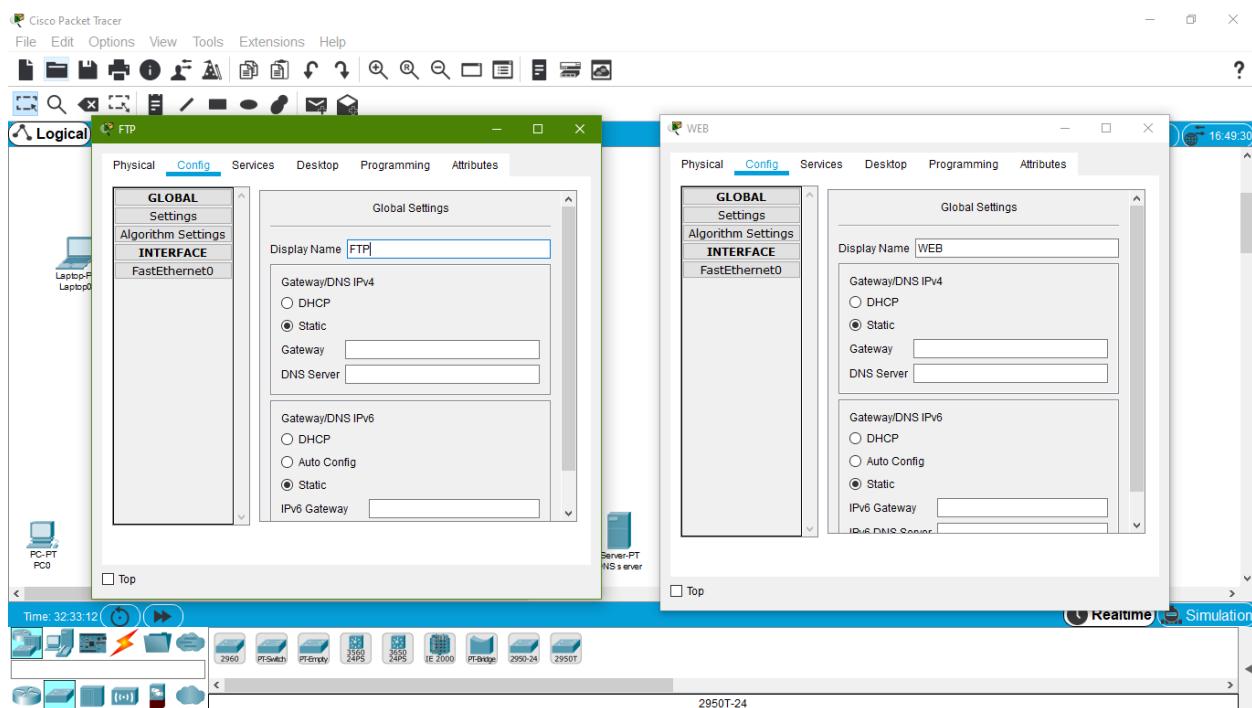
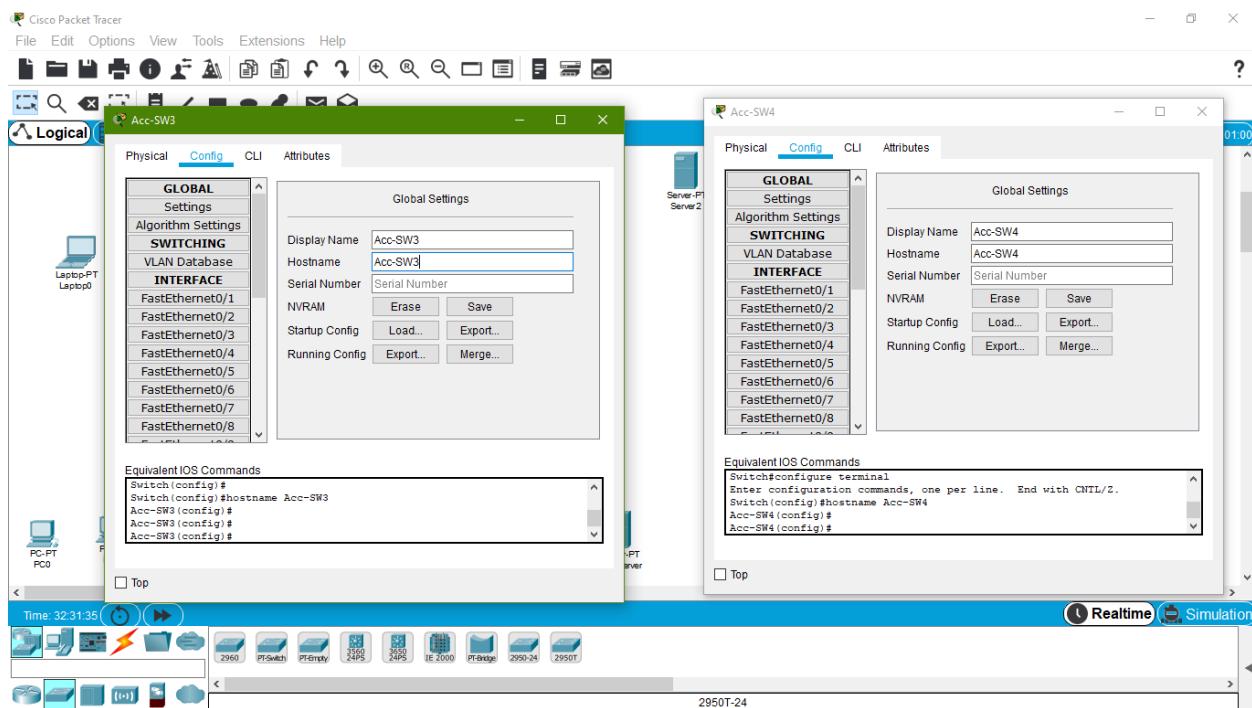
Khoa Công nghệ Thông tin
Đại học Khoa học Tự nhiên TP HCM

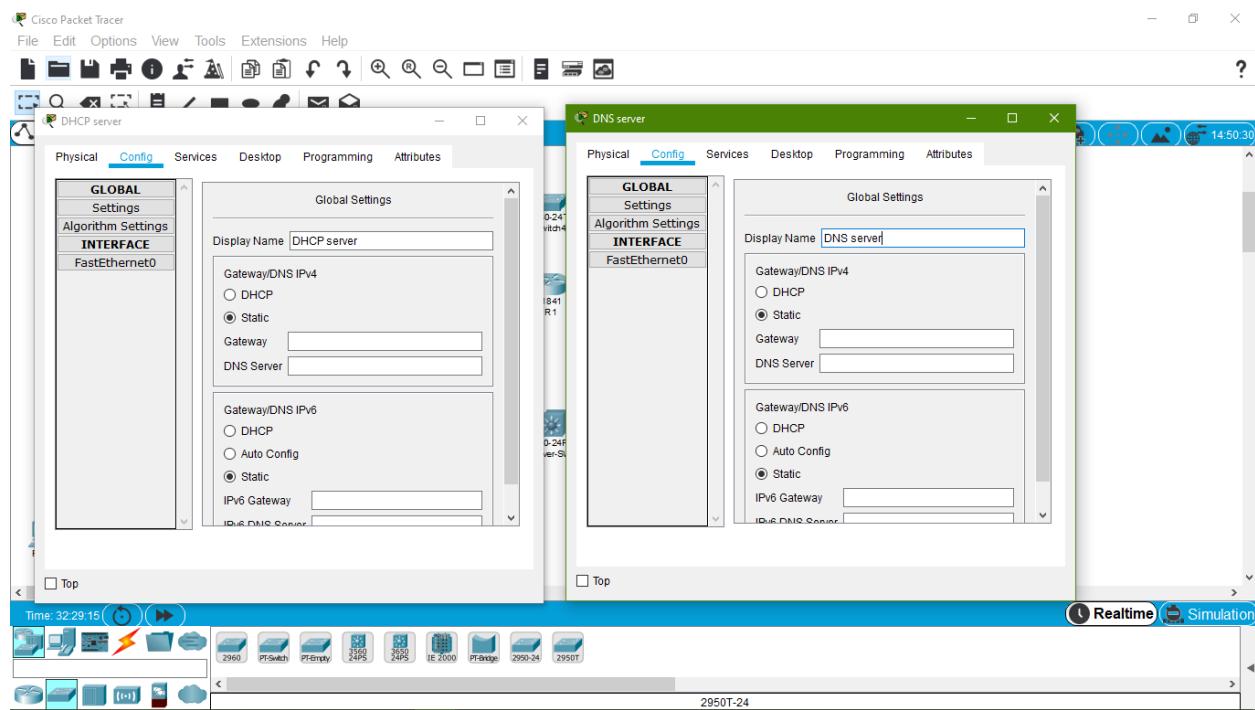
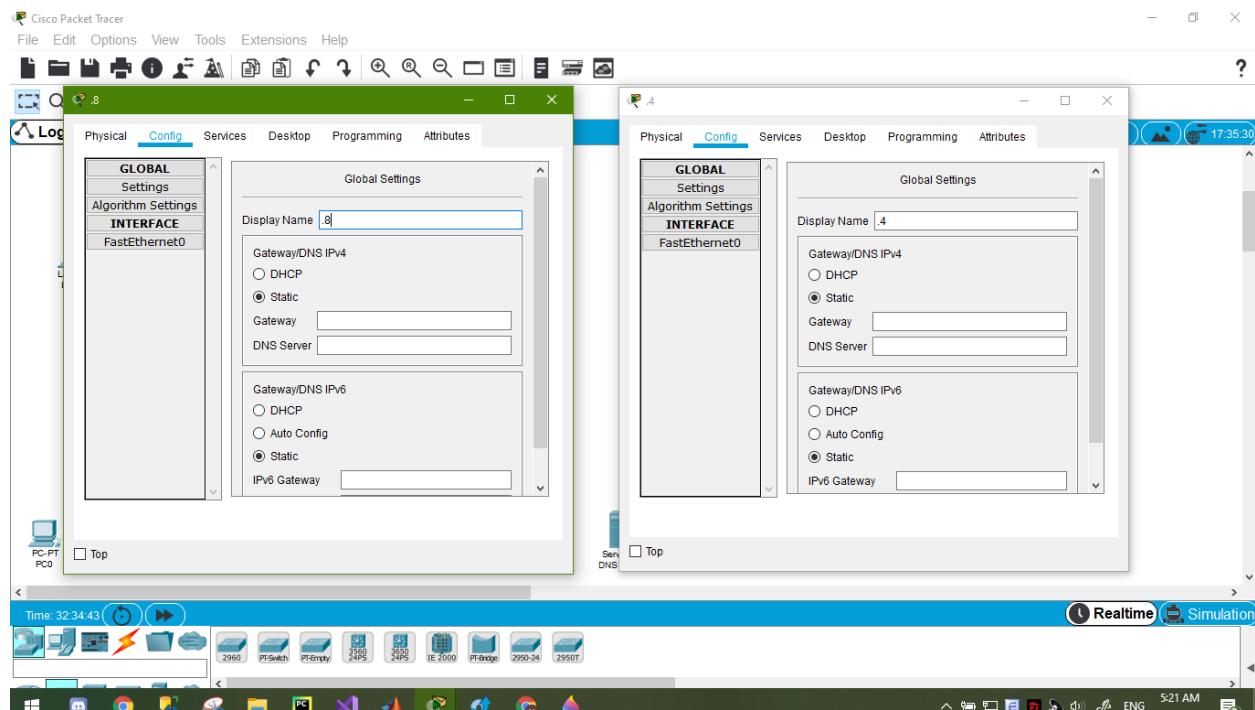
1. Xây dựng sơ đồ mạng và cấu hình các tham số cơ bản

- Lựa chọn, đổi tên và hostname sao cho giống với đề bài

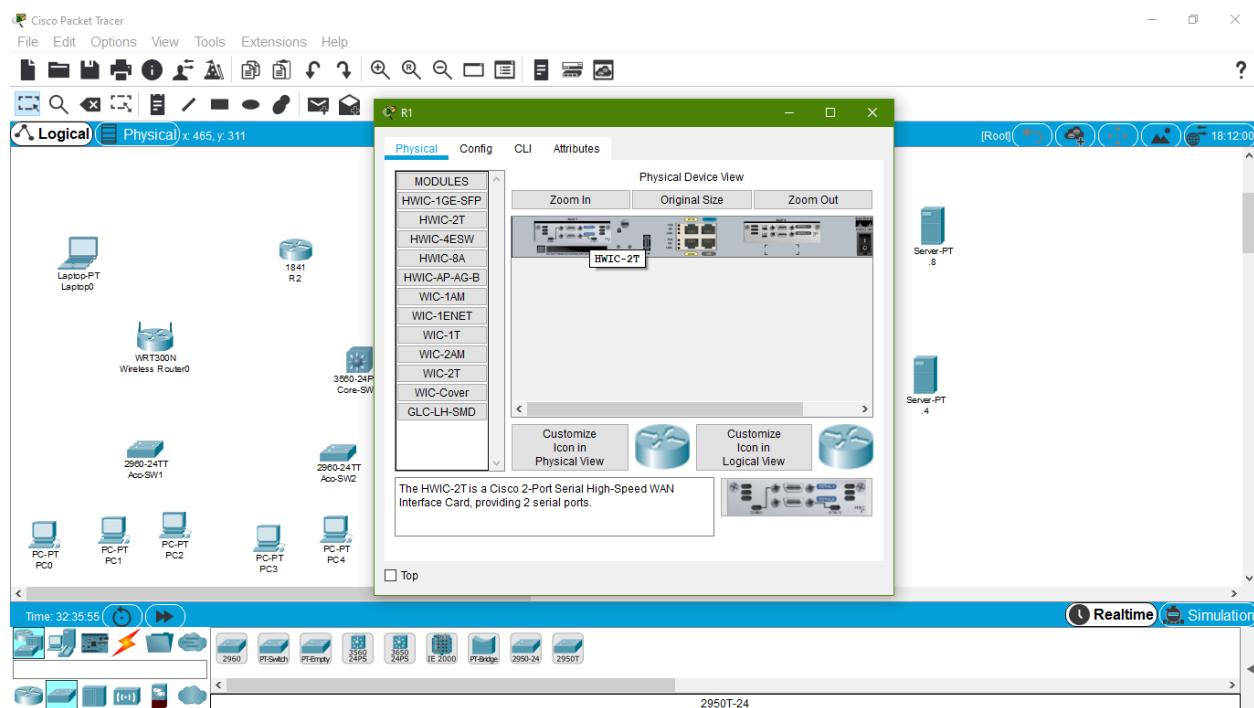
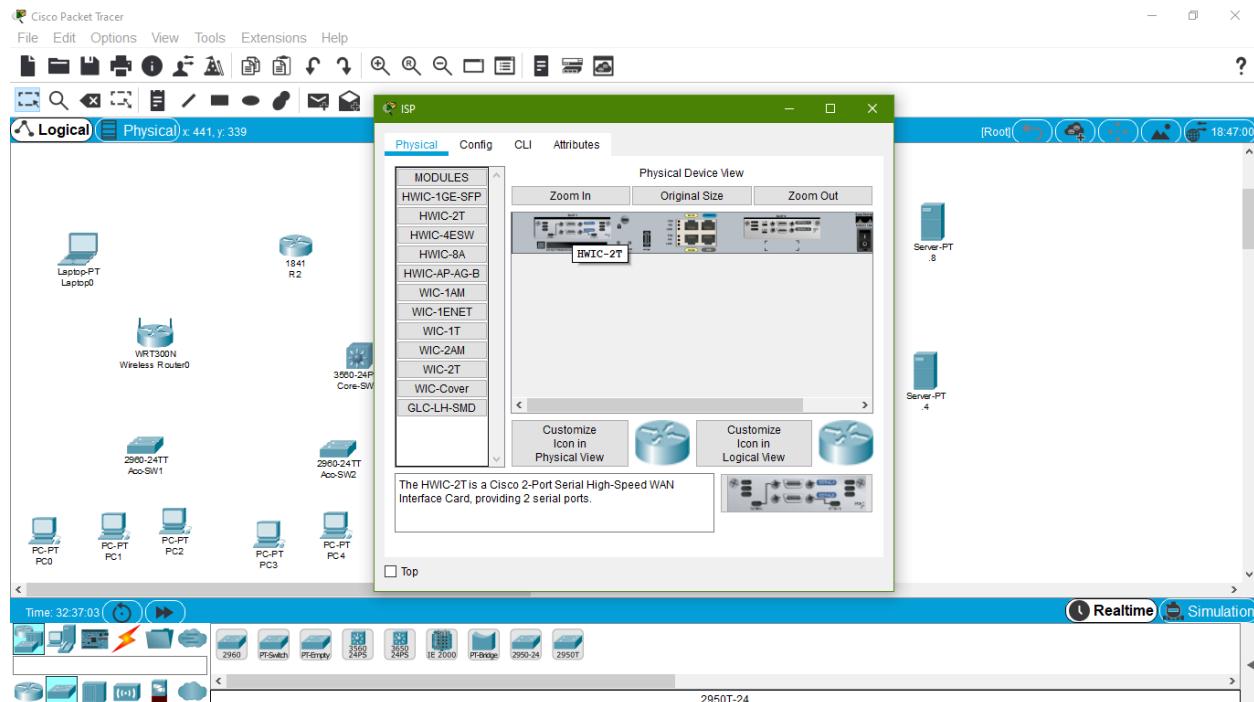




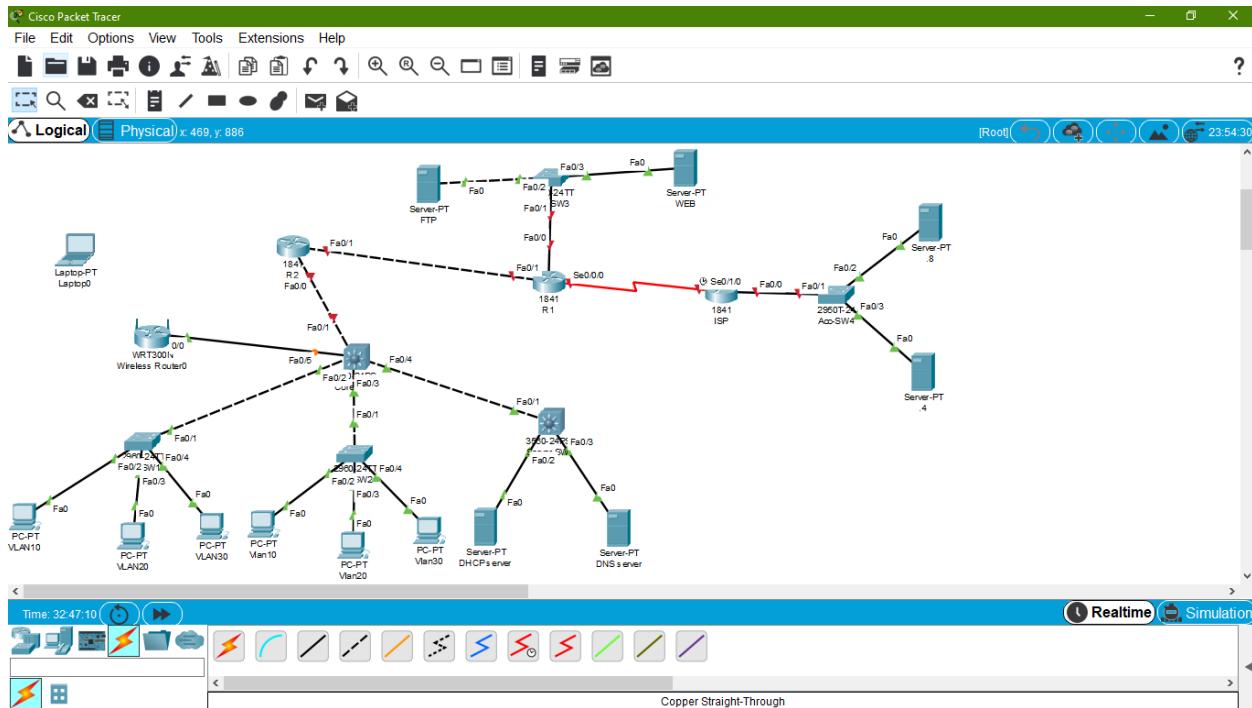




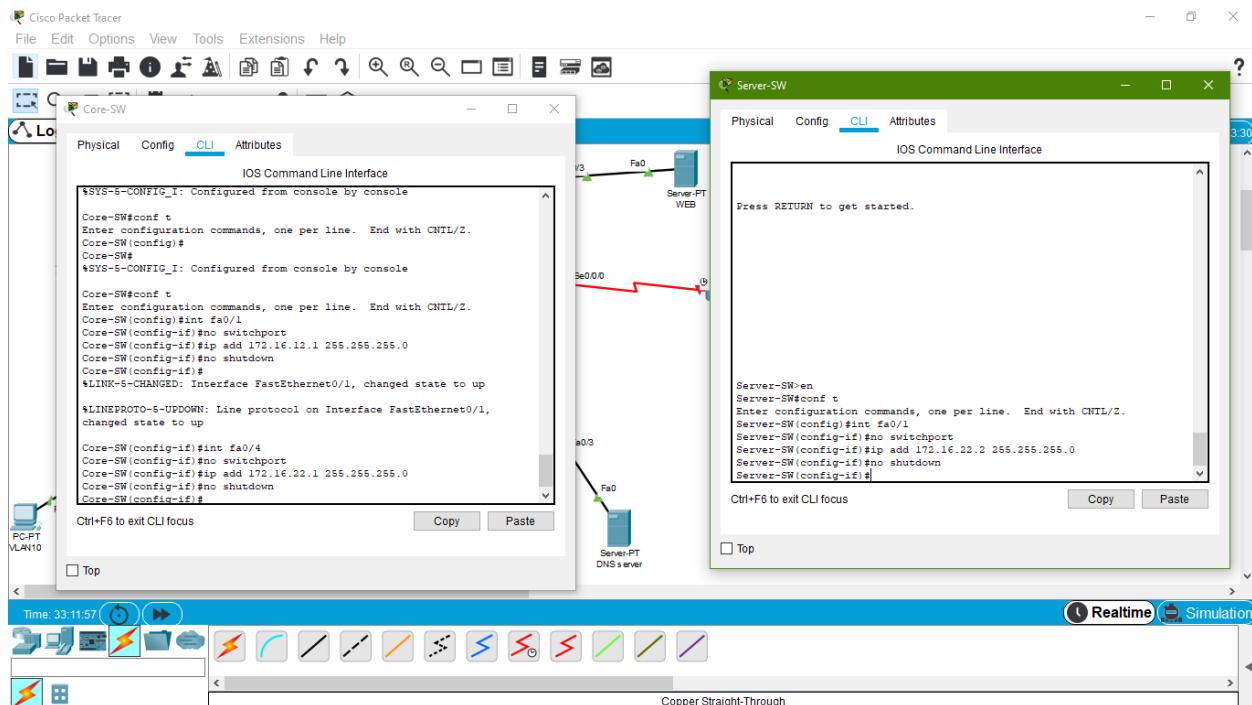
- Lắp vào cổng serial card mạng **HWIC-2T** cho cả hai thiết bị (Router) R1 và ISP (phải tắt thiết bị trước, sau đó bật lại)



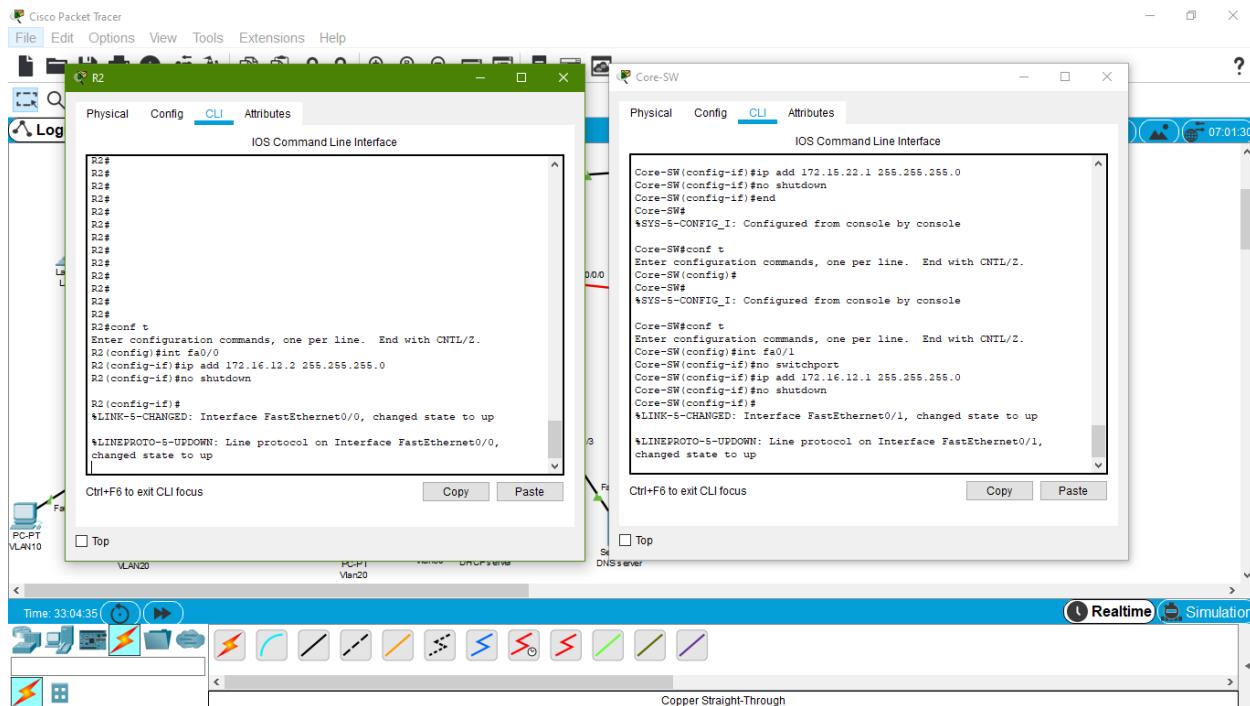
- Sau đó tiến hành nối dây với các cổng tương ứng trên thiết bị



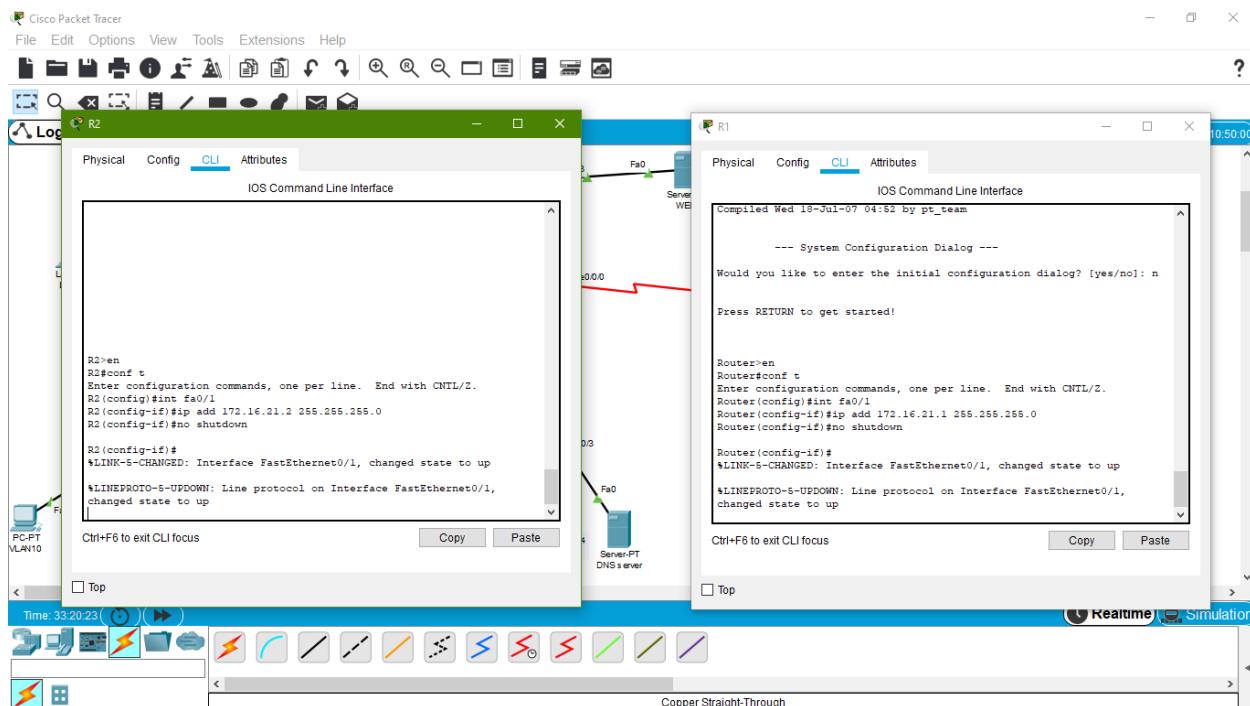
- Tiến hành thêm địa chỉ IP để các Multilayers Switch, Router có thể kết nối với nhau
 - Core-SW và Server-SW



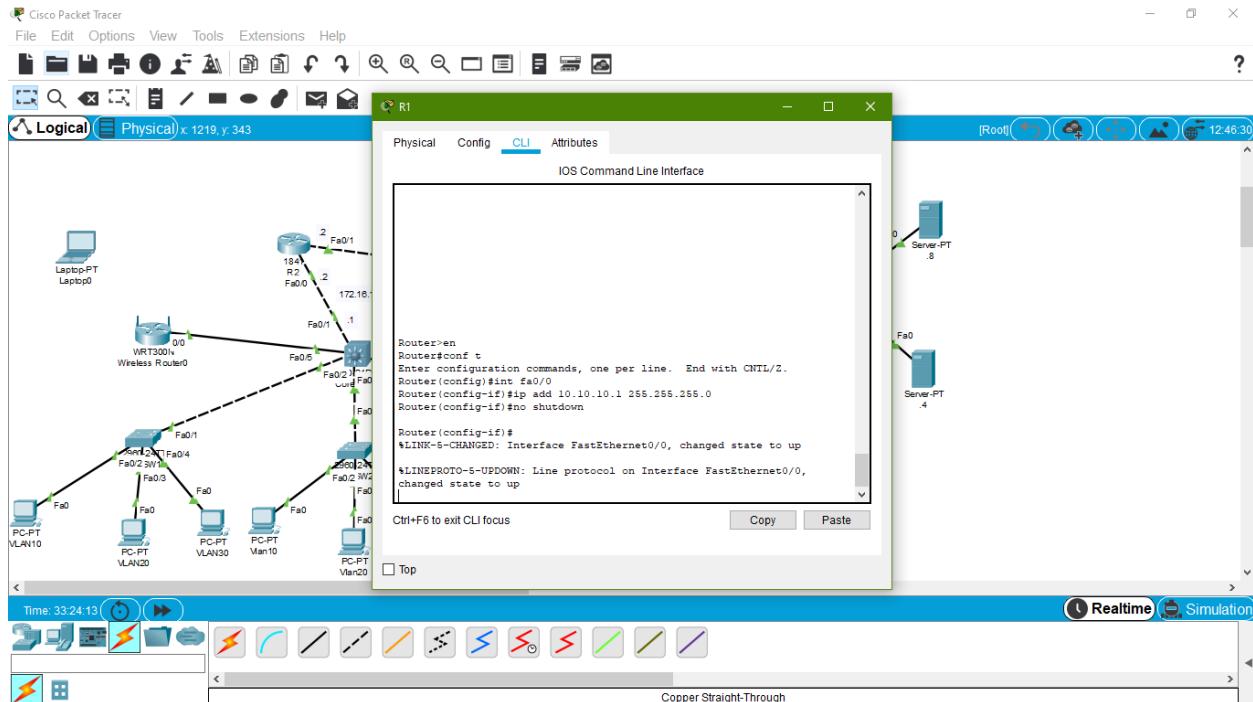
- Core-SW và R2



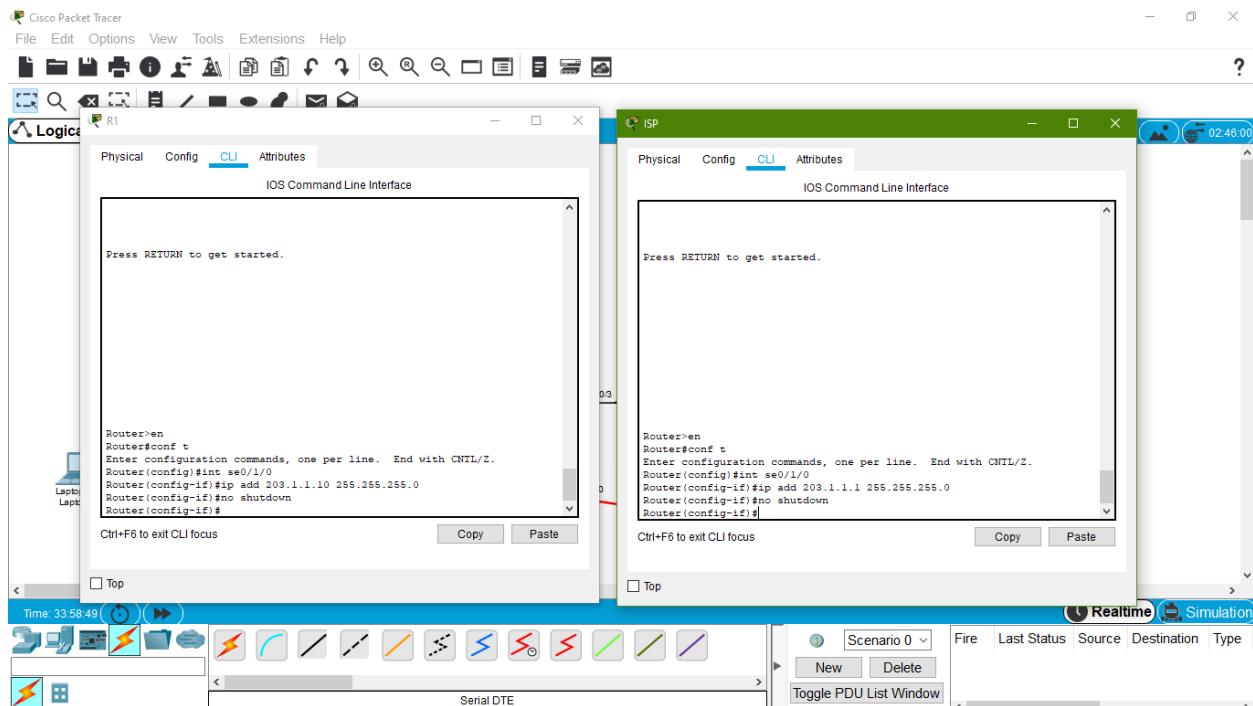
- R1 và R2



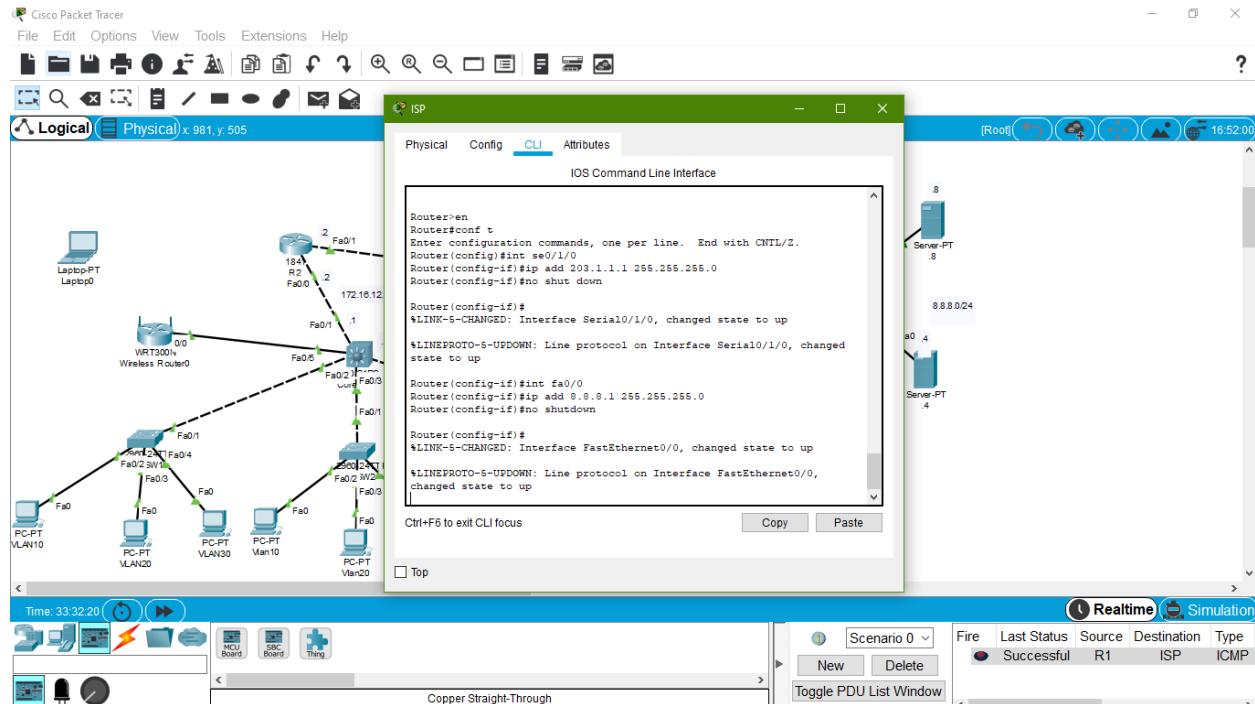
- R1 và đường mạng 10.10.10.0/24 (có vai trò là default gateway của đường mạng)



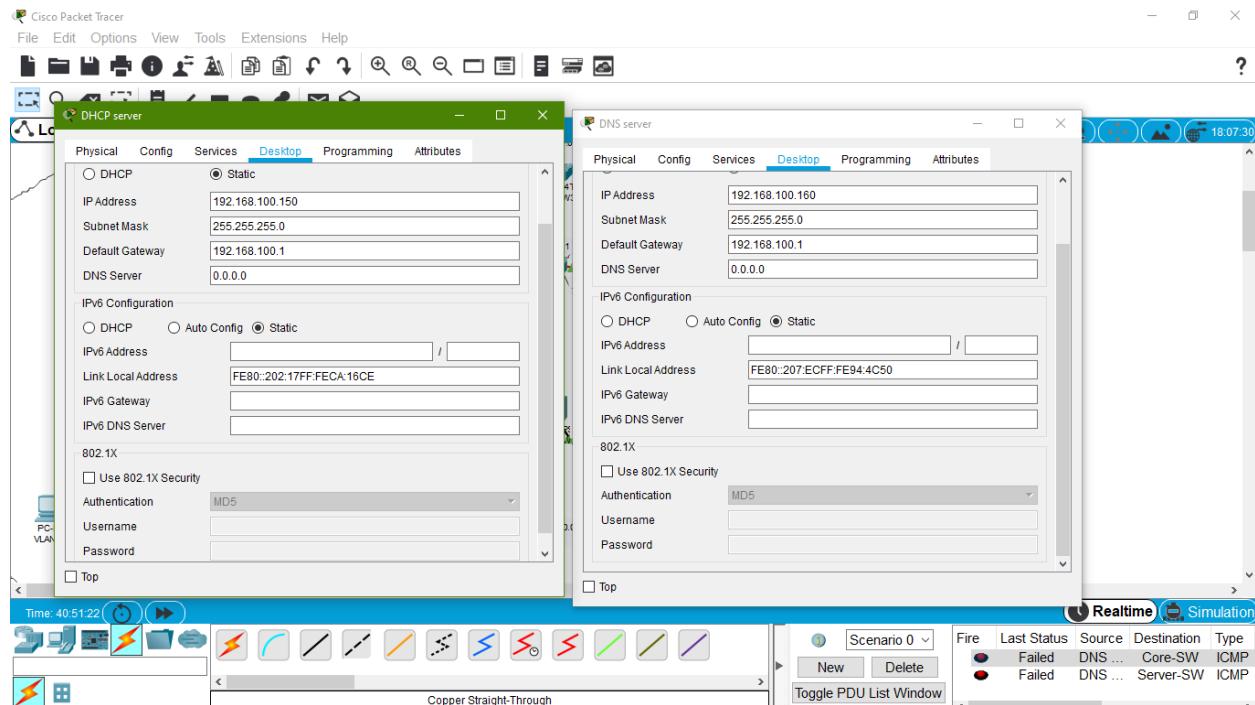
- R1 và ISP (ra ngoài Internet)

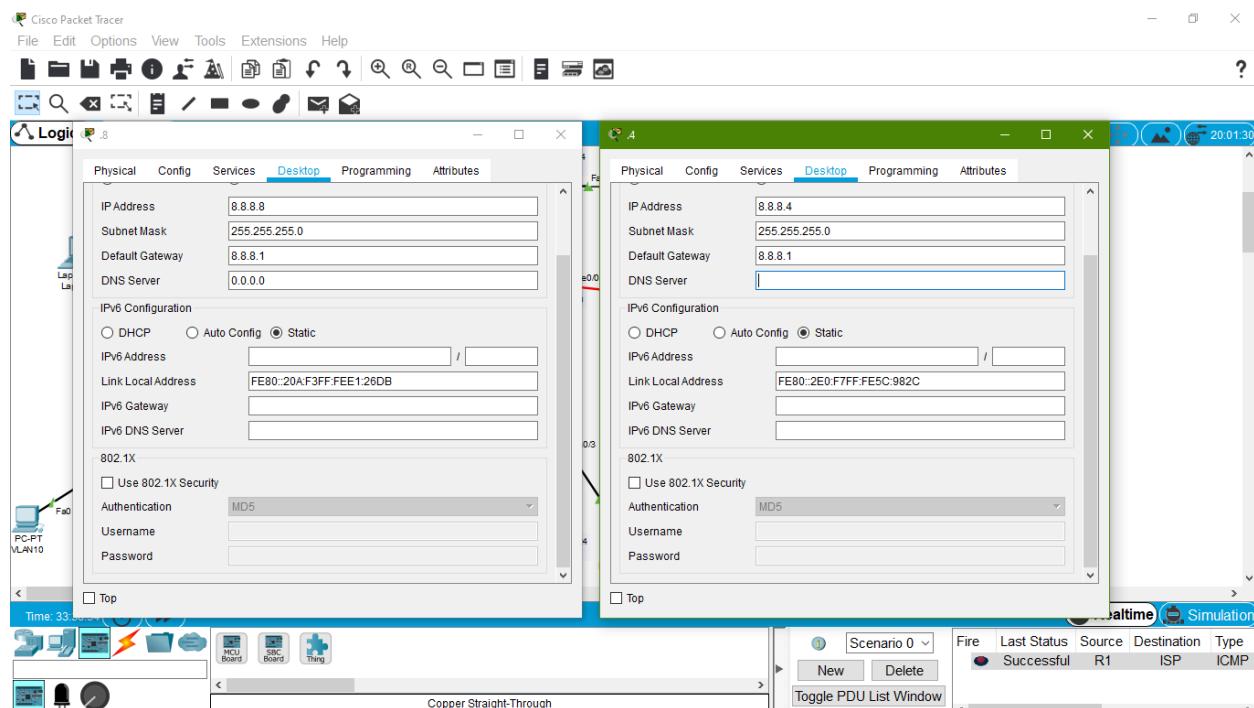
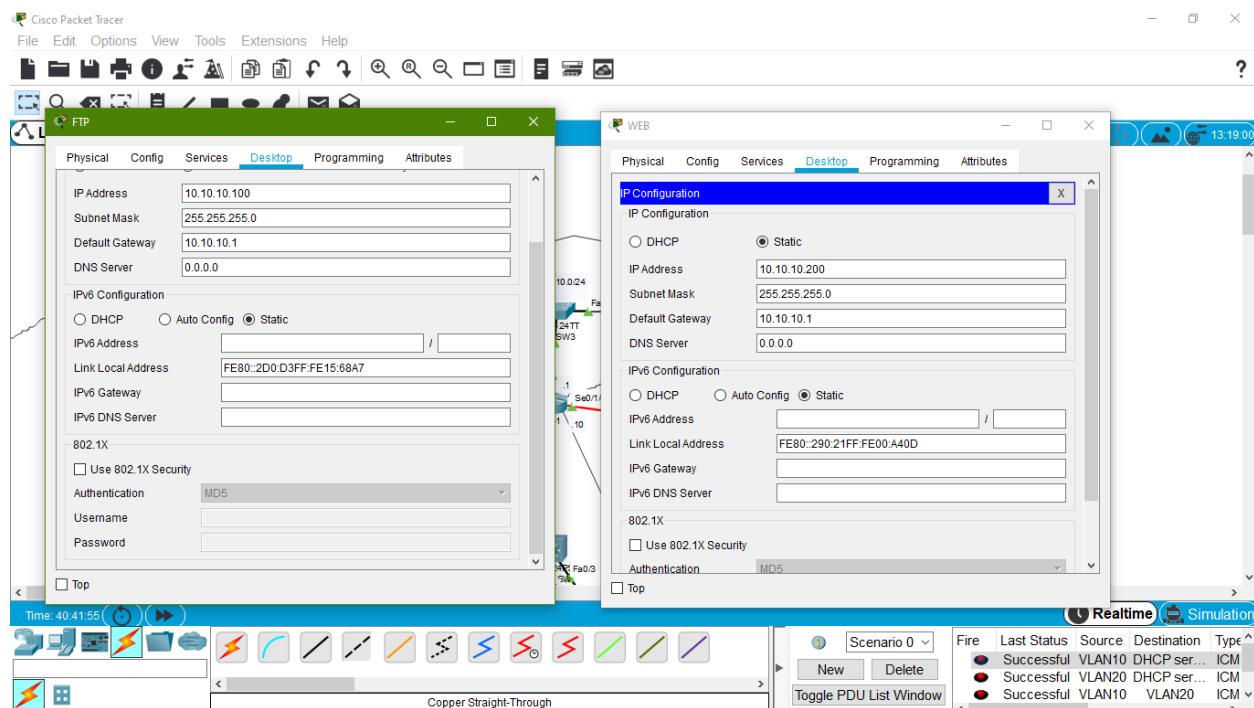


- ISP và đường mạng 8.8.8.0/24 (đóng vai trò là default gateway của đường mạng, là Internet)

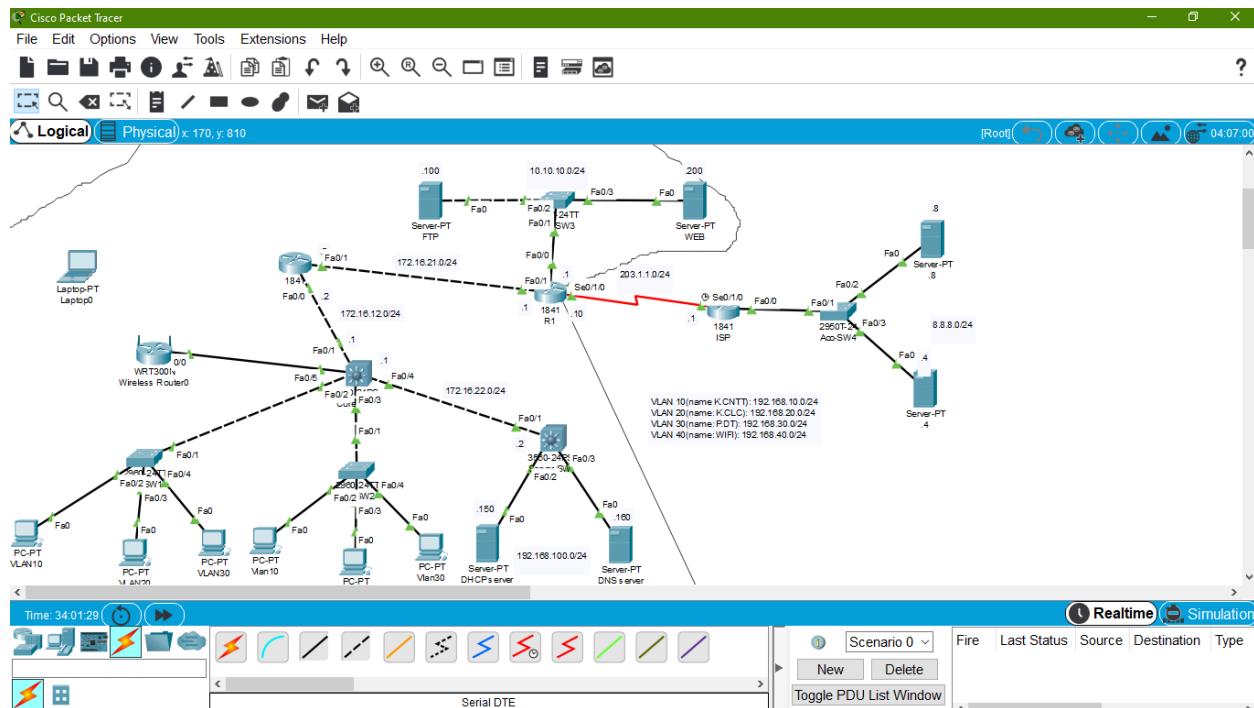


- Tiến hành gán các địa chỉ IP cố định cho các Server





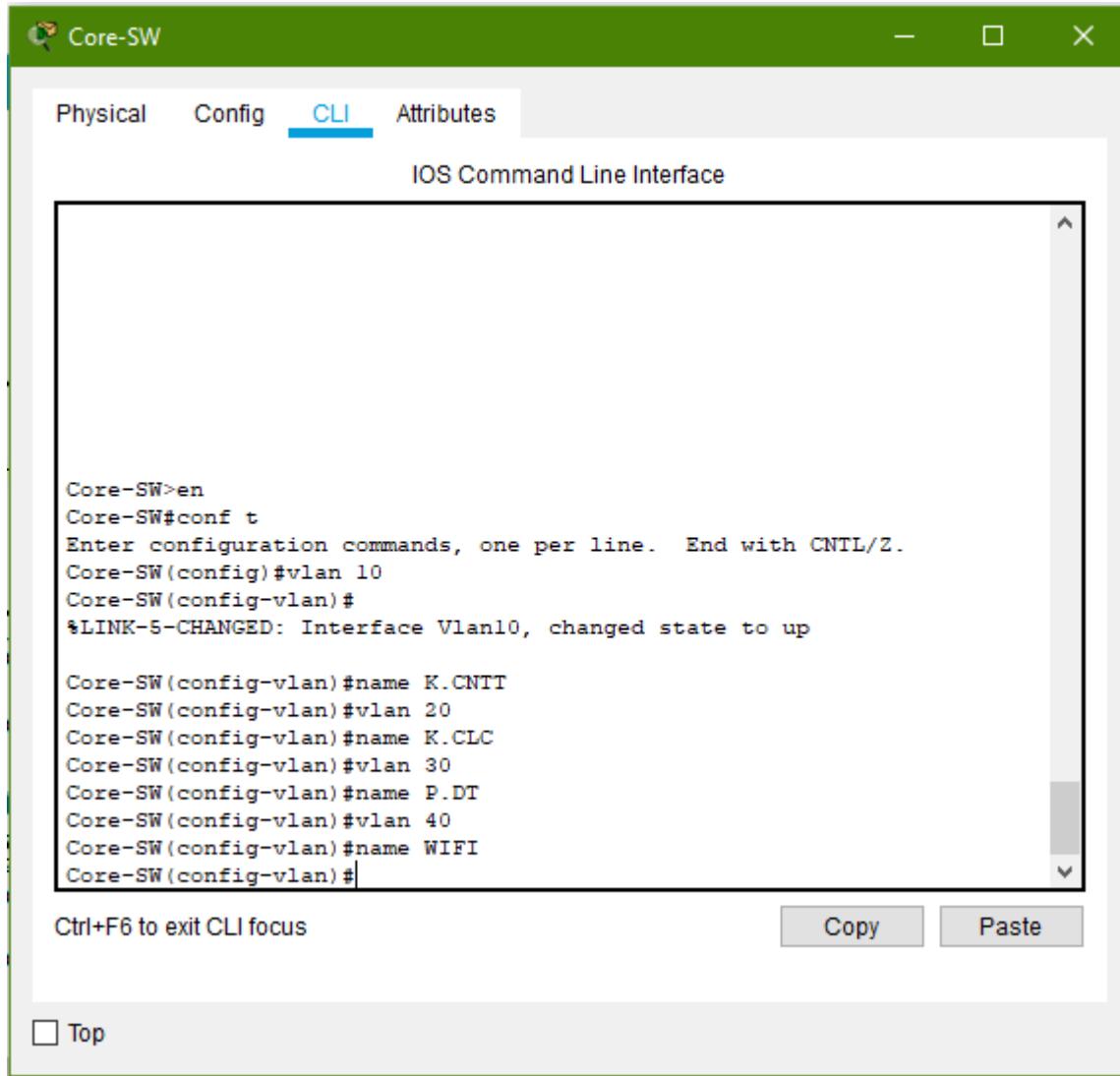
- Sau các bước cấu hình cơ bản, ta có sơ đồ mạng như sau:



2. Cấu hình VLAN, Trunking, IP cho các interface VLAN (SV tự cho)

a. VLAN

- Trên Core-SW
 - Tạo tên VLAN tương ứng trong đề bài



```
Core-SW>en
Core-SW#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Core-SW(config)#vlan 10
Core-SW(config-vlan)#
%LINK-5-CHANGED: Interface Vlan10, changed state to up

Core-SW(config-vlan)#name K.CNTT
Core-SW(config-vlan)#vlan 20
Core-SW(config-vlan)#name K.CLC
Core-SW(config-vlan)#vlan 30
Core-SW(config-vlan)#name P.DT
Core-SW(config-vlan)#vlan 40
Core-SW(config-vlan)#name WIFI
Core-SW(config-vlan)#

Ctrl+F6 to exit CLI focus
```

Top

Copy Paste

- Gán địa chỉ IP cho các VLAN
(cần thêm lệnh **Core-SW(config-if)#no shutdown** để các VLAN không bị tắt)

The screenshot shows a Windows application window titled "Core-SW". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs, it says "IOS Command Line Interface". The main area contains the following CLI session output:

```
Core-SW>en
Core-SW#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Core-SW(config)#int vlan 10
Core-SW(config-if)#ip add 192.168.10.1 255.255.255.0
Core-SW(config-if)#int vlan 20
Core-SW(config-if)#ip add 192.168.20.1 255.255.255.0
Core-SW(config-if)#int vlan 30
Core-SW(config-if)#ip add 192.168.30.1 255.255.255.0
Core-SW(config-if)#int vlan 40
Core-SW(config-if)#ip add 192.168.40.1 255.255.255.0
Core-SW(config-if)#exit
Core-SW(config)#[
```

At the bottom of the window, there are two buttons: "Copy" and "Paste". Below the buttons, there is a checkbox labeled "Top".

- Đối với VLAN 40 thì ta kết nối trực tiếp với Core-SW ở cổng fa0/5

The screenshot shows a Windows application window titled "Core-SW". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs, it says "IOS Command Line Interface". A large text area contains the following CLI session:

```
Press RETURN to get started.

Core-SW>en
Core-SW#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Core-SW(config)#int fa0/5
Core-SW(config-if)#switchport mode access
Core-SW(config-if)#switchport access vlan 40
Core-SW(config-if)#
```

At the bottom left, there is a status message: "Ctrl+F6 to exit CLI focus". On the right side, there are two buttons: "Copy" and "Paste". At the very bottom, there is a small checkbox labeled "Top".

- Trên Server-SW

Tạo VLAN 100: **Server-pool** có đường mạng là 192.168.100.0/24. Đồng thời gán 2 cổng fa0/2 và fa0/3 kết nối đến VLAN

```
Server-SW>en
Server-SW#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Server-SW(config)#vlan 100
Server-SW(config-vlan)#name Server-pool
Server-SW(config-vlan)#exit
Server-SW(config)#int vlan 100
Server-SW(config-if)#
%LINK-5-CHANGED: Interface Vlan100, changed state to up

Server-SW(config-if)#ip add 192.168.100.1 255.255.255.0
Server-SW(config-if)#int fa0/2
Server-SW(config-if)#switchport mode access
Server-SW(config-if)#switchport access vlan 100
Server-SW(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan100, changed state
to up

Server-SW(config-if)#int fa0/3
Server-SW(config-if)#switchport mode access
Server-SW(config-if)#switchport access vlan 100
Server-SW(config-if)#

Ctrl+F6 to exit CLI focus
```

Top

Copy Paste

- Tạo VLAN đối với 2 Acc-SW1 và Acc-SW2 (có kết nối đến VLAN 10, 20, 30) tương tự như trên Core-SW (nhưng không cần gán IP). Tùy theo từng loại Switch mà có thể từ đồng bộ VLAN để ta không cần tạo lại VLAN

b. Trunking

- Tiến hành tạo các đường Trunk để kết nối các VLAN(dành cho các VLAN 10, 20, 30. VLAN 40 kết nối trực tiếp với cổng fa0/5)
 - Trên Core-SW: Tạo đường Trunk cho hai cổng fa0/2 và fa0/3 (kết nối đến VLAN 10, 20, 30)

The screenshot shows a Cisco IOS CLI window titled "Core-SW". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". Below the tabs, it says "IOS Command Line Interface". The main area displays the following configuration commands:

```
Core-SW>en
Core-SW#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Core-SW(config)#int fa0/2
Core-SW(config-if)#switchport trunk encapsulation dot1q
Core-SW(config-if)#switchport mode trunk

Core-SW(config-if)#
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,
changed state to down

*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/2,
changed state to up
```

At the bottom left, there is a note: "Ctrl+F6 to exit CLI focus". At the bottom right, there are "Copy" and "Paste" buttons. A checkbox labeled "Top" is located at the very bottom left.

The screenshot shows a Windows application window titled "Core-SW". The window has a green header bar with the title and standard window controls (minimize, maximize, close). Below the header is a menu bar with tabs: "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". The main area is labeled "IOS Command Line Interface". Inside this area, there is a large text box containing the following CLI session output:

```
Core-SW>en
Core-SW#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Core-SW(config)#int fa0/3
Core-SW(config-if)#switchport trunk encapsulation dot1q
Core-SW(config-if)#switchport mode trunk

Core-SW(config-if)#
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,
changed state to down

*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/3,
changed state to up
```

At the bottom of the text box, there is a message: "Ctrl+F6 to exit CLI focus". To the right of the text box are two buttons: "Copy" and "Paste". At the very bottom of the window, there is a small checkbox labeled "Top".

- Trên Acc-SW1 (có kết nối đến VLAN 10, 20, 30)
 - Tạo đường Trunk ở cổng fa0/1

The screenshot shows a Cisco IOS Command Line Interface (CLI) window titled "Acc-SW1". The window has tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is labeled "IOS Command Line Interface" and contains the following text:

```
Press RETURN to get started.

Acc-SW1>en
Acc-SW1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Acc-SW1(config)#int fa0/1
Acc-SW1(config-if)#switchport mode trunk
Acc-SW1(config-if)#[
```

At the bottom of the window, there are buttons for "Copy" and "Paste". Below the window, there is a status bar with the text "Ctrl+F6 to exit CLI focus" and a "Top" button.

- Gán các cổng fa tương ứng với các VLAN

The screenshot shows a Cisco IOS Command Line Interface (CLI) window titled "Acc-SW1". The window has tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the following configuration commands:

```
Acc-SW1>en
Acc-SW1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Acc-SW1(config)#int fa0/2
Acc-SW1(config-if)#switchport mode access
Acc-SW1(config-if)#switchport access vlan 10
Acc-SW1(config-if)#int fa0/3
Acc-SW1(config-if)#switchport mode access
Acc-SW1(config-if)#switchport access vlan 20
Acc-SW1(config-if)#int fa0/4
Acc-SW1(config-if)#switchport mode access
Acc-SW1(config-if)#switchport access vlan 30
Acc-SW1(config-if)#

```

At the bottom of the CLI window, there are buttons for "Copy" and "Paste", and a checkbox labeled "Top".

- Trên Acc-SW2 (có kết nối đến các VLAN 10, 20, 30)
 - Tạo đường Trunk ở cổng fa0/1

The screenshot shows a Windows application window titled "Acc-SW2". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected and highlighted in blue), and "Attributes". Below the tabs is a title bar "IOS Command Line Interface". The main area contains several lines of text output from the CLI, followed by a configuration session:

```
*LINK-5-CHANGED: Interface FastEthernet0/4, changed state to up
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4,
changed state to up
*SPANTREE-2-RECV_PVID_ERR: Received 802.1Q BPDU on non trunk
FastEthernet0/1 VLAN1.

*SPANTREE-2-BLOCK_PVID_LOCAL: Blocking FastEthernet0/1 on VLAN0001.
Inconsistent port type.

*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to down
*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1,
changed state to up

Acc-SW2>en
Acc-SW2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Acc-SW2(config)#int fa0/1
Acc-SW2(config-if)#switchport mode trunk
Acc-SW2(config-if)#
```

At the bottom of the window, there is a status message "Ctrl+F6 to exit CLI focus" and two buttons: "Copy" and "Paste". A checkbox labeled "Top" is located at the bottom left.

- Gán các cổng fa tương ứng với các VLAN

The screenshot shows a Windows application window titled "Acc-SW2". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected and highlighted in blue), and "Attributes". Below the tabs, it says "IOS Command Line Interface". The main area of the window contains the following configuration commands:

```
Acc-SW2>en
Acc-SW2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Acc-SW2(config)#int fa0/2
Acc-SW2(config-if)#switchport mode access
Acc-SW2(config-if)#switchport access vlan 10
Acc-SW2(config-if)#int fa0/3
Acc-SW2(config-if)#switchport mode access
Acc-SW2(config-if)#switchport access vlan 20
Acc-SW2(config-if)#int fa0/4
Acc-SW2(config-if)#switchport mode access
Acc-SW2(config-if)#switchport access vlan 30
Acc-SW2(config-if)#
```

At the bottom of the CLI window, there are two buttons: "Copy" and "Paste". Below the window, there is a status bar with the text "Ctrl+F6 to exit CLI focus" and a checkbox labeled "Top".

c. Gán IP cho các interface VLAN (đã trình bày ở trên)

d. Kiểm tra cấu hình

The screenshot shows a window titled "Core-SW" with a green header bar. Below the header are tabs: "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". The main area is labeled "IOS Command Line Interface". It displays the following configuration script:

```
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
  no ip address
  shutdown
!
interface Vlan10
  mac-address 0060.5c00.e601
  ip address 192.168.10.1 255.255.255.0
!
interface Vlan20
  mac-address 0060.5c00.e602
  ip address 192.168.20.1 255.255.255.0
!
interface Vlan30
  mac-address 0060.5c00.e603
  ip address 192.168.30.1 255.255.255.0
!
interface Vlan40
  mac-address 0060.5c00.e604
  ip address 192.168.40.1 255.255.255.0
!
--More-- |
```

At the bottom of the window, there is a status message: "Ctrl+F6 to exit CLI focus". To the right of this message are two buttons: "Copy" and "Paste". At the very bottom left is a checkbox labeled "Top".

The screenshot shows a Cisco IOS Command Line Interface (CLI) window titled "Core-SW". The window has tabs at the top: Physical, Config, CLI (which is selected), and Attributes. Below the tabs is the text "IOS Command Line Interface". The main area displays the following configuration output:

```
interface Vlan40
  mac-address 0060.5c00.e604
  ip address 192.168.40.1 255.255.255.0
!
router ospf 1
  log-adjacency-changes

Core-SW#show int trunk
Port      Mode       Encapsulation  Status      Native vlan
Fa0/2    on        802.1q        trunking     1
Fa0/3    on        802.1q        trunking     1

Port      Vlans allowed on trunk
Fa0/2    1,10,20,30
Fa0/3    1,10,20,30

Port      Vlans allowed and active in management domain
Fa0/2    1,10,20,30
Fa0/3    1,10,20,30

Port      Vlans in spanning tree forwarding state and not pruned
Fa0/2    1,10,20,30
Fa0/3    1,10,20,30

Core-SW#
```

At the bottom left of the window, it says "Ctrl+F6 to exit CLI focus". On the right side, there are "Copy" and "Paste" buttons. At the very bottom left is a "Top" button.

The screenshot shows a software window titled "Acc-SW1" with a green header bar. Below the header are tabs: "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is labeled "IOS Command Line Interface". Inside this area, the following command output is displayed:

```
Acc-SW1>show int trunk
Port      Mode       Encapsulation  Status      Native vlan
Fa0/1    on        802.1q         trunking     1

Port      Vlans allowed on trunk
Fa0/1    1-1005

Port      Vlans allowed and active in management domain
Fa0/1    1,10,20,30

Port      Vlans in spanning tree forwarding state and not pruned
Fa0/1    1,10,20,30

Acc-SW1>
```

Below the terminal window, there is a status message: "Ctrl+F6 to exit CLI focus". To the right of the terminal are two buttons: "Copy" and "Paste". At the bottom left of the window is a "Top" button.

The screenshot shows a Cisco IOS CLI window titled "Acc-SW2". The "CLI" tab is selected. The window displays the following text:

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan30, changed state to up

Acc-SW2(config-if)#ip add 192.168.30.1 255.255.255.0
Acc-SW2(config-if)#
Acc-SW2(config-if)#exit
Acc-SW2(config)#
Acc-SW2#
%SYS-5-CONFIG_I: Configured from console by console

Acc-SW2#show int trunk
Port      Mode       Encapsulation  Status      Native vlan
Fa0/1    on         802.1q        trunking     1

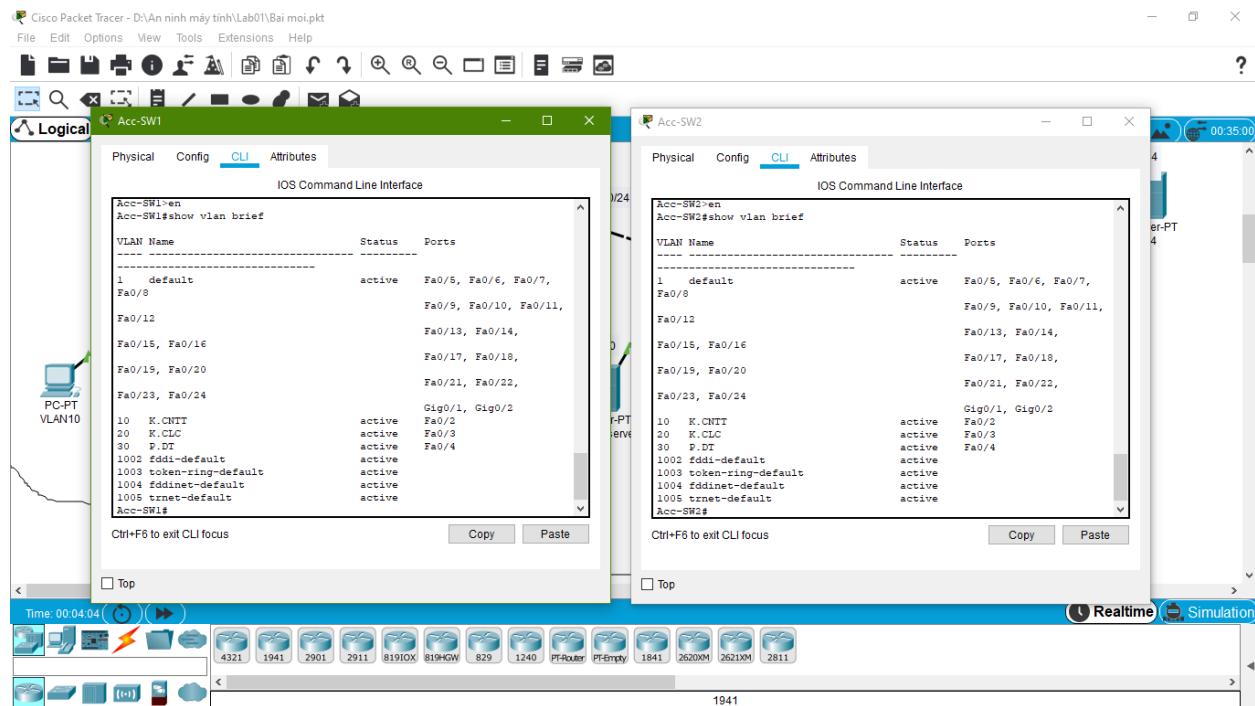
Port      Vlans allowed on trunk
Fa0/1    1-1005

Port      Vlans allowed and active in management domain
Fa0/1    1,10,20,30

Port      Vlans in spanning tree forwarding state and not pruned
Fa0/1    1,10,20,30

Acc-SW2#
```

At the bottom of the window, there are buttons for "Copy" and "Paste". Below the window, a status bar shows "Ctrl+F6 to exit CLI focus" and a checkbox labeled "Top".



3. Định tuyến, DHCP, DNS và WIFI

a. Định tuyến hệ thống mạng nội bộ

Định tuyến router ospf với giao thức là 1 và area 0 cho các thiết bị. Định tuyến đối với các đường mạng mà thiết bị được kết nối trực tiếp đến (đối với các đường mạng không kết nối trực tiếp, các thiết bị sẽ có khả năng tự học để biết các đường mạng trong nội bộ)

- Trên Core-SW

```
Core-SW>en
Core-SW#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Core-SW(config)#ip routing
Core-SW(config)#router ospf 1
Core-SW(config-router)#network 192.168.10.0 255.255.255.0 area 0
Core-SW(config-router)#network 192.168.20.0 255.255.255.0 area 0
Core-SW(config-router)#network 192.168.30.0 255.255.255.0 area 0
Core-SW(config-router)#network 192.168.40.0 255.255.255.0 area 0
Core-SW(config-router)#network 172.16.22.0 255.255.255.0 area 0
Core-SW(config-router)#network 172.16.12.0 255.255.255.0 area 0
Core-SW(config-router)##
```

Ctrl+F6 to exit CLI focus

Top

- Trên Server-SW

The screenshot shows a Windows application window titled "Server-SW". The window has a green header bar with the title and standard window controls (minimize, maximize, close). Below the header is a menu bar with tabs: "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". The main area is labeled "IOS Command Line Interface". It contains the following text:

```
Press RETURN to get started.

Server-SW>en
Server-SW#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Server-SW(config)#ip routing
Server-SW(config)#router ospf 1
Server-SW(config-router)#network 192.168.100.0 255.255.255.0 area 0
Server-SW(config-router)#network 172.16.22.0| 255.255.255.0 area 0
```

At the bottom left, there is a note: "Ctrl+F6 to exit CLI focus". On the right side, there are two buttons: "Copy" and "Paste". At the very bottom, there is a "Top" button.

- Trên R2

The screenshot shows a Windows command-line interface window titled "R2". The title bar has icons for minimize, maximize, and close. Below the title bar is a menu bar with four tabs: "Physical", "Config", "CLI" (which is highlighted in blue), and "Attributes". The main area of the window is labeled "IOS Command Line Interface". Inside this area, there is a text box containing the following text:

```
Press RETURN to get started.

R2>en
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip routing
R2(config)#router ospf 1
R2(config-router)#network 172.16.12.0 255.255.255.0 area 0
R2(config-router)#network 172.16.21.0 255.255.255.0 area 0
R2(config-router)#

```

Below the text box, there is a status message "Ctrl+F6 to exit CLI focus" and two buttons: "Copy" and "Paste". At the bottom left of the window, there is a checkbox labeled "Top".

- Trên R1

The screenshot shows a Cisco IOS Command Line Interface (CLI) window titled "R1". The window has tabs at the top: "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the tabs, it says "IOS Command Line Interface". A message "Press RETURN to get started." is displayed. The main area contains configuration commands:

```
R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip routing
R1(config)#router ospf 1
R1(config-router)#network 172.16.21.0 255.255.255.0 area 0
R1(config-router)#network 10.10.10.0 255.255.255.0 area 0
R1(config-router)#

```

At the bottom left, it says "Ctrl+F6 to exit CLI focus". On the right side, there are "Copy" and "Paste" buttons. At the very bottom, there is a checkbox labeled "Top".

- Kiểm tra lại định tuyến:

The screenshot shows a window titled "Server-SW" with a green header bar containing tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". Below the header is the text "IOS Command Line Interface". The main content area displays the output of the command "show ip route". The output includes route codes and descriptions, a list of routes, and a prompt "Server-SW#". At the bottom of the window are buttons for "Copy" and "Paste", and a checkbox labeled "Top".

```
Server-SW#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
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      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, ia - IS-IS
      inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

  10.0.0.0/24 is subnetted, 1 subnets
O  10.10.10.0 [110/4] via 172.16.22.1, 00:00:03, FastEthernet0/1
  172.16.0.0/24 is subnetted, 3 subnets
O  172.16.12.0 [110/2] via 172.16.22.1, 00:00:03, FastEthernet0/1
O  172.16.21.0 [110/3] via 172.16.22.1, 00:00:03, FastEthernet0/1
C  172.16.22.0 is directly connected, FastEthernet0/1
O  192.168.10.0/24 [110/2] via 172.16.22.1, 00:00:03, FastEthernet0/1
O  192.168.20.0/24 [110/2] via 172.16.22.1, 00:00:03, FastEthernet0/1
O  192.168.30.0/24 [110/2] via 172.16.22.1, 00:00:03, FastEthernet0/1
O  192.168.40.0/24 [110/2] via 172.16.22.1, 00:00:03, FastEthernet0/1
C  192.168.100.0/24 is directly connected, Vlan100

Server-SW#
```

```
Core-SW# 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
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      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, ia - IS-IS
      inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

  10.0.0.0/24 is subnetted, 1 subnets
O   10.10.10.0 [110/3] via 172.16.12.2, 00:02:01, FastEthernet0/1
  172.16.0.0/24 is subnetted, 3 subnets
C     172.16.12.0 is directly connected, FastEthernet0/1
O     172.16.21.0 [110/2] via 172.16.12.2, 00:04:53, FastEthernet0/1
C     172.16.22.0 is directly connected, FastEthernet0/4
C     192.168.10.0/24 is directly connected, Vlan10
C     192.168.20.0/24 is directly connected, Vlan20
C     192.168.30.0/24 is directly connected, Vlan30
C     192.168.40.0/24 is directly connected, Vlan40
O     192.168.100.0/24 [110/2] via 172.16.22.2, 00:00:48, FastEthernet0/4

Core-SW#
```

Ctrl+F6 to exit CLI focus

Top

The screenshot shows a Cisco IOS CLI window titled "R2". The window has tabs at the top: Physical, Config, CLI (which is selected), and Attributes. Below the tabs is the text "IOS Command Line Interface". The main content area displays the output of the command "R2#show ip route". The output includes route codes and descriptions, followed by a list of routes. At the bottom of the window, there are buttons for "Copy" and "Paste", and a "Top" button.

```
R2#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
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      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, ia - IS-IS
      inter area
      * - candidate default, U - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is not set

  10.0.0.0/24 is subnetted, 1 subnets
O   10.10.10.0 [110/2] via 172.16.21.1, 00:02:50, FastEthernet0/1
  172.16.0.0/24 is subnetted, 3 subnets
C     172.16.12.0 is directly connected, FastEthernet0/0
C     172.16.21.0 is directly connected, FastEthernet0/1
O     172.16.22.0 [110/2] via 172.16.12.1, 00:01:32, FastEthernet0/0
O     192.168.10.0/24 [110/2] via 172.16.12.1, 00:05:52, FastEthernet0/0
O     192.168.20.0/24 [110/2] via 172.16.12.1, 00:05:52, FastEthernet0/0
O     192.168.30.0/24 [110/2] via 172.16.12.1, 00:05:52, FastEthernet0/0
O     192.168.40.0/24 [110/2] via 172.16.12.1, 00:05:52, FastEthernet0/0
O     192.168.100.0/24 [110/3] via 172.16.12.1, 00:01:32, FastEthernet0/0

R2#
```

R1>en
R1#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
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
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, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route

Gateway of last resort is not set

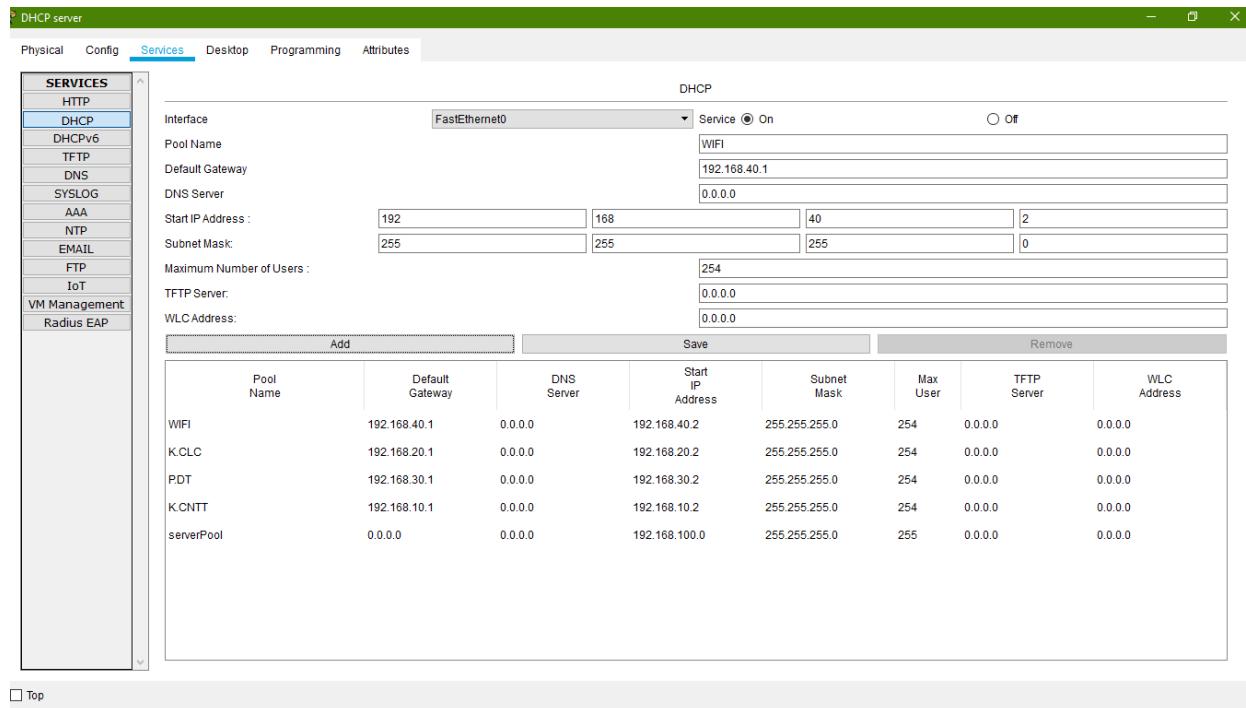
10.0.0.0/24 is subnetted, 1 subnets
C 10.10.10.0 is directly connected, FastEthernet0/0
172.16.0.0/24 is subnetted, 3 subnets
O 172.16.12.0 [110/2] via 172.16.21.2, 00:01:48, FastEthernet0/1
C 172.16.21.0 is directly connected, FastEthernet0/1
O 172.16.22.0 [110/3] via 172.16.21.2, 00:01:48, FastEthernet0/1
O 192.168.10.0/24 [110/3] via 172.16.21.2, 00:01:48, FastEthernet0/1
O 192.168.20.0/24 [110/3] via 172.16.21.2, 00:01:48, FastEthernet0/1
O 192.168.30.0/24 [110/3] via 172.16.21.2, 00:01:48, FastEthernet0/1
O 192.168.40.0/24 [110/3] via 172.16.21.2, 00:01:48, FastEthernet0/1
C 203.1.1.0/24 is directly connected, Serial0/1/0

Ctrl+F6 to exit CLI focus Copy Paste

Top

b. Cấu hình DHCP cấp IP cho các VLAN

- Trên DHCP Server (có địa chỉ là 192.168.100.150/24 thuộc VLAN 100)
 - Vào Service và tiến hành thêm các server



- Trên Core-SW dùng lệnh ip helper-address <địa chỉ DHCP Server> cho từng VLAN (do bị chặn gói tin broadcast) để xin cấp IP cho từng VLAN

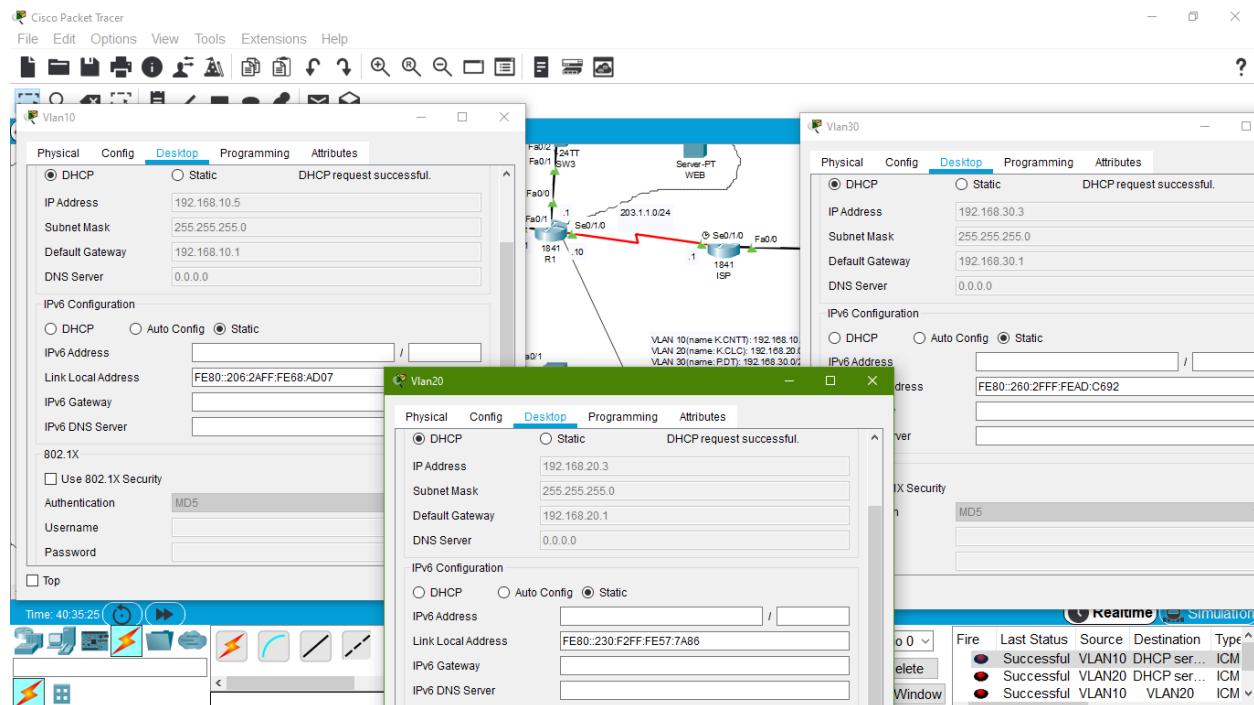
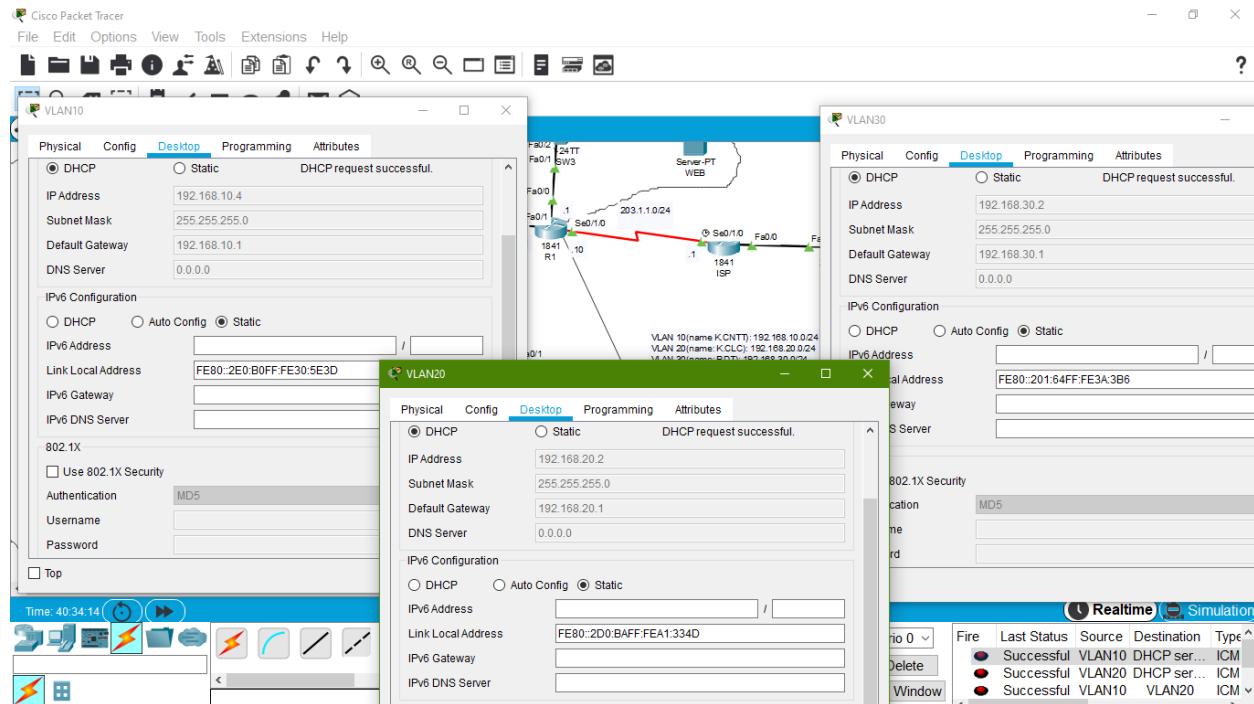
The screenshot shows a Cisco IOS CLI window titled "Core-SW". The "CLI" tab is selected. The command-line interface displays the following configuration:

```
Core-SW>en
Core-SW#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Core-SW(config)#int vlan 10
Core-SW(config-if)#ip helper-address 192.168.100.150
Core-SW(config-if)#int vlan 20
Core-SW(config-if)#ip helper-address 192.168.100.150
Core-SW(config-if)#int vlan 30
Core-SW(config-if)#ip helper-address 192.168.100.150
Core-SW(config-if)#int vlan 40
Core-SW(config-if)#ip helper-address 192.168.100.150
Core-SW(config-if)#

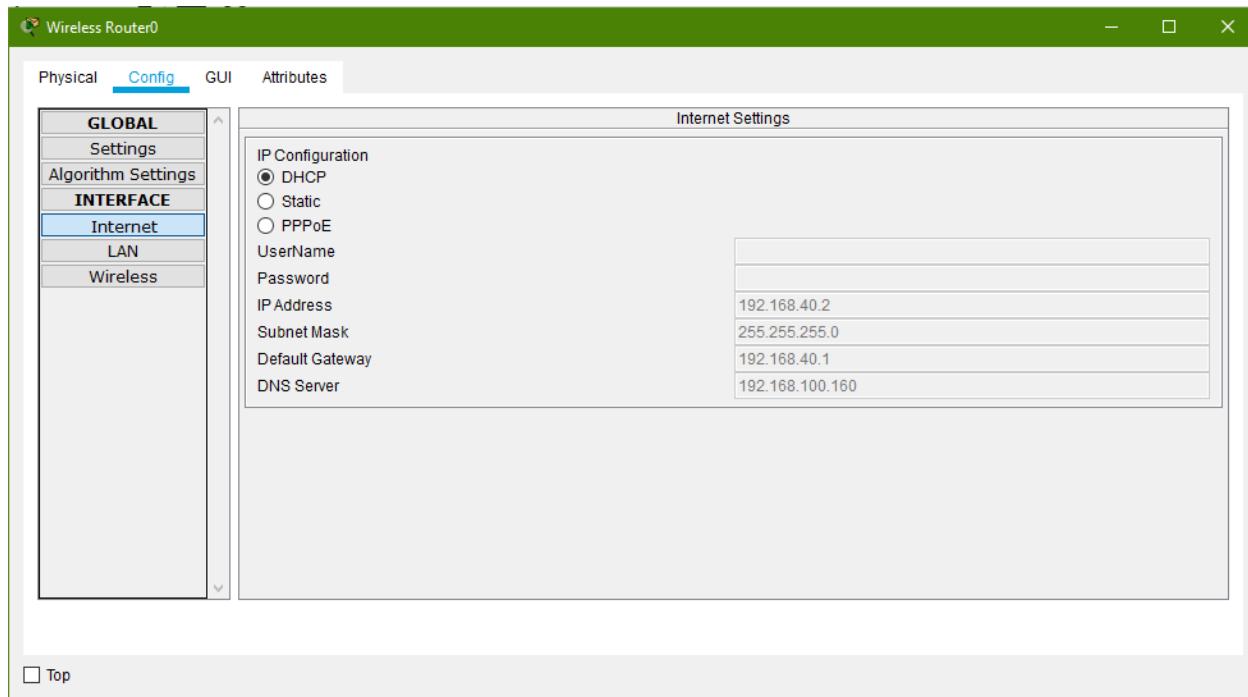
```

Below the command window, there is a status message: "Ctrl+F6 to exit CLI focus". To the right of the window are two buttons: "Copy" and "Paste". At the bottom left is a checkbox labeled "Top".

- Tiến hành kiểm tra việc cấp phát IP

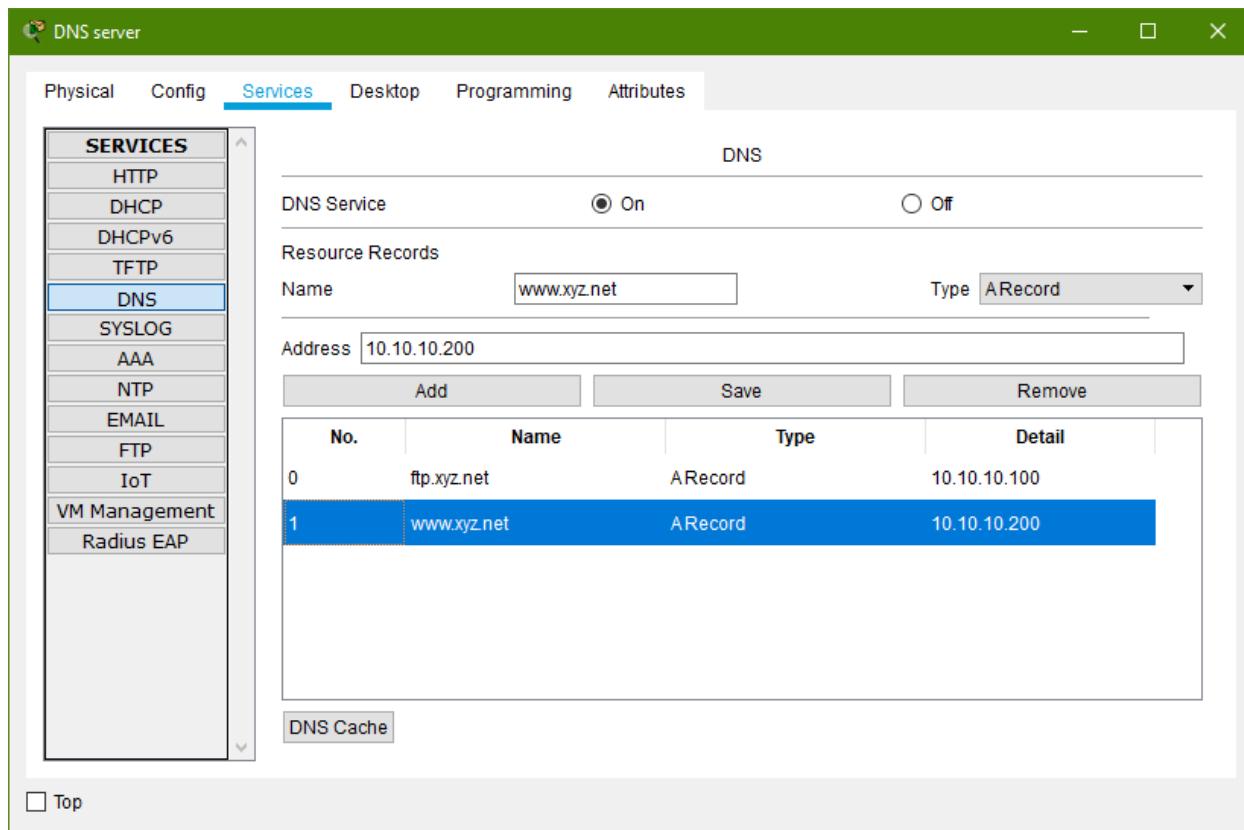


- VLAN 40 (Router WIFI) cũng đã nhận địa chỉ IP được cấp phát từ DHCP Server (được kiểm tra sau khi cấu hình xong cả dịch vụ DNS)

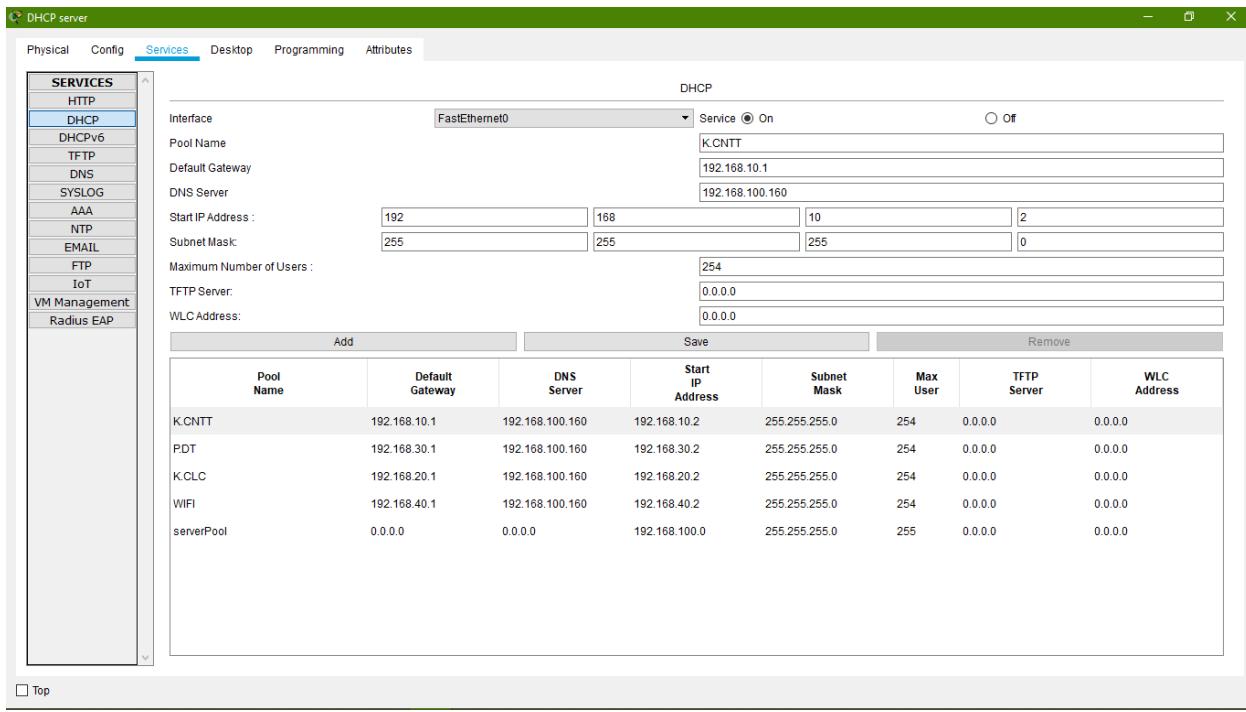


c. Cấu hình local DNS phân giải cho server WEB (www.xyz.net) và FTP (ftp.xyz.net)

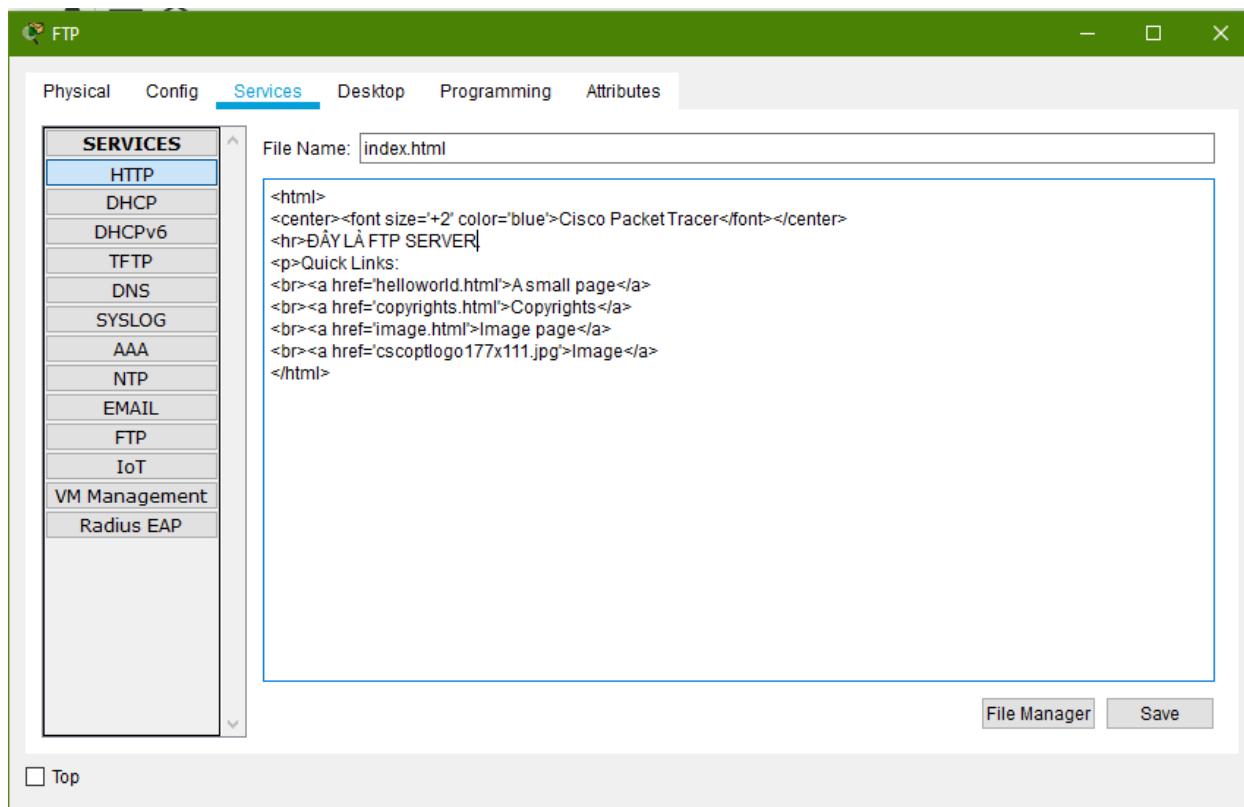
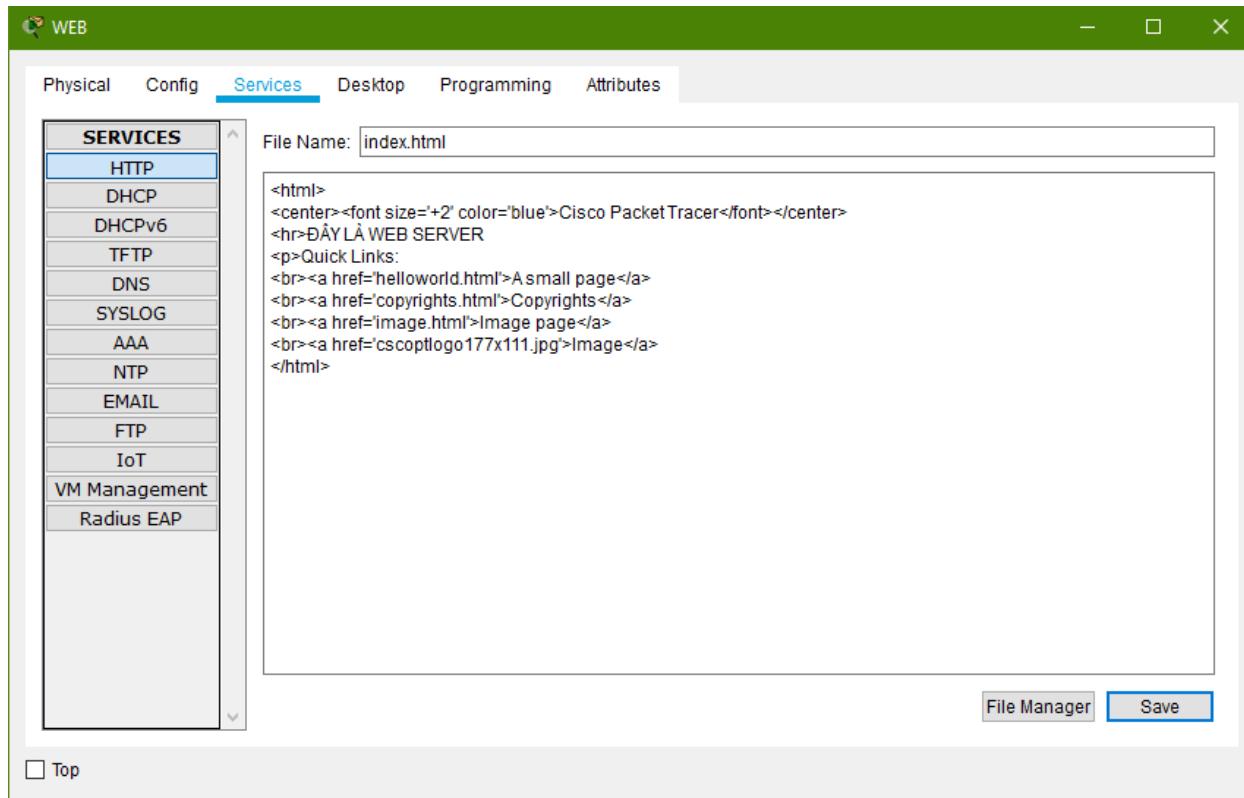
- Vào phần Service của DNS Server (có địa chỉ là 192.168.100.160 thuộc VLAN 100) thêm các record tương ứng với địa chỉ IP vào Domain



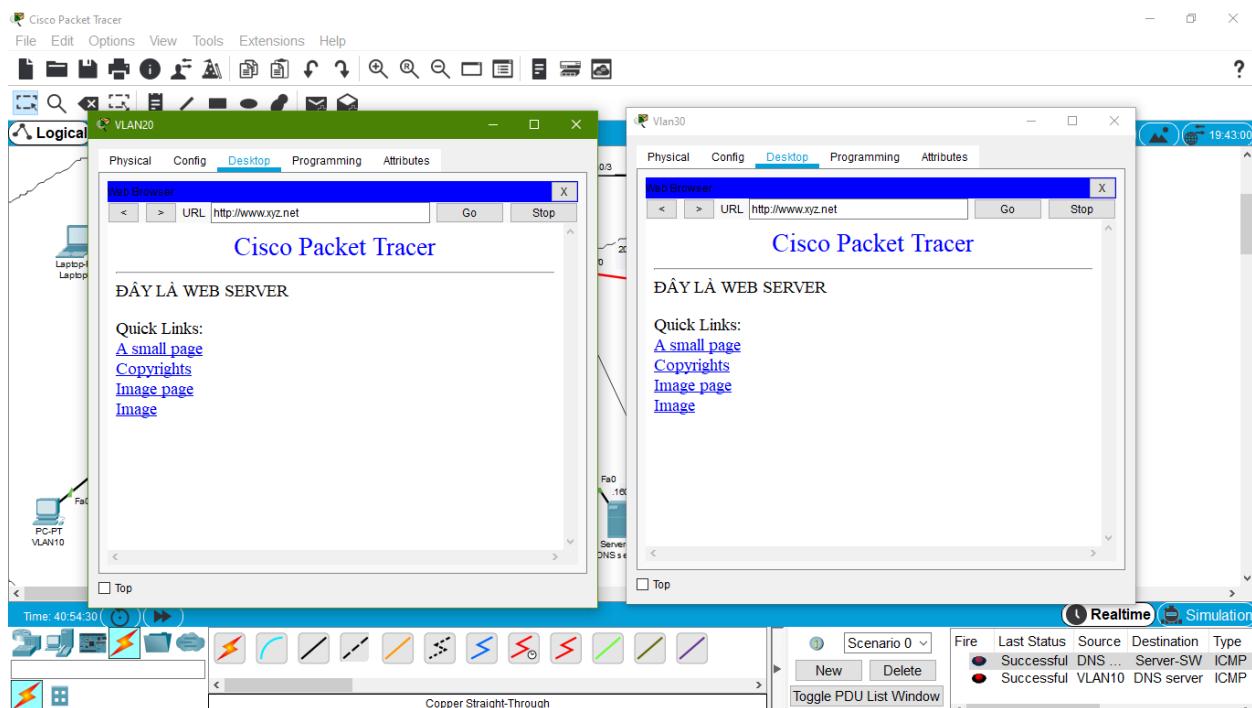
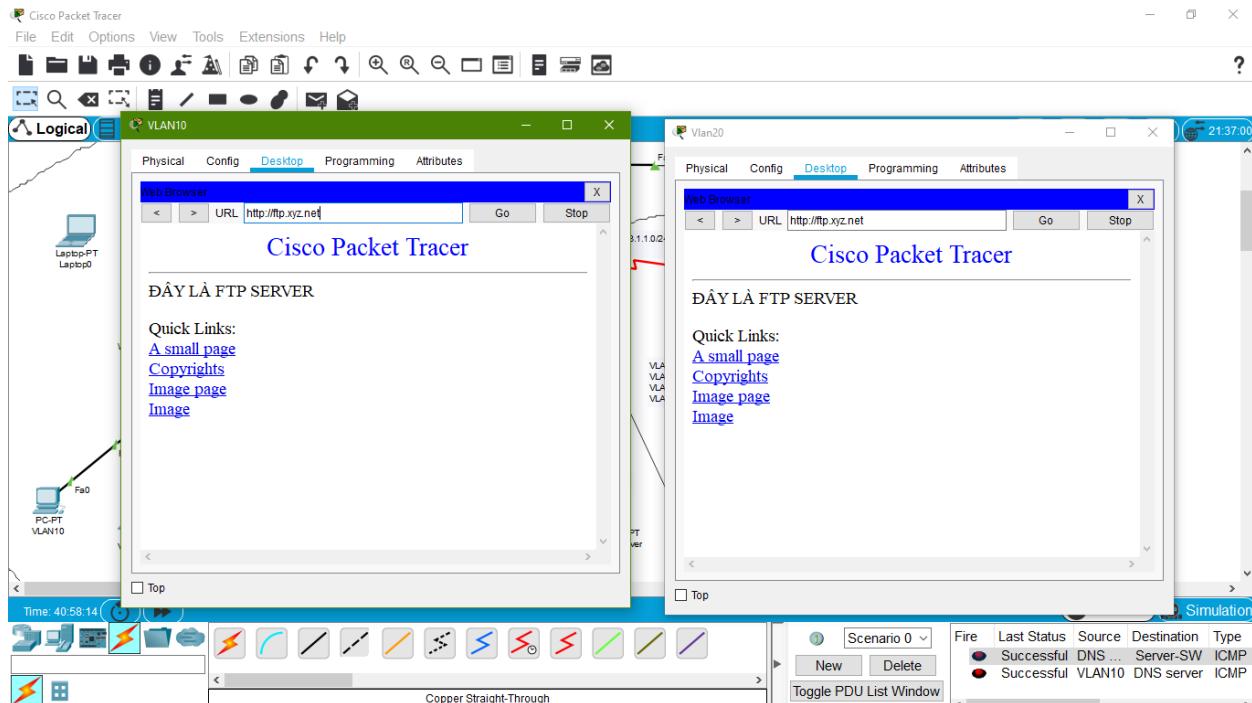
- Trên DHCP Server thêm địa chỉ DNS Server vào địa chỉ DNS được sử dụng mà được dùng để cấp phát cho các VLAN



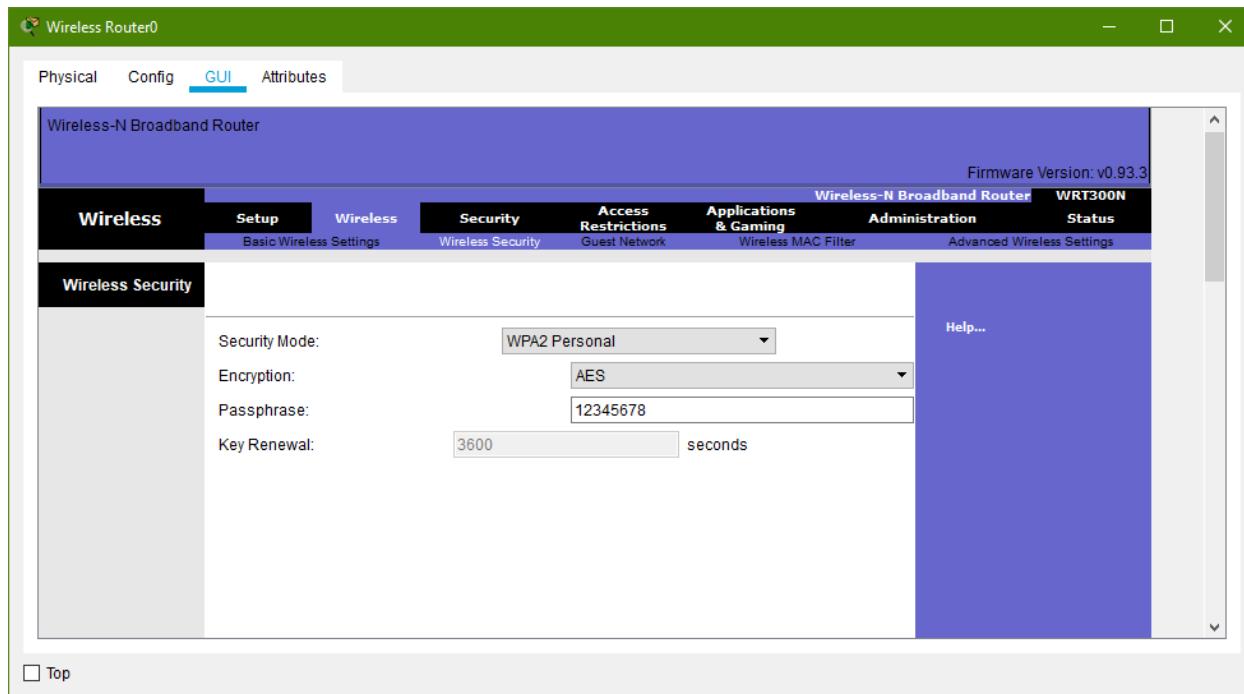
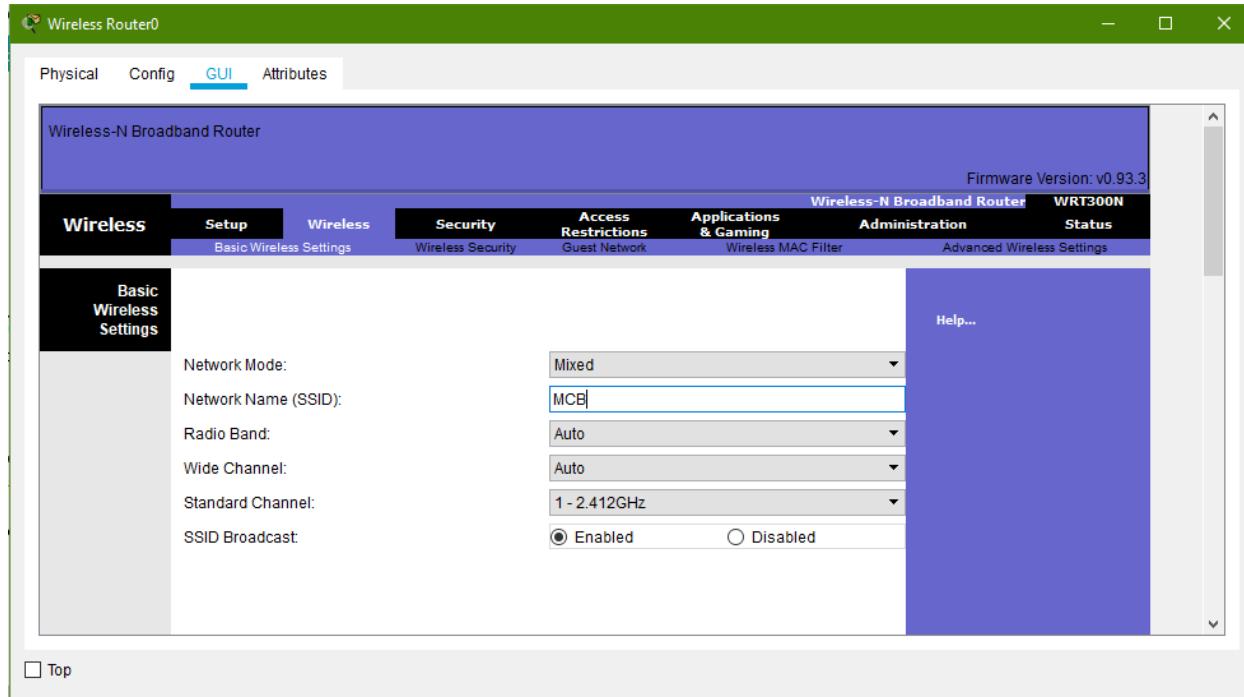
- Bật dịch vụ HTTP ở cả FTP và WEB Server để có thể truy cập vào trang của hai Server này. Bên cạnh đó, ta sửa file index.html để có thể phân biệt được 2 Server này



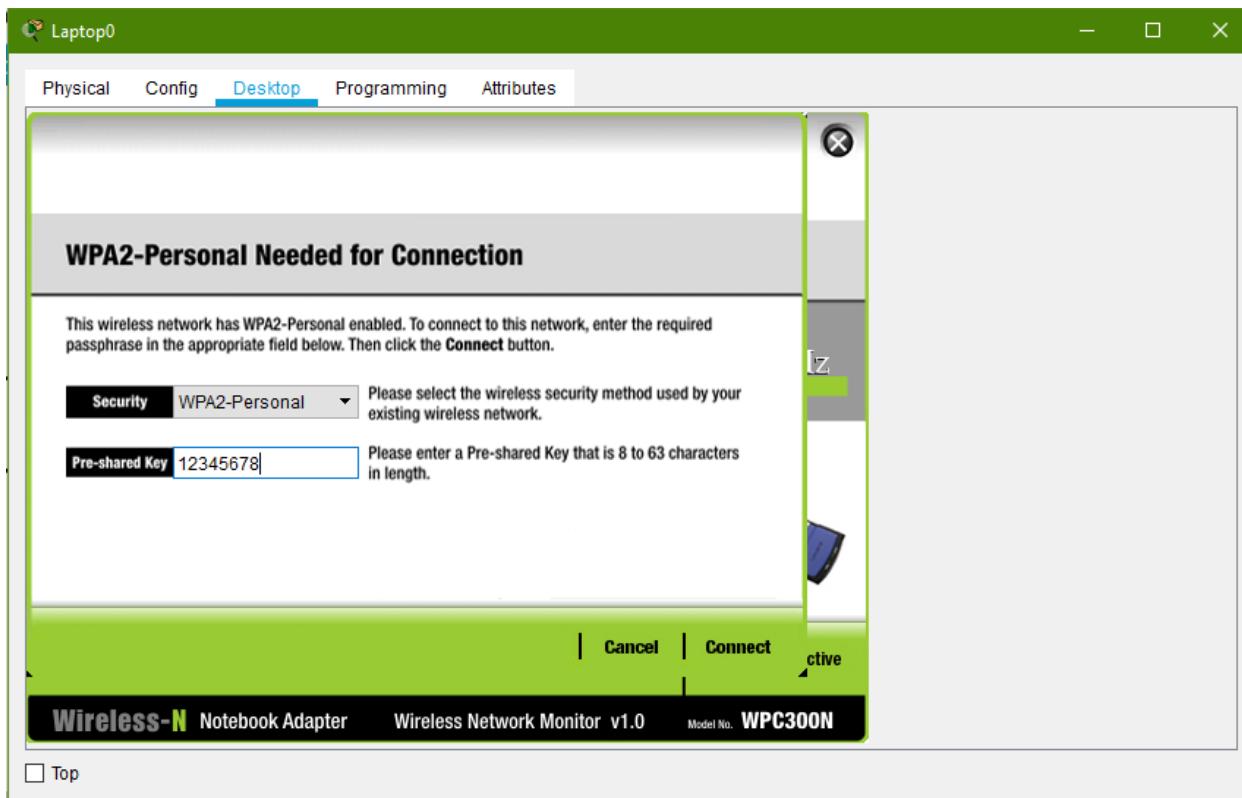
- Kiểm tra việc cấu hình local DNS Server (ở VLAN 40 được kiểm tra sau khi cấu hình WIFI)



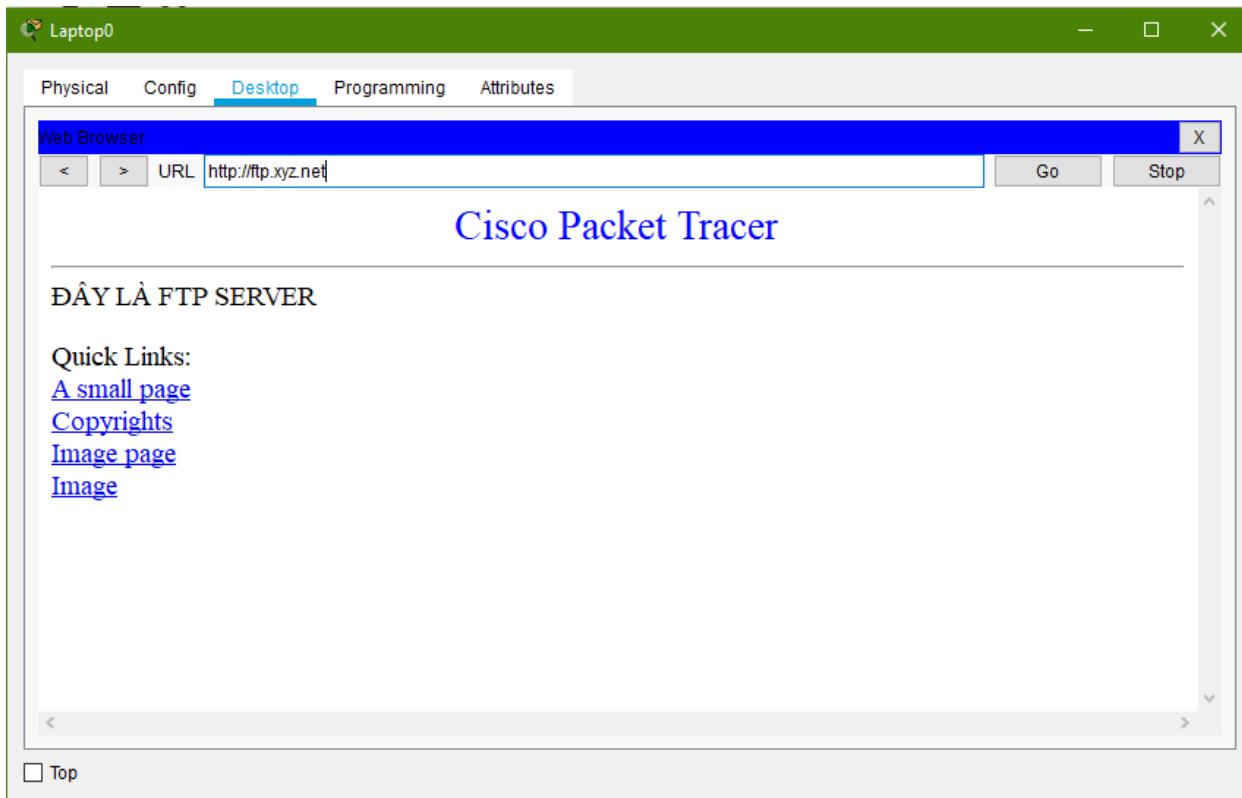
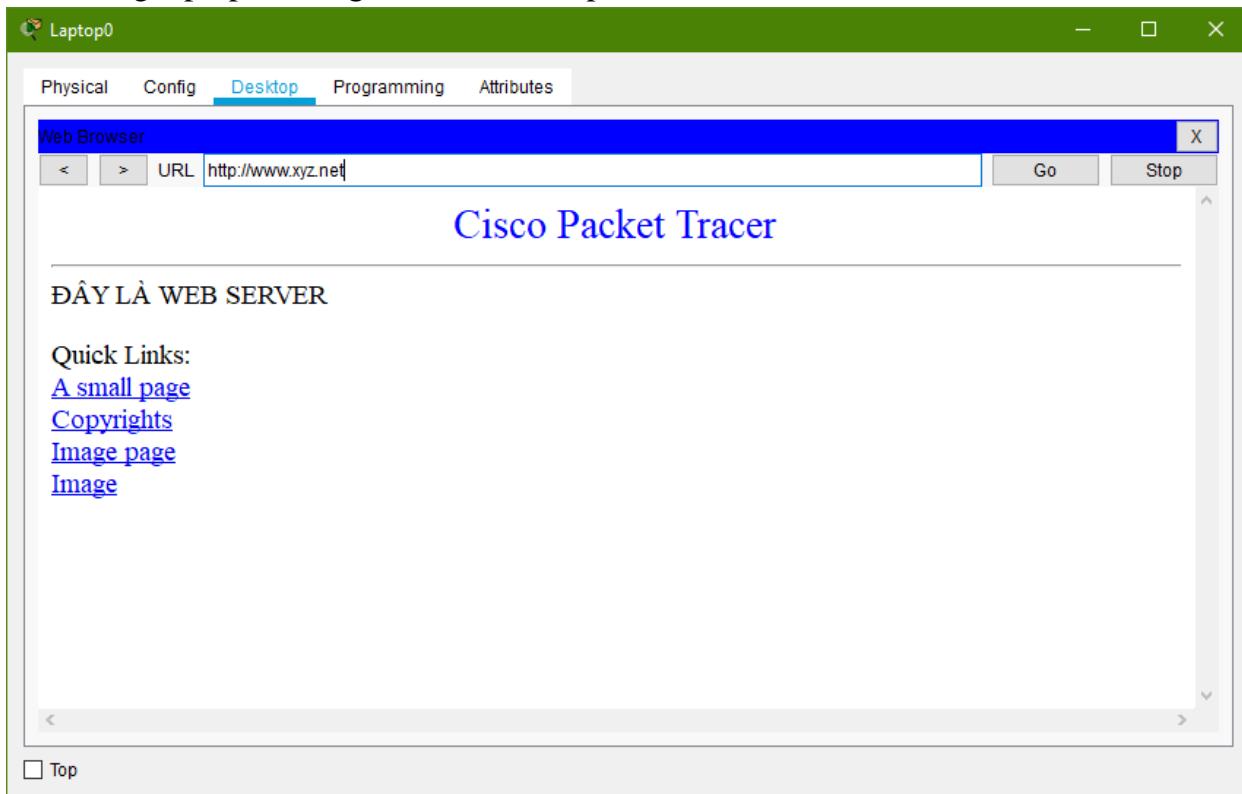
d. Cấu hình mạng Wifi như trong đề bài (SSID: MCB, chứng thực WPA2)



- Kiểm tra việc cấu hình WIFI



- Dùng laptop sử dụng WIFI để vào Ftp và Web Server



4. Cấu hình NAT

a. Tiến hành định tuyến default route cho R1 và R2

- Tại R2: địa chỉ 0.0.0.0 0.0.0.0 (default route) được trỏ tới R1

The screenshot shows a Cisco IOS CLI window titled "R2". The tab bar at the top has "Physical", "Config", "CLI" (which is underlined), and "Attributes". Below the tabs, it says "IOS Command Line Interface". The main area displays the following configuration commands:

```
Press RETURN to get started.

R2>en
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip routing
R2(config)#ip route 0.0.0.0 0.0.0.0 172.16.21.1
R2(config)#[
```

At the bottom of the window, there are buttons for "Copy" and "Paste". A checkbox labeled "Top" is also present.

- Tại R1: địa chỉ 0.0.0.0 0.0.0.0 (default route) được trả tới ISP (ra ngoài Internet)

The screenshot shows a Cisco IOS CLI window titled "R1". The window has tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the IOS Command Line Interface (CLI). It starts with a message "Press RETURN to get started." followed by configuration commands:

```
R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip routing
R1(config)#router ospf 1
R1(config-router)#ip route 0.0.0.0 0.0.0.0 203.1.1.1
R1(config)#
```

At the bottom of the CLI window, there are buttons for "Copy" and "Paste". Below the window, there is a status bar with the text "Ctrl+F6 to exit CLI focus" and a checkbox labeled "Top".

- Đến đây ta đã xong cấu hình default route. Để thuận tiện trong việc kiểm tra, ta cấu hình default route trả ngược lại đường mạng bên trong

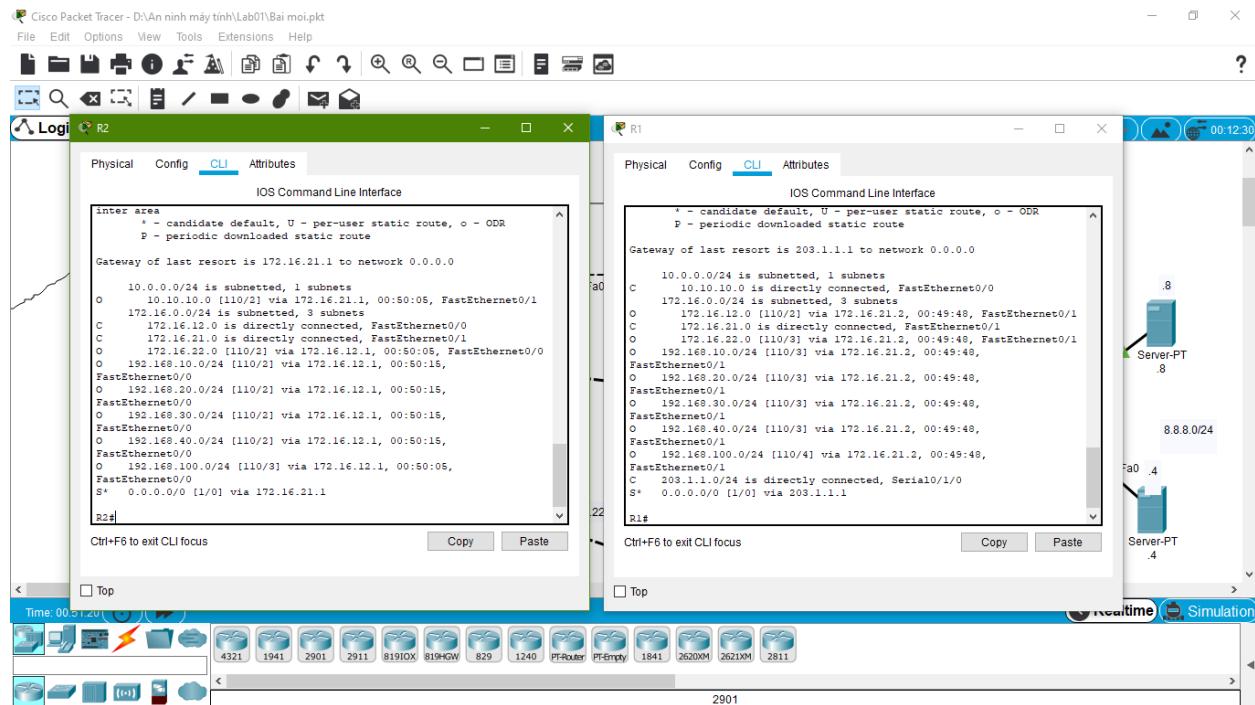
The screenshot shows a Cisco IOS CLI interface. The title bar says "ISP". Below it, tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes" are visible. The main area is labeled "IOS Command Line Interface". The command history and output are as follows:

```
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to down
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

Router>
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip routing
Router(config)#router ospf 1
Router(config-router)#ip route 0.0.0.0 0.0.0.0 203.1.1.10
Router(config)#
```

At the bottom left, there's a note: "Ctrl+F6 to exit CLI focus". On the right side, there are "Copy" and "Paste" buttons. At the very bottom left, there's a "Top" button.

- Kiểm tra cấu hình default route



b. Public 2 server ở vùng DMZ với IP public như trong đề bài

- Tại R1, ta public Web và FTP Server

The screenshot shows a Cisco IOS Command Line Interface (CLI) window titled "R1". The window has tabs for "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area displays the following configuration commands:

```
R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip nat inside source static 10.10.10.200 4.4.4.4
R1(config)#ip nat inside source static 10.10.10.100 5.5.5.5
R1(config)#
```

Below the CLI window, there is a status bar with the text "Ctrl+F6 to exit CLI focus" and two buttons: "Copy" and "Paste". At the bottom left, there is a "Top" button.

- Tại ISP, ta cấu hình để trả lại phía đường mạng local

The screenshot shows a Windows application window titled "ISP". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected), and "Attributes". The main area is titled "IOS Command Line Interface". It displays the following text:

```
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version
12.4(15)T1, RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team

Press RETURN to get started!

*LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0,
changed state to up

*LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

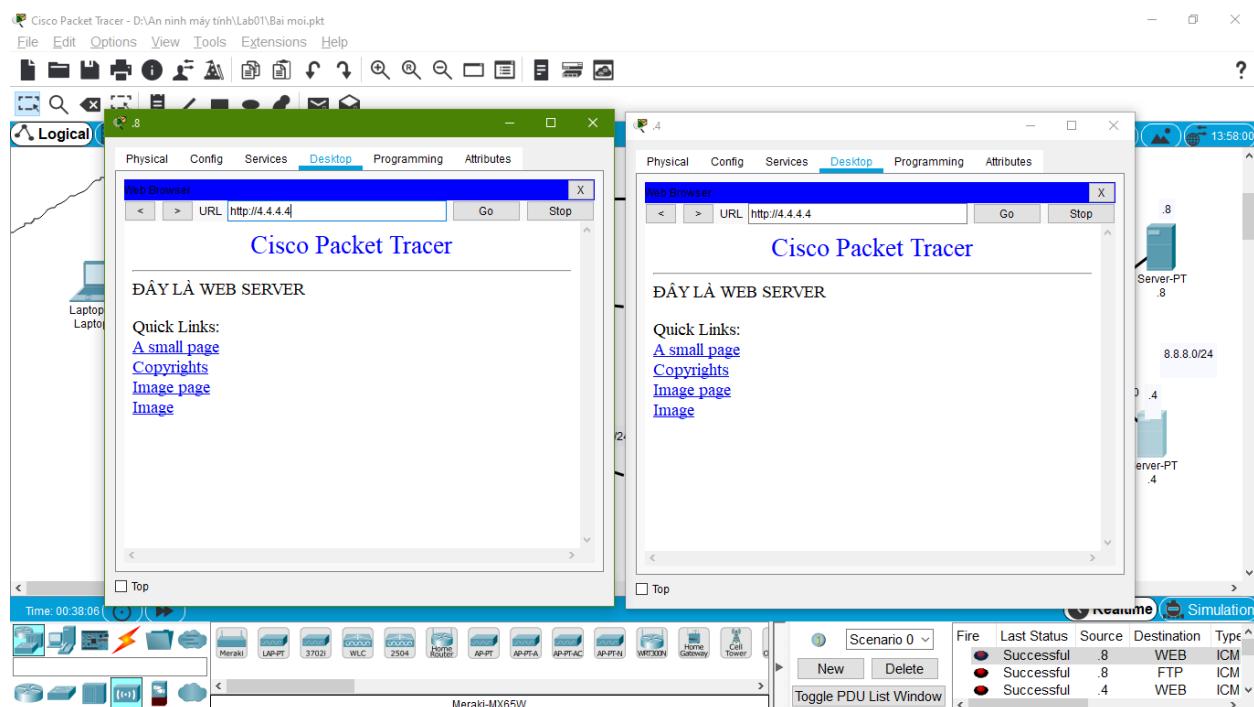
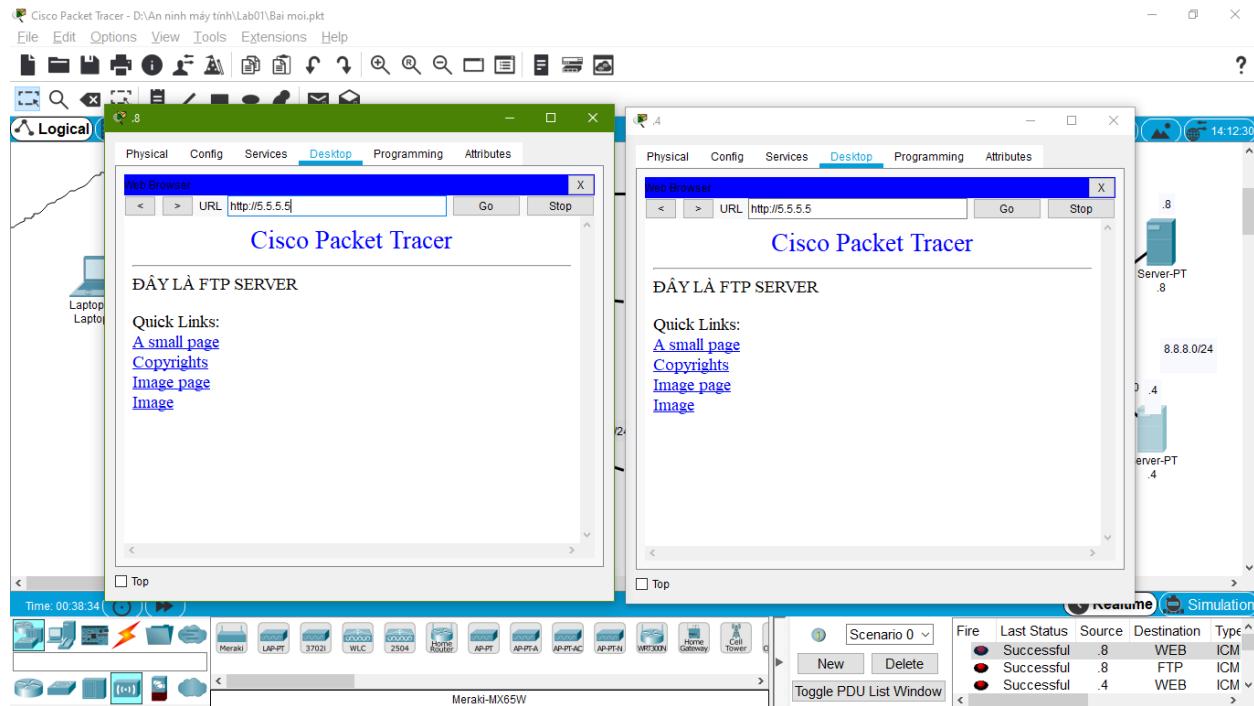
*LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed
state to up

Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 4.4.4.4 255.255.255.255 se0/1/0
Router(config)#ip route 5.5.5.5 255.255.255.255 se0/1/0
Router(config)#

```

At the bottom left, it says "Ctrl+F6 to exit CLI focus". At the bottom right, there are "Copy" and "Paste" buttons. A checkbox labeled "Top" is located at the bottom left of the main text area.

- Kiểm tra việc public server



c. Cấu hình PAT

- Tại R1
 - Ta quy định cổng interface nào ở bên ngoài và bên trong mạng local

The screenshot shows a Windows application window titled "R1". The tab bar at the top has four tabs: "Physical", "Config", "CLI" (which is selected and highlighted in blue), and "Attributes". Below the tabs, it says "IOS Command Line Interface". A message "Press RETURN to get started." is displayed above the command history. The command history shows the configuration of PAT on interface fa0/0:

```
R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int se0/1/0
R1(config-if)#ip nat outside
R1(config-if)#int fa0/0
R1(config-if)#ip nat inside
R1(config-if)#int fa0/1
R1(config-if)#ip nat inside
R1(config-if)#

```

At the bottom of the window, there are two buttons: "Copy" and "Paste". Below the window, there is a toolbar with a "Top" button.

- Ta cấu hình để lan default route cho các thiết bị layer 3 ở bên trong đường mạng

The screenshot shows a window titled "R1" with the "CLI" tab selected. The interface is labeled "IOS Command Line Interface". A message at the top says "Press RETURN to get started.". Below it, a command history is shown:

```
R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#router ospf 1
R1(config-router)#default-information originate
R1(config-router)#[
```

At the bottom left, there is a note: "Ctrl+F6 to exit CLI focus". On the right side, there are "Copy" and "Paste" buttons. At the very bottom, there is a checkbox labeled "Top".

- Sau đó ta cho phép các địa chỉ bên trong đường mạng local ra ngoài Internet

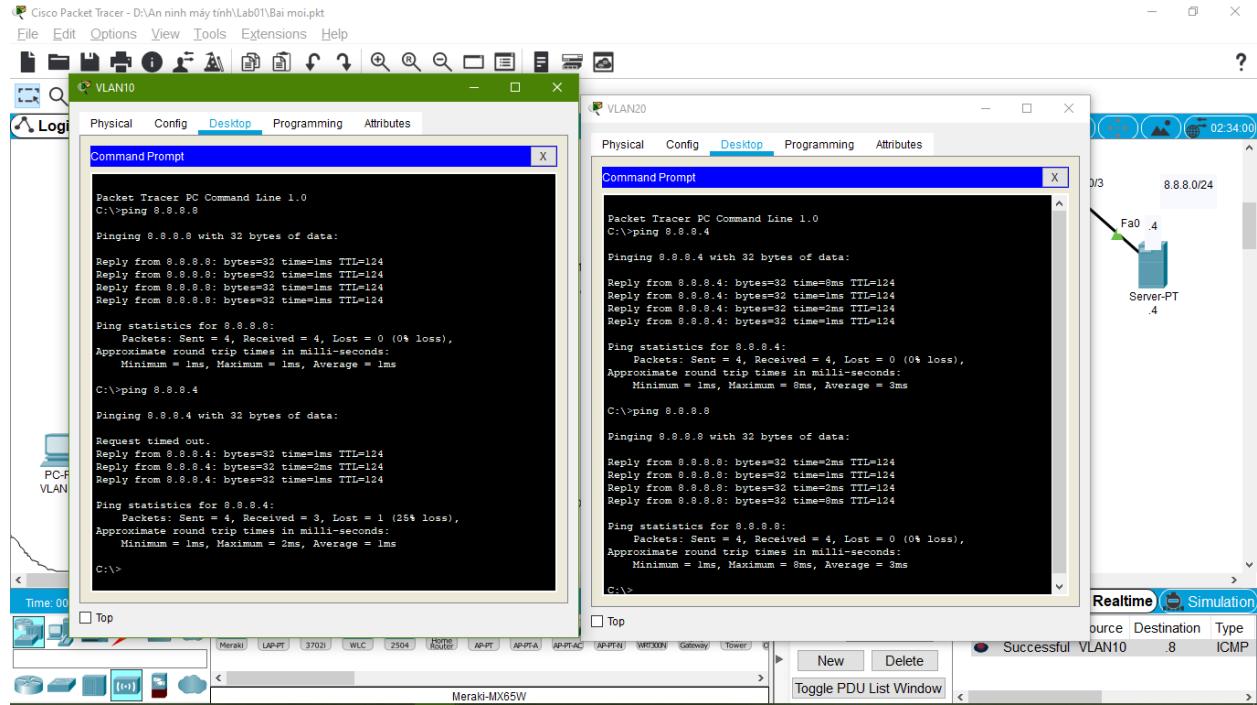
The screenshot shows a window titled 'R1' with a green header bar. The header contains tabs: 'Physical', 'Config', 'CLI' (which is highlighted in blue), and 'Attributes'. Below the header, it says 'IOS Command Line Interface'. A large text area in the center displays the following configuration commands:

```
Press RETURN to get started.

R1>en
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#access-list 1 permit any
R1(config)#ip nat inside source list 1 interface se0/1/0 overload
R1(config)#
```

At the bottom left of the text area, there is a note: 'Ctrl+F6 to exit CLI focus'. To the right of the text area are two buttons: 'Copy' and 'Paste'. At the very bottom of the window, there is a small checkbox labeled 'Top'.

- Tiến hành kiểm tra bằng việc ping các server từ bên trong đường mạng và kiểm tra bảng chuyển đổi NAT



R1

Physical Config **CLI** Attributes

IOS Command Line Interface

```
R1>en
R1#show ip nat translation
Pro Inside global      Inside local        Outside local       Outside global
icmp 4.4.4.4:3          10.10.10.200:3    8.8.8.4:3          8.8.8.4:3
icmp 4.4.4.4:4          10.10.10.200:4    8.8.8.8:4          8.8.8.8:4
icmp 5.5.5.5:4          10.10.10.100:4    8.8.8.4:4          8.8.8.4:4
icmp 5.5.5.5:5          10.10.10.100:5    8.8.8.8:5          8.8.8.8:5
udp 203.1.1.10:1025     203.1.1.10:1025   255.255.255.255:53 255.255.255.255:53
--- 4.4.4.4              10.10.10.200      ---                ---
--- 5.5.5.5              10.10.10.100     ---                ---
```

R1#

Ctrl+F6 to exit CLI focus

Top

Copy Paste

The screenshot shows a window titled "R1" with a green header bar. Below the header, there are tabs: "Physical", "Config", "CLI" (which is underlined in blue), and "Attributes". The main area is labeled "IOS Command Line Interface". Inside, the CLI output is displayed in a scrollable text box:

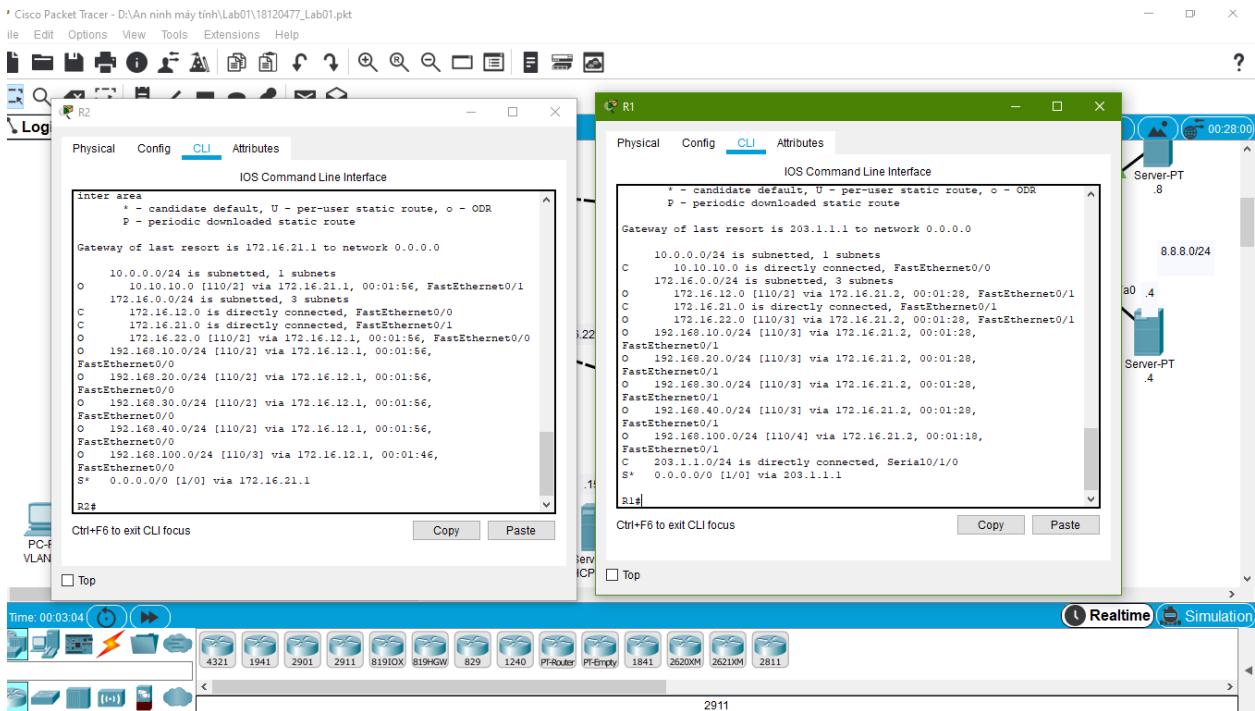
```
R1>en
R1#show ip nat translation
Pro Inside global      Inside local        Outside local       Outside global
icmp 203.1.1.10:1024   192.168.30.4:4    8.8.8.8:4          8.8.8.8:1024
icmp 203.1.1.10:20    192.168.10.4:20    8.8.8.4:20         8.8.8.4:20
icmp 203.1.1.10:21    192.168.10.4:21    8.8.8.8:21         8.8.8.8:21
icmp 203.1.1.10:3     192.168.30.4:3    8.8.8.4:3          8.8.8.4:3
icmp 203.1.1.10:4     192.168.20.4:4    8.8.8.4:4          8.8.8.4:4
icmp 203.1.1.10:5     192.168.20.4:5    8.8.8.8:5          8.8.8.8:5
--- 4.4.4.4           10.10.10.200     ---                ---
--- 5.5.5.5           10.10.10.100     ---                ---

R1#show ip nat translation
Pro Inside global      Inside local        Outside local       Outside global
icmp 203.1.1.10:5     192.168.40.2:5    8.8.8.4:5          8.8.8.4:5
icmp 203.1.1.10:6     192.168.40.2:6    8.8.8.8:6          8.8.8.8:6
--- 4.4.4.4           10.10.10.200     ---                ---
--- 5.5.5.5           10.10.10.100     ---                ---

R1#
```

At the bottom left of the text box, it says "Ctrl+F6 to exit CLI focus". To the right of the text box are two buttons: "Copy" and "Paste". At the very bottom left of the window is a checkbox labeled "Top".

- Kiểm tra ip route

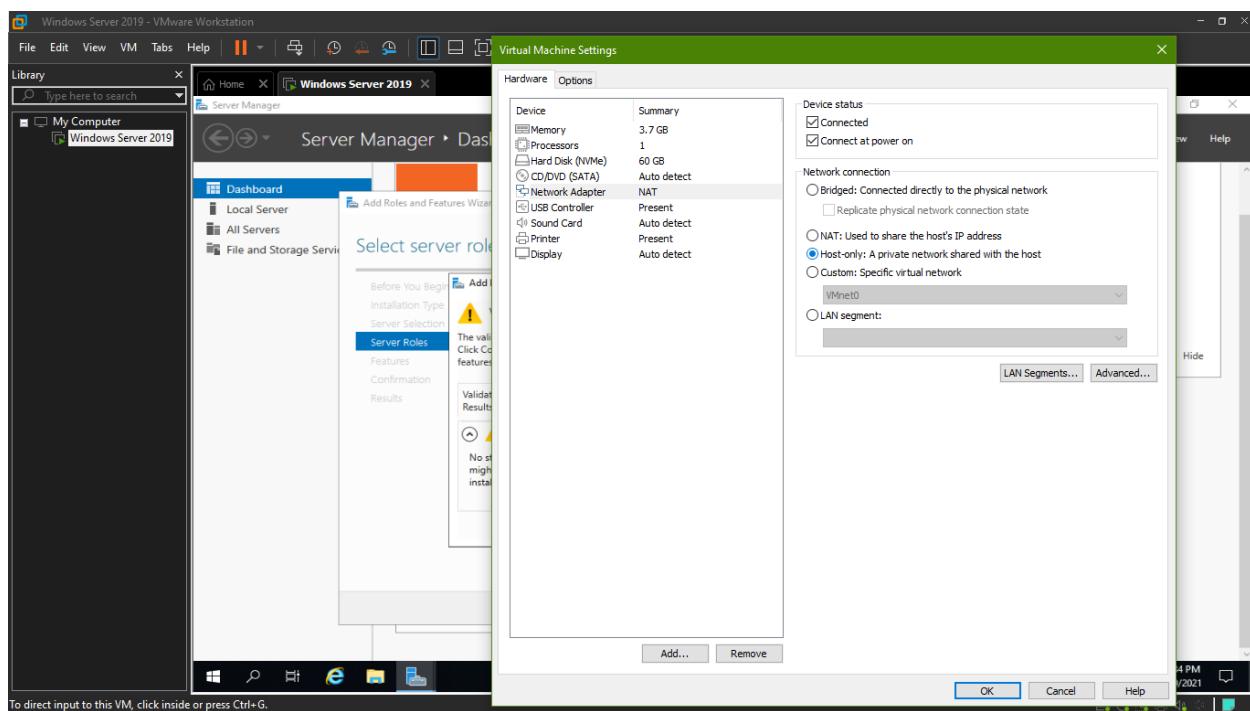


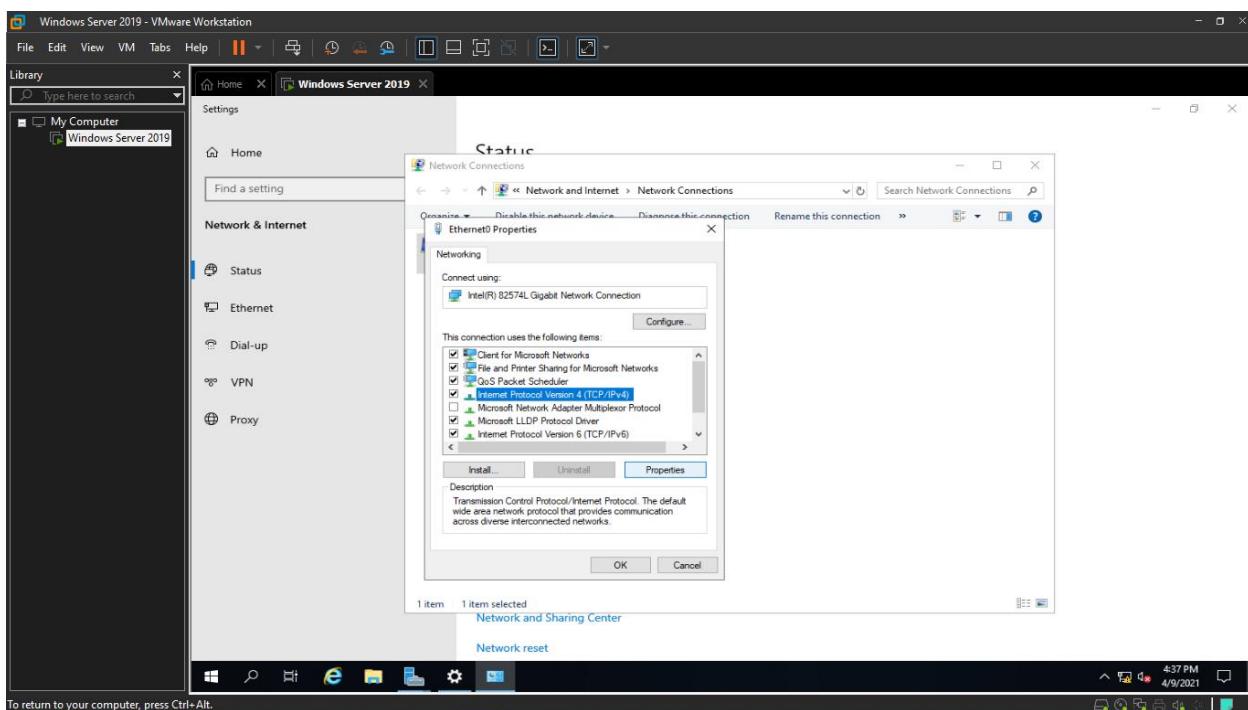
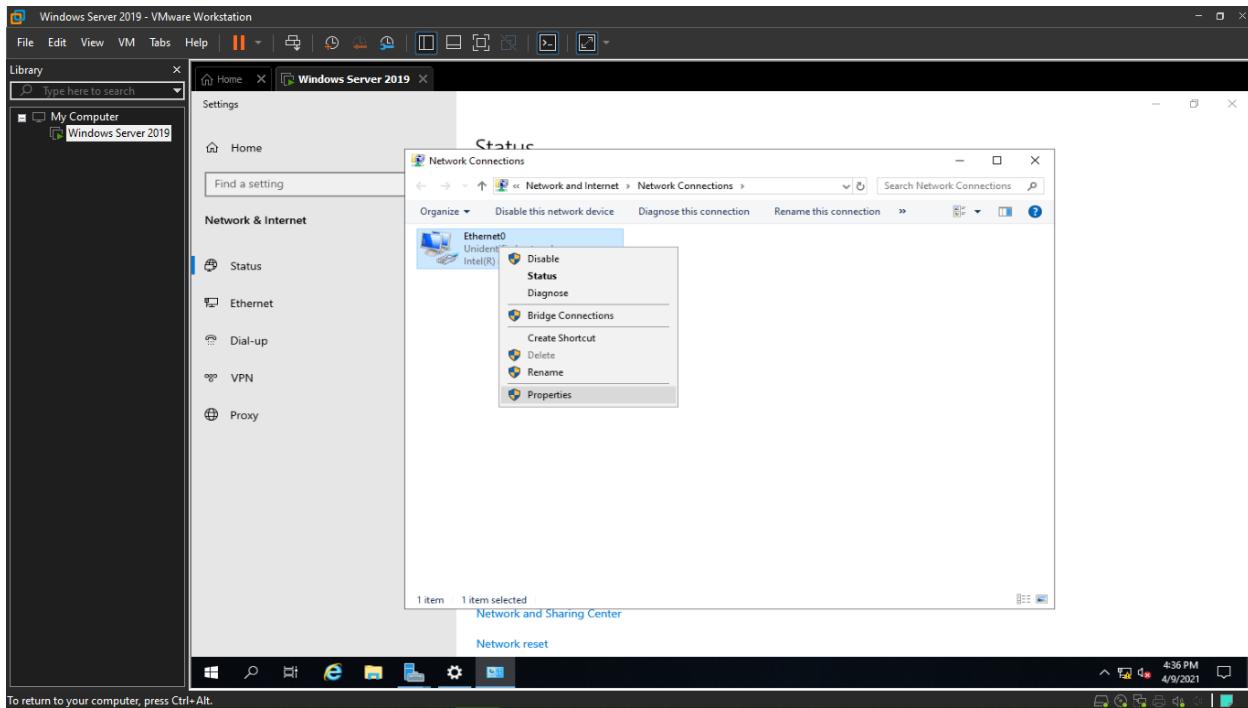
5. Cấu hình DHCP, DNS, WEB, FTP Server (trên Windows 2019)

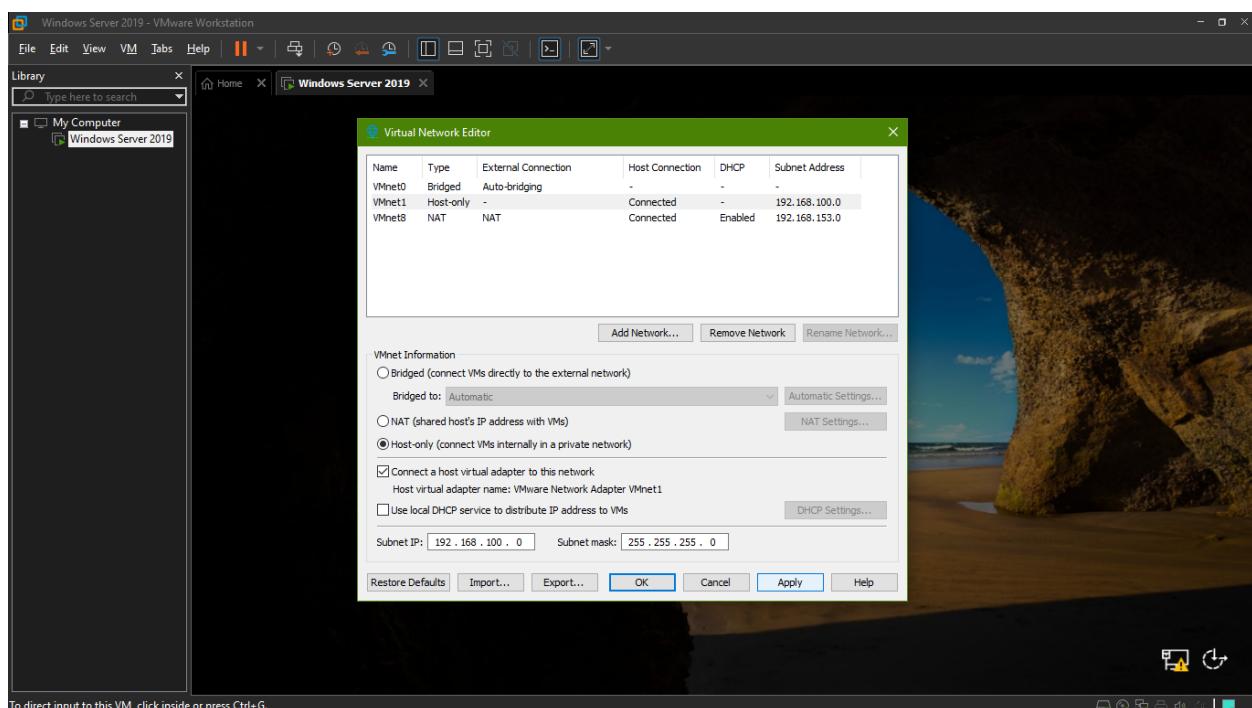
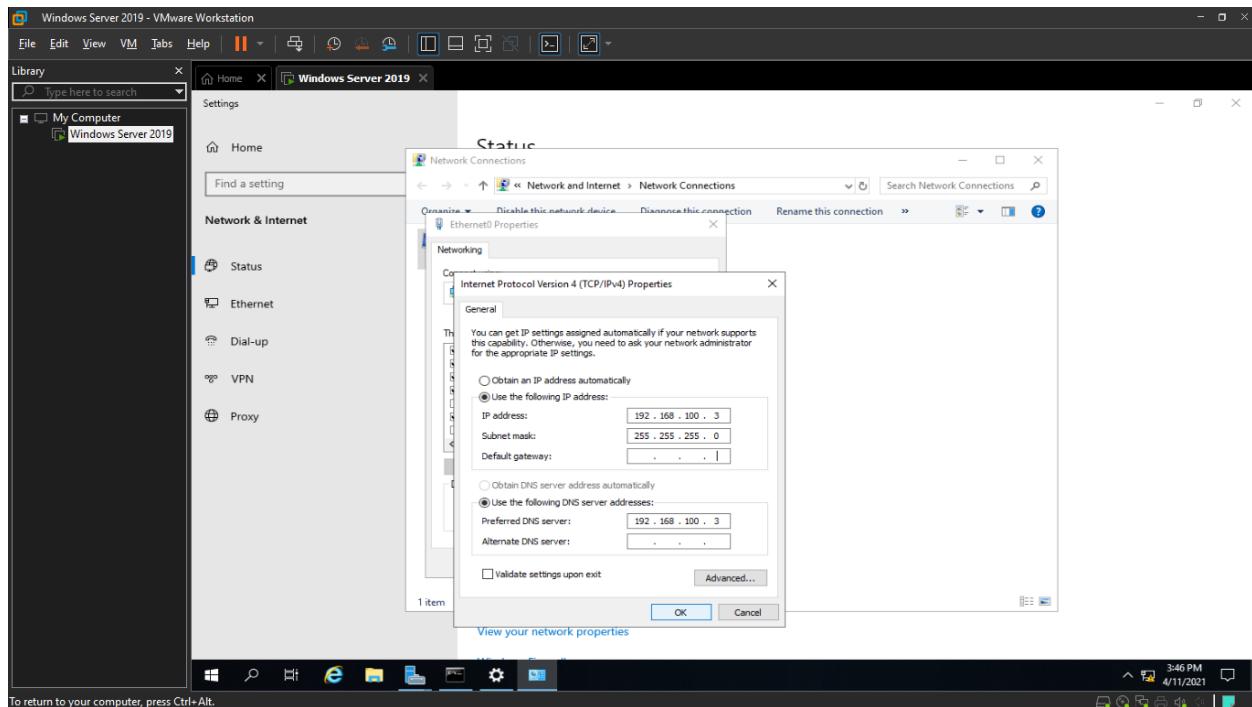
- Để thuận tiện trong việc cài đặt và kiểm tra các kết nối, ta tắt tường lửa cho cả 2 máy thật (đóng vai trò là Client) và máy ảo (đóng vai trò là Server – Windows Server 2019). Ta tắt hết các card mạng khác và để lại card VMnet1 (card mạng mặc định để kết nối với máy thật. Địa chỉ các Server được cố định là 192.168.100.3

a. Các bước cấu địa chỉ IP cho hai máy thật và ảo

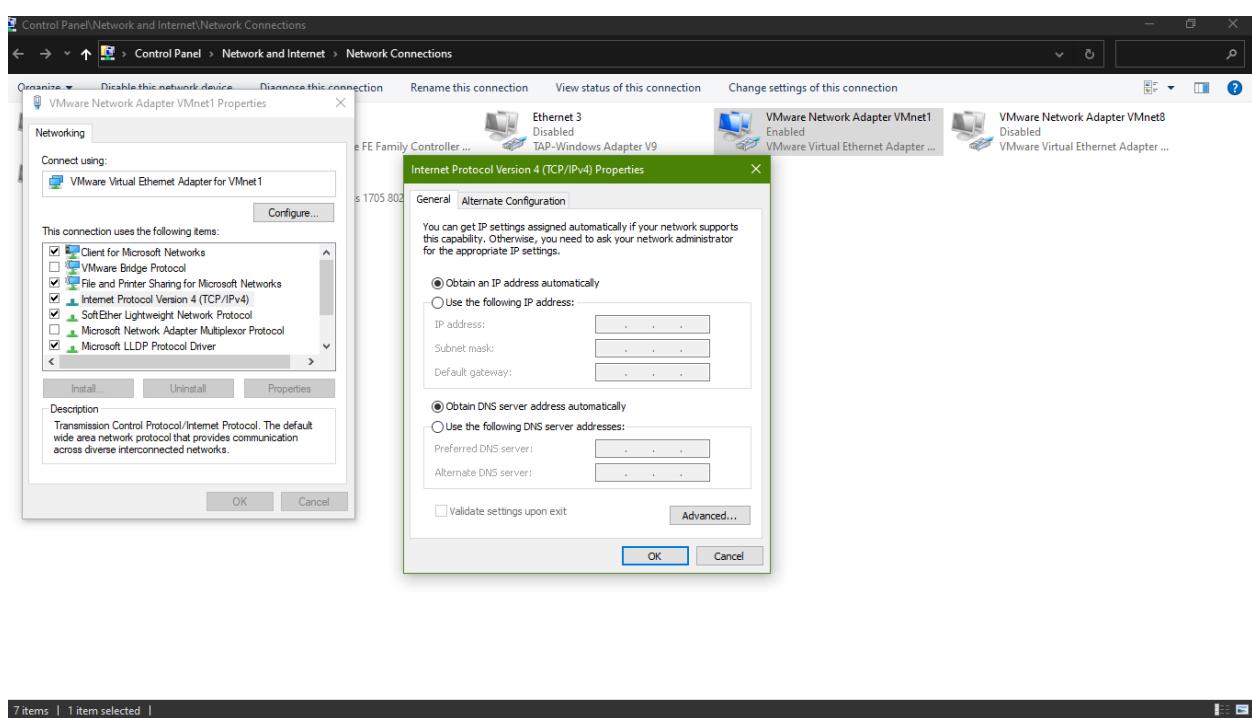
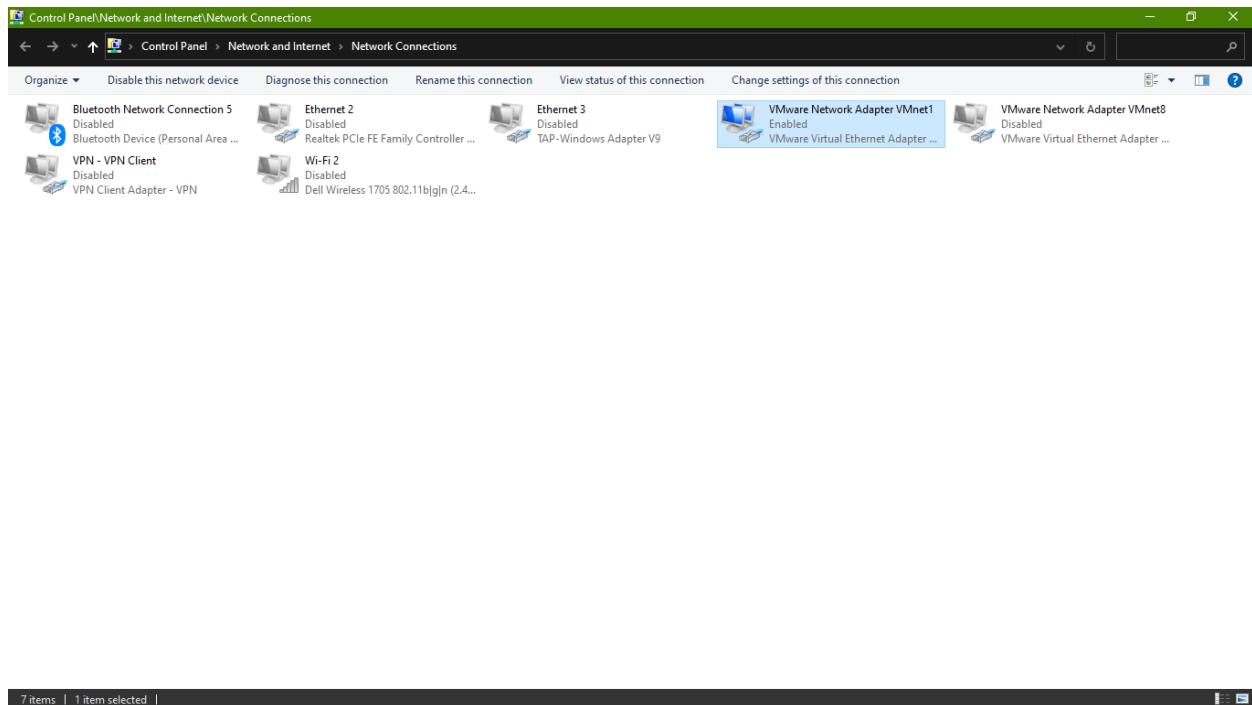
- Cấu hình địa chỉ IP (sẽ tắt IPv6 vì IPv6 không xài)





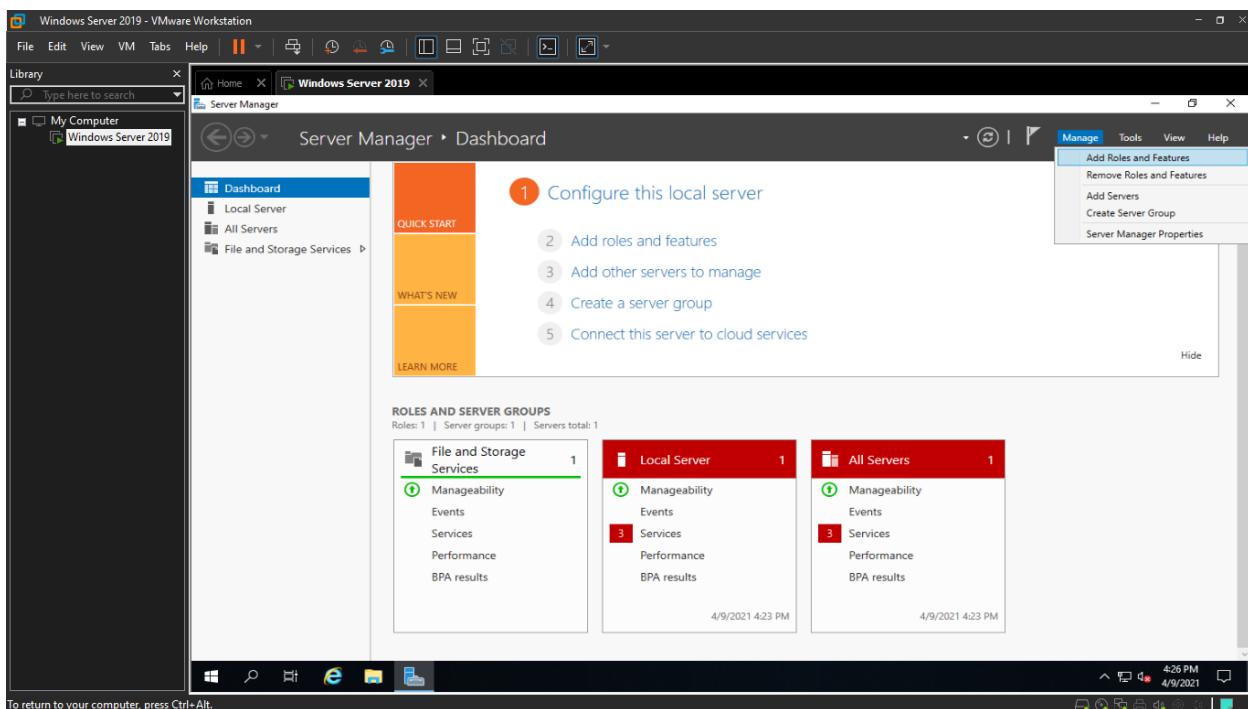
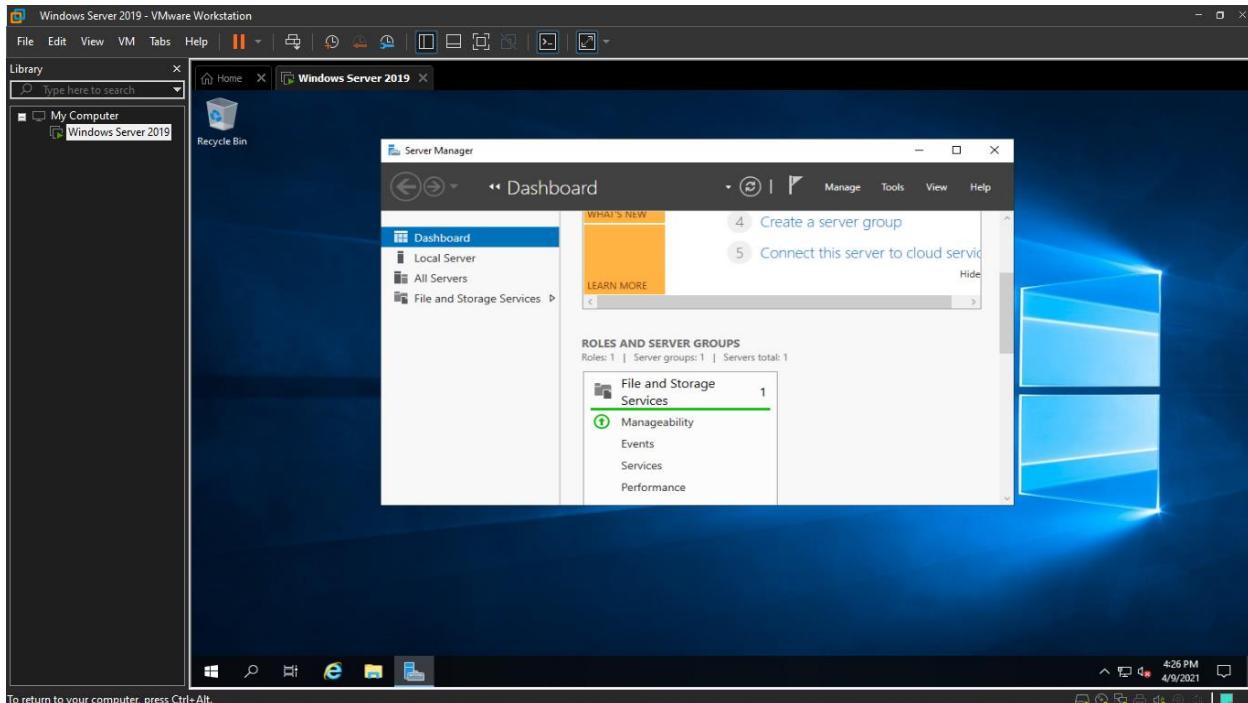


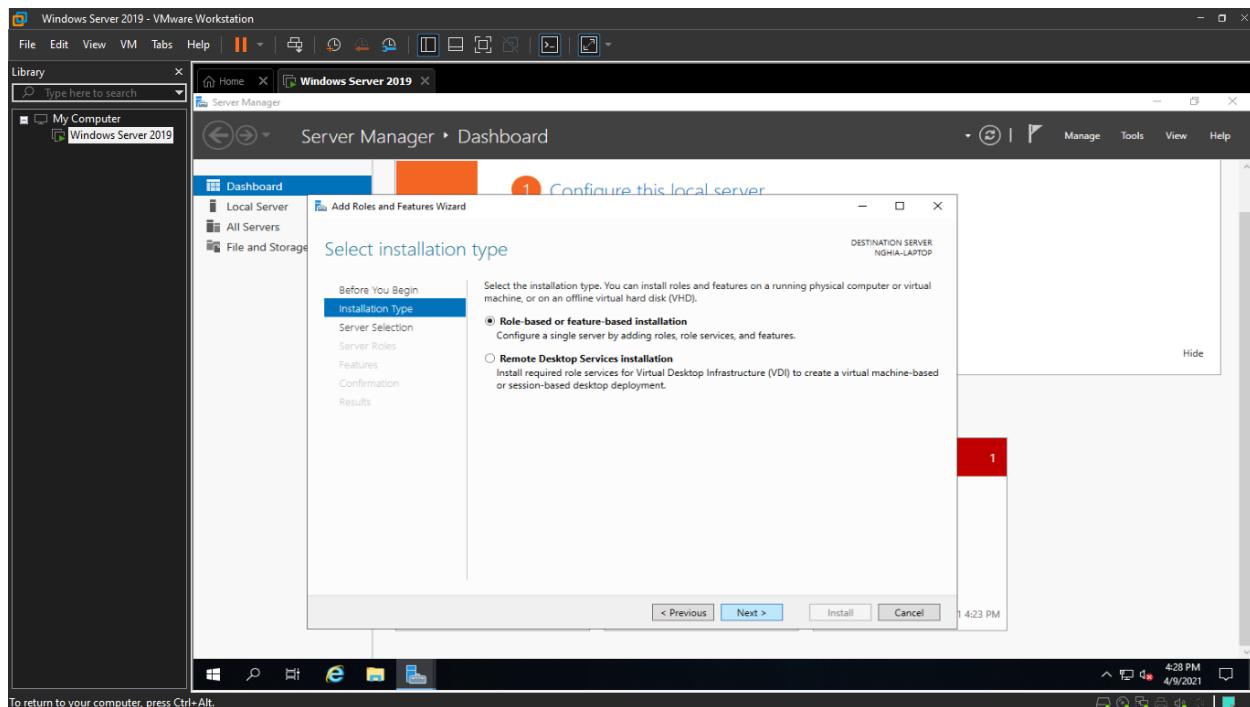
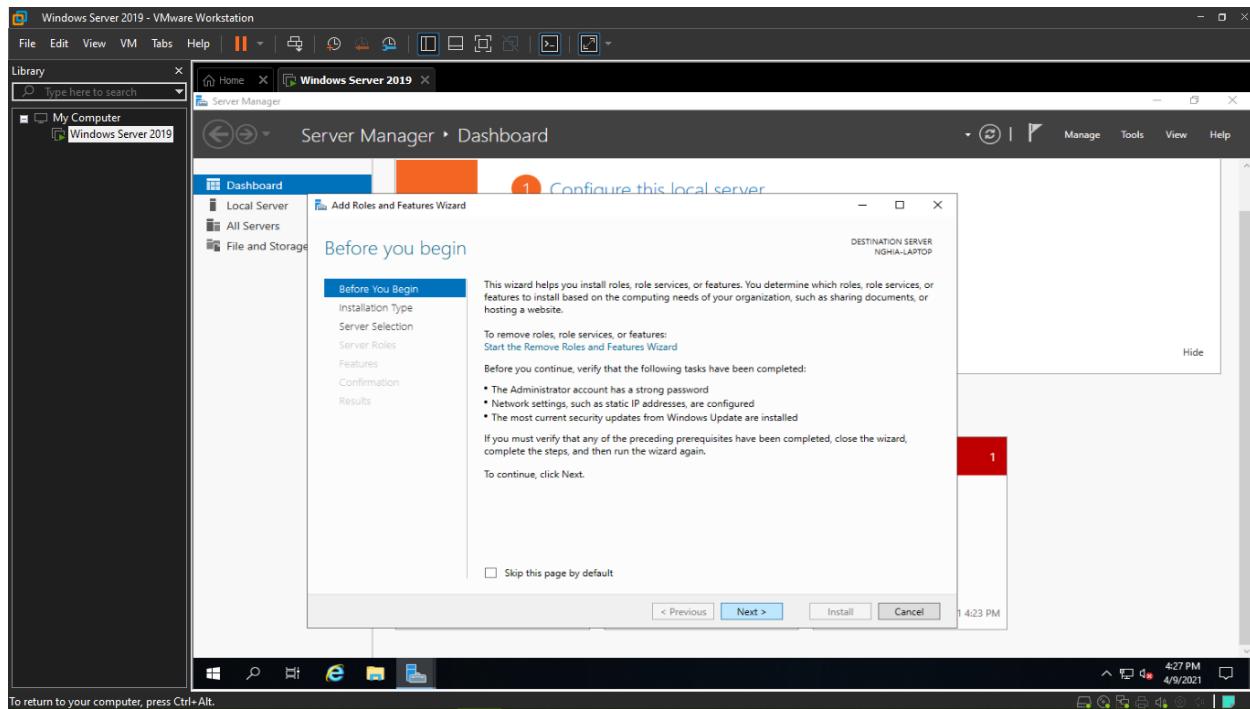
- Với máy thật (Client) tắt hết các card mạng và để lại VMnet 1, sau đó cấu hình card VMnet 1 nhận IP động (cài đặt cho IPv4, tắt IPv6)

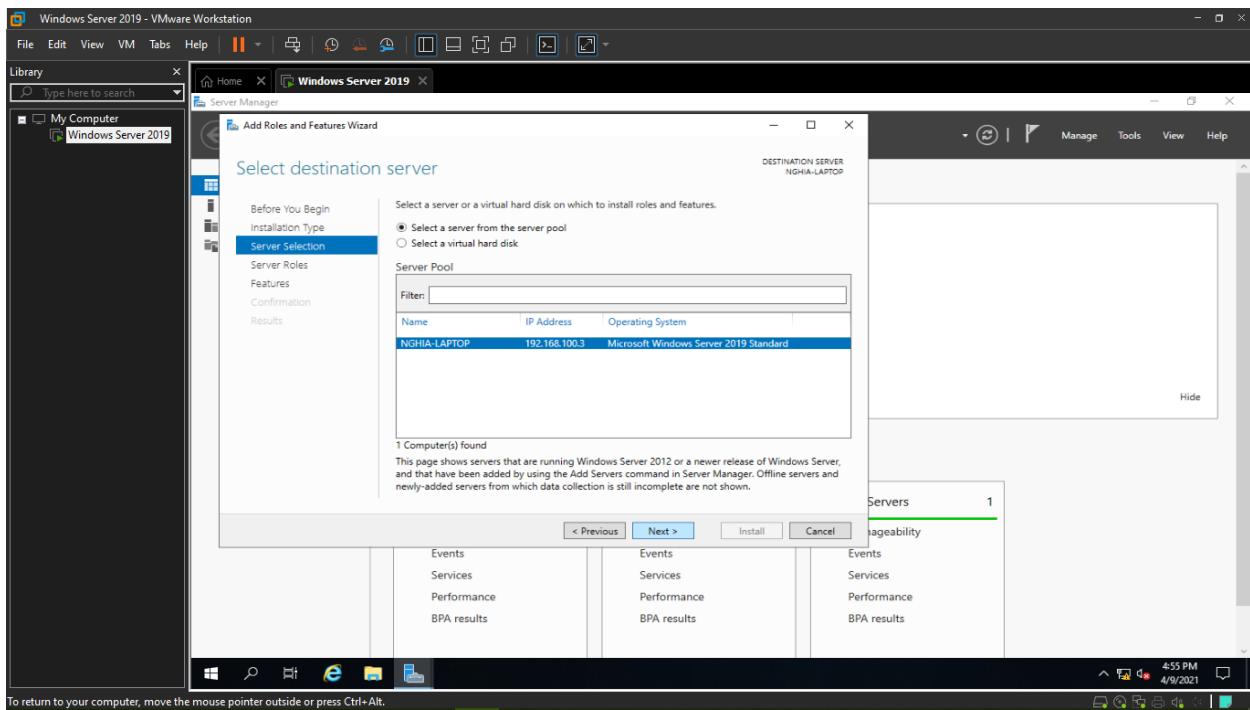


b. Các bước cấu hình chung khi cài đặt DHCP, DNS, Web, FTP Server

- Vào Mange -> Add Roles and Features

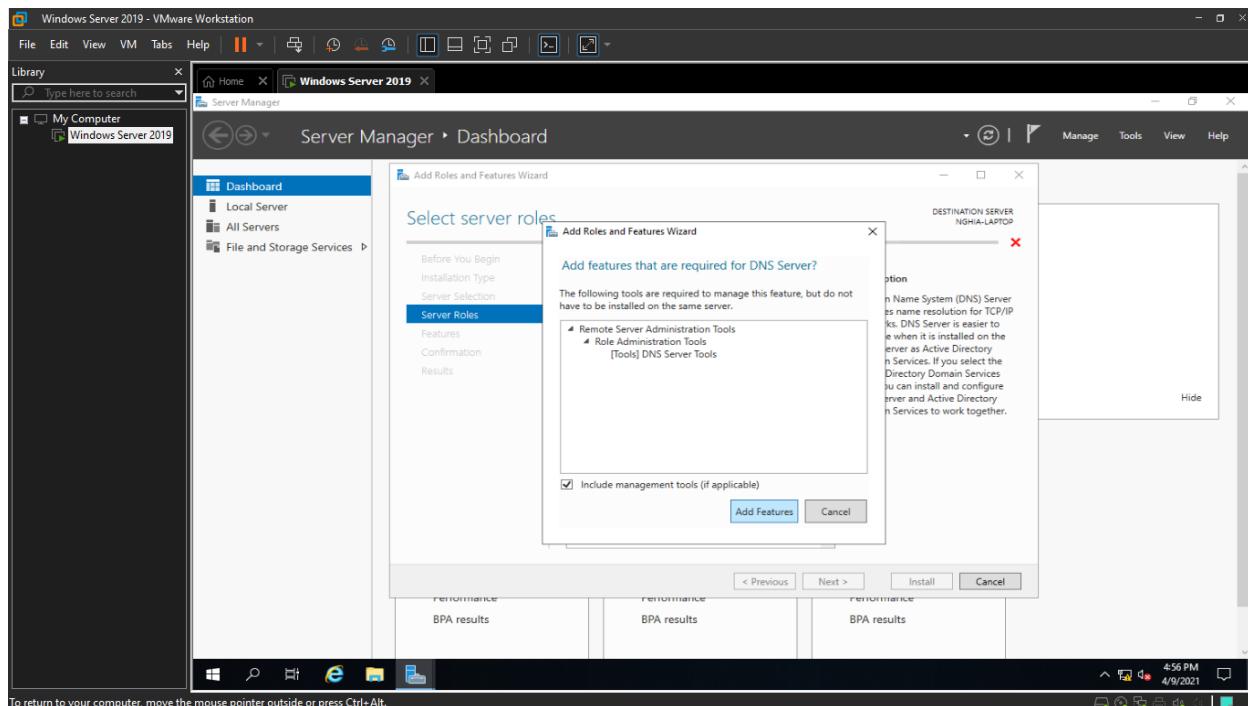
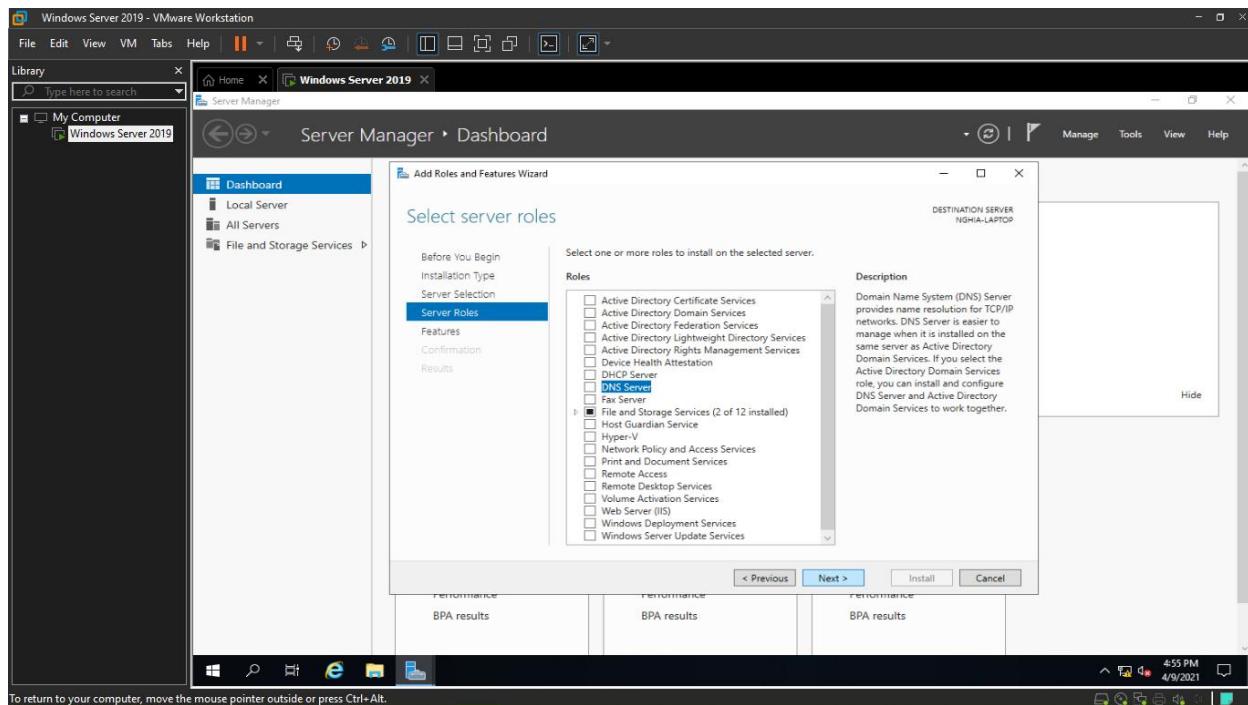


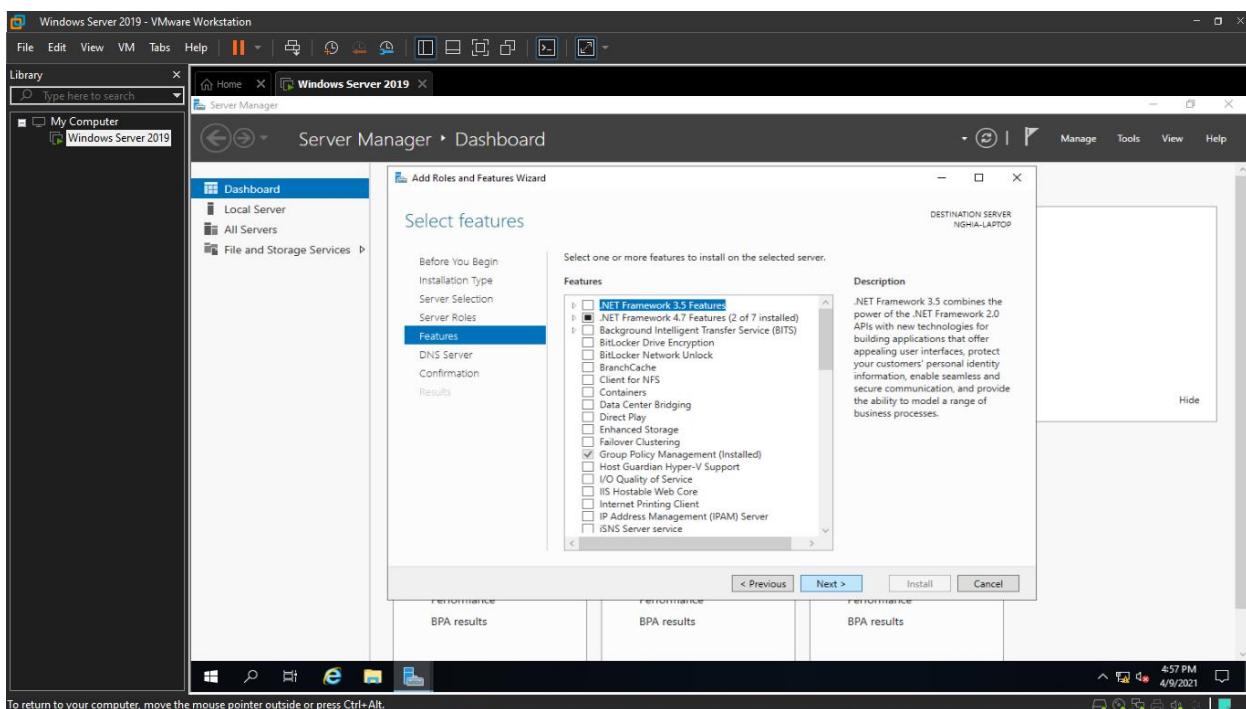
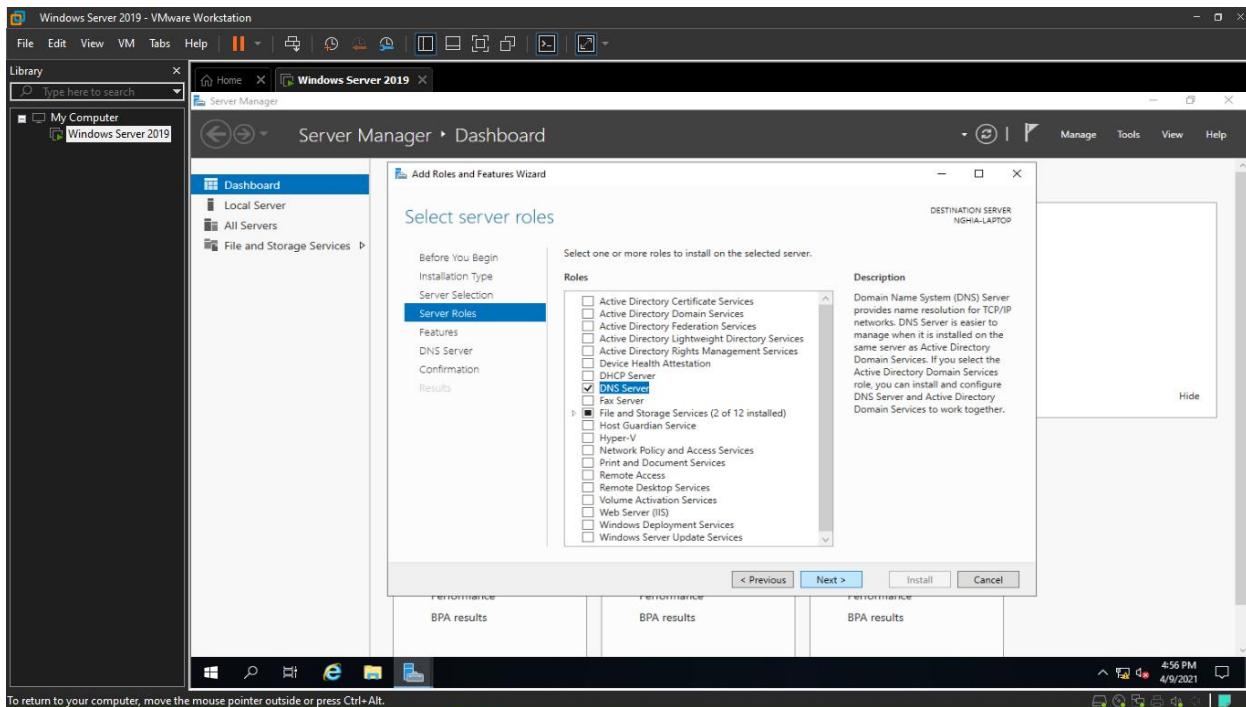


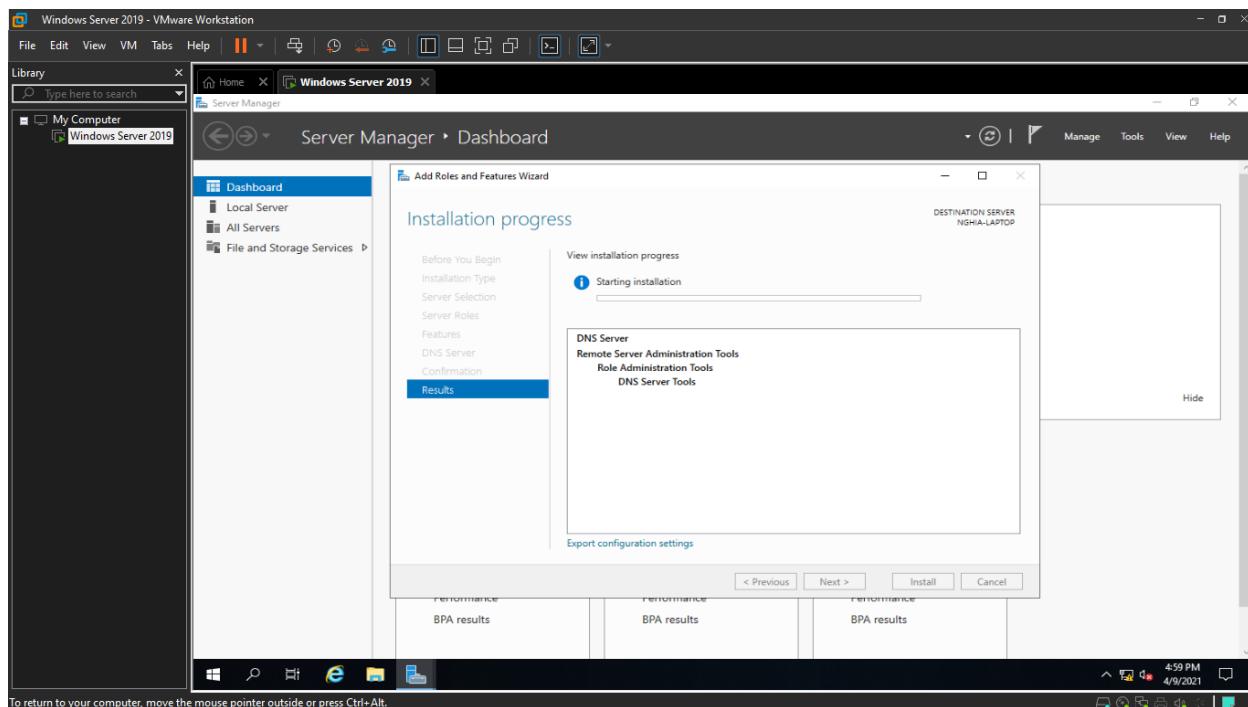
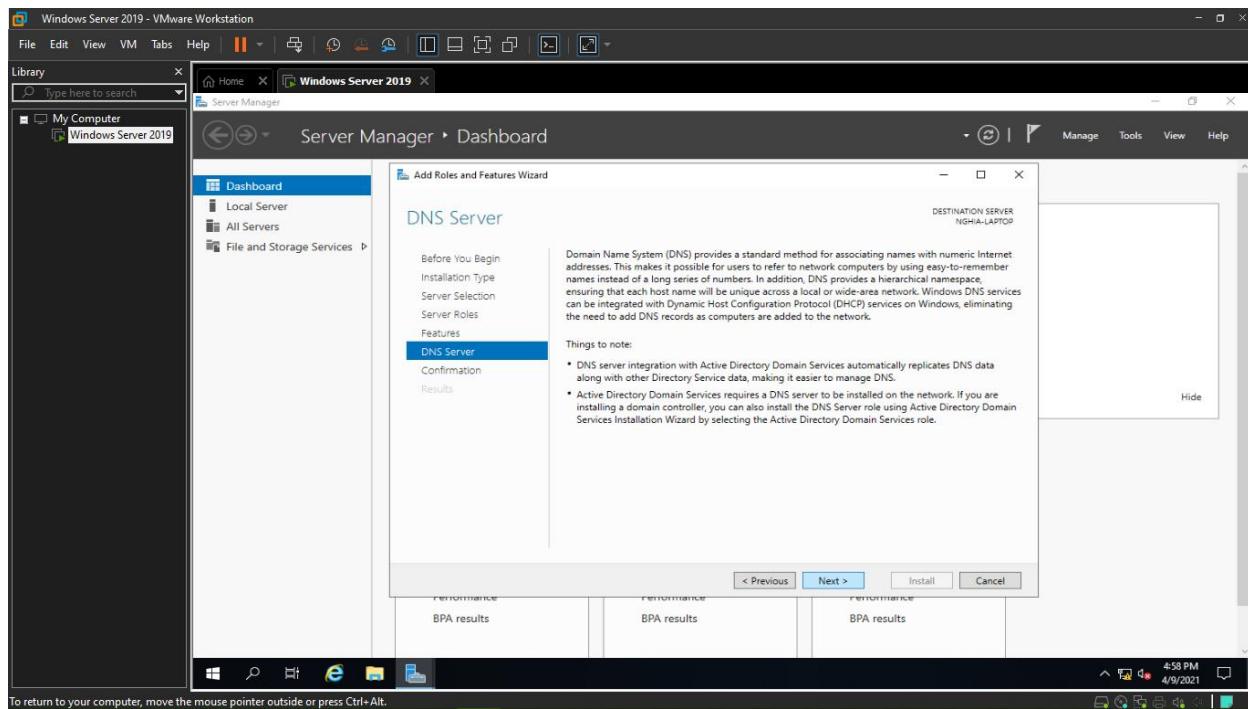


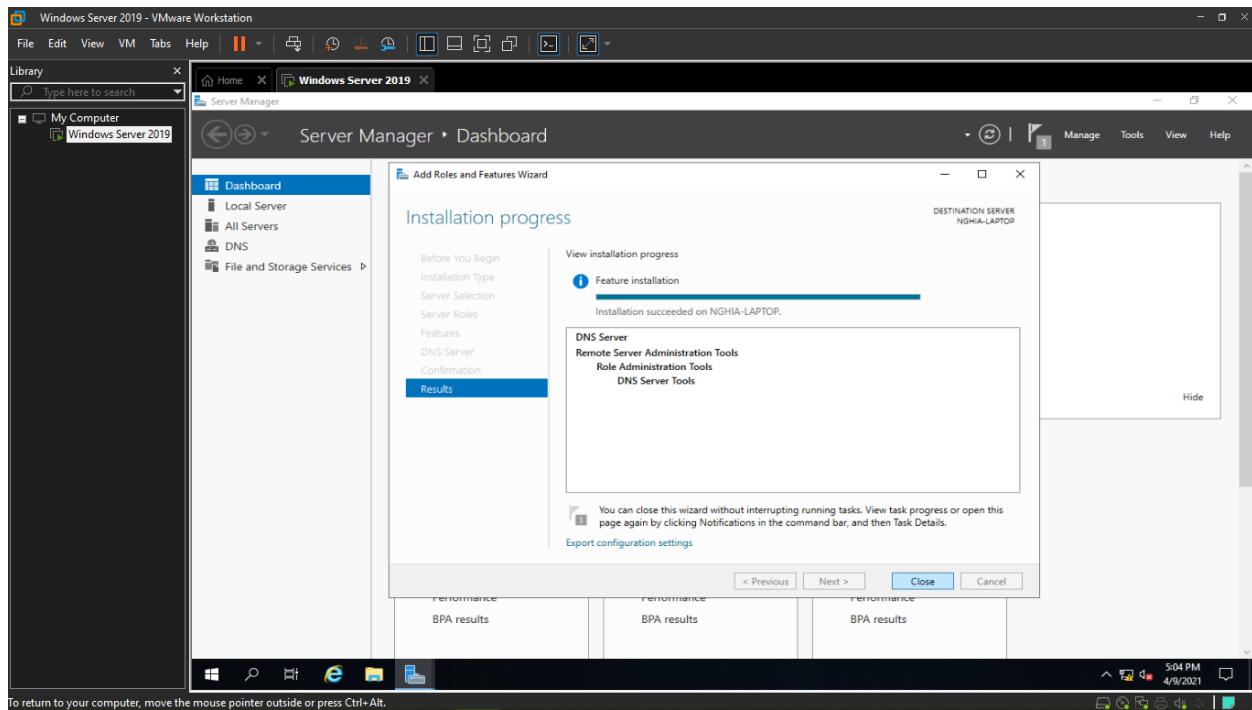
c. Cấu hình DNS

- Các bước cài dịch vụ

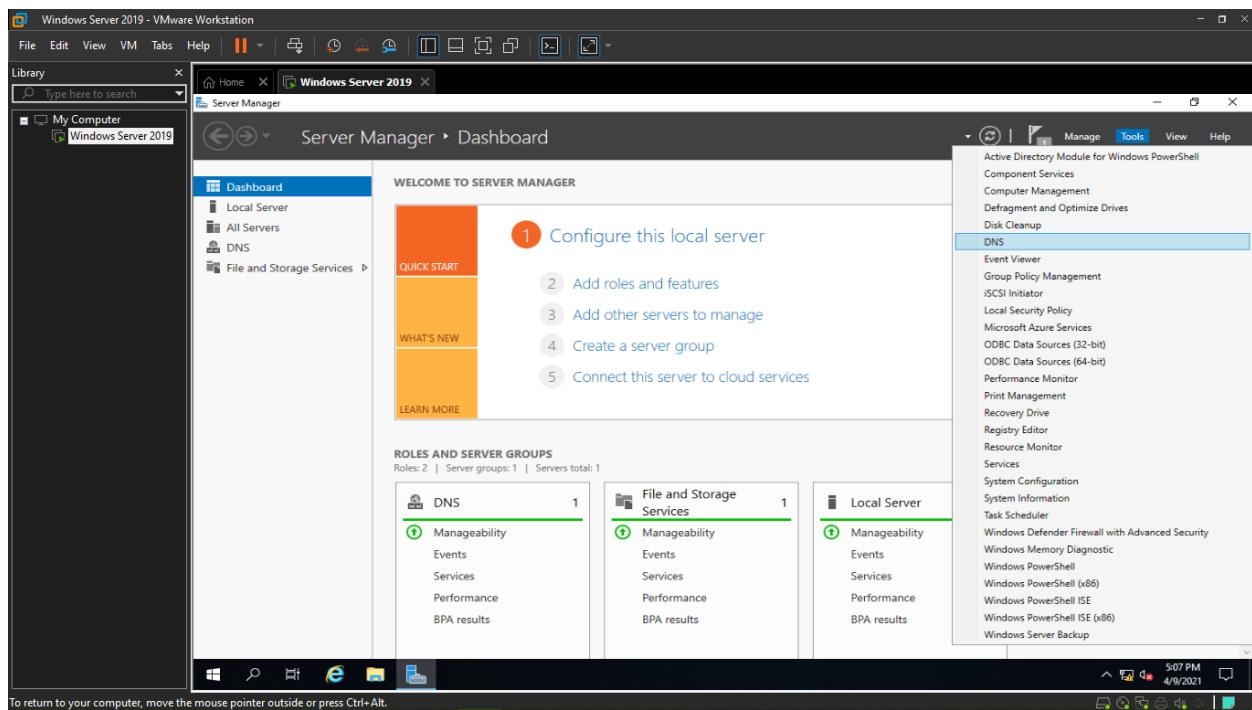


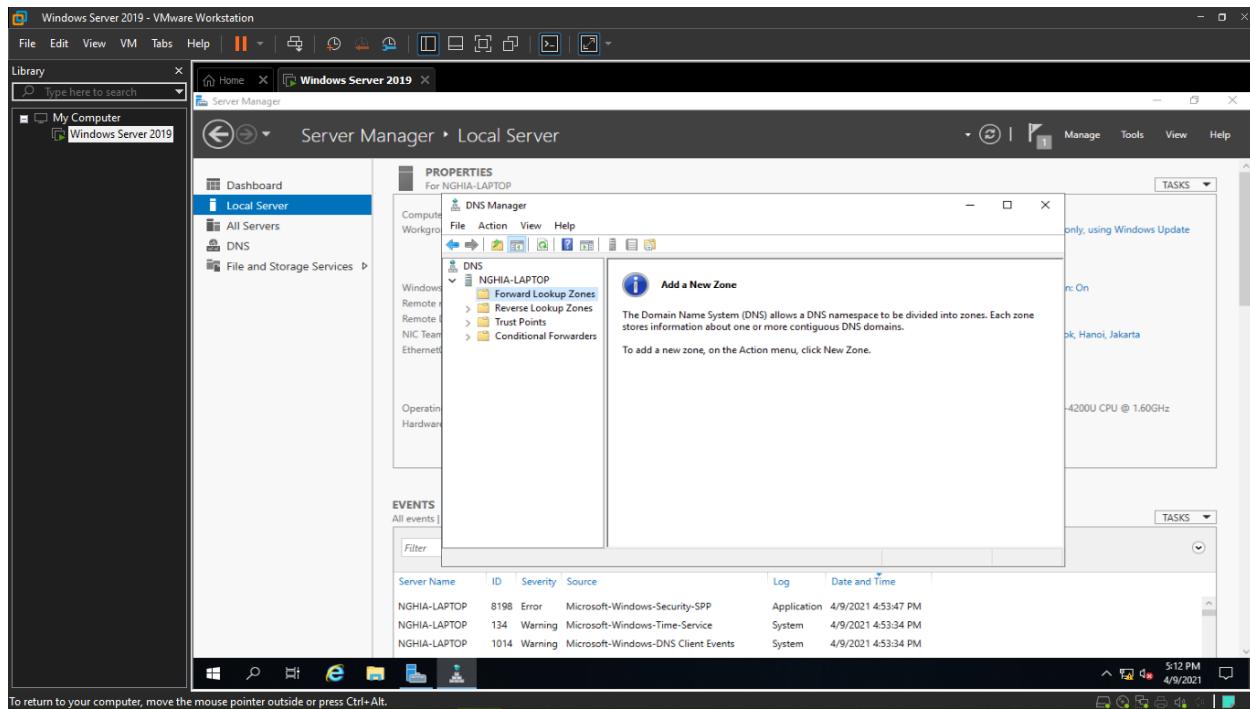




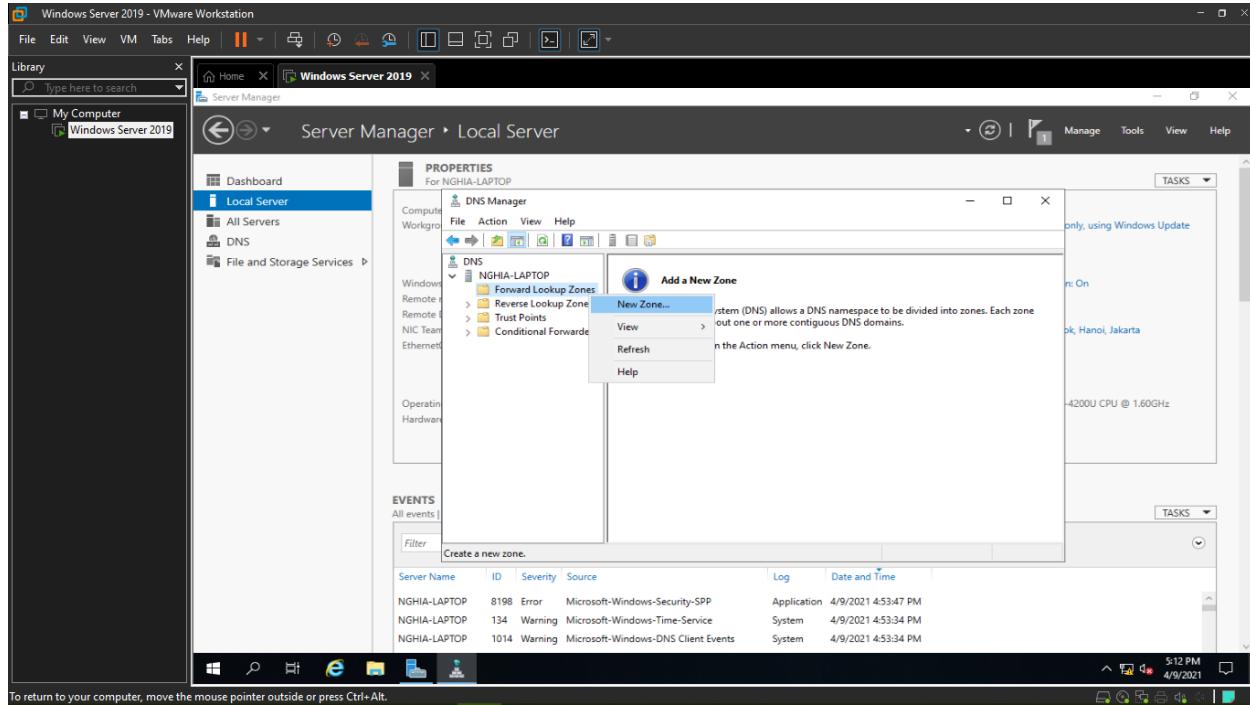


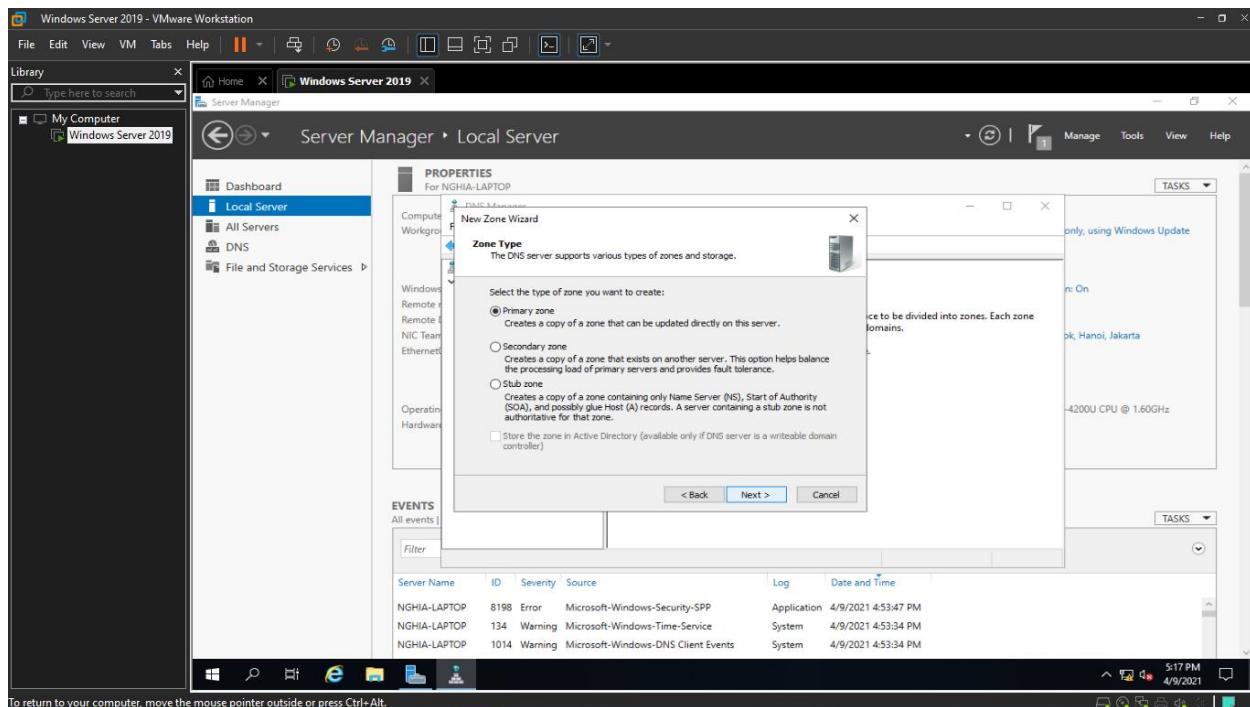
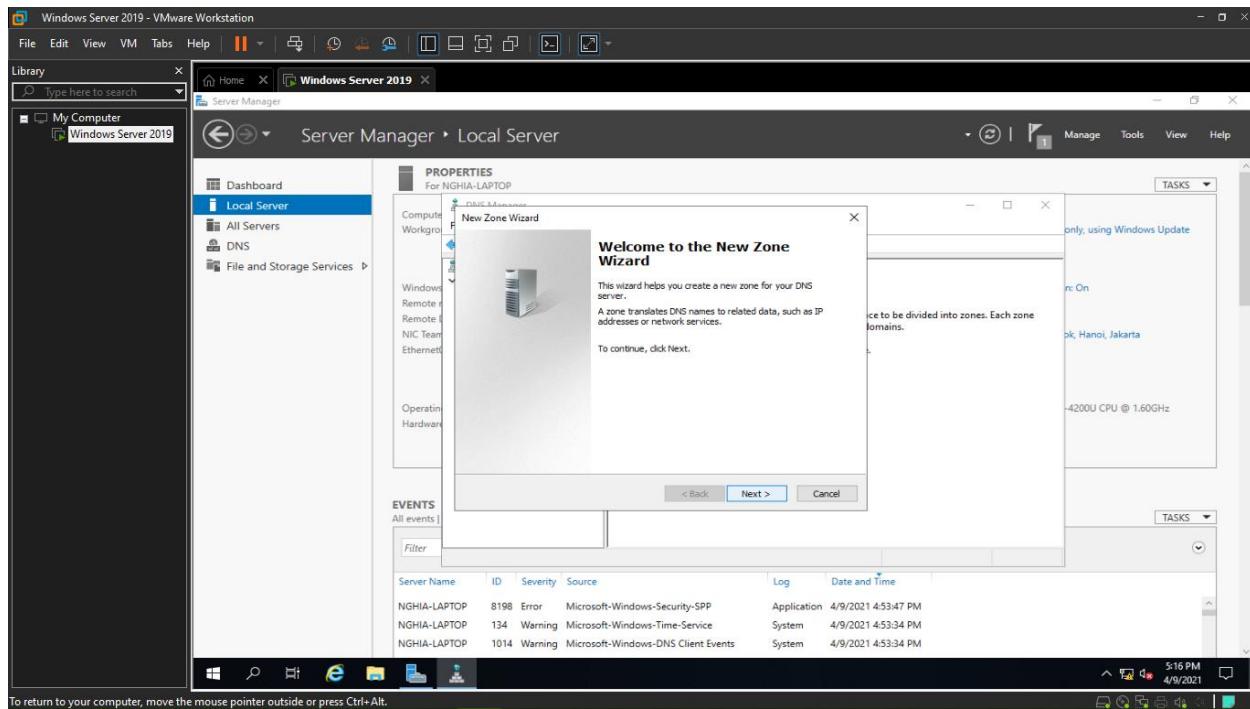
- Đã cài xong, ta vào cấu hình



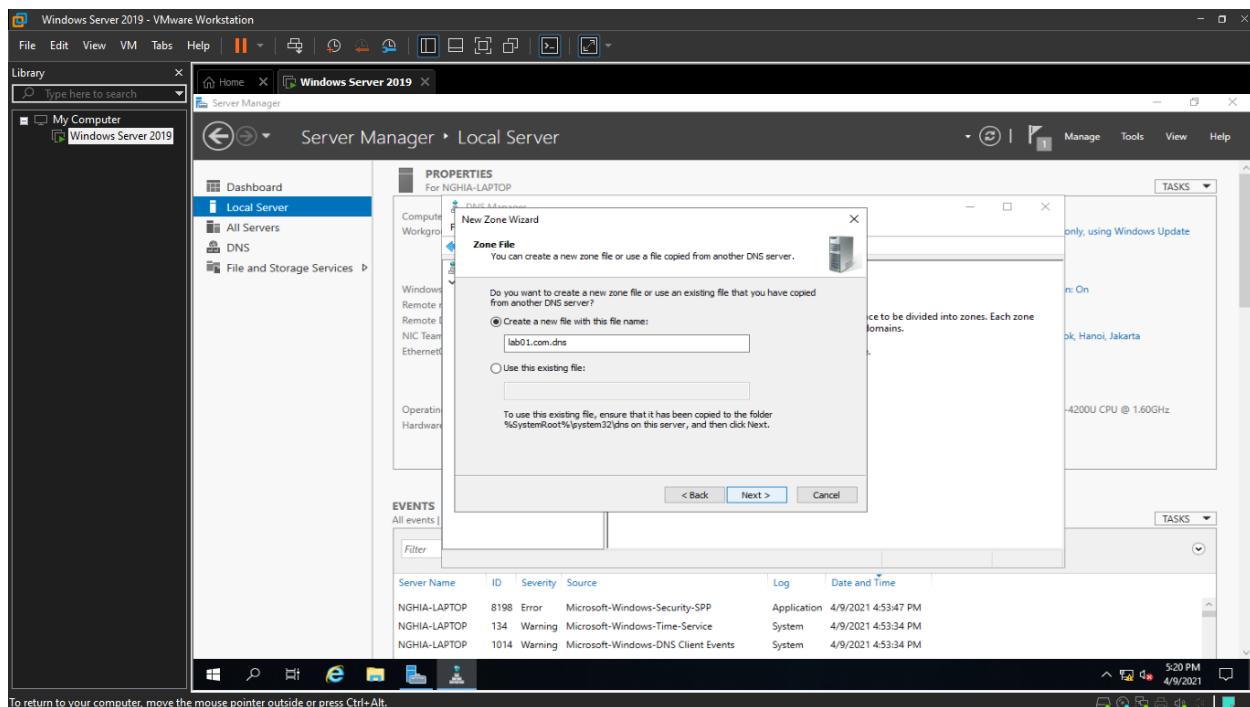
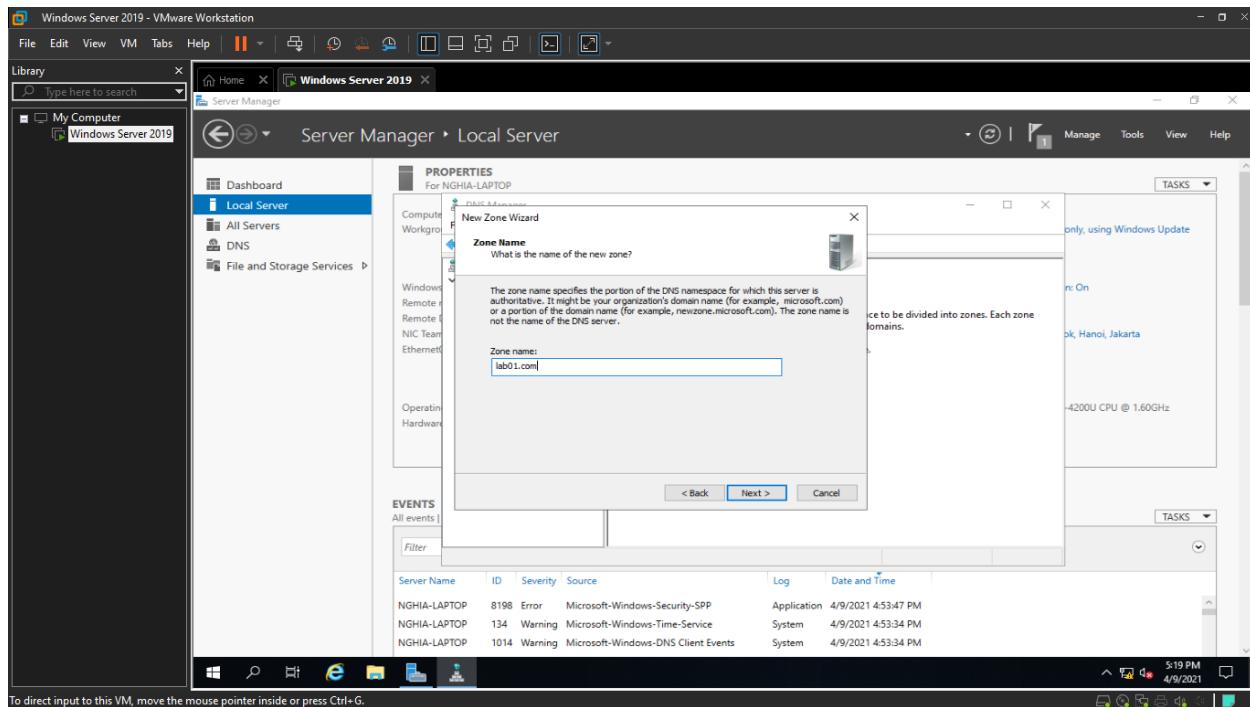


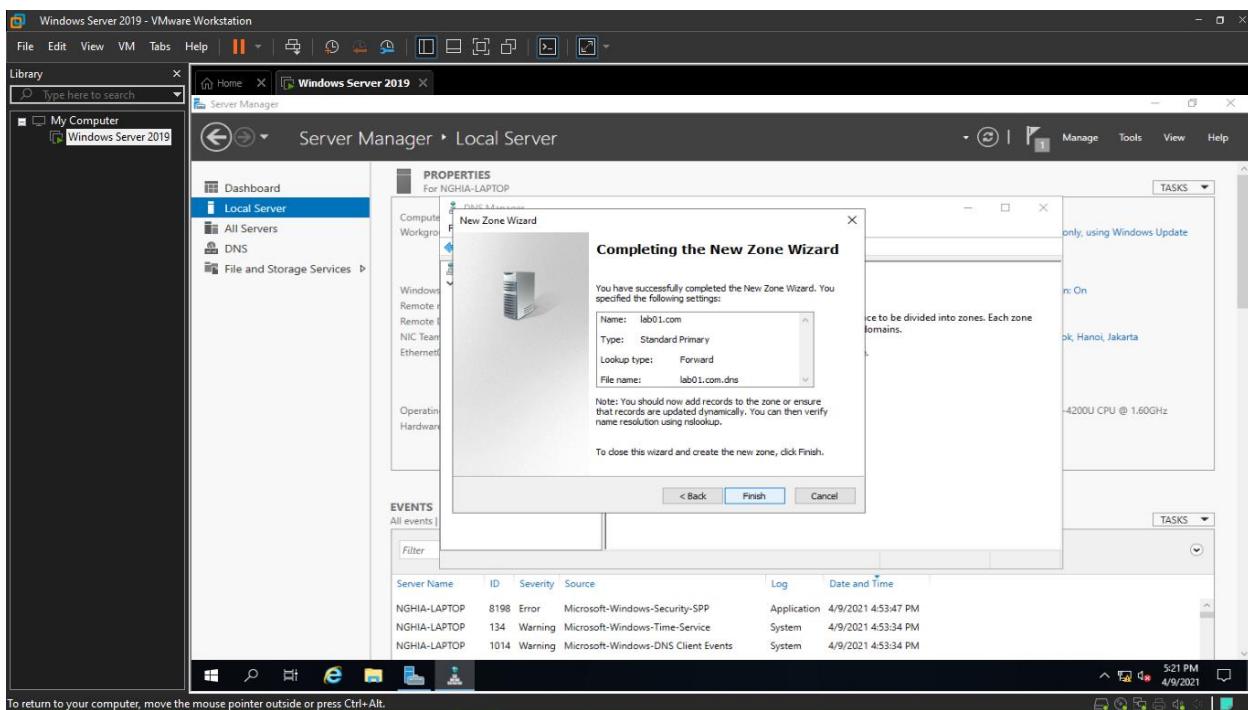
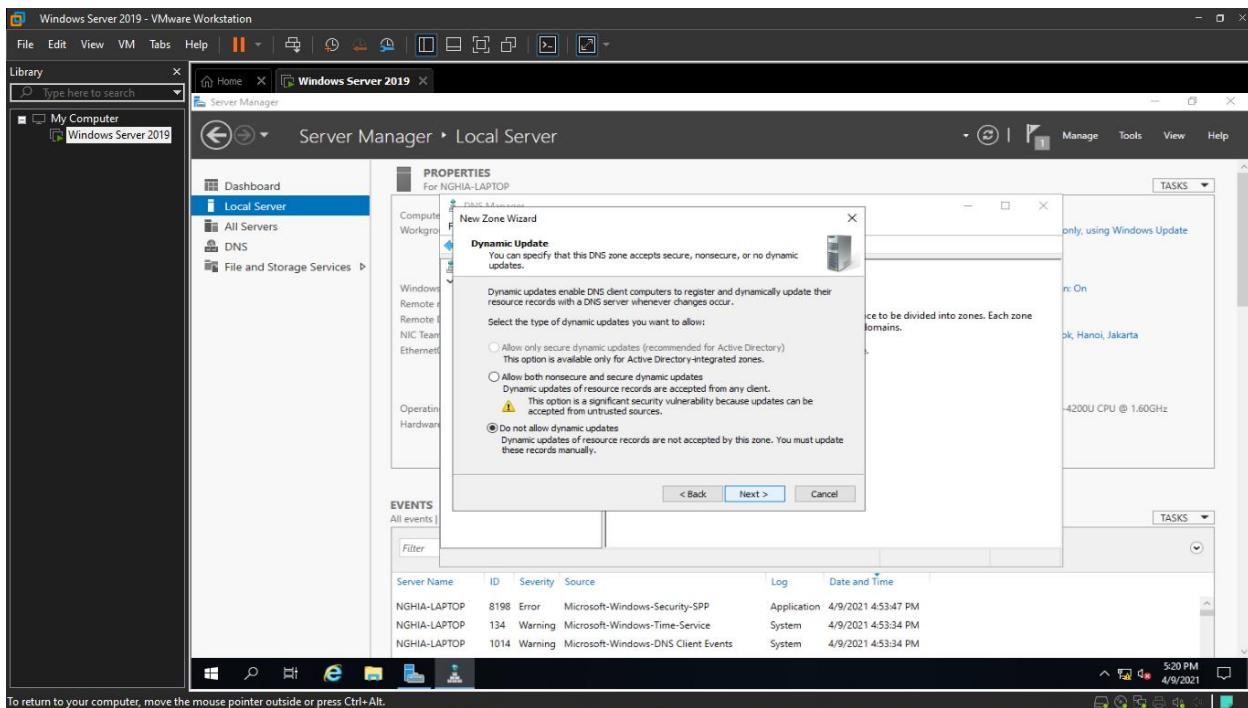
- Tạo Scope mới

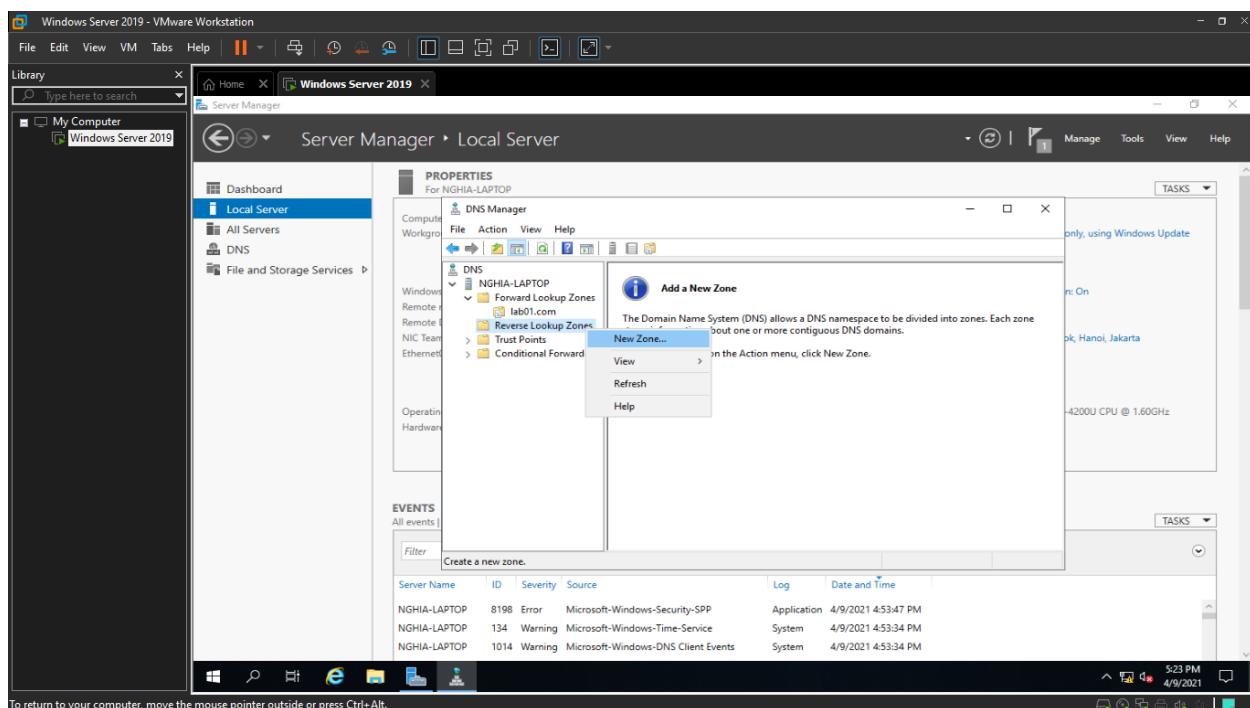
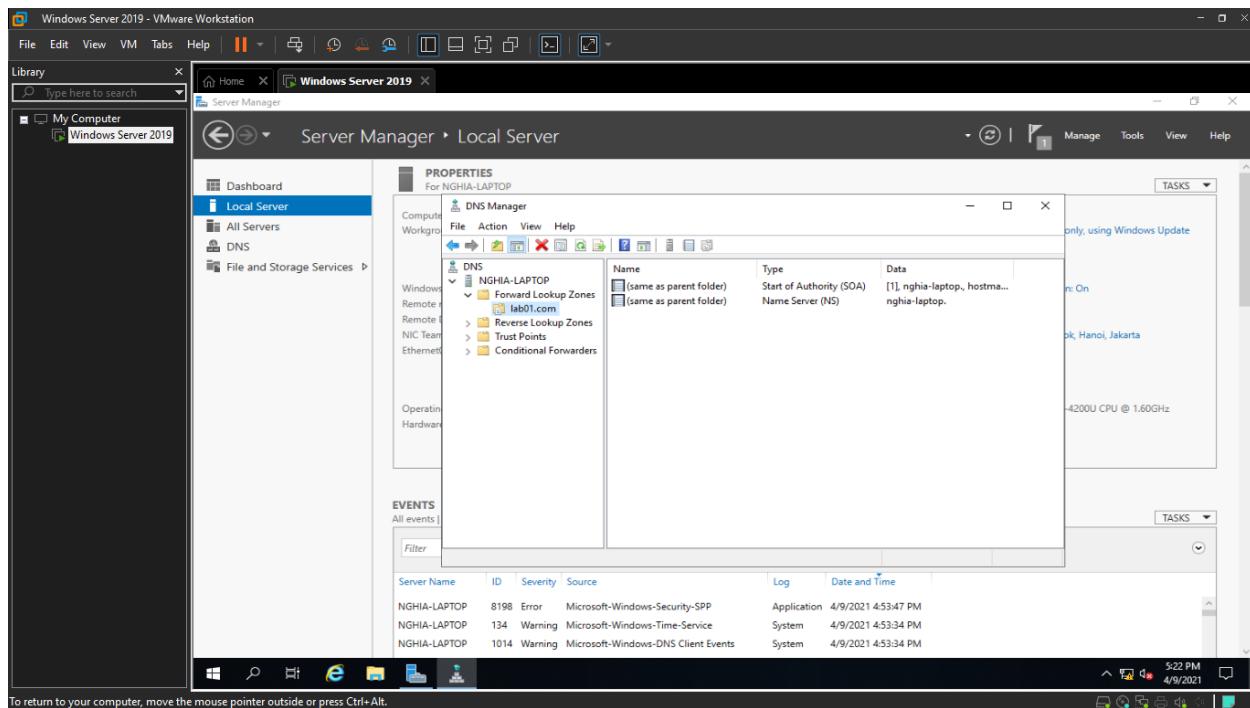


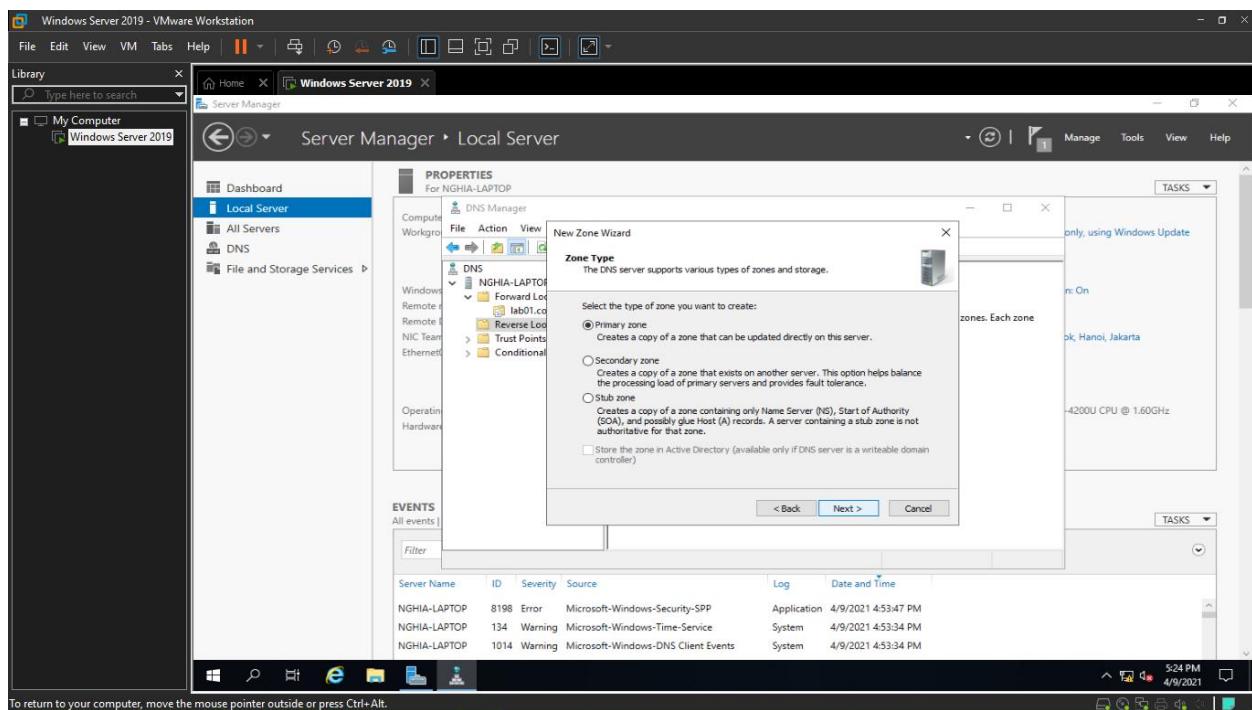
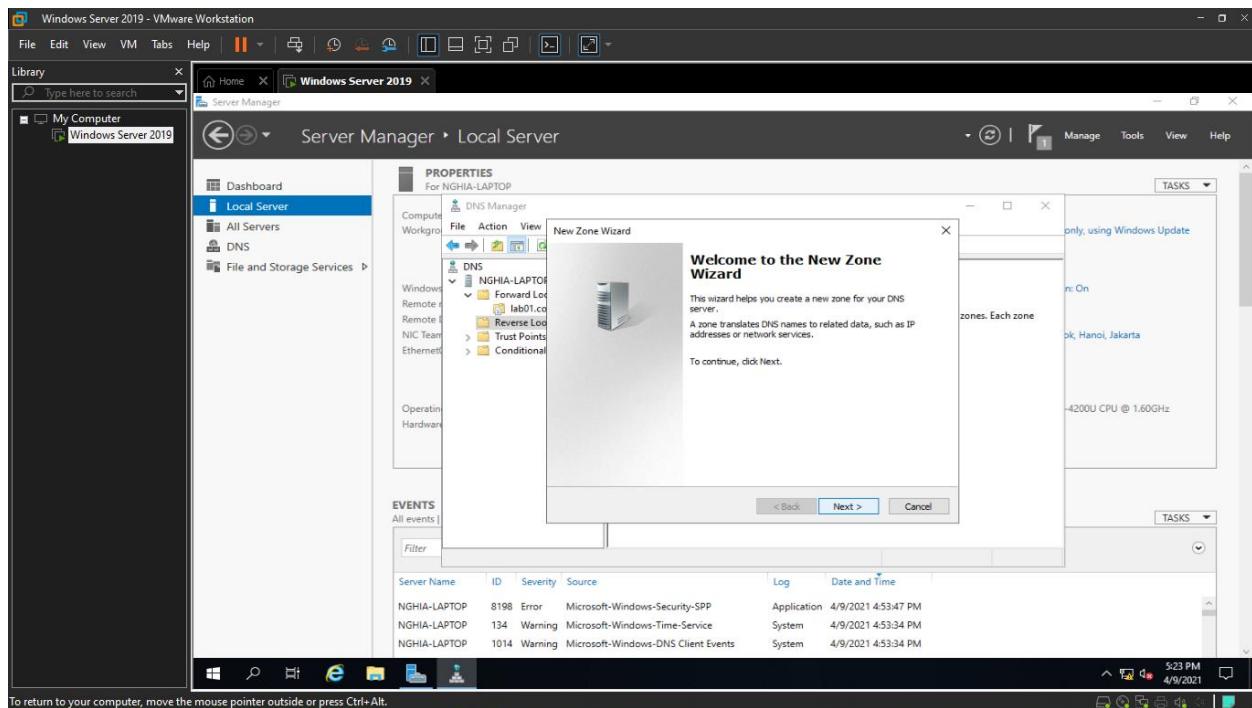


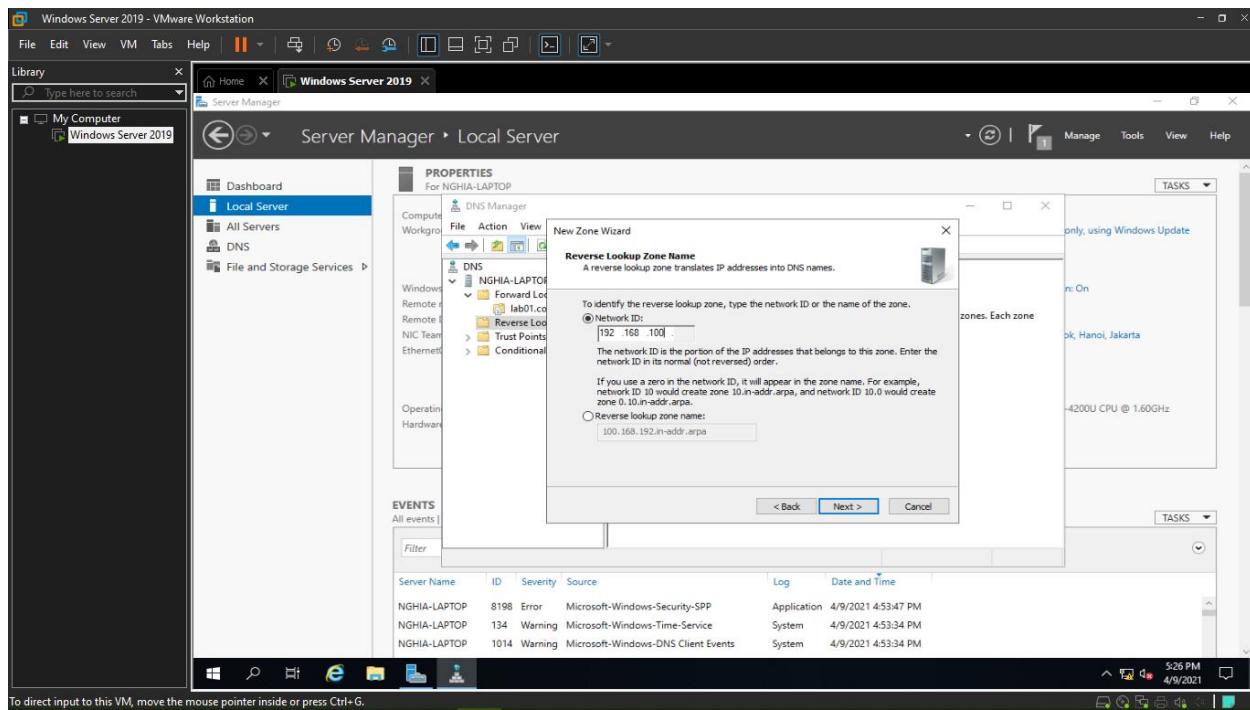
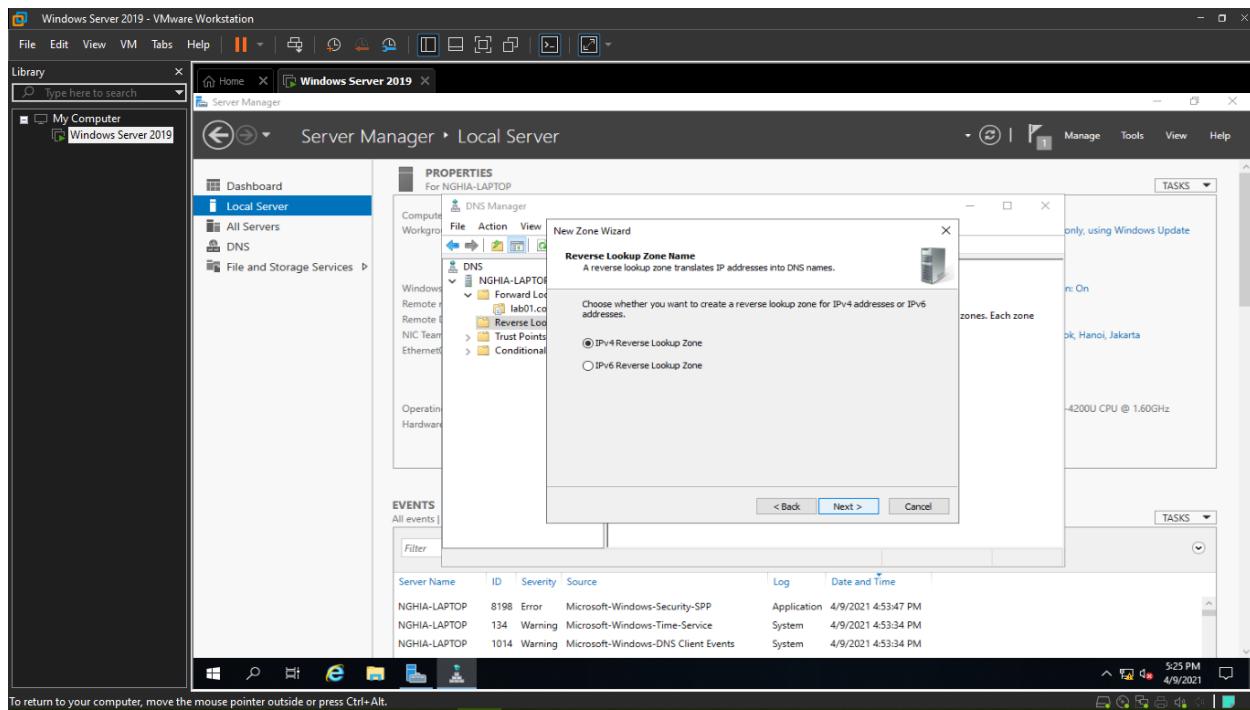
- Chọn Zone Nem là lab01.com

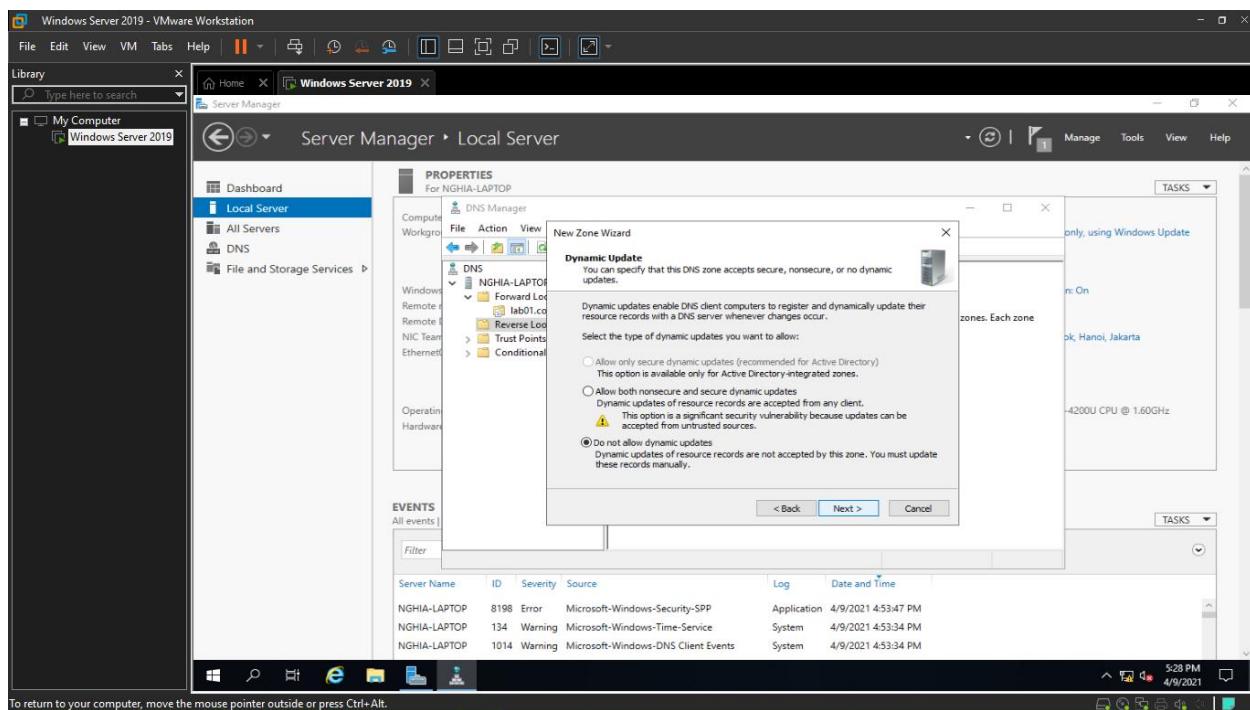
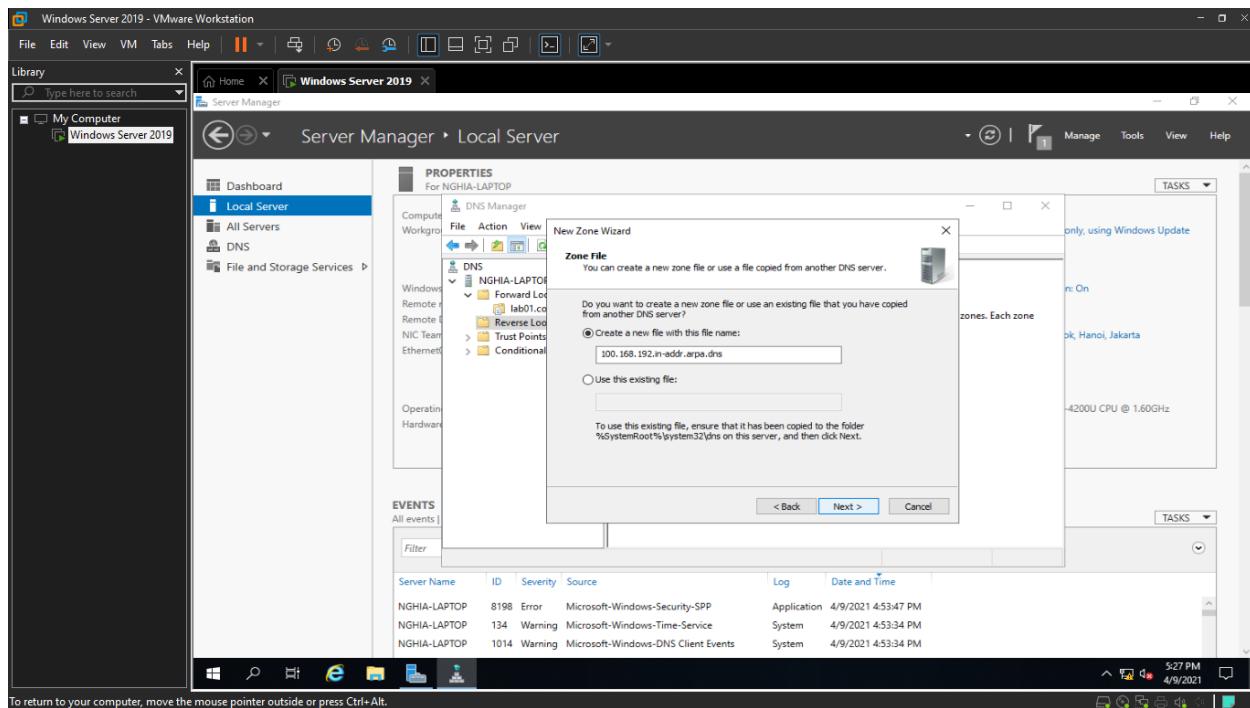


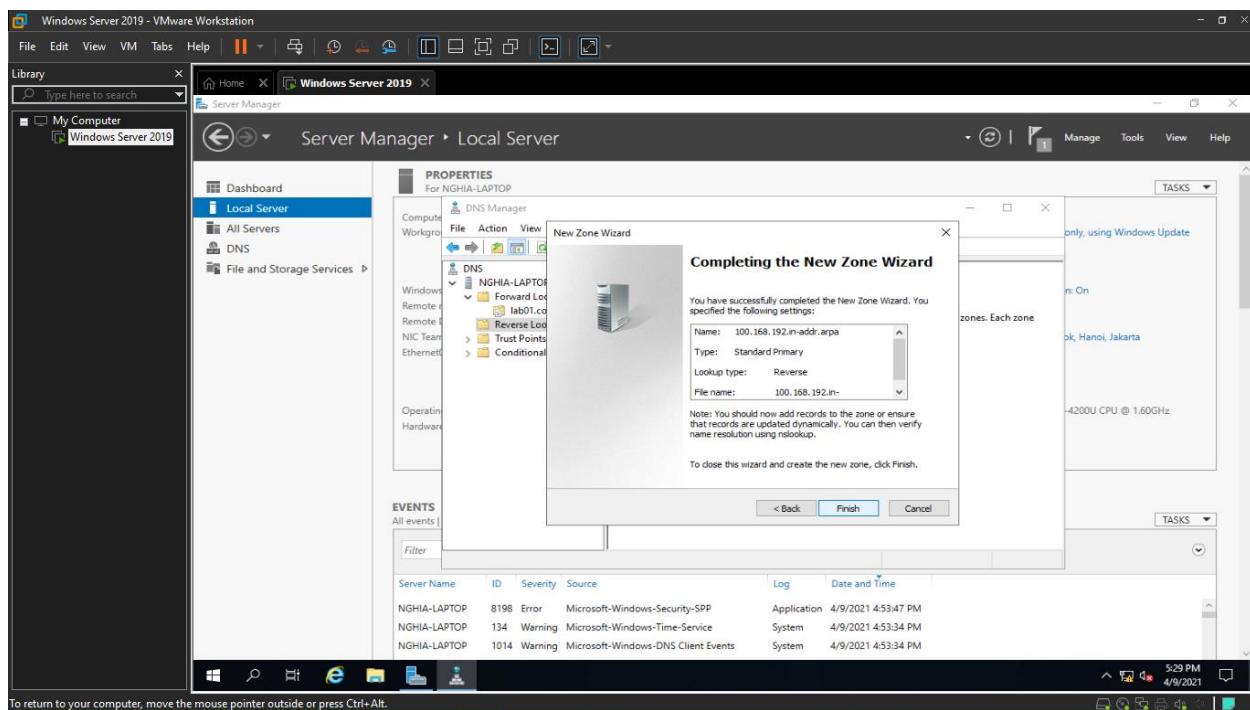




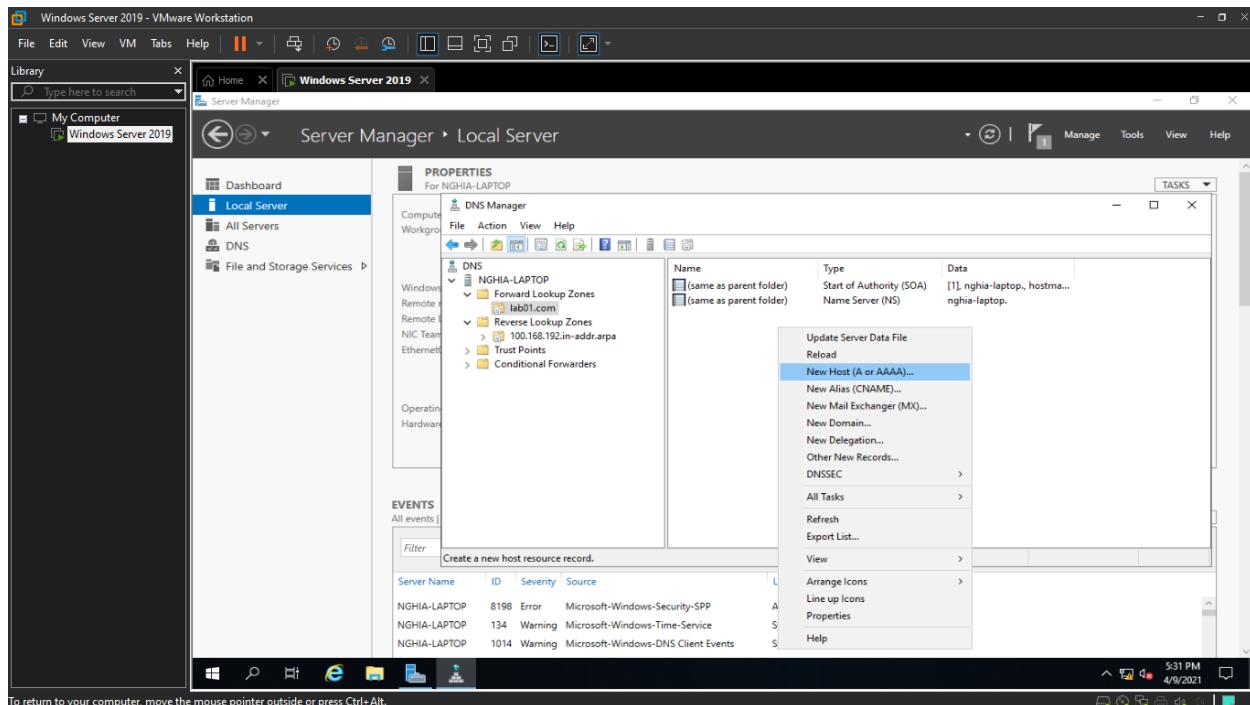


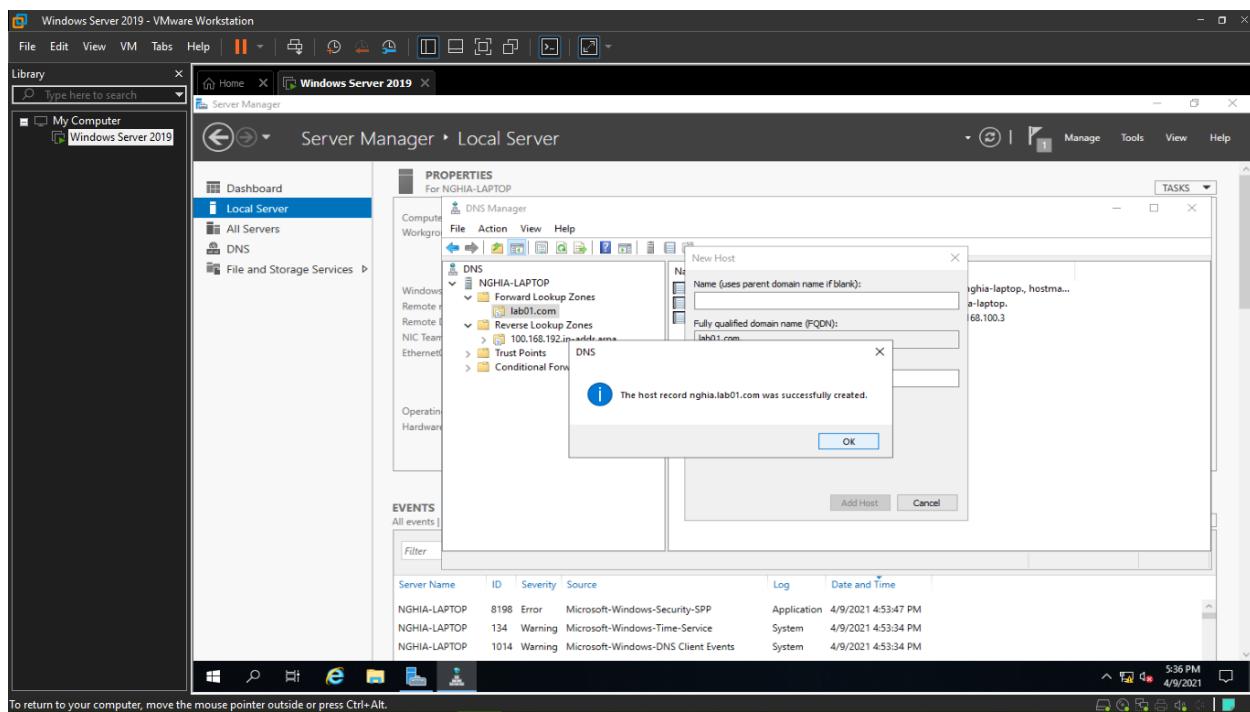
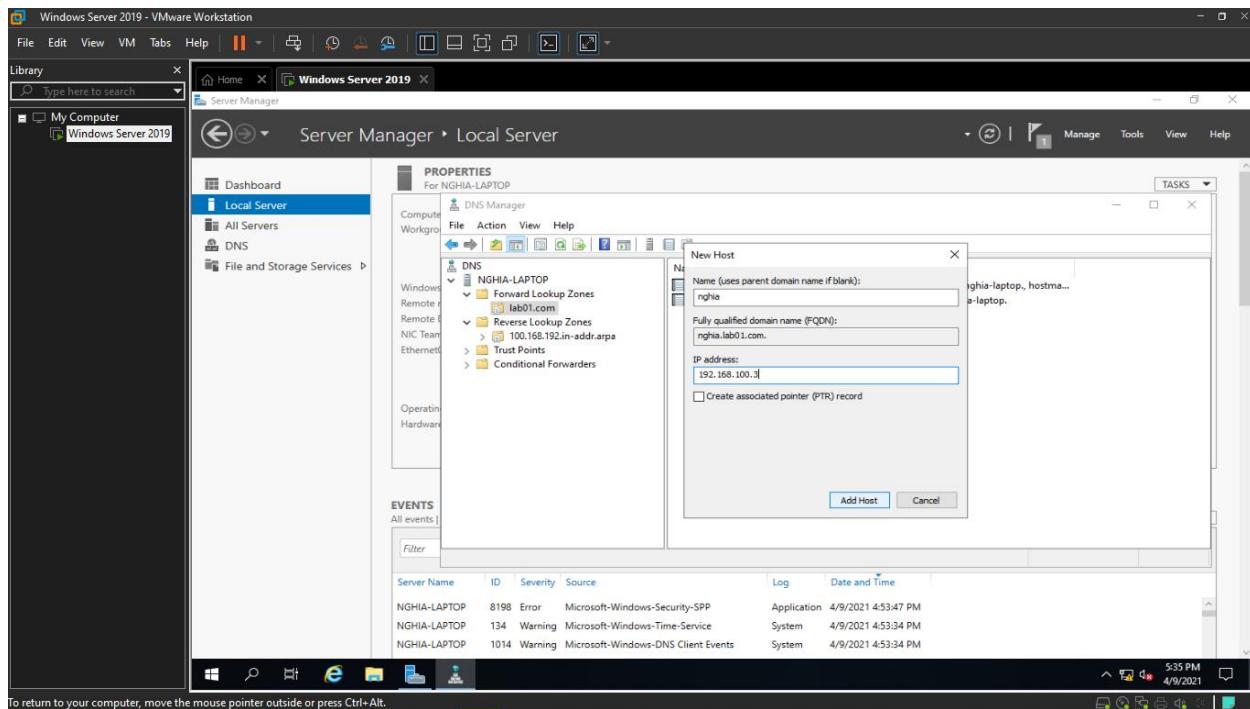


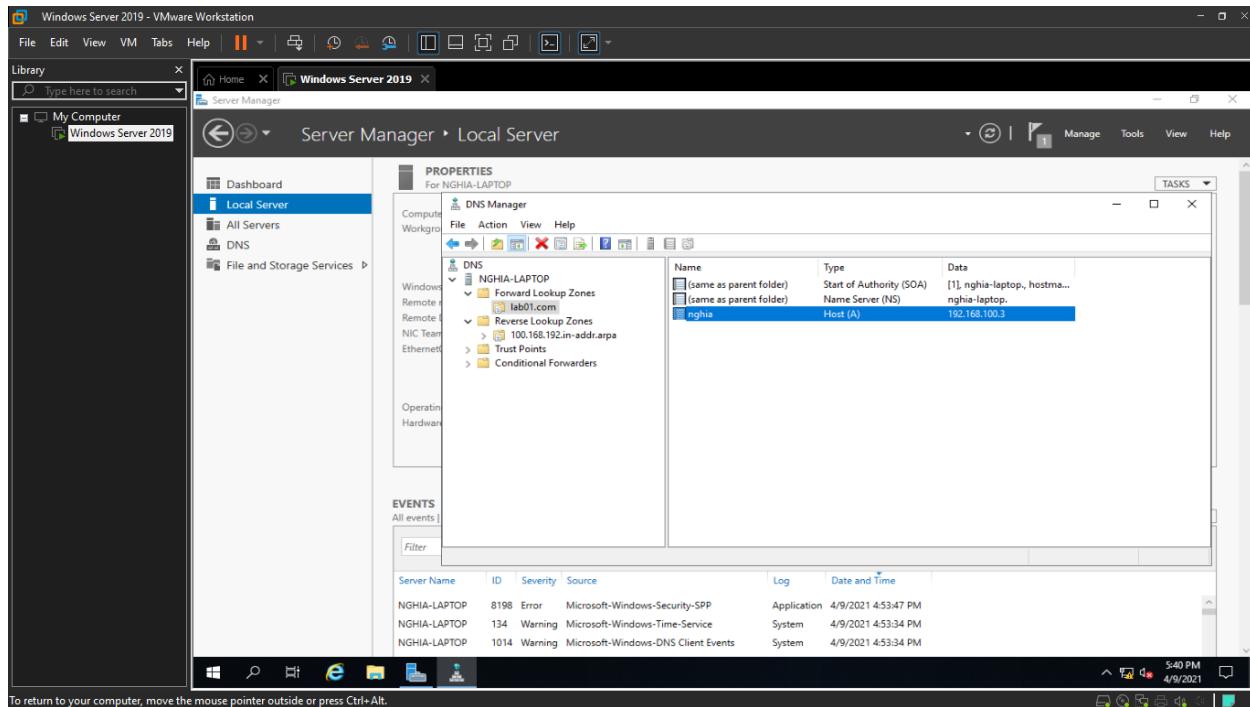




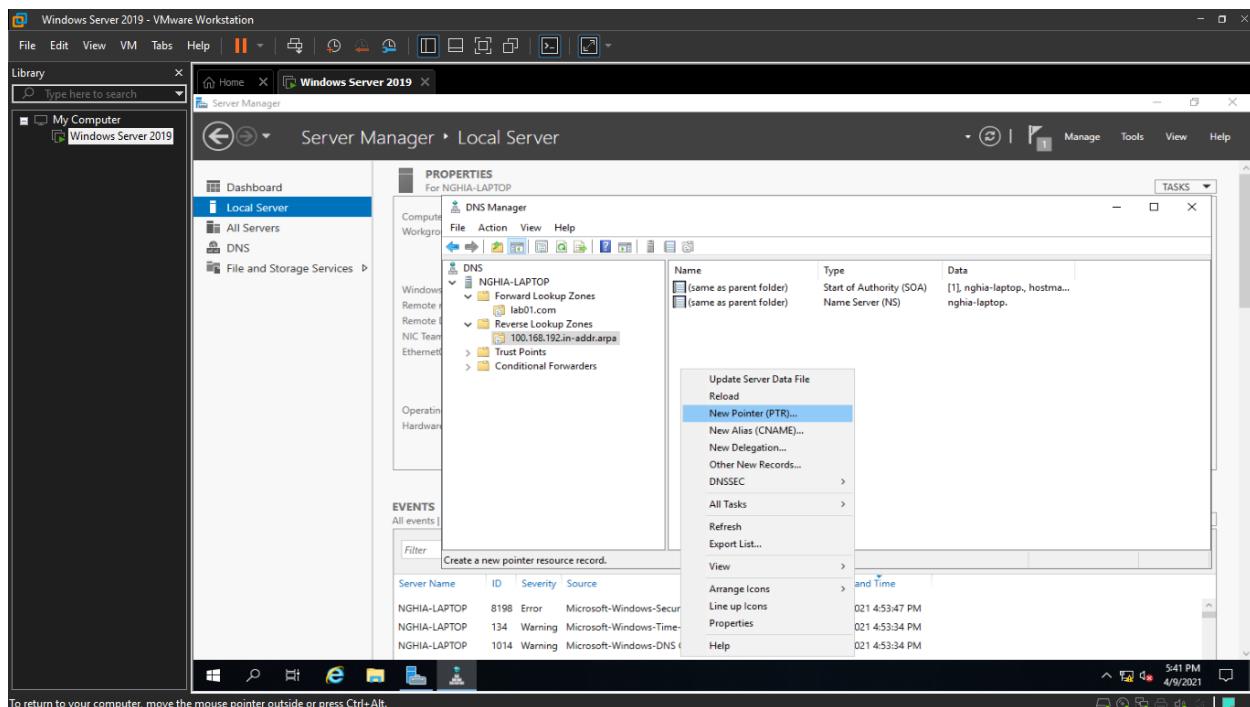
- Tạo host mới

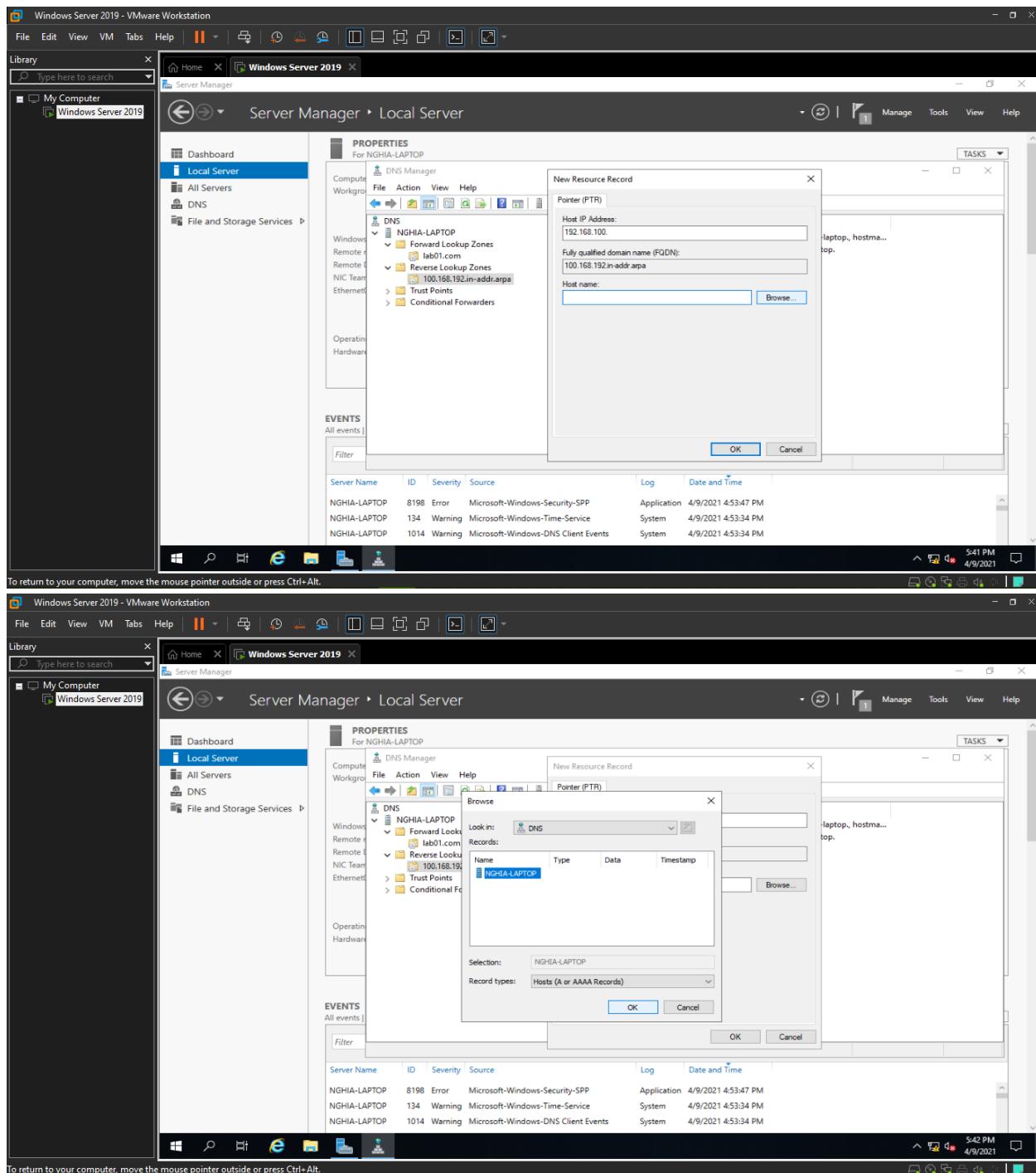


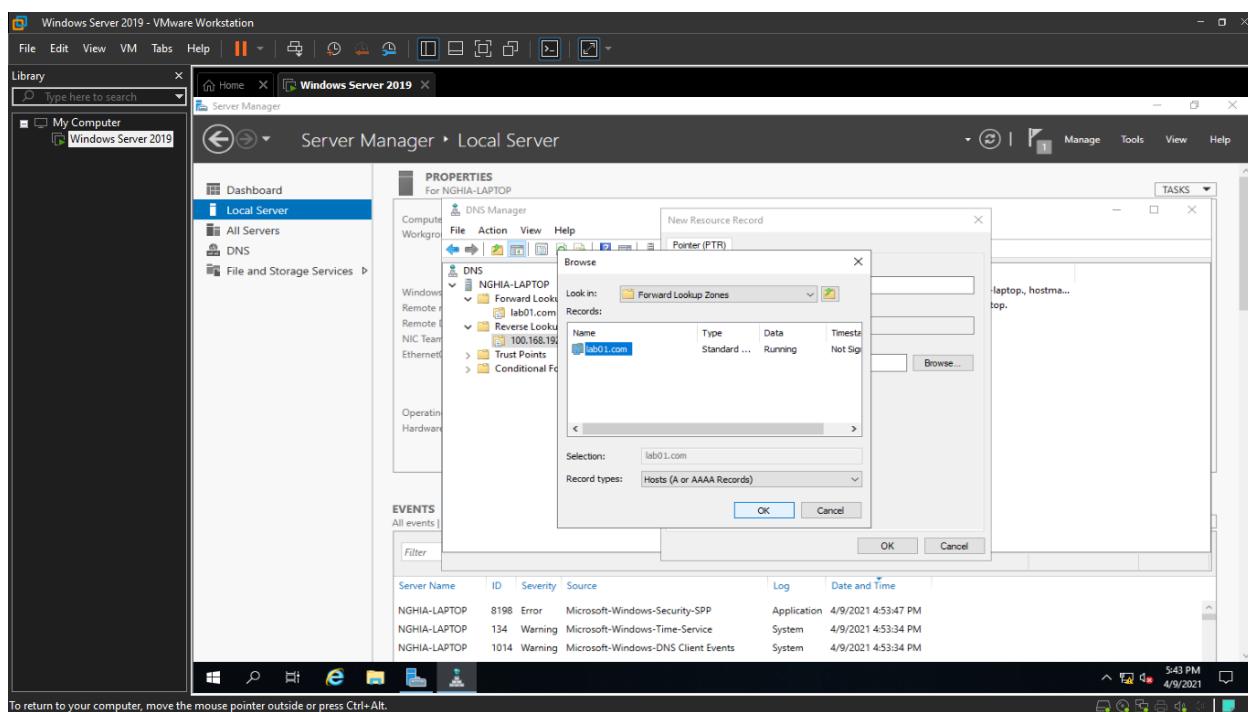
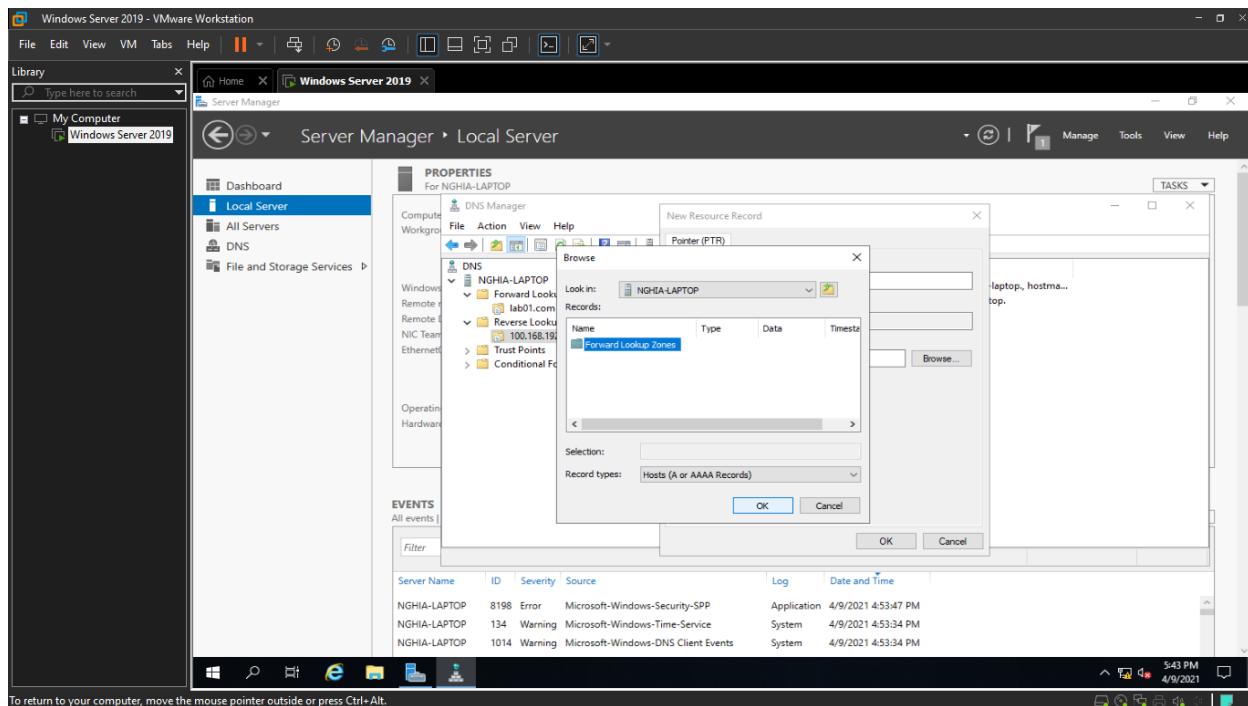


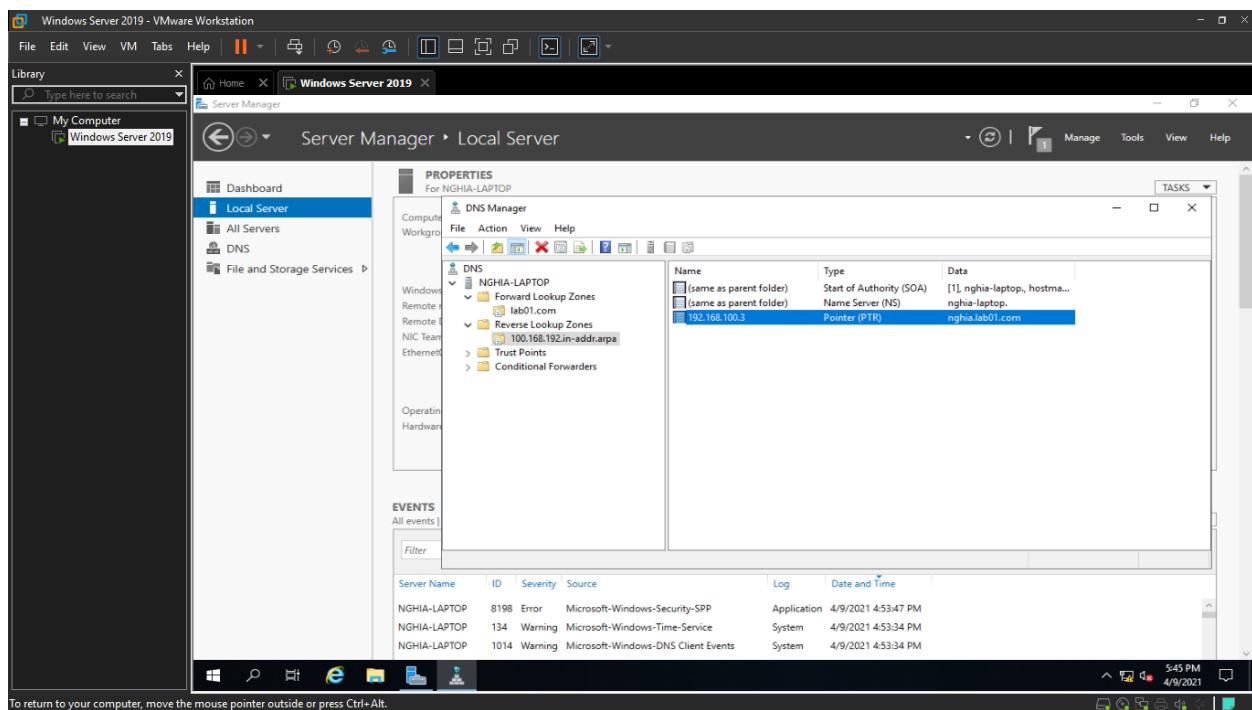
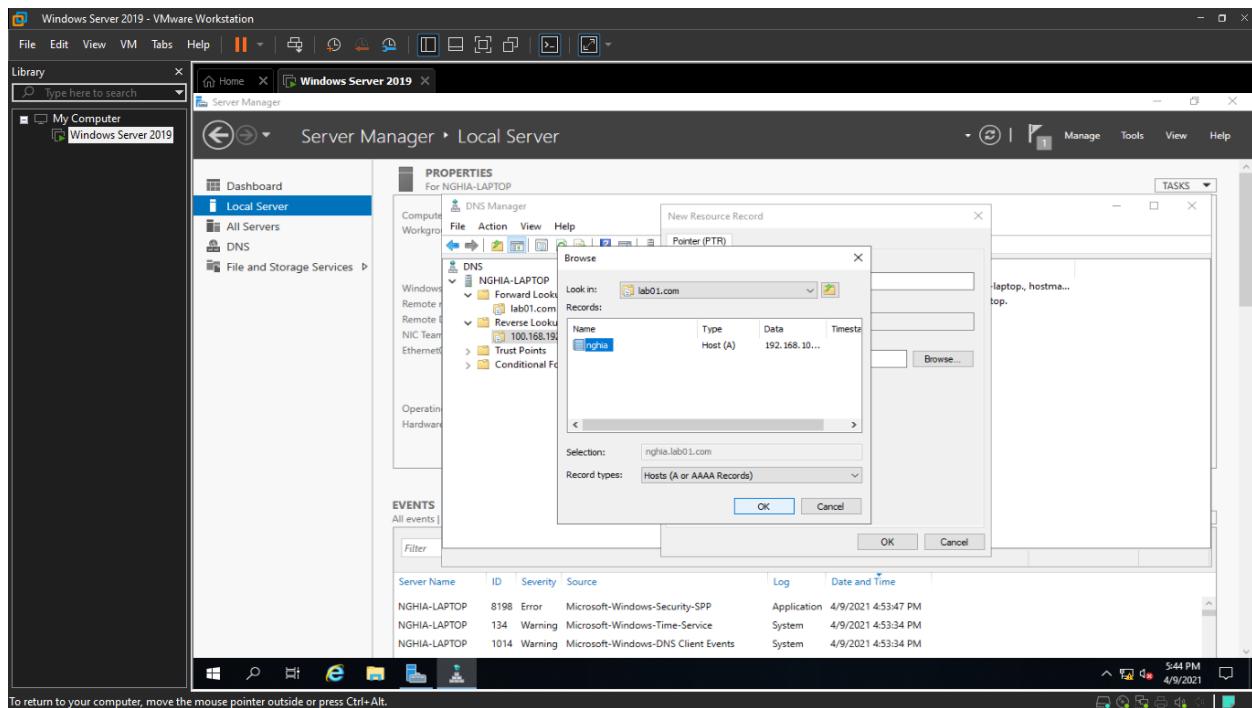


- Đã tạo xong, giờ ta tạo pointer

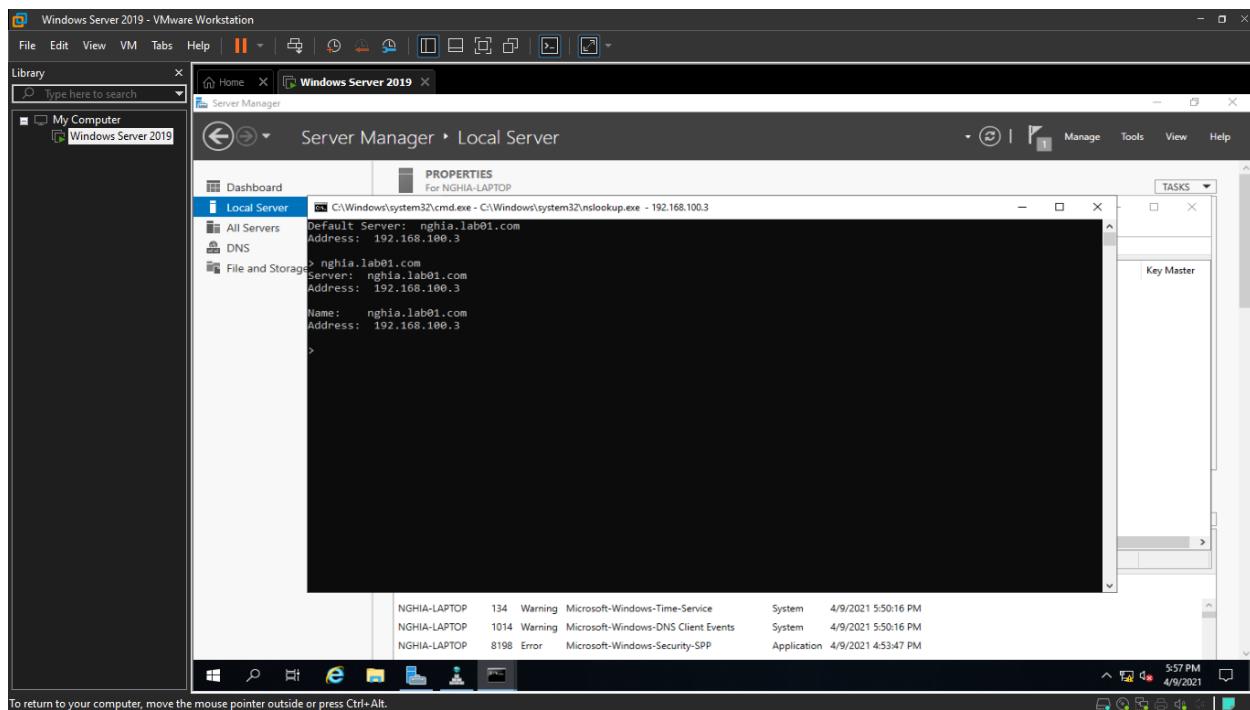
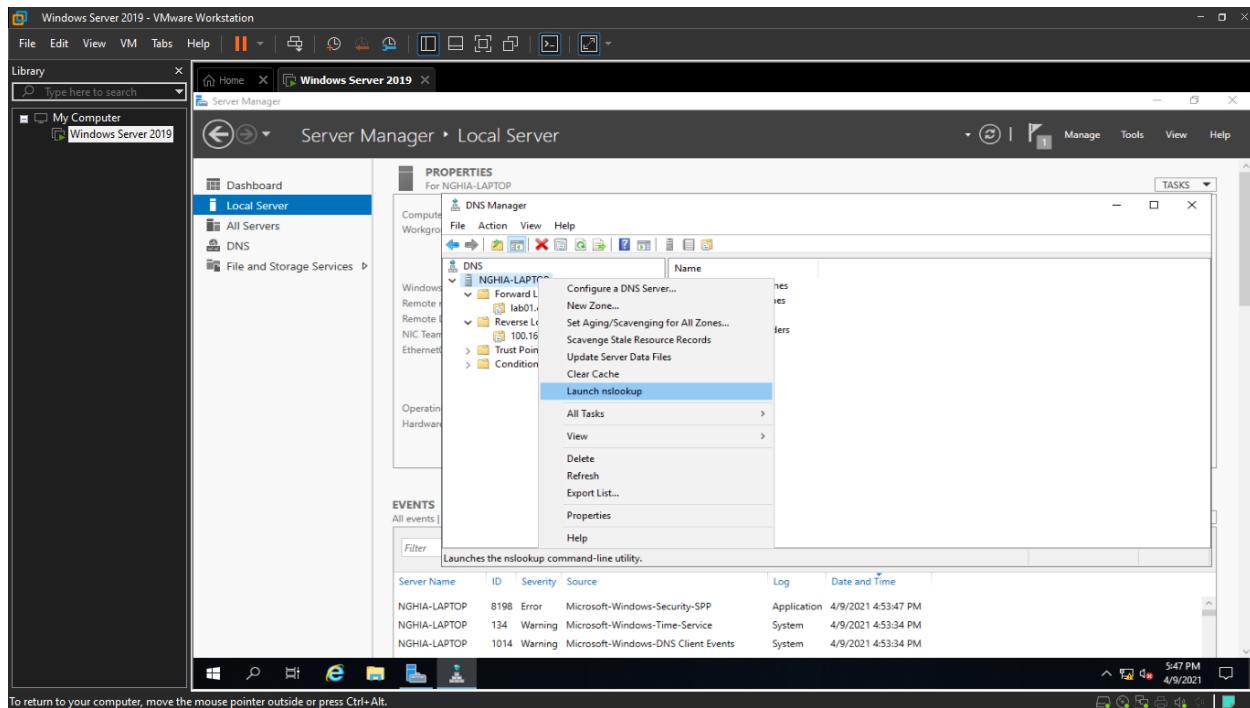






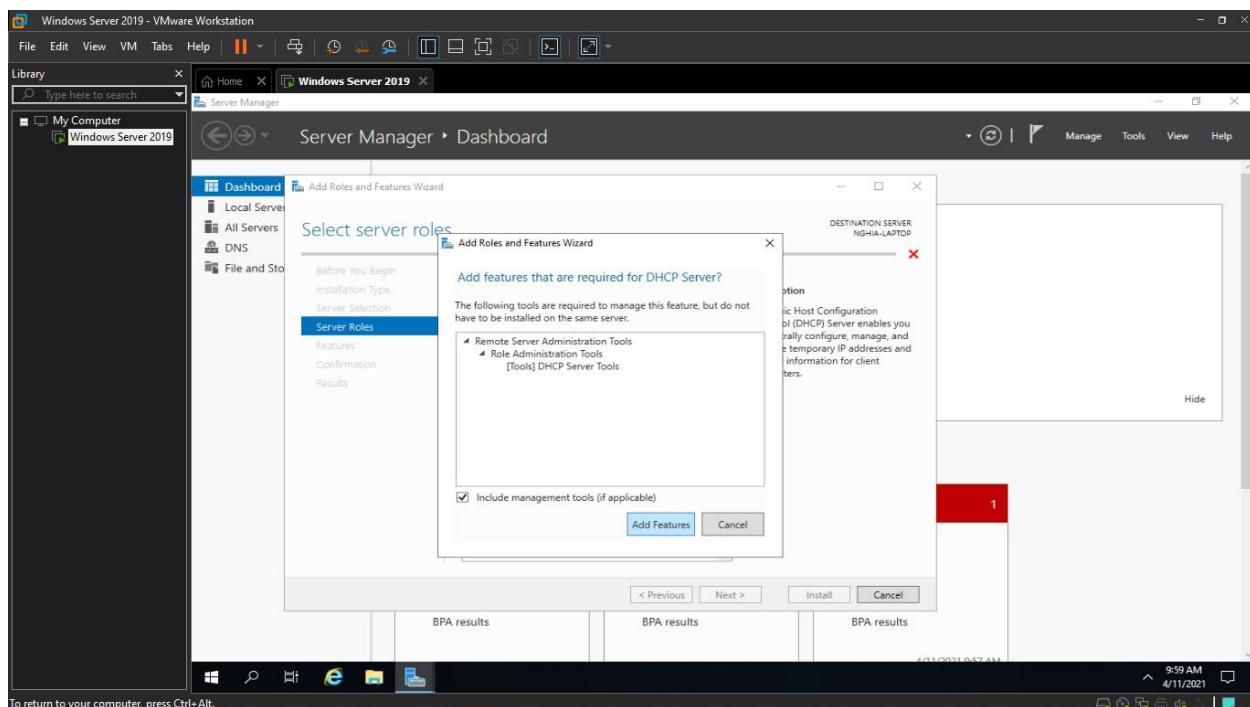
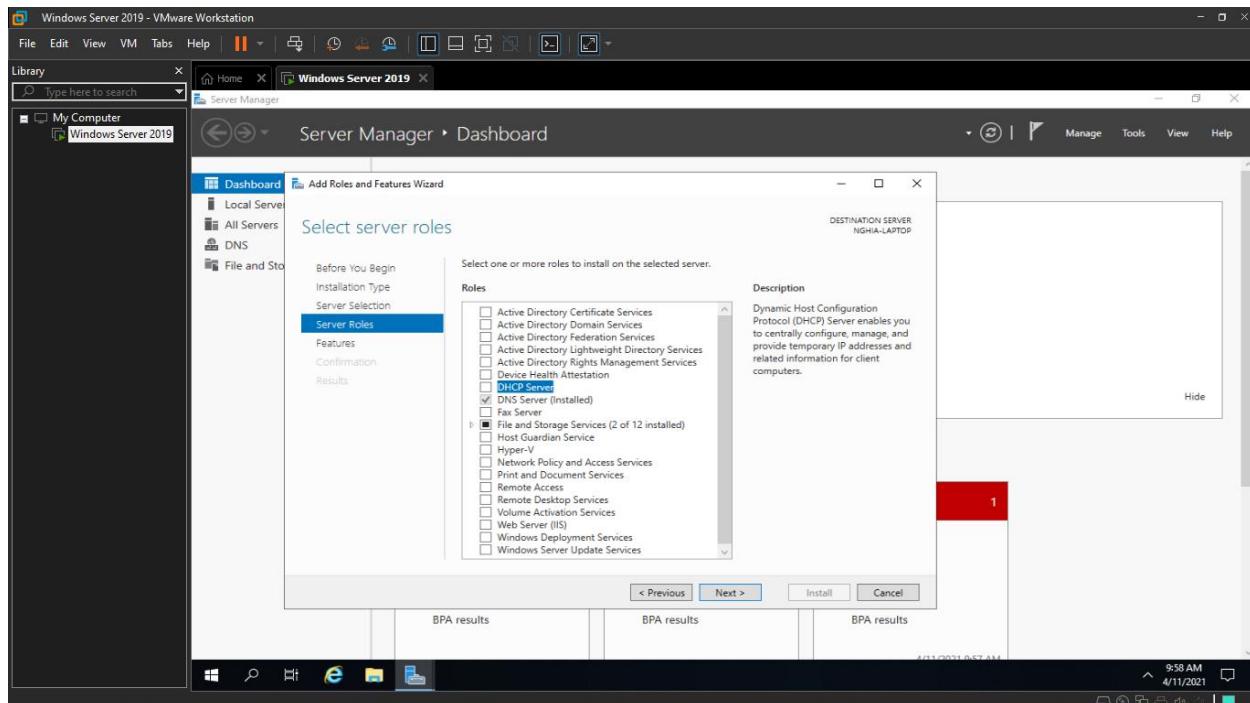


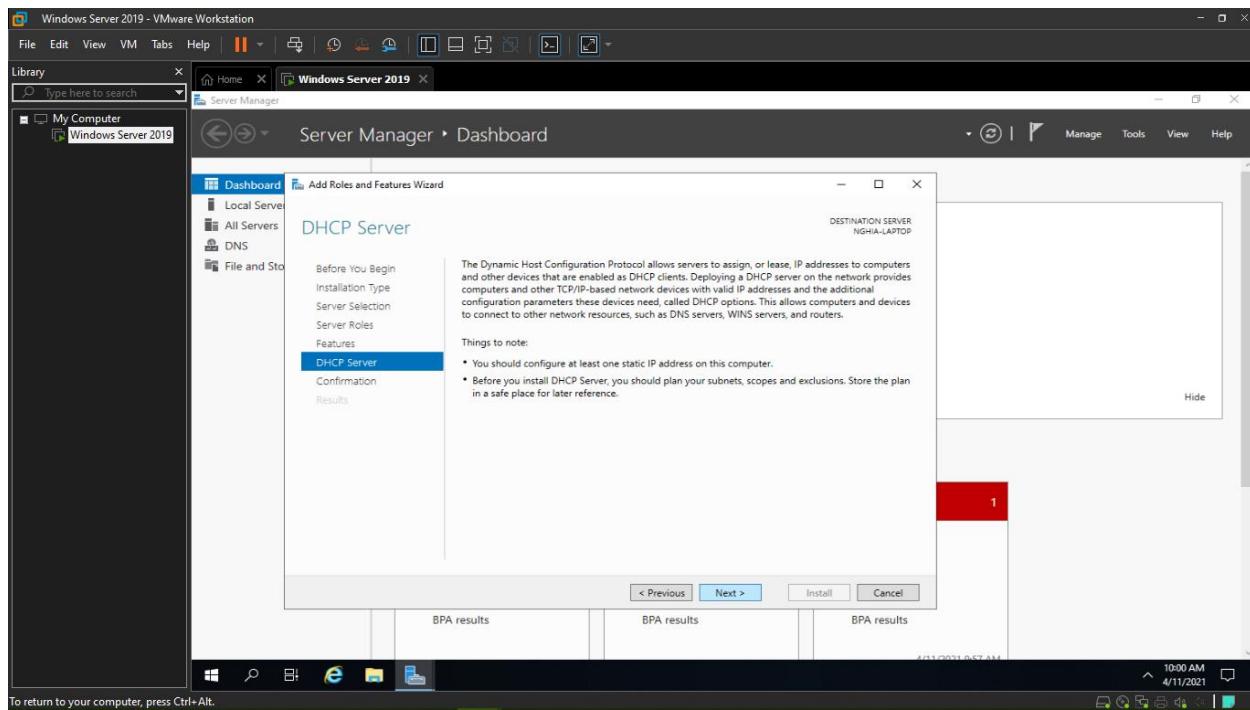
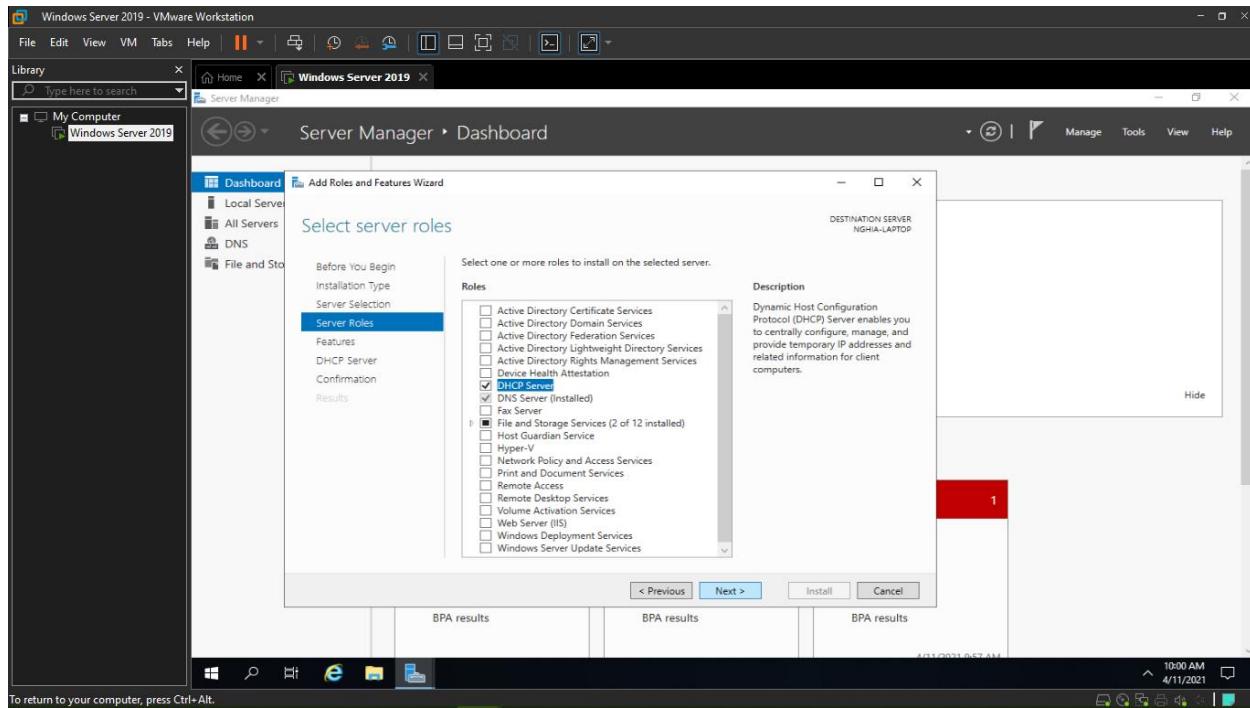
- Kiểm tra xem DNS có hoạt động không

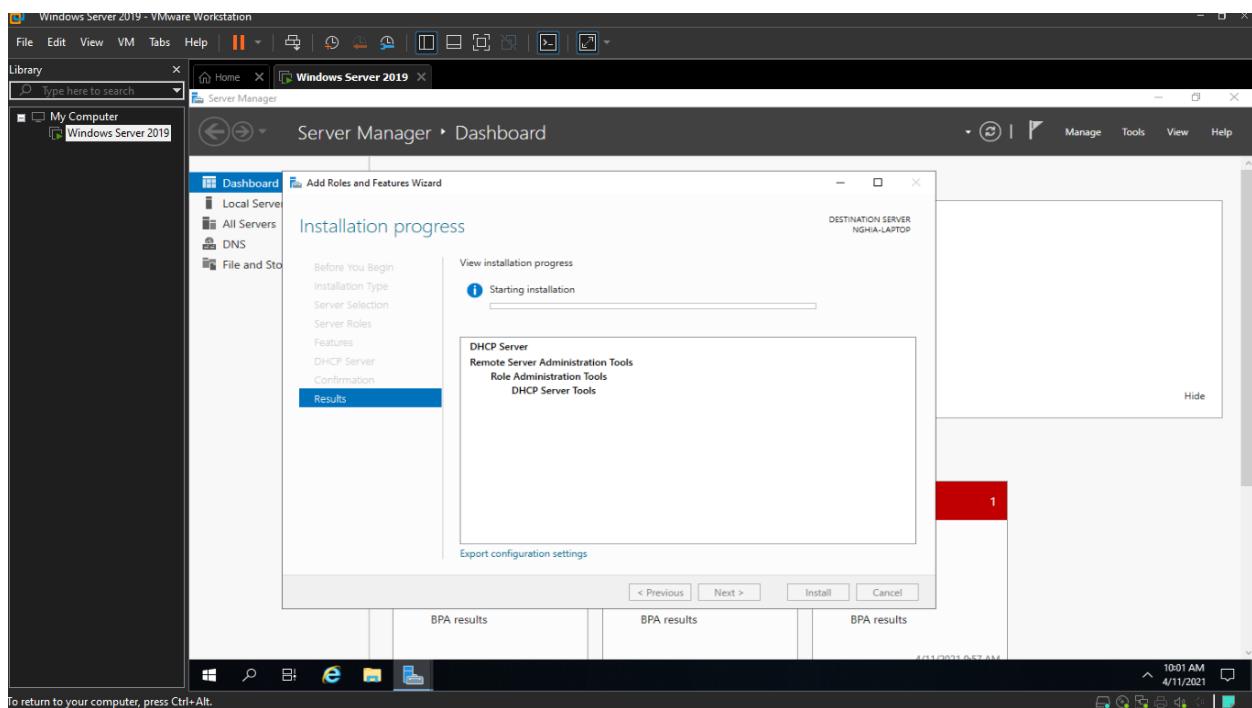
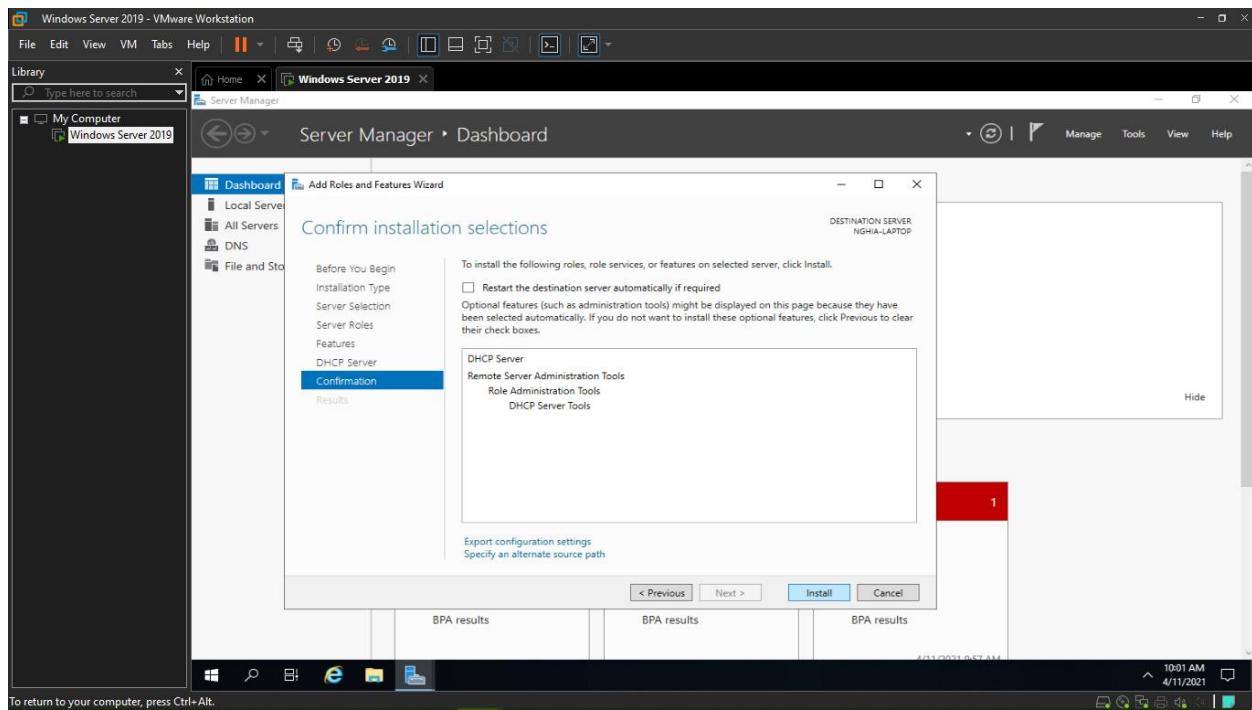


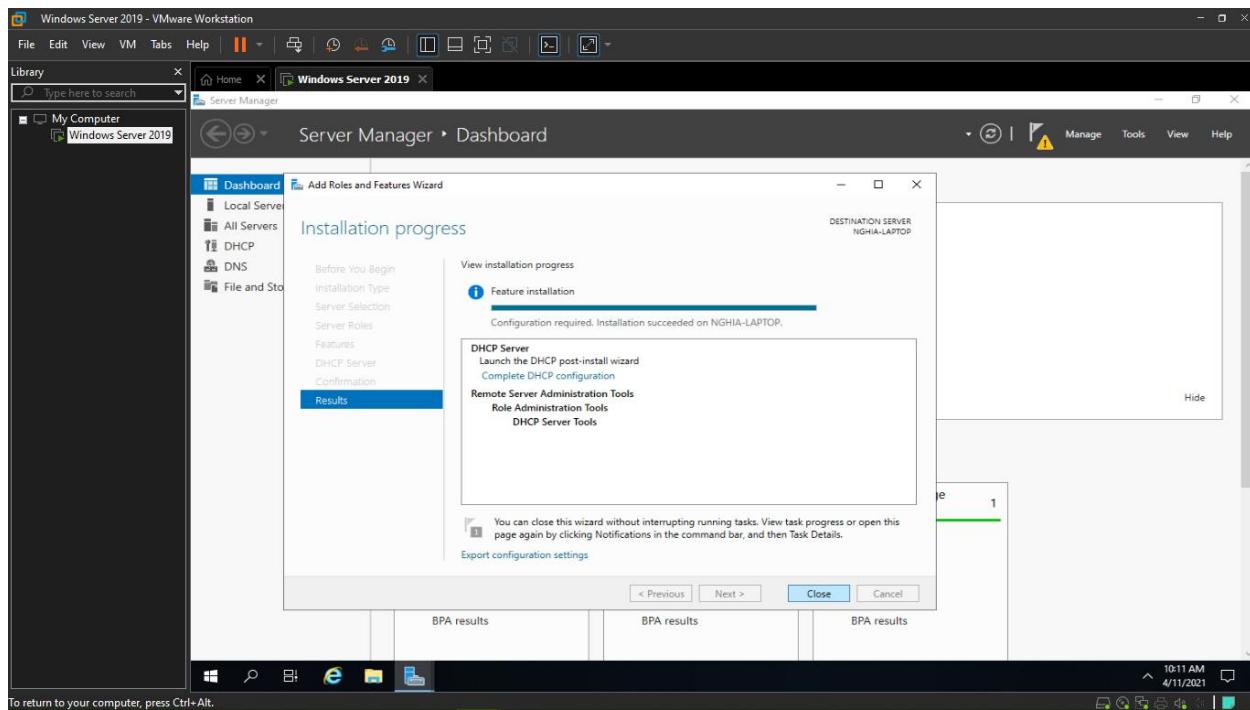
d. Cài đặt DHCP

- Ta chọn dịch vụ DHCP

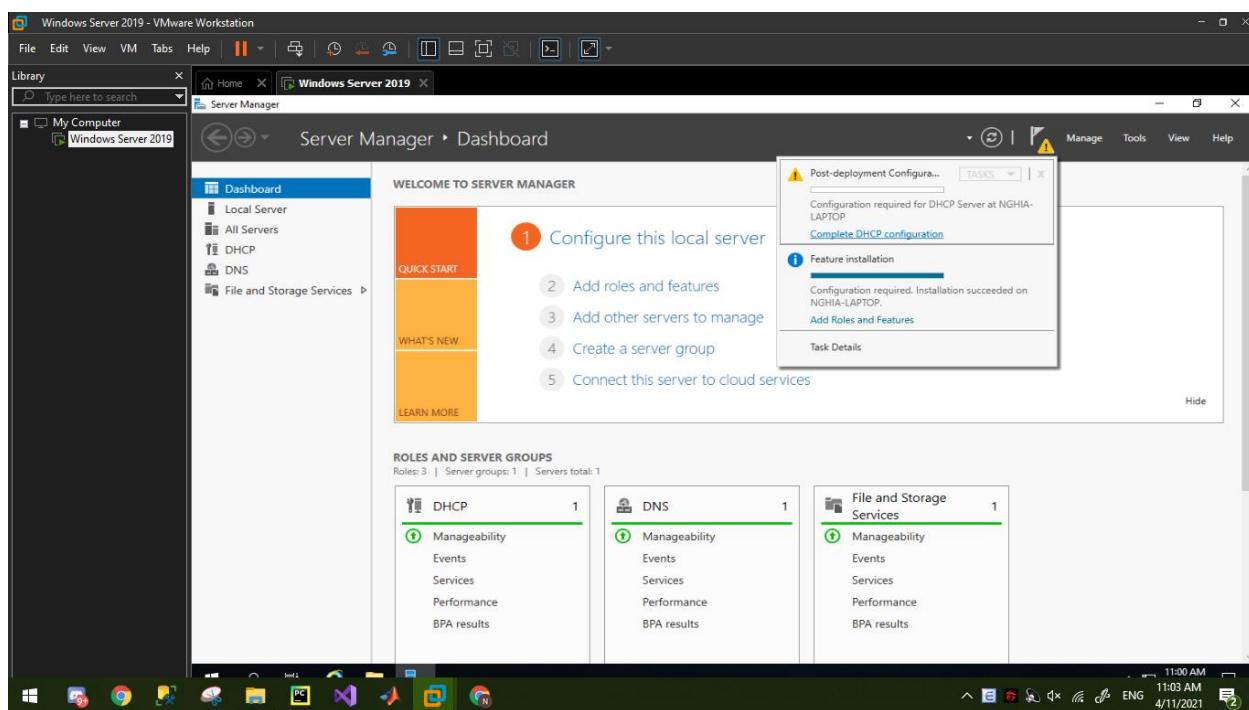




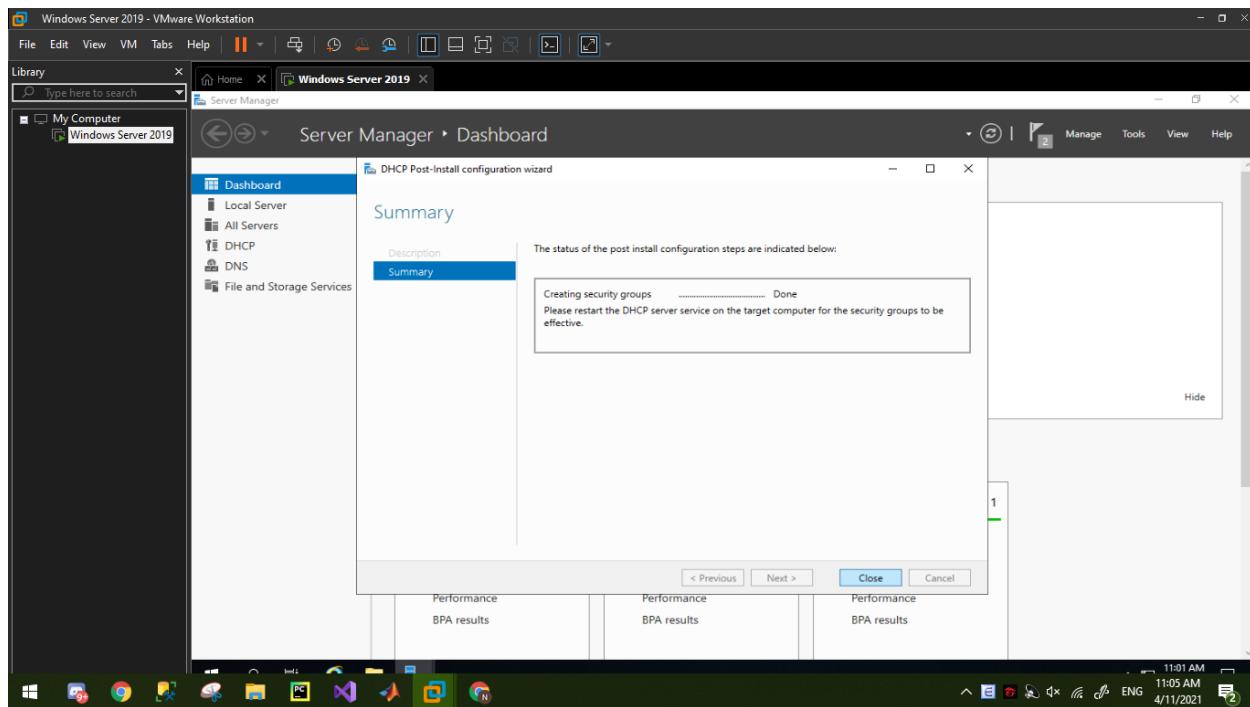
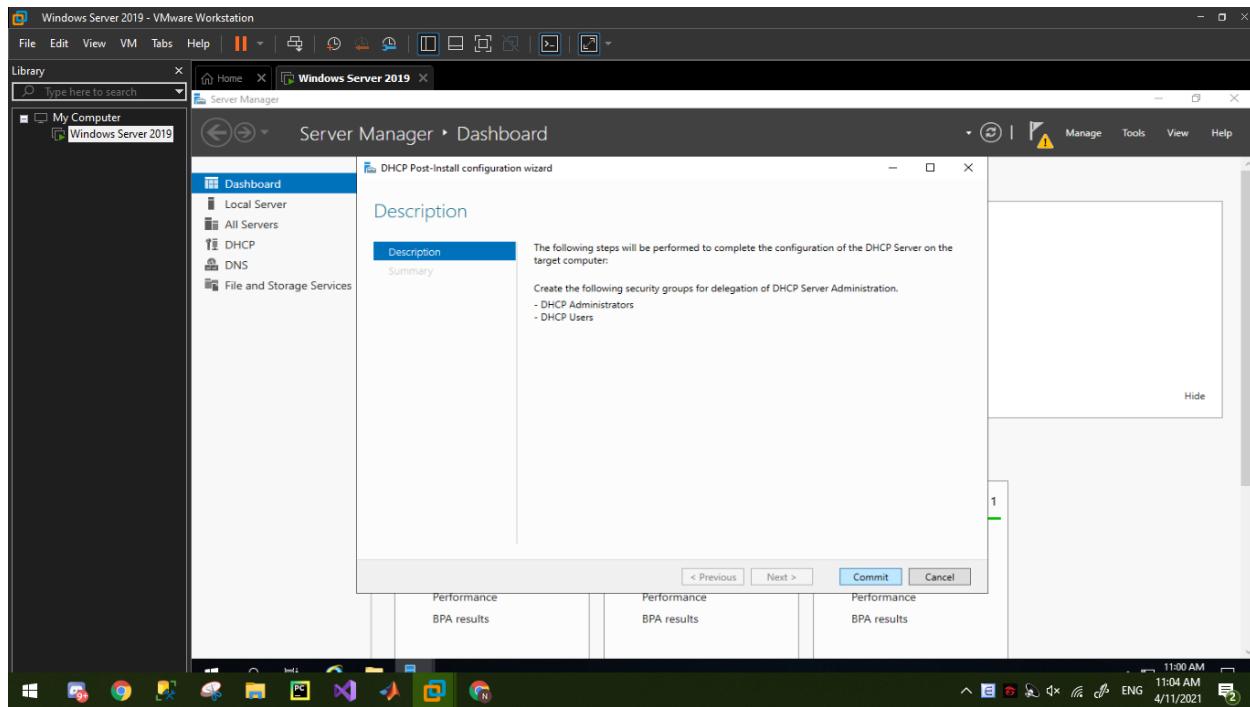


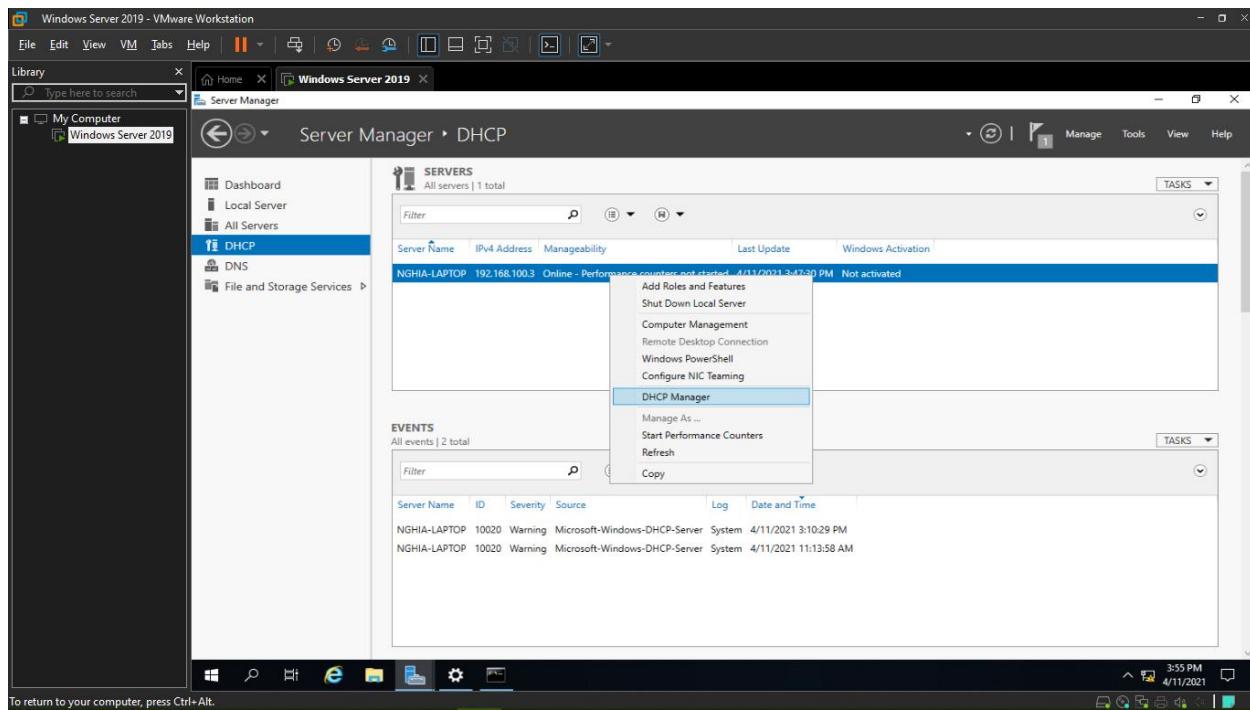


- Đã cài xong DHCP Server, ta tiếp hành cấu hình

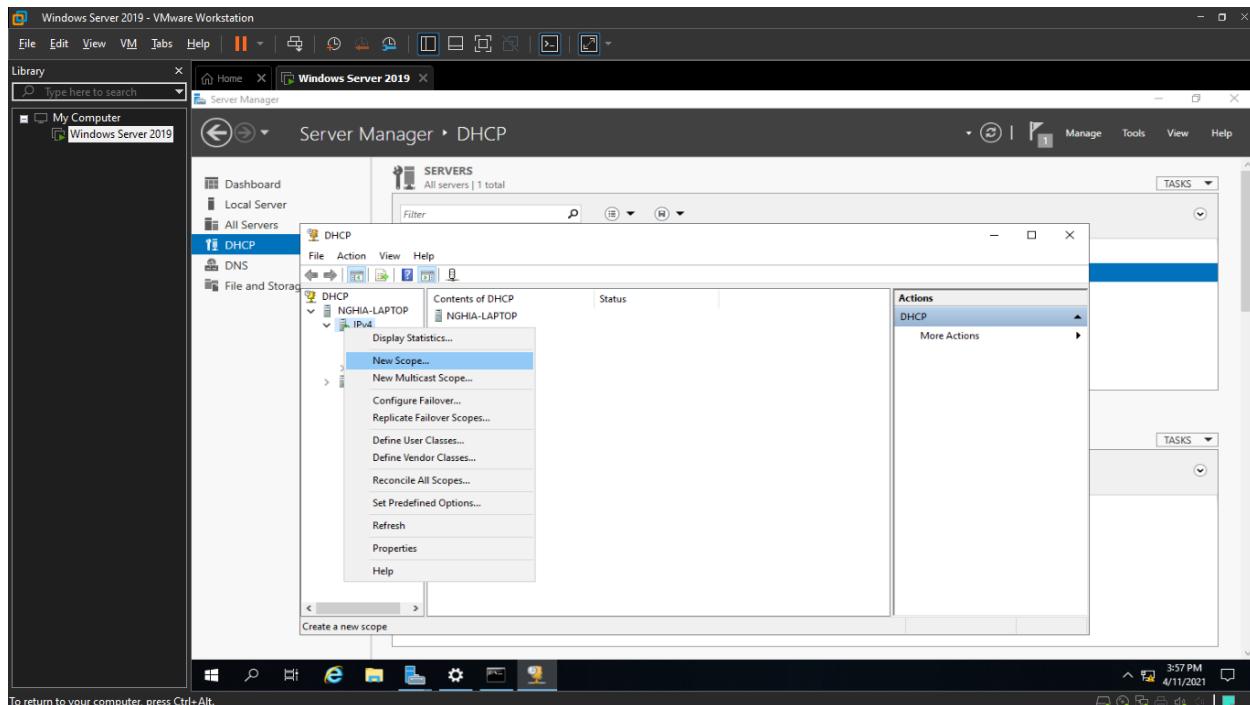


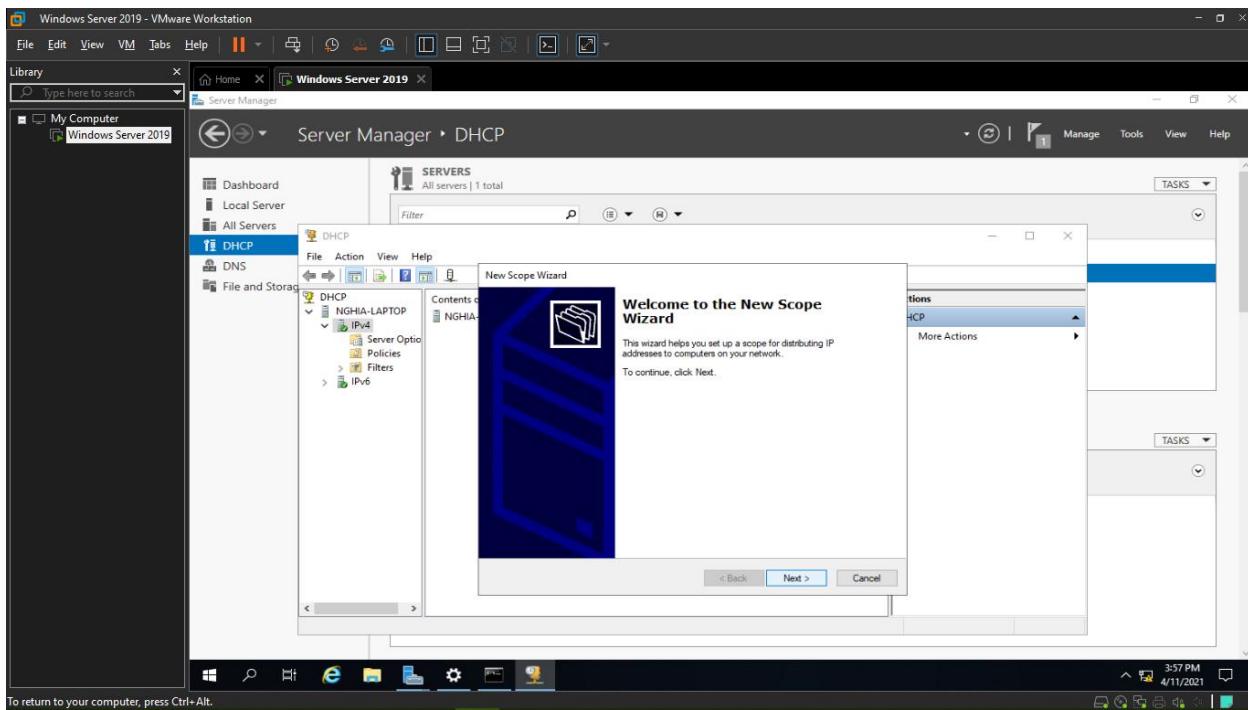
- Chọn Commit để đóng ý



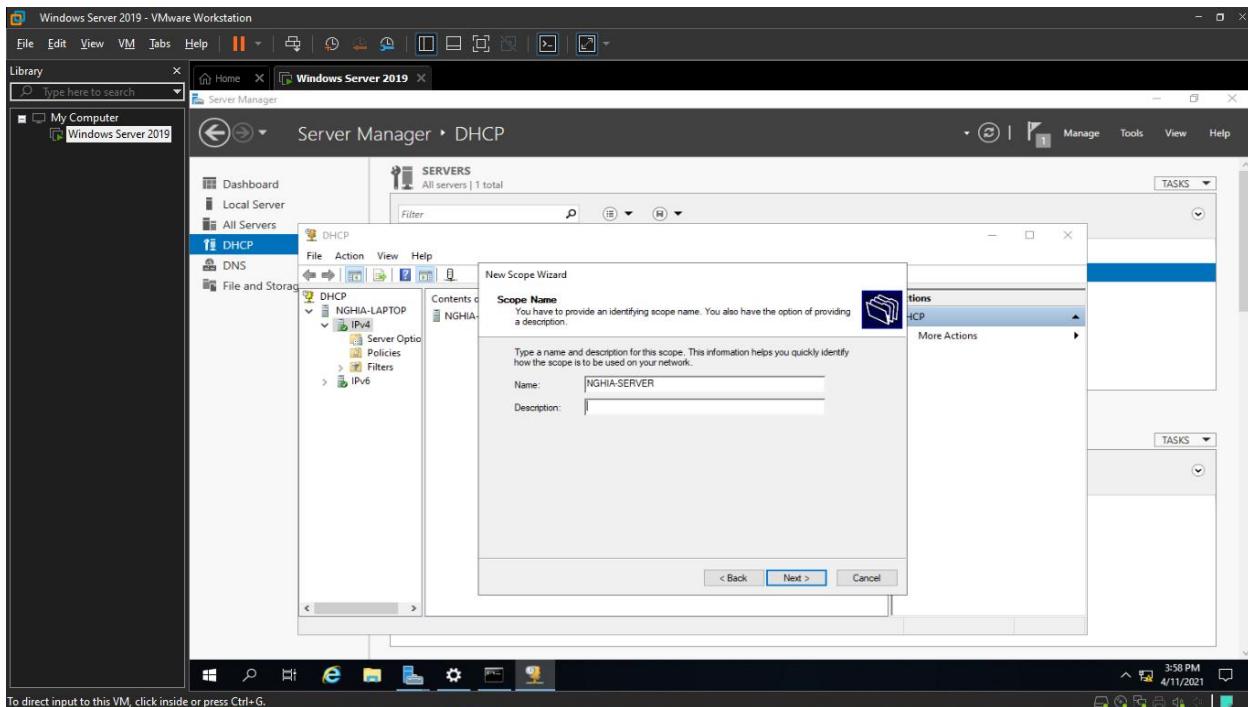


- Tạo một Scope mới

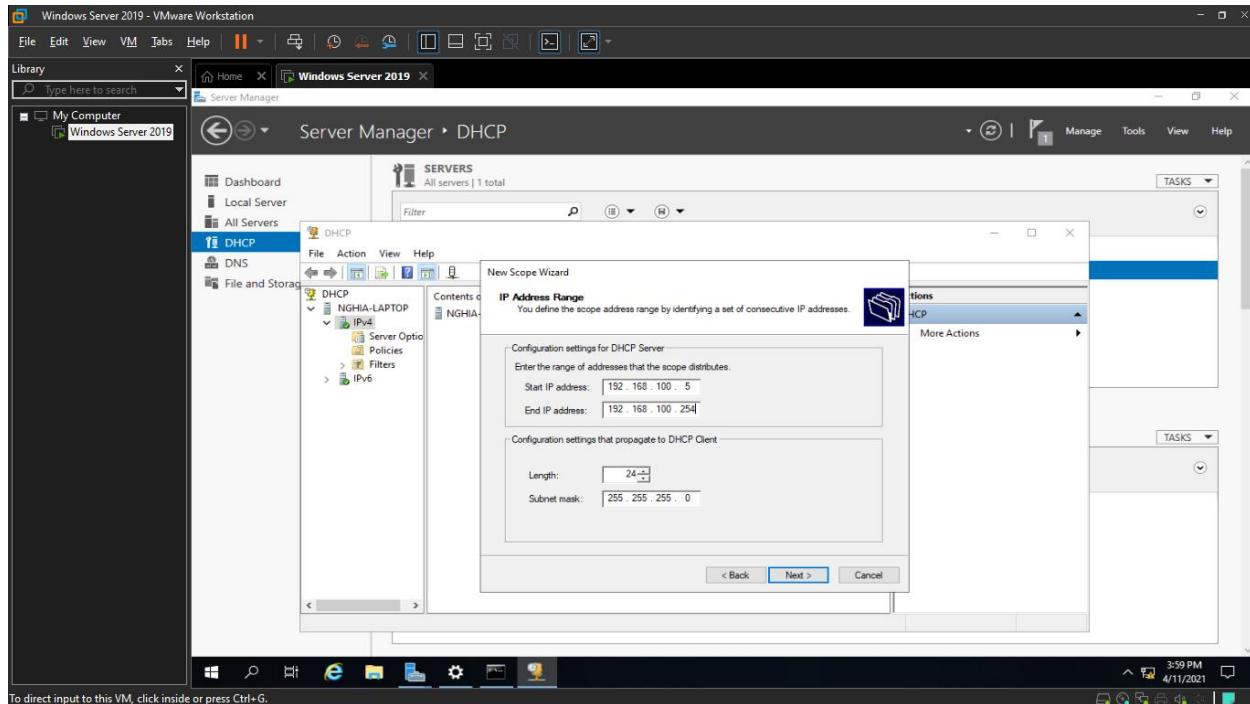




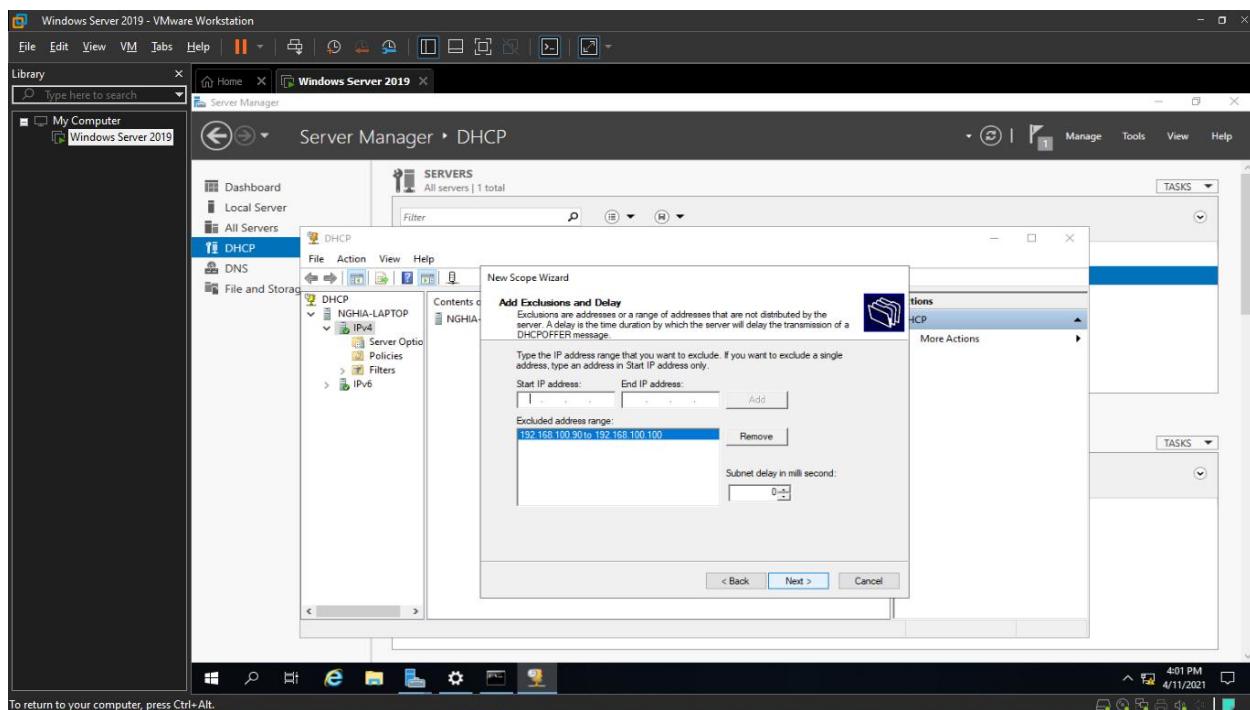
- Đặt tên Server là NGHIA-SERVER

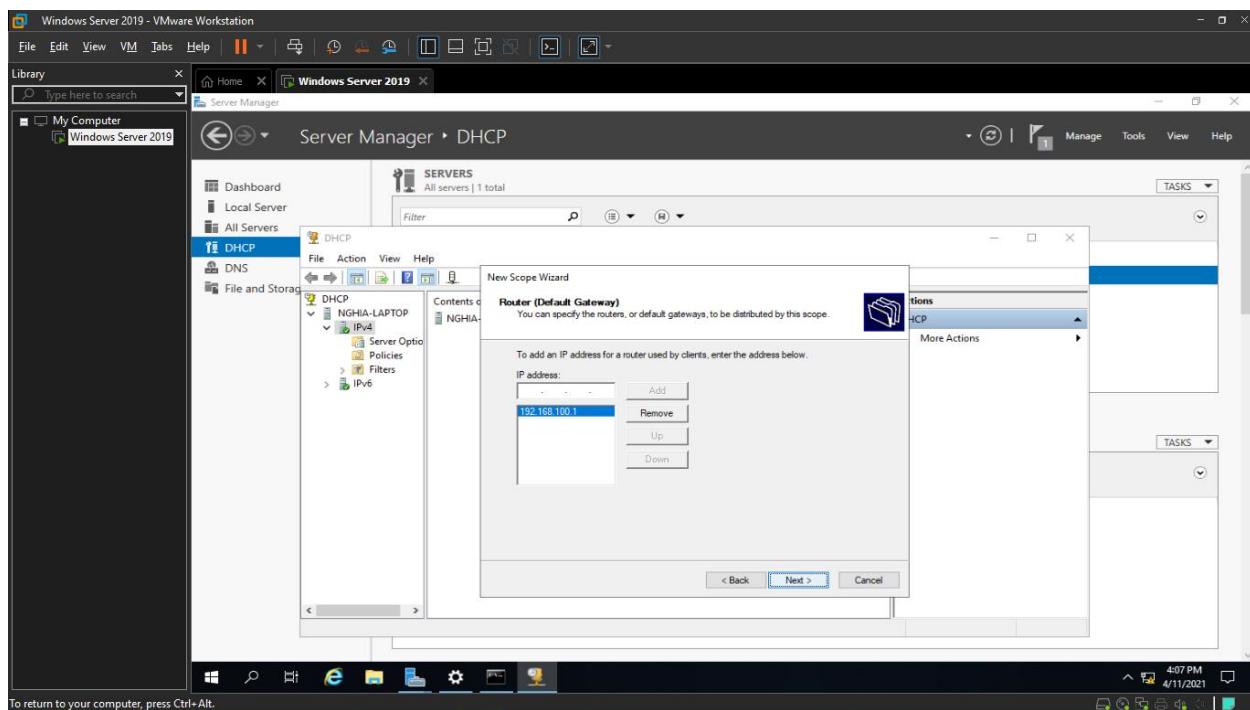
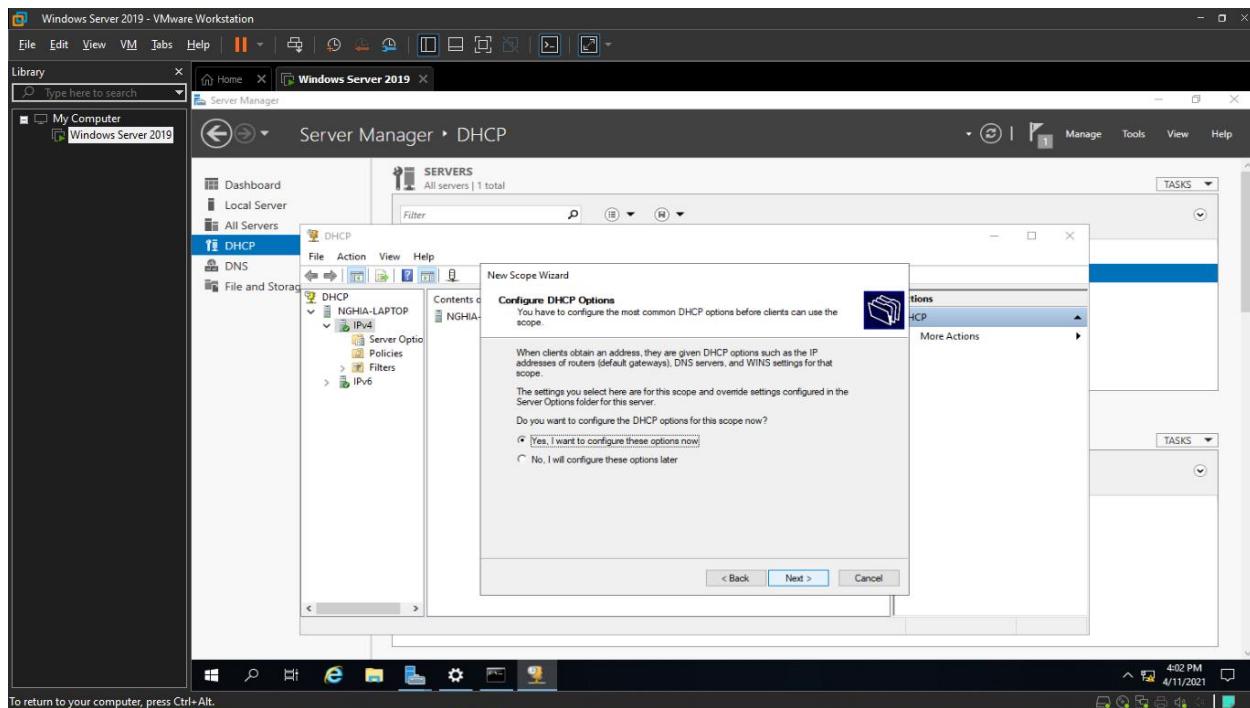


- Cấp phát địa chỉ IP thuộc đường mạng là 192.168.100.0/24 có IP bắt đầu là 192.168.100.5

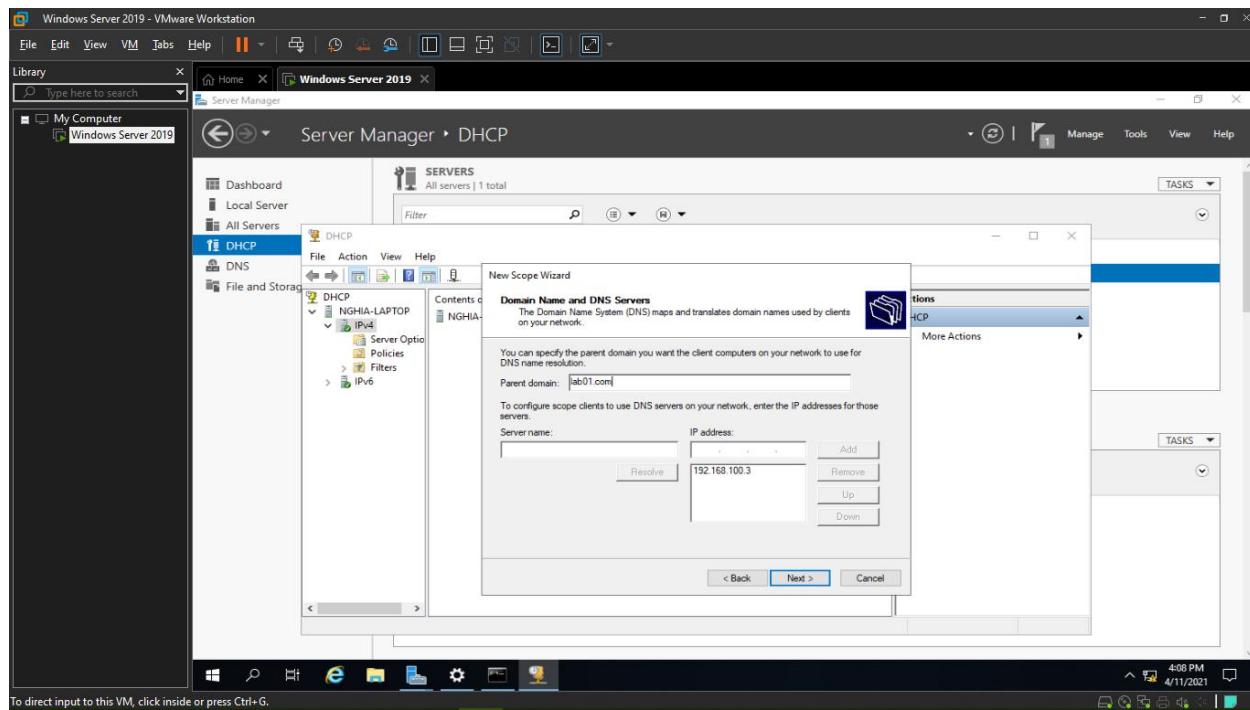


- Thêm khoảng IP dành riêng (bình thường không sử dụng, để dành)

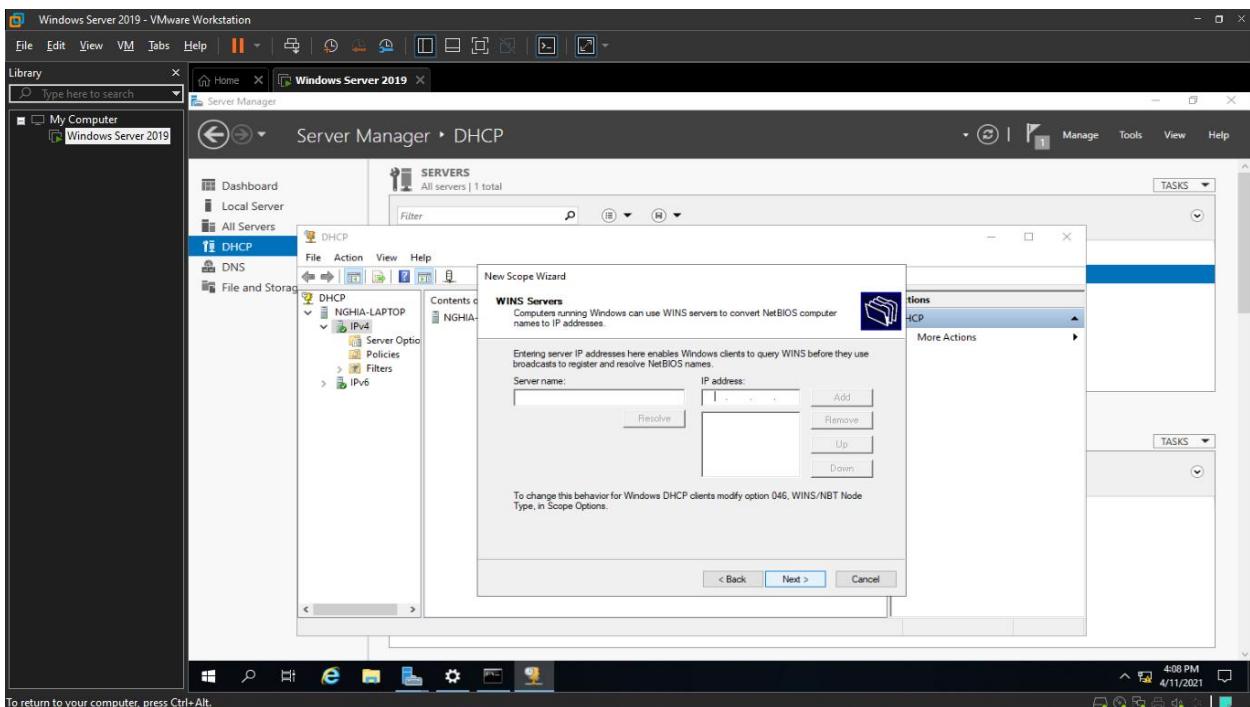


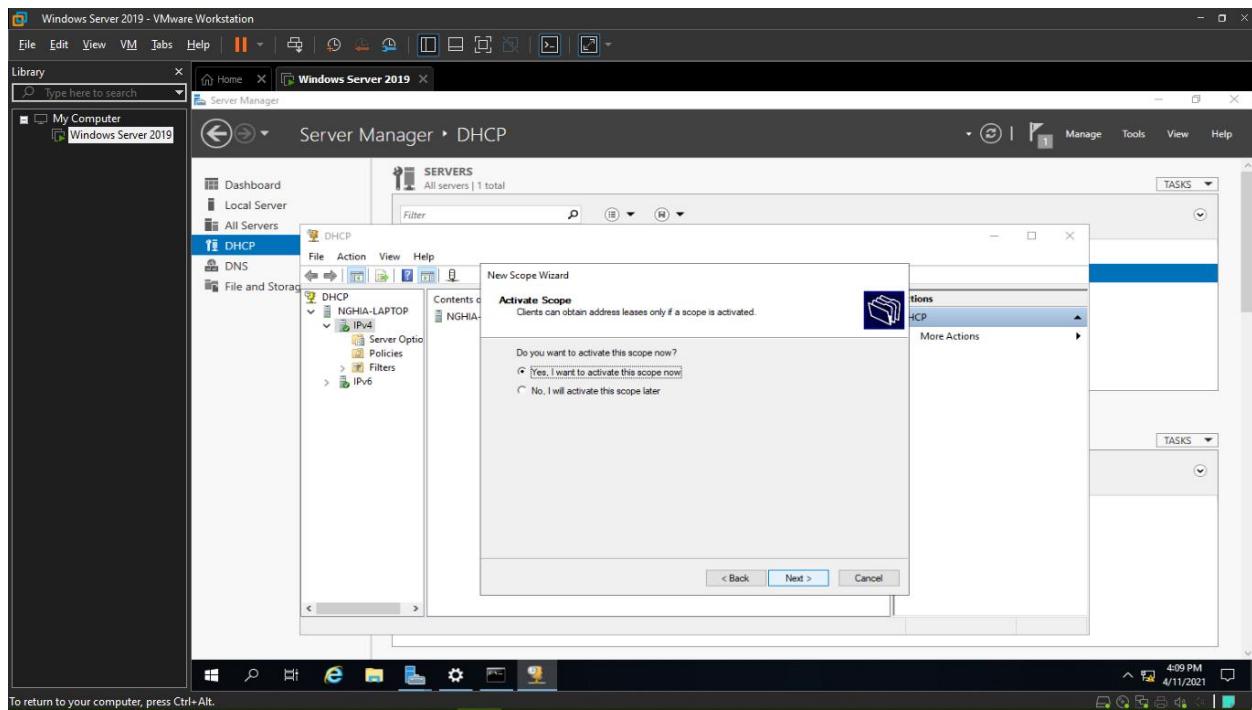


- Sử dụng Domain Name được cài từ trước là lab01.com

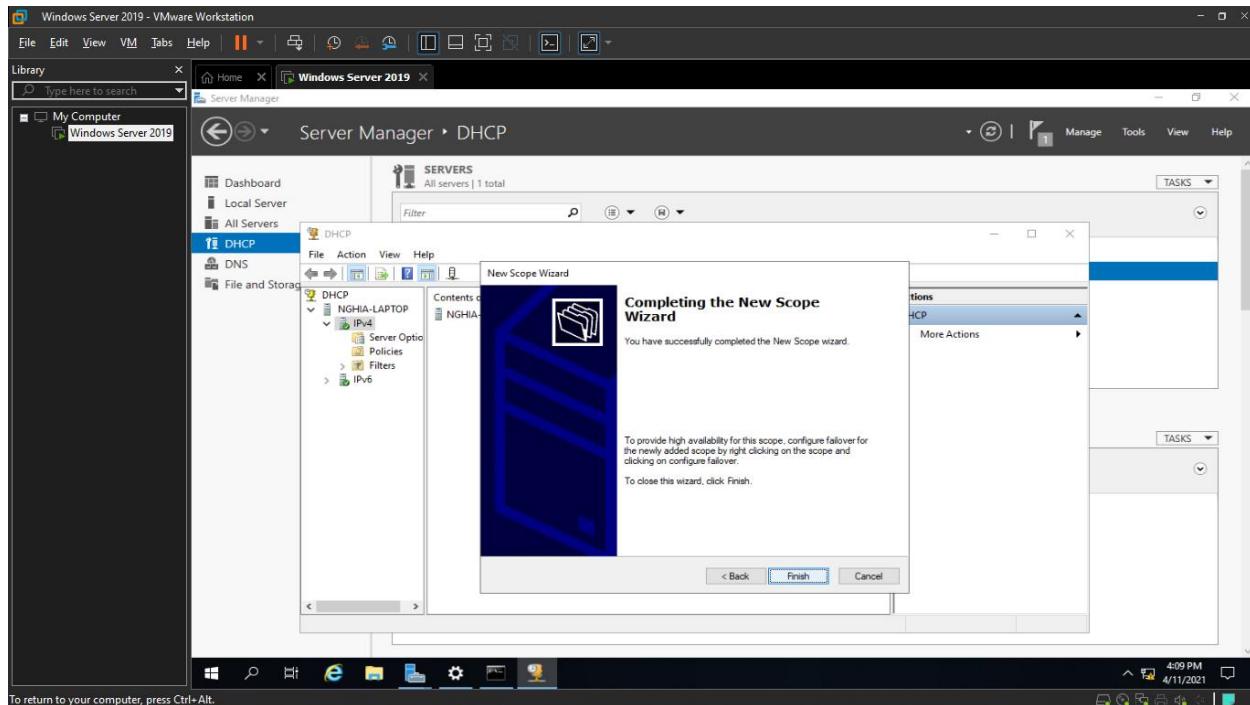


- Bỏ qua WINS vì thường không sử dụng

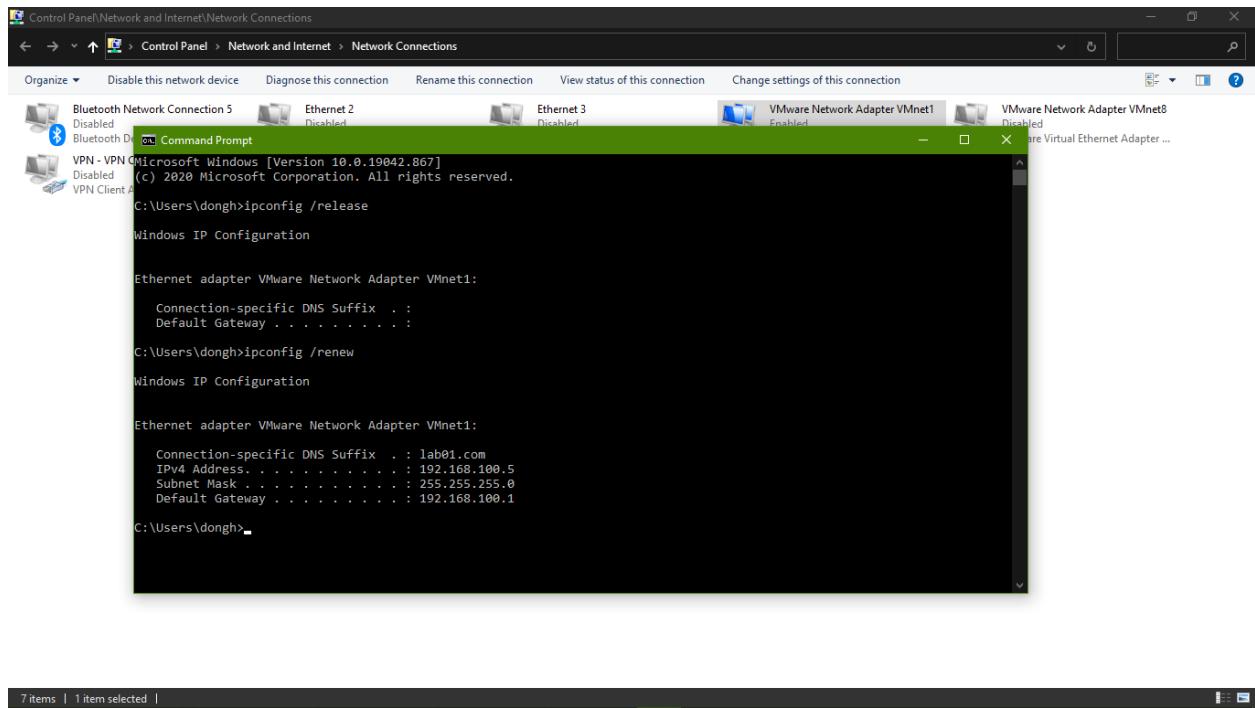




- Hoàn thành việc cài DHCP Server

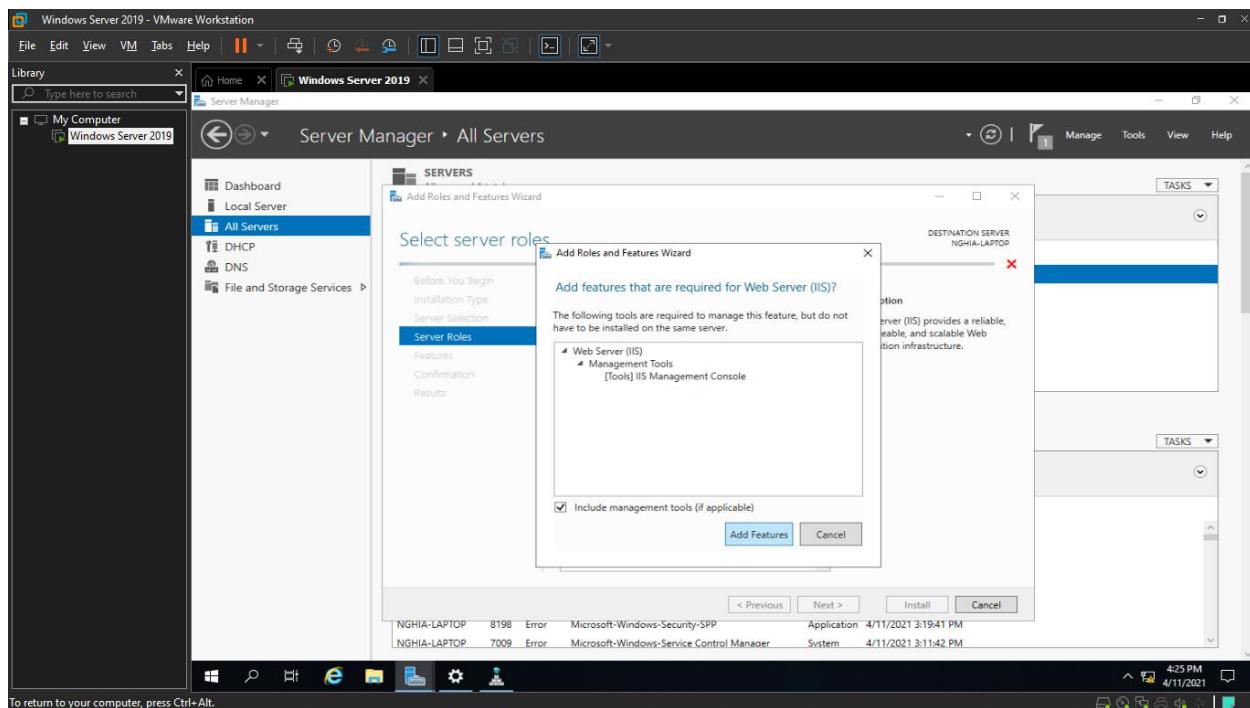
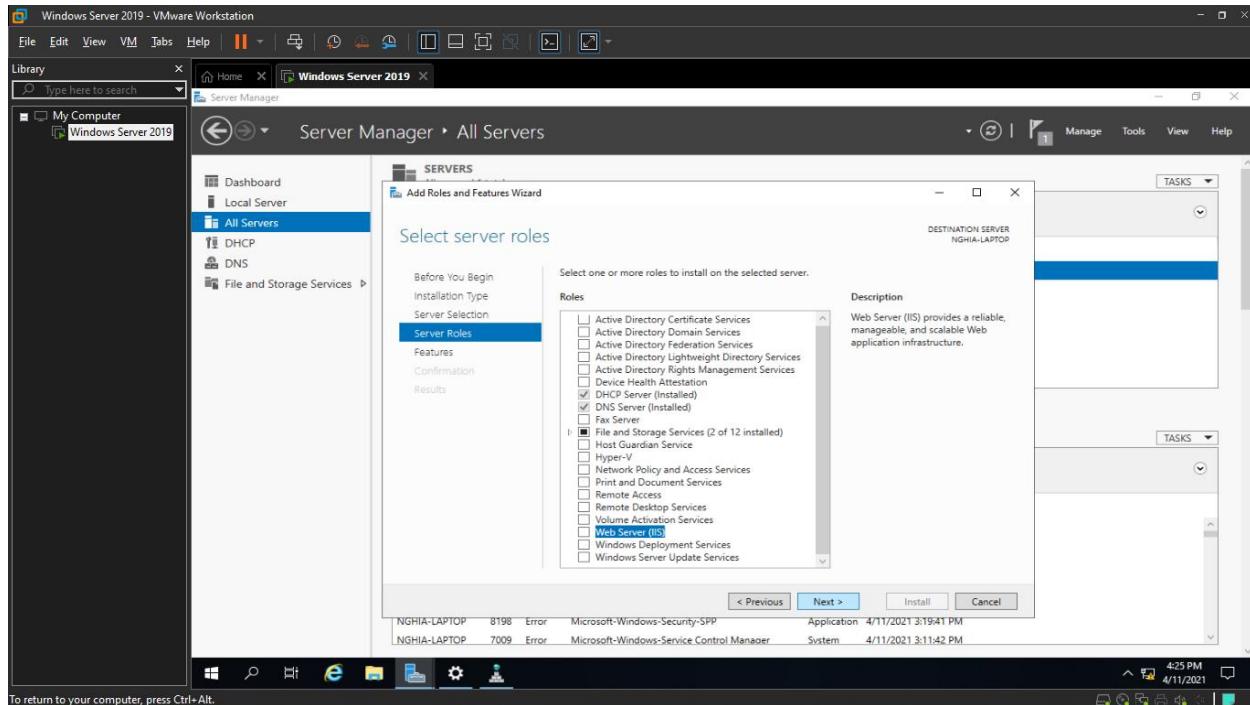


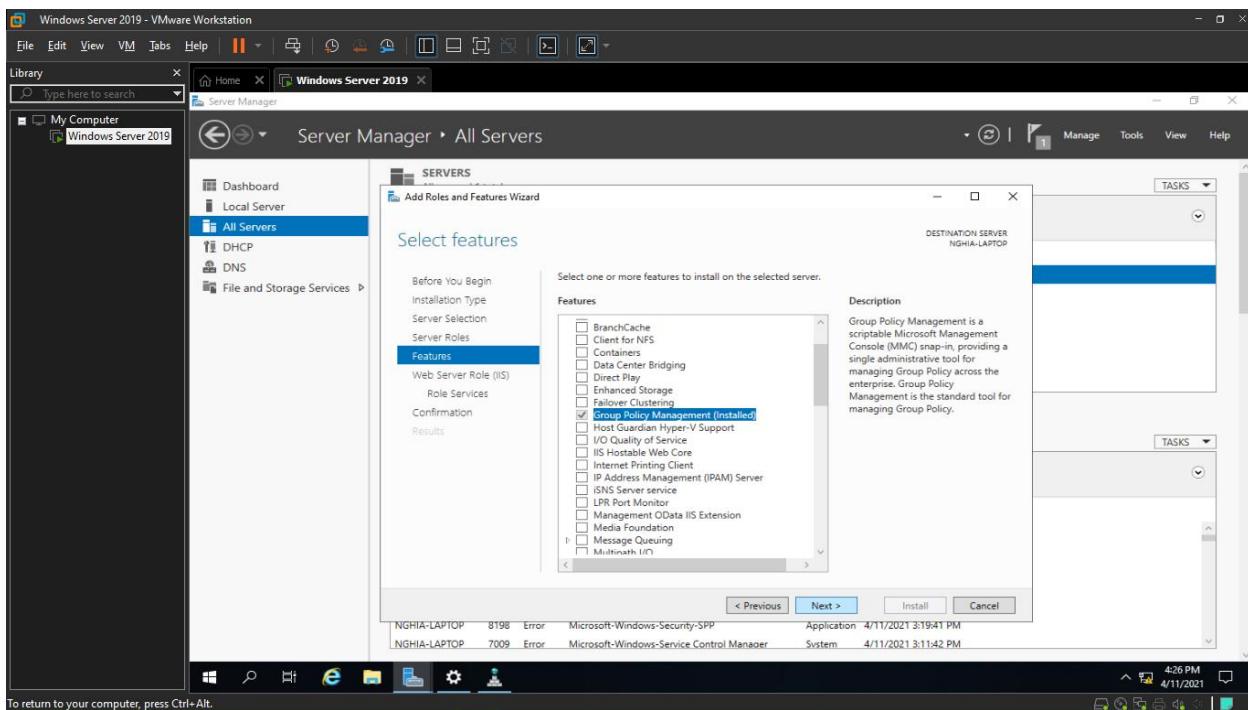
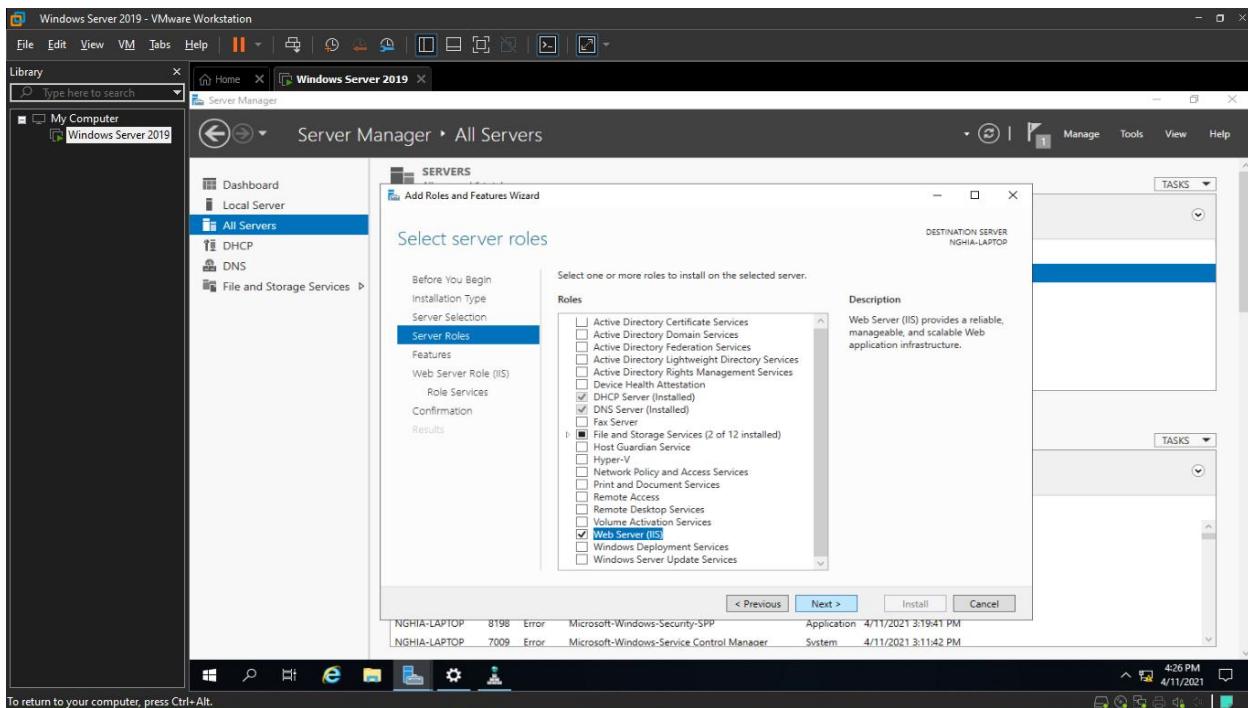
- Kiểm tra xem máy thật có nhận được IP từ DHCP Server hay không:

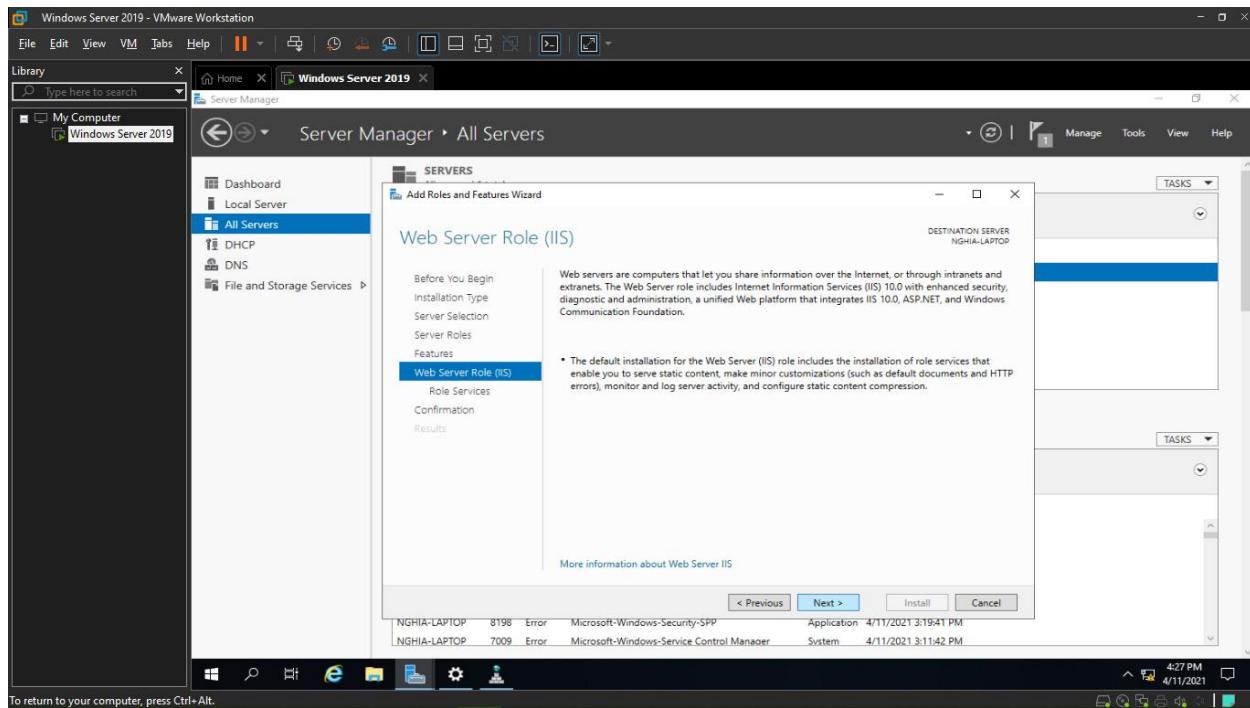


e. Cài đặt FTP và Web

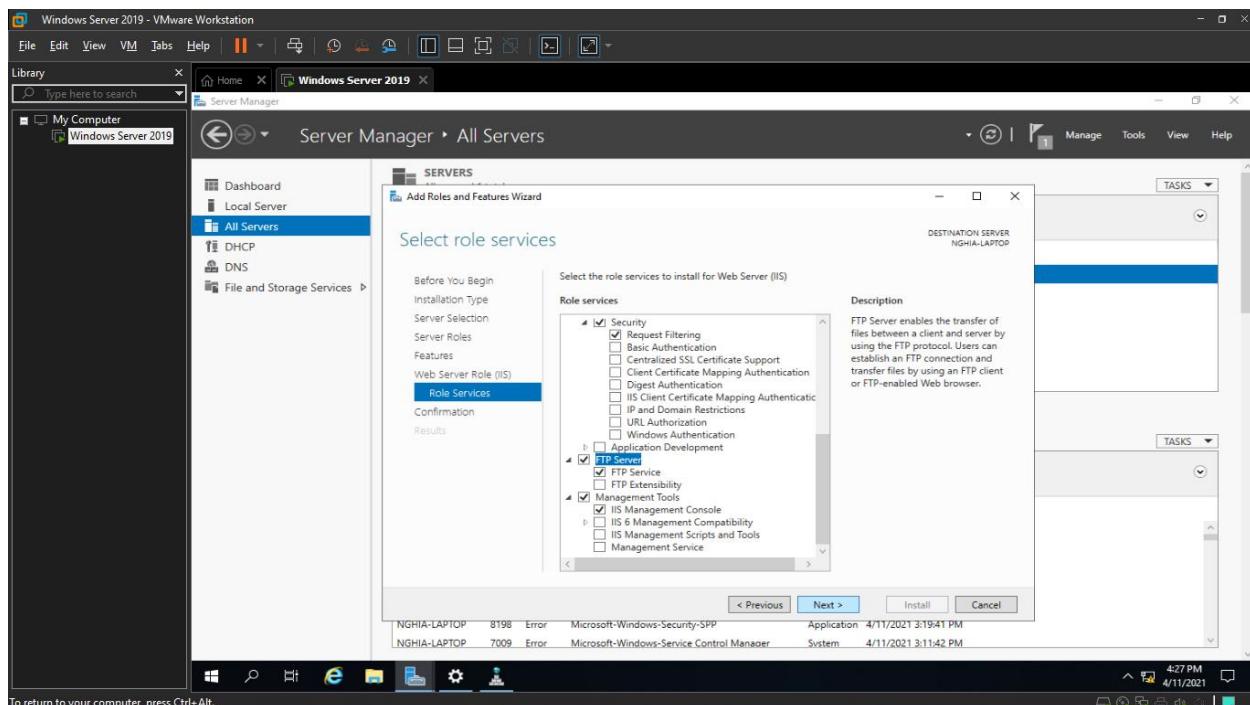
- Trong khi chọn cài đặt Web Server, ta chọn thêm dịch vụ FTP

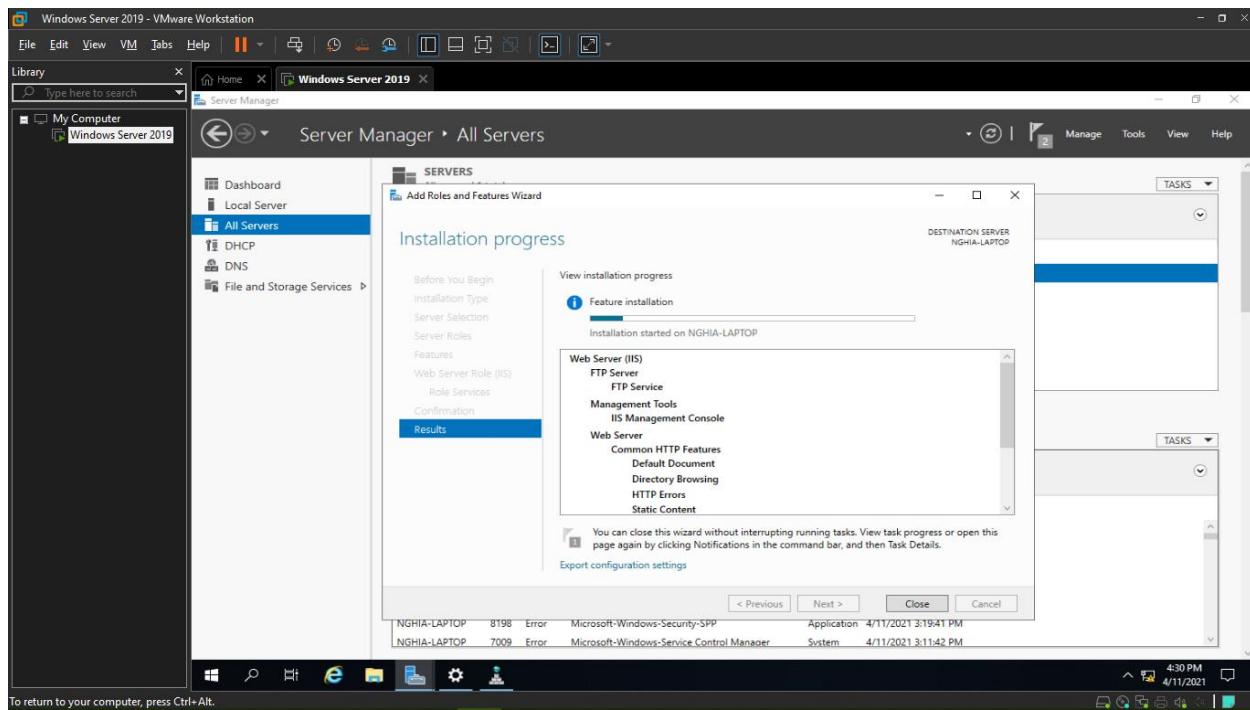
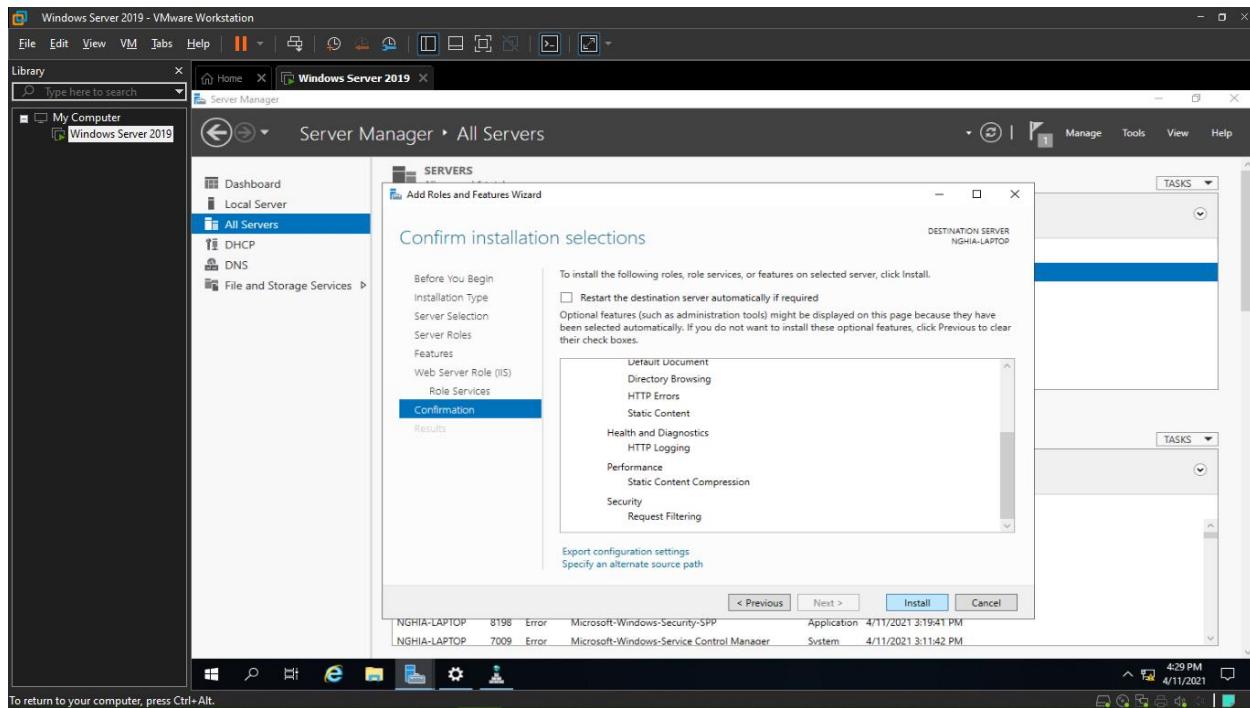


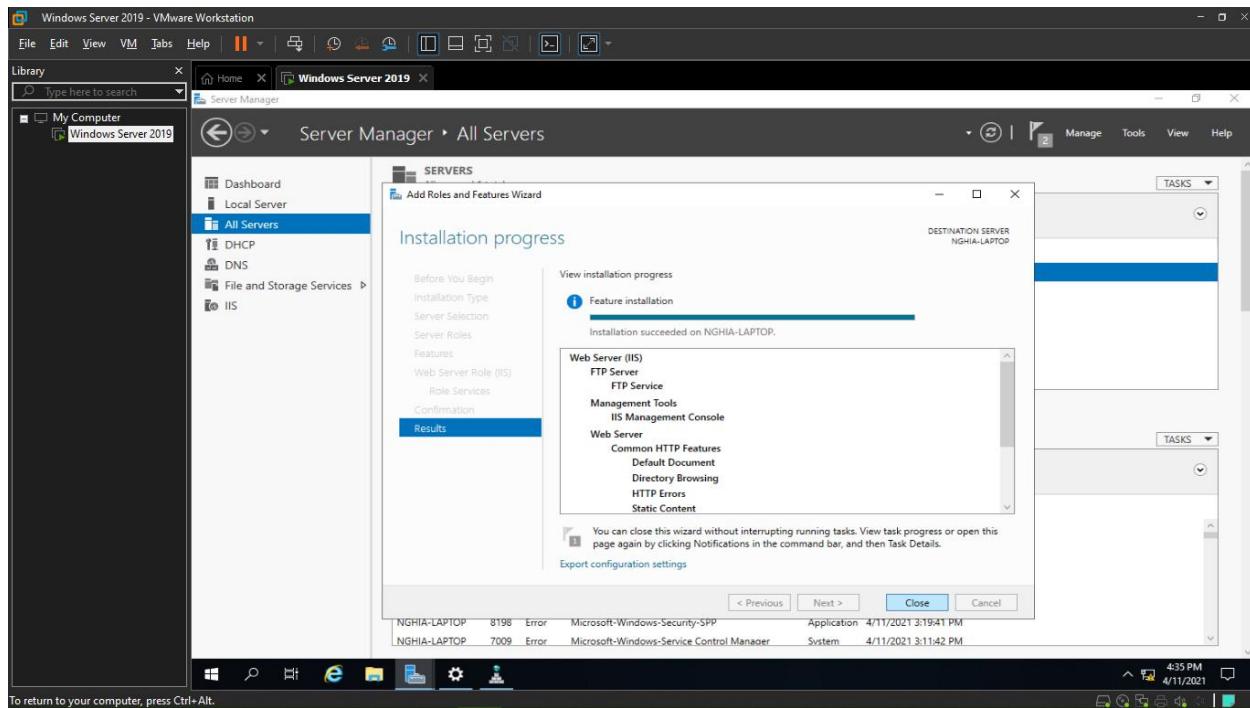




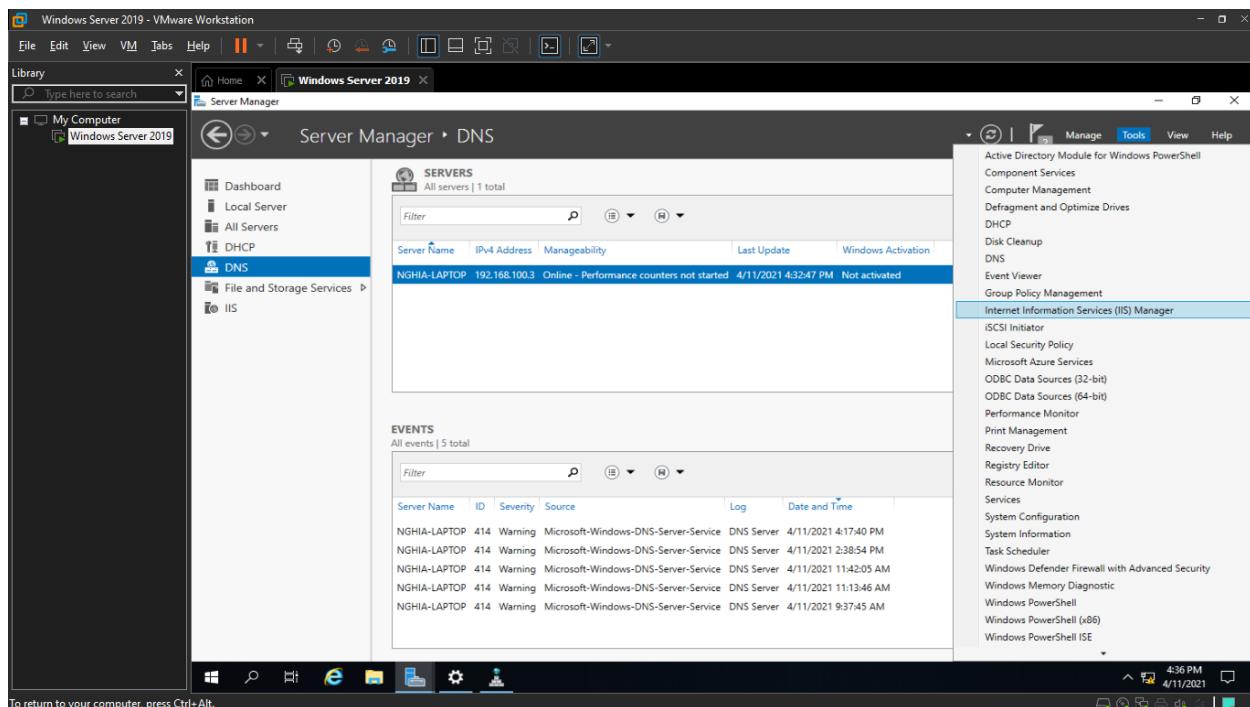
- Chọn thêm dịch vụ FTP



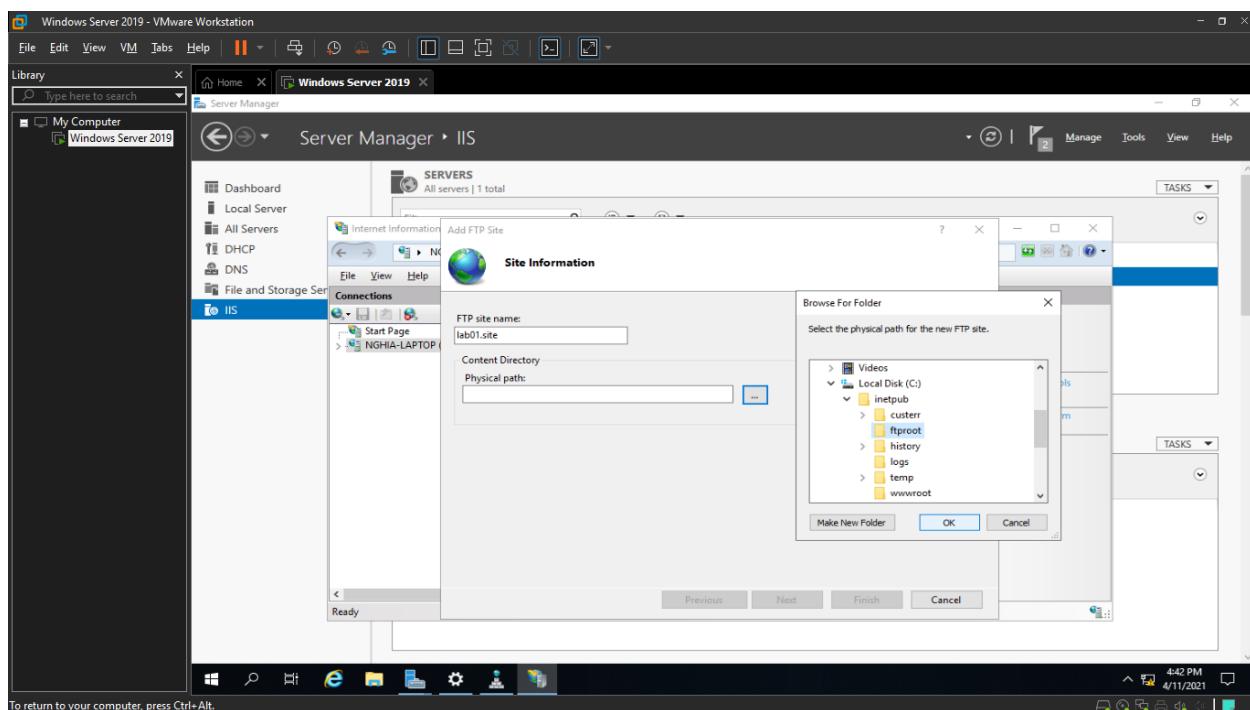
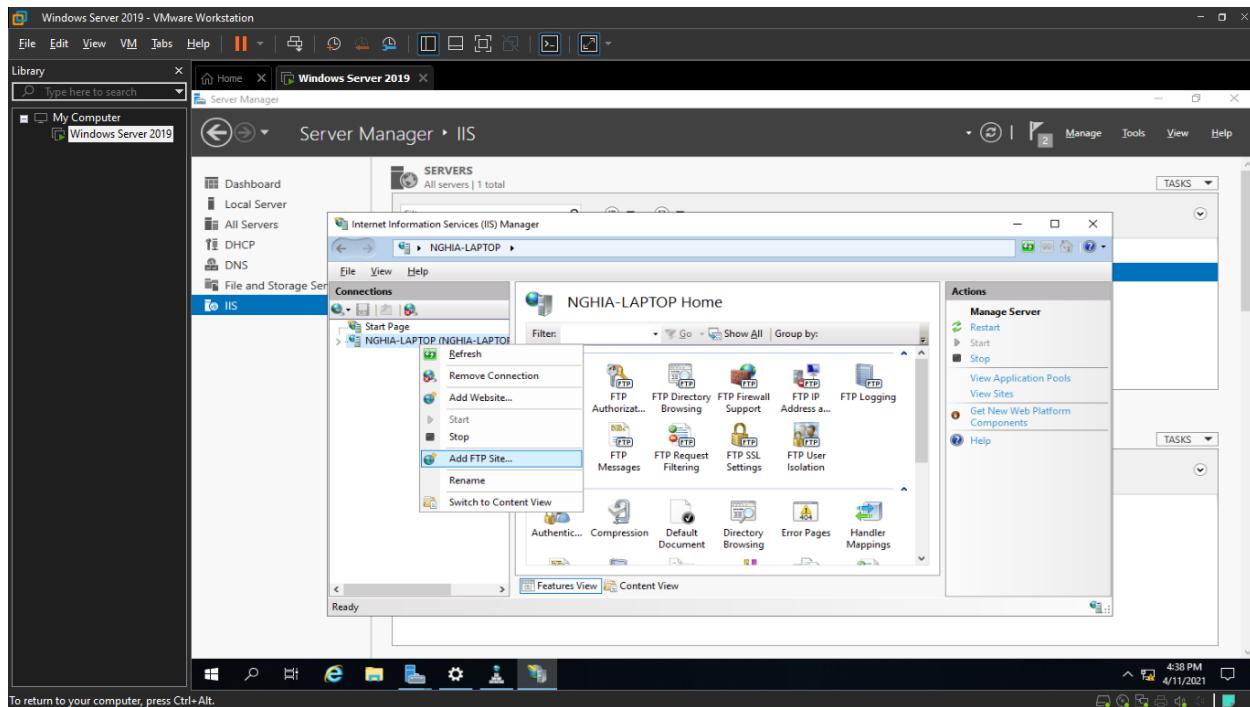


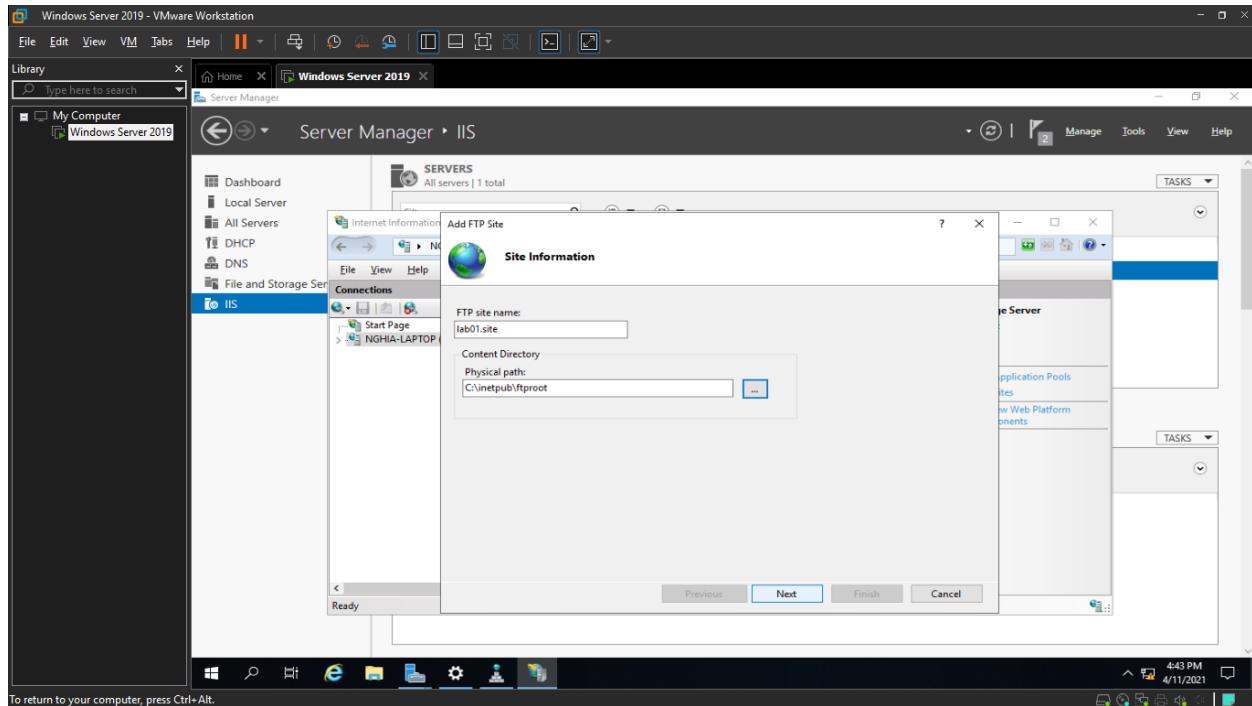


- Đã cài đặt xong, ta tiến hành cấu hình

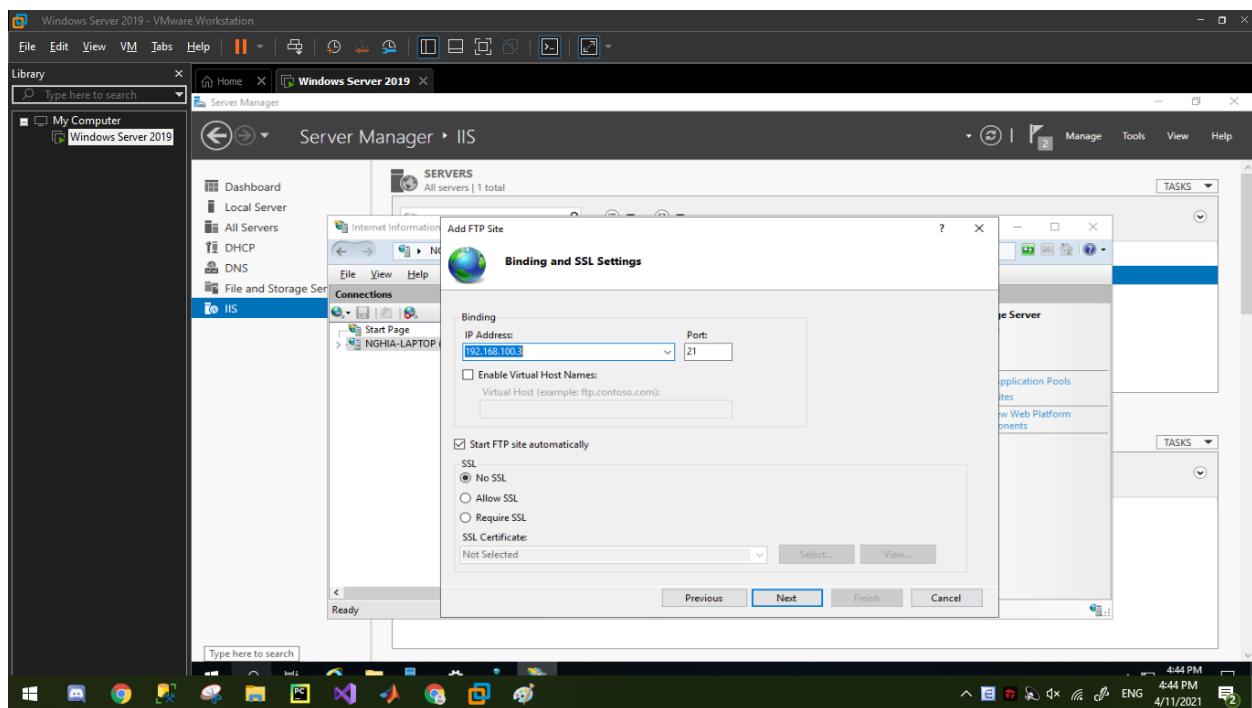


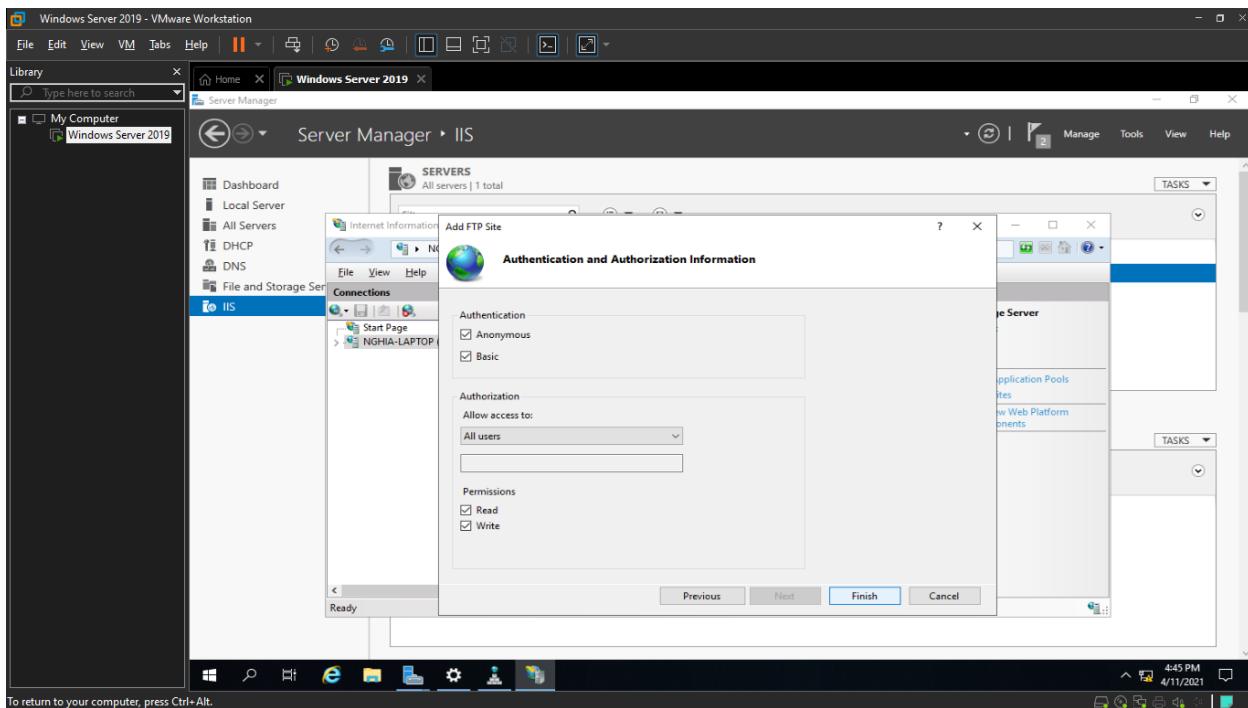
- Thêm một FTP site



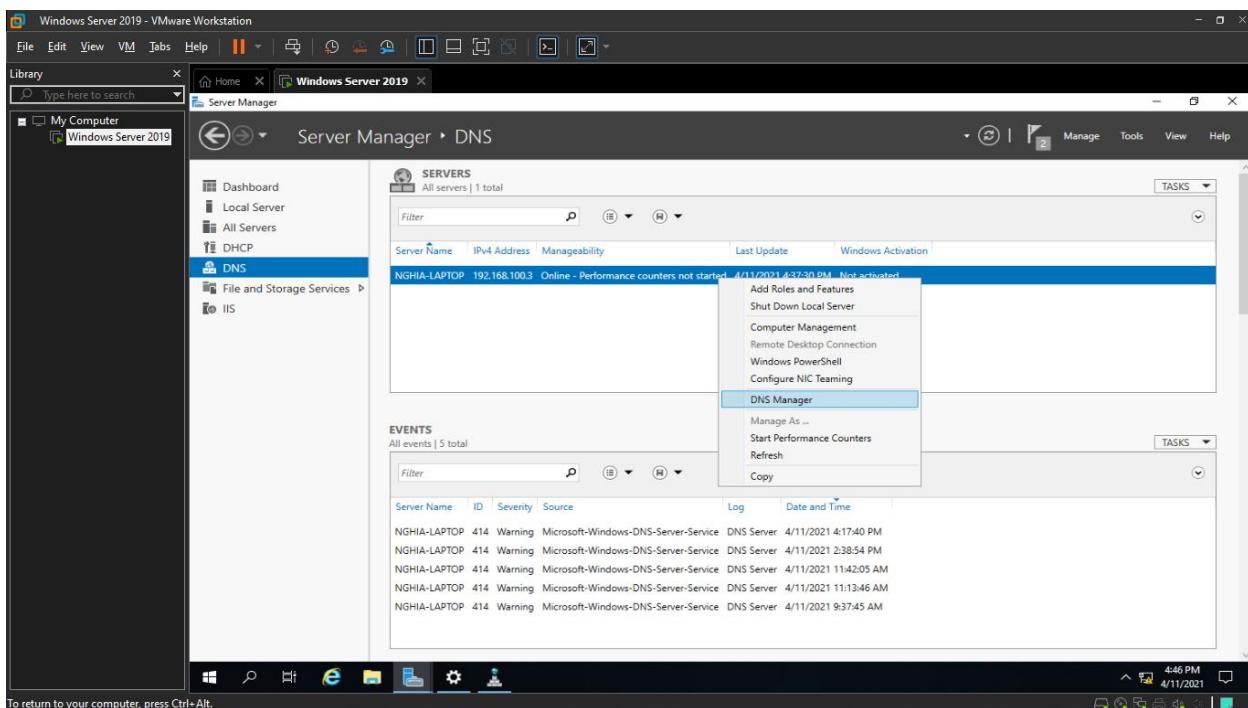


- IP là 192.168.100.3

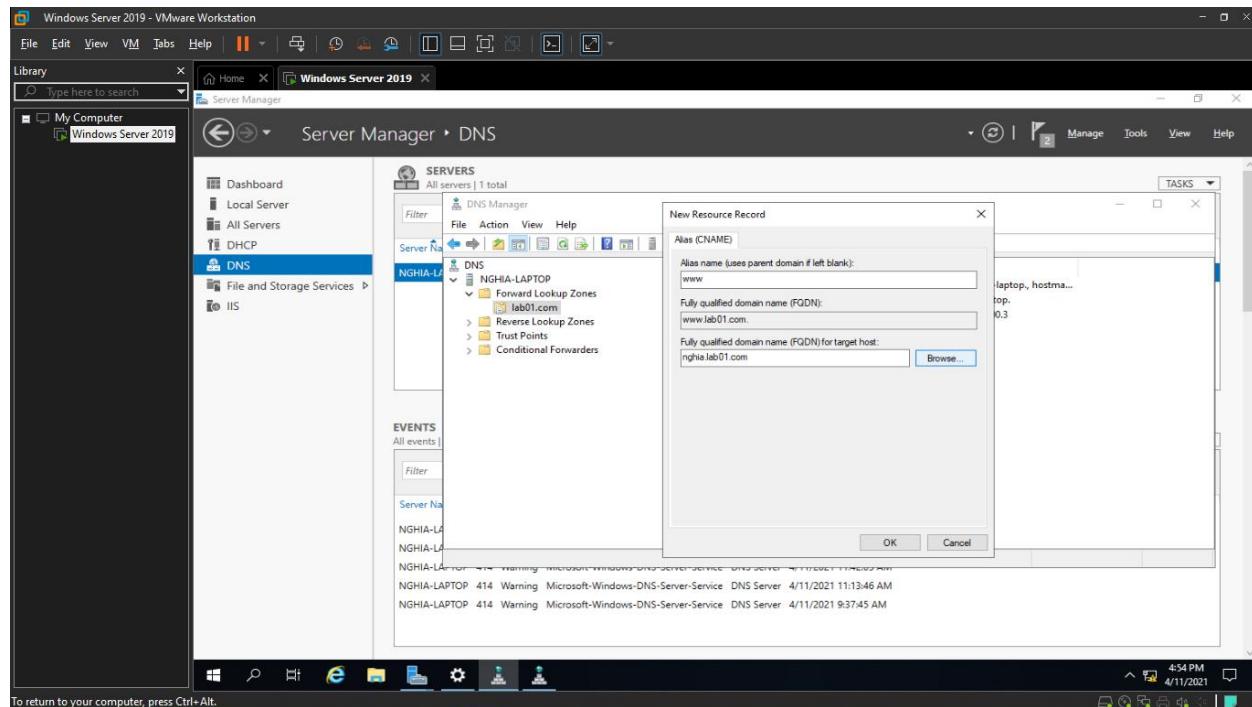
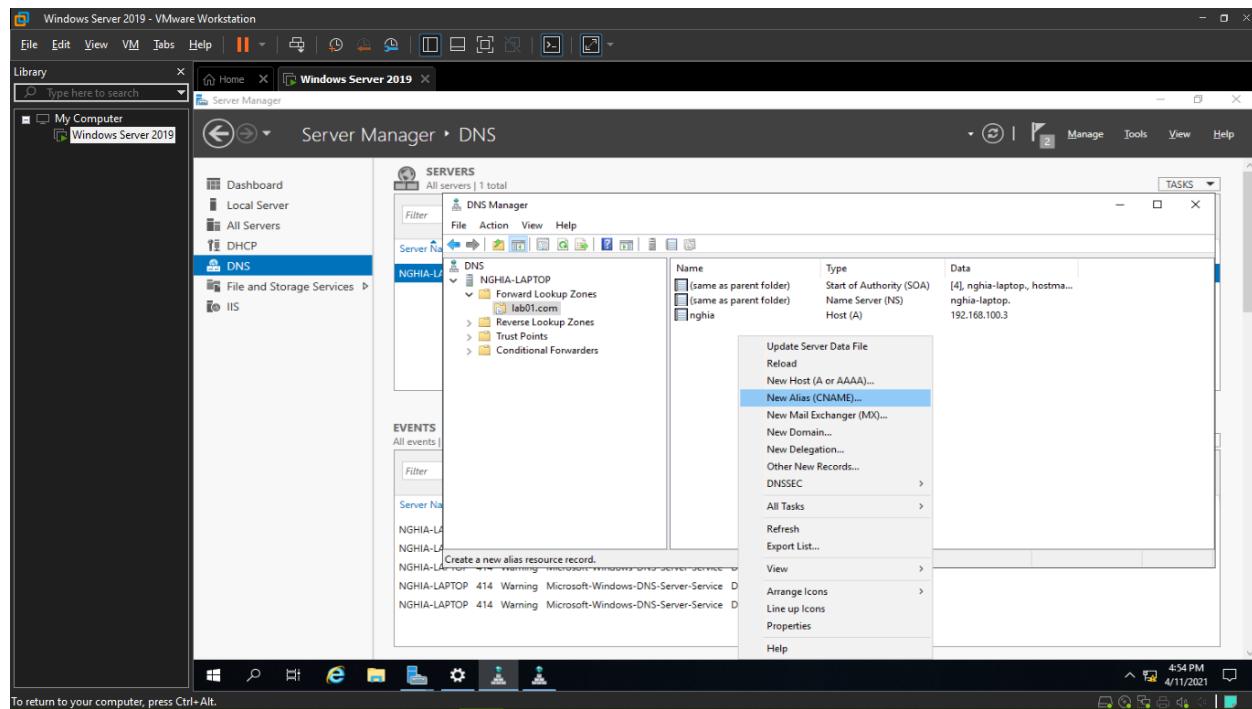


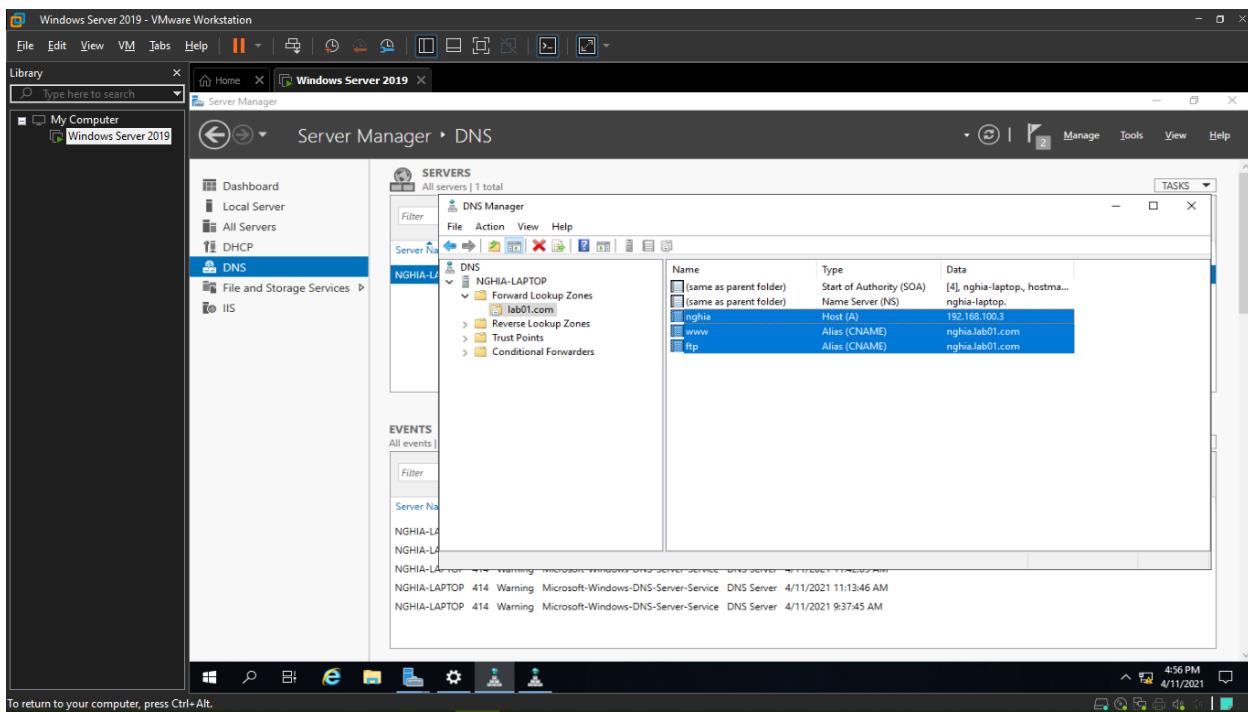
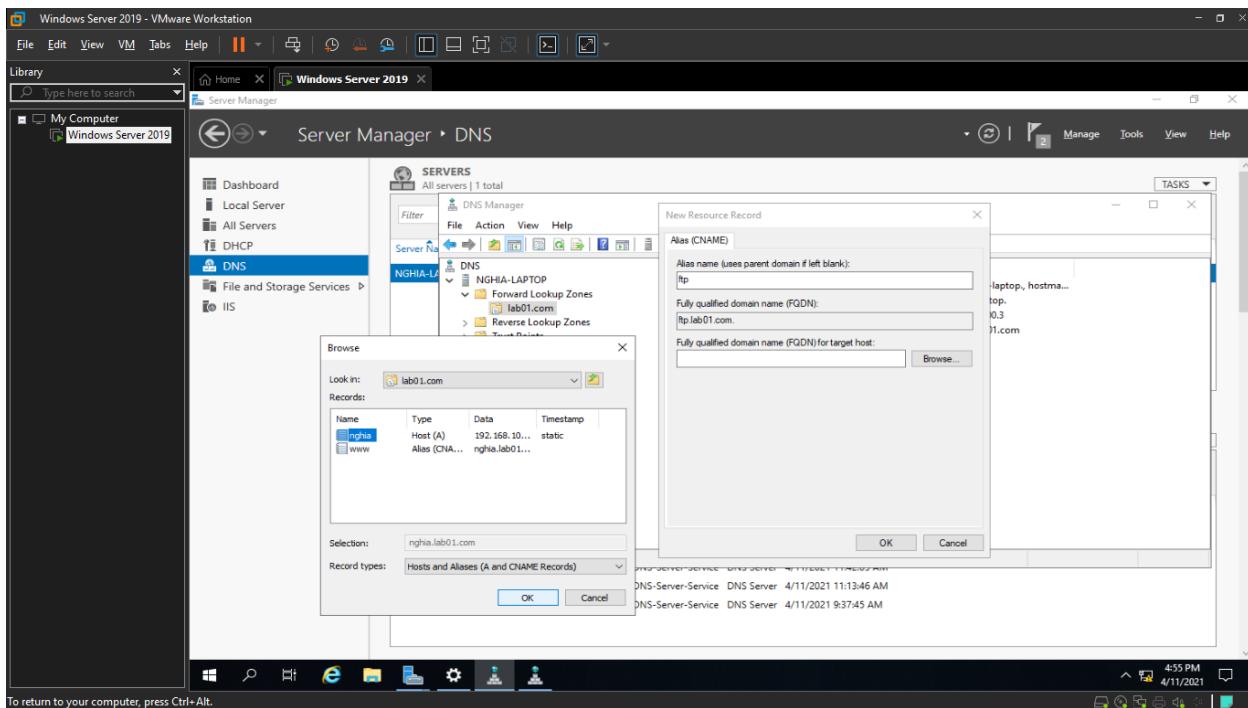


- Sau đó vào DNS manager để tạo các CNAME với từng dịch vụ

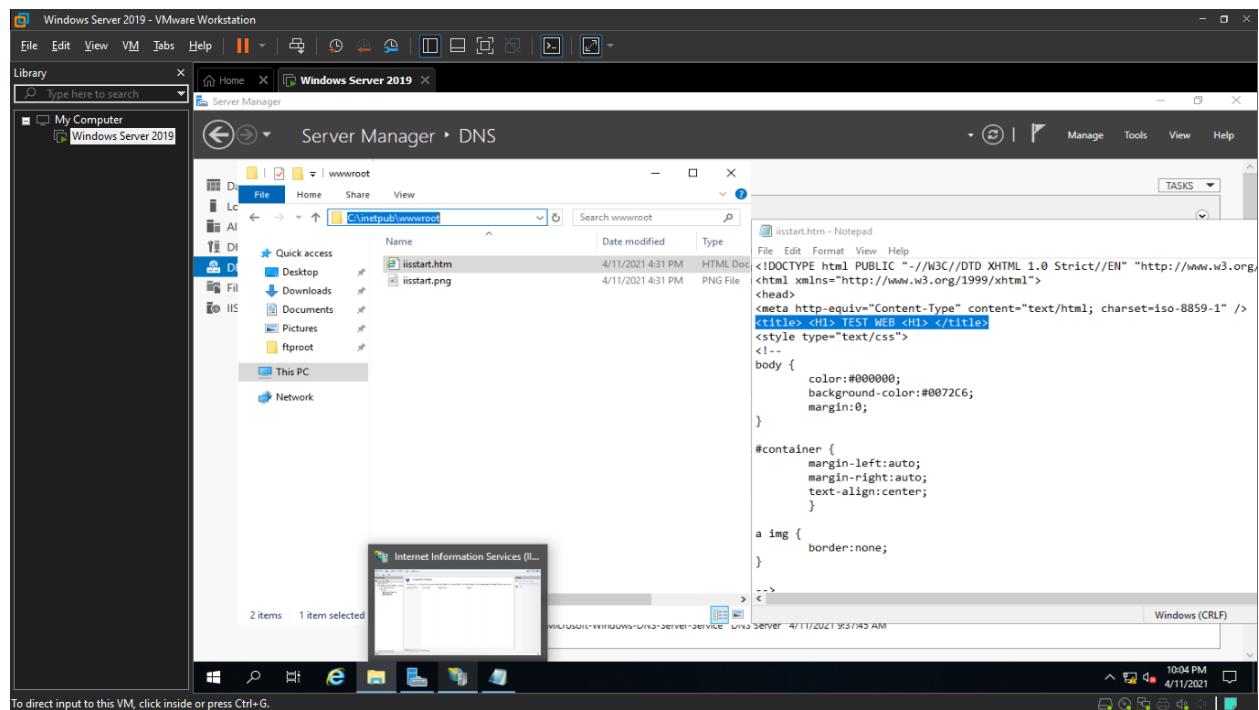
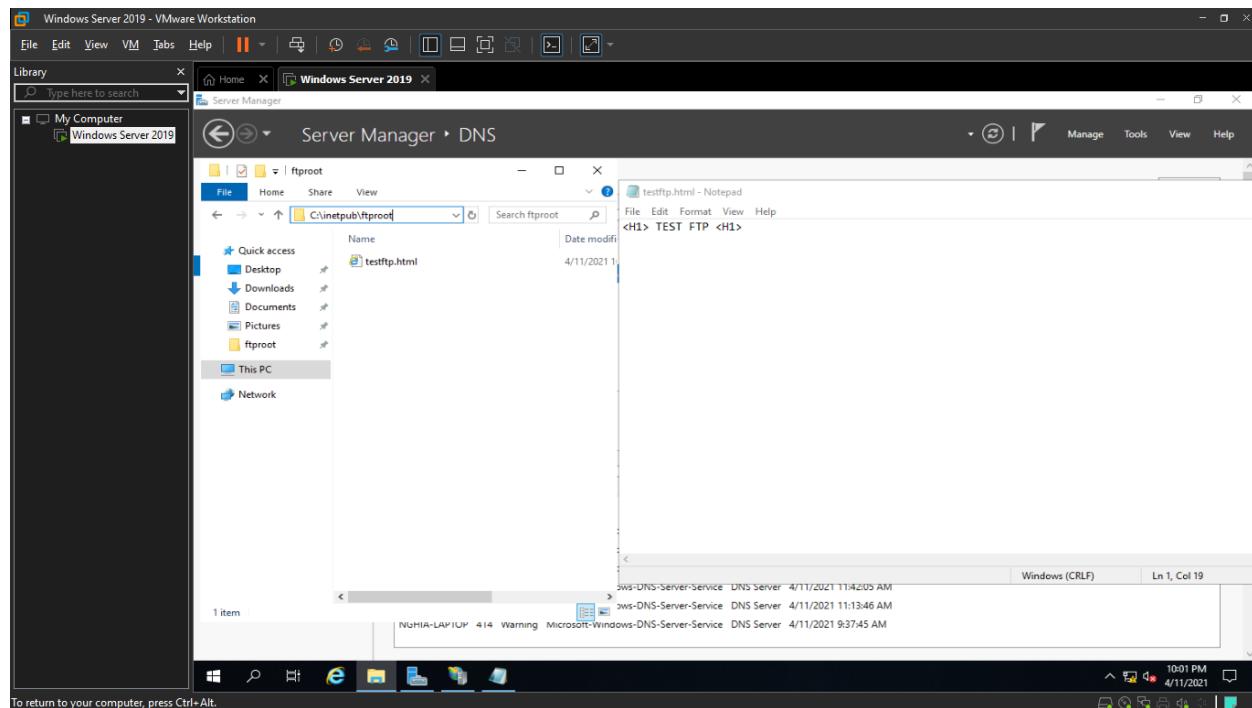


- Các CNAME có ý nghĩa như sau
 - www.lab01.com => ứng với dịch vụ Web
 - ftp.lab01.com => ứng với dịch vụ FTP

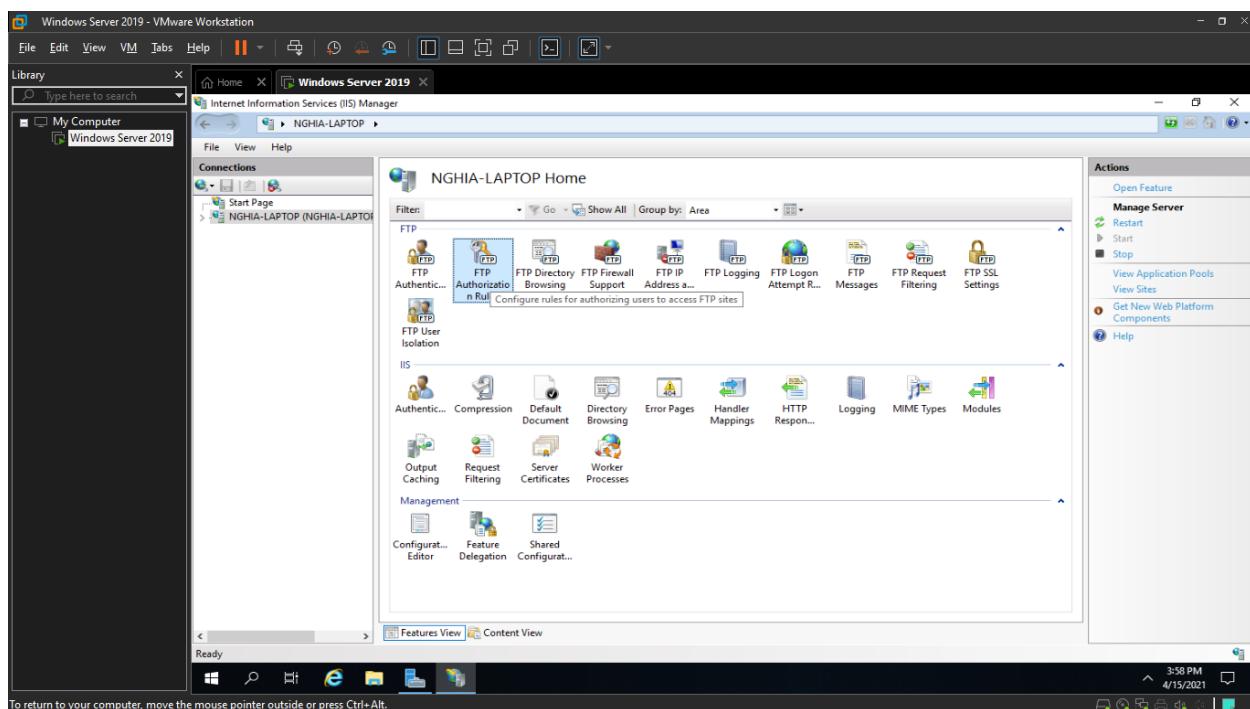
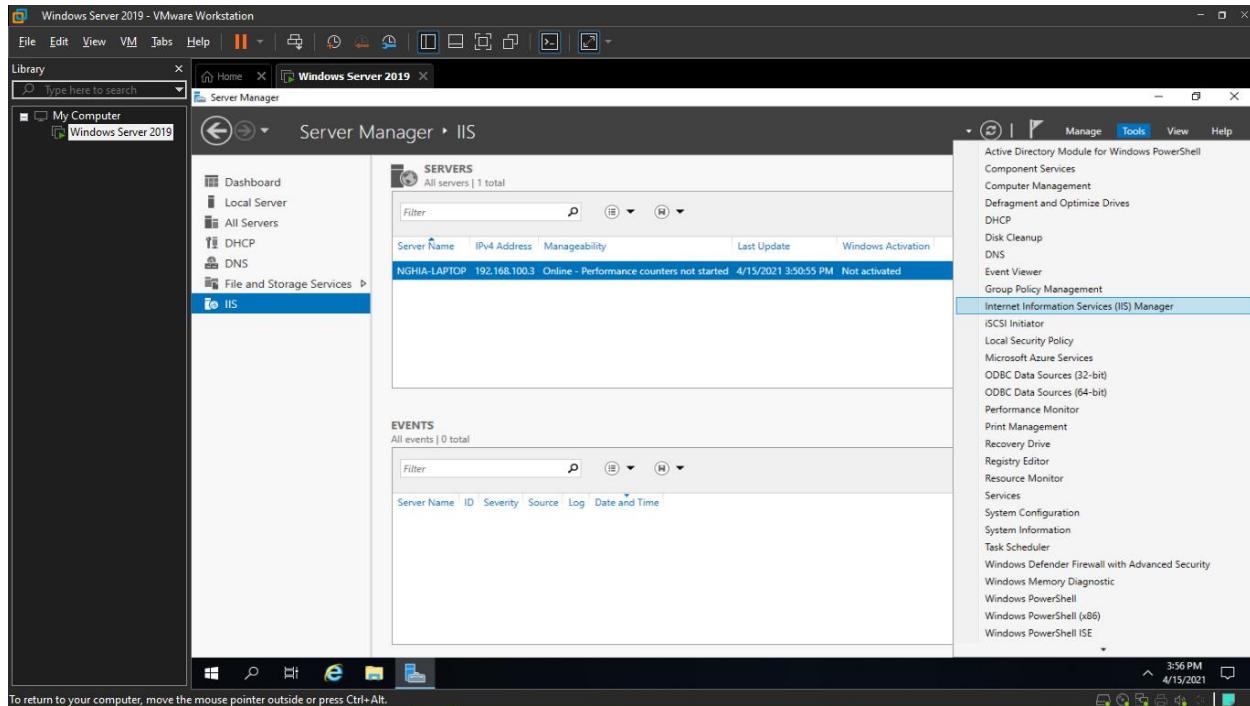


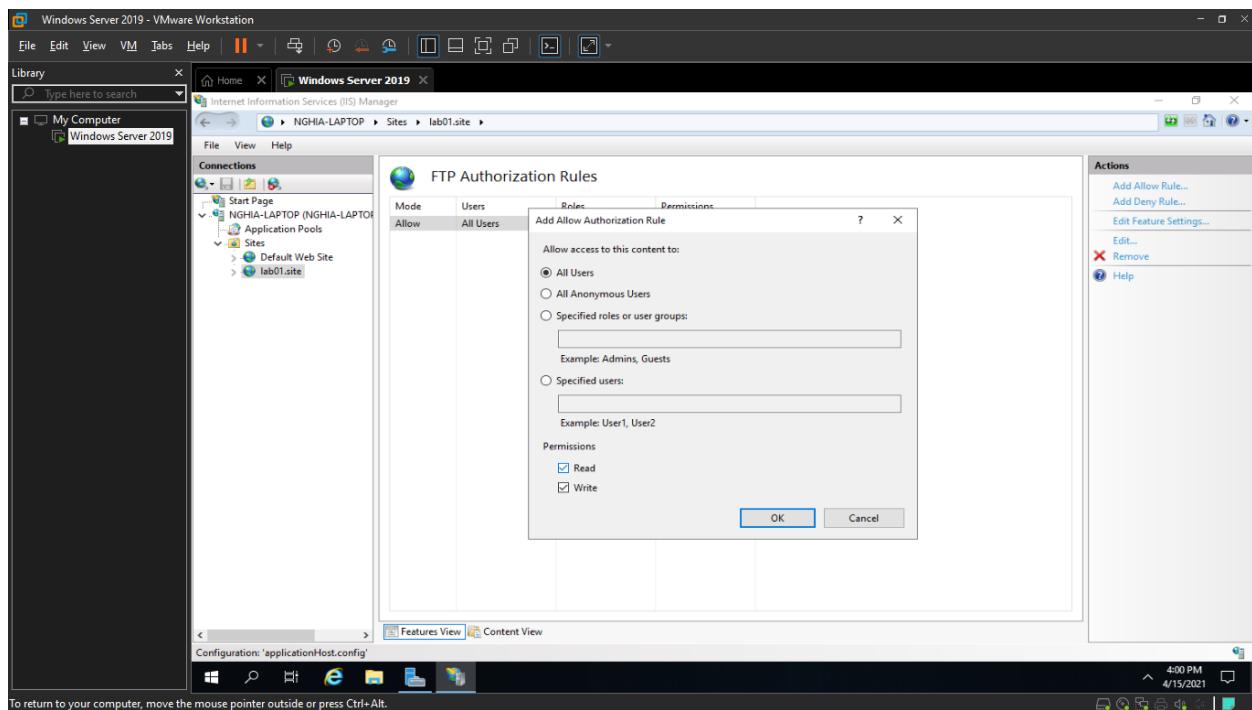
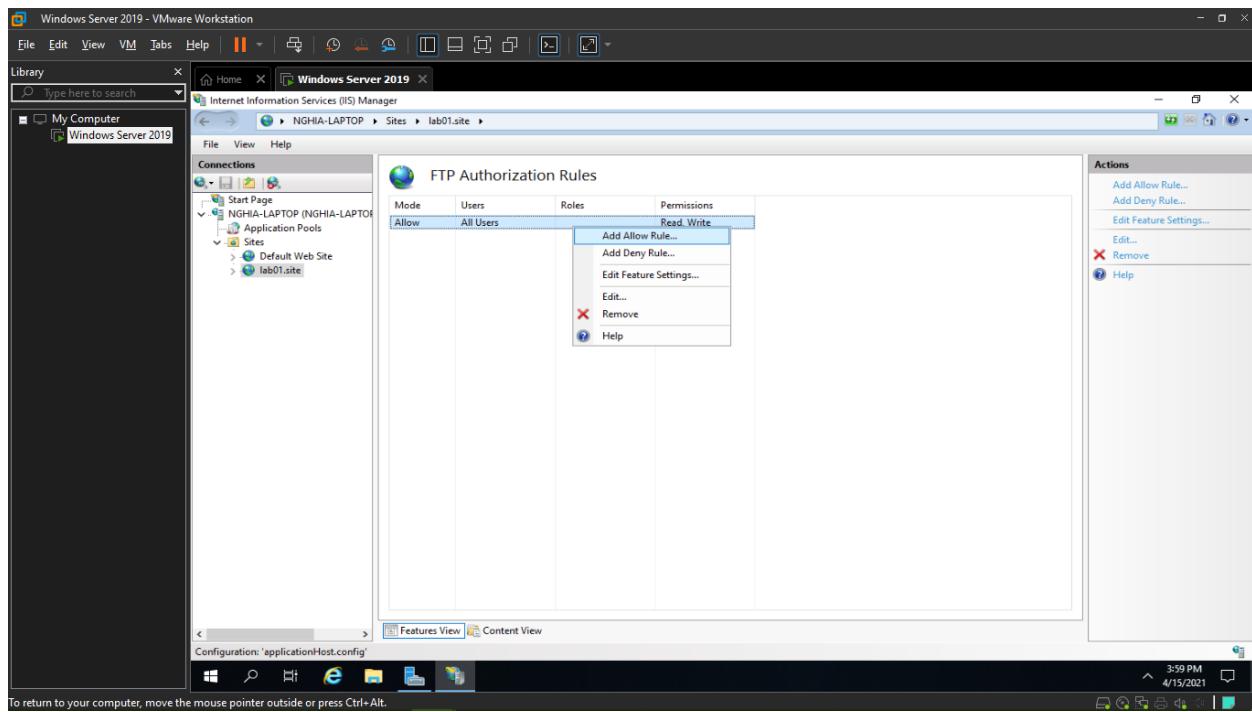


- Đổi với từng physic root đã tạo ứng với Web (C:\inetpub\root) và FTP (C:\inetpub\ftproot), ta tiến hành sửa đổi hoặc thêm các file mới để dễ dàng kiểm tra xem dịch vụ có hoạt động hay không



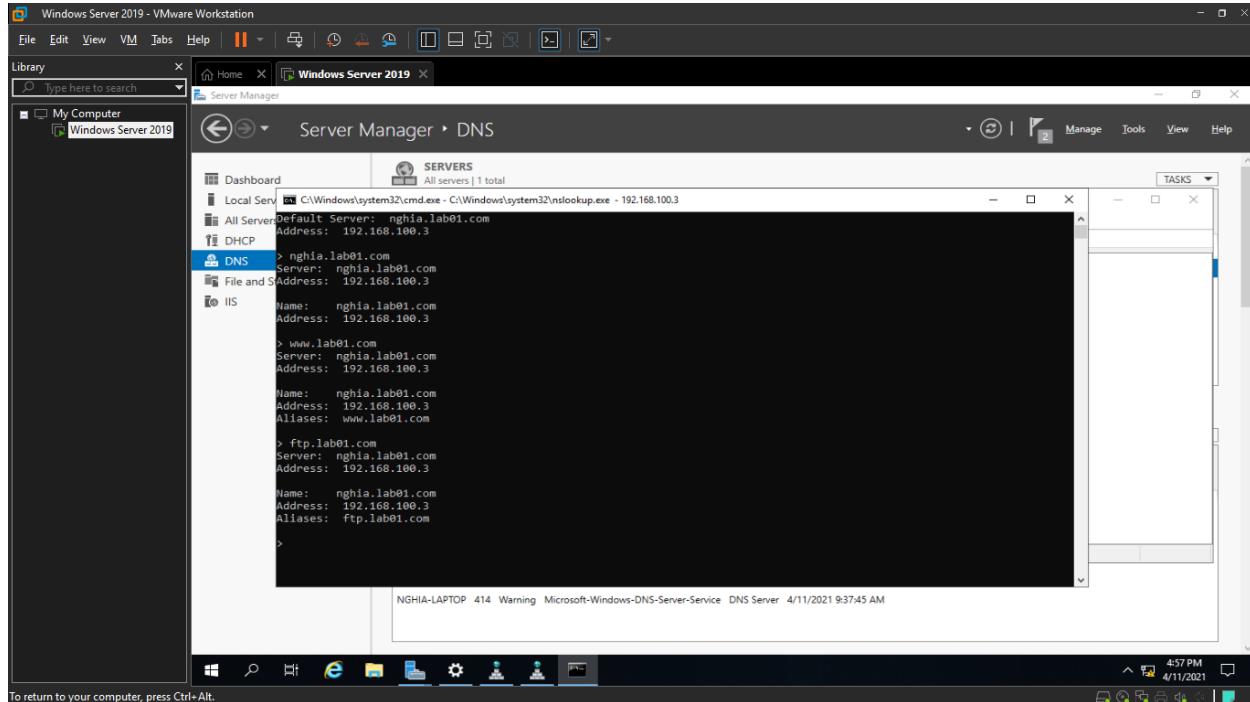
- Ta cấp quyền cho tất cả các người dùng đều có thể đọc và chỉnh sửa (Read và Write)



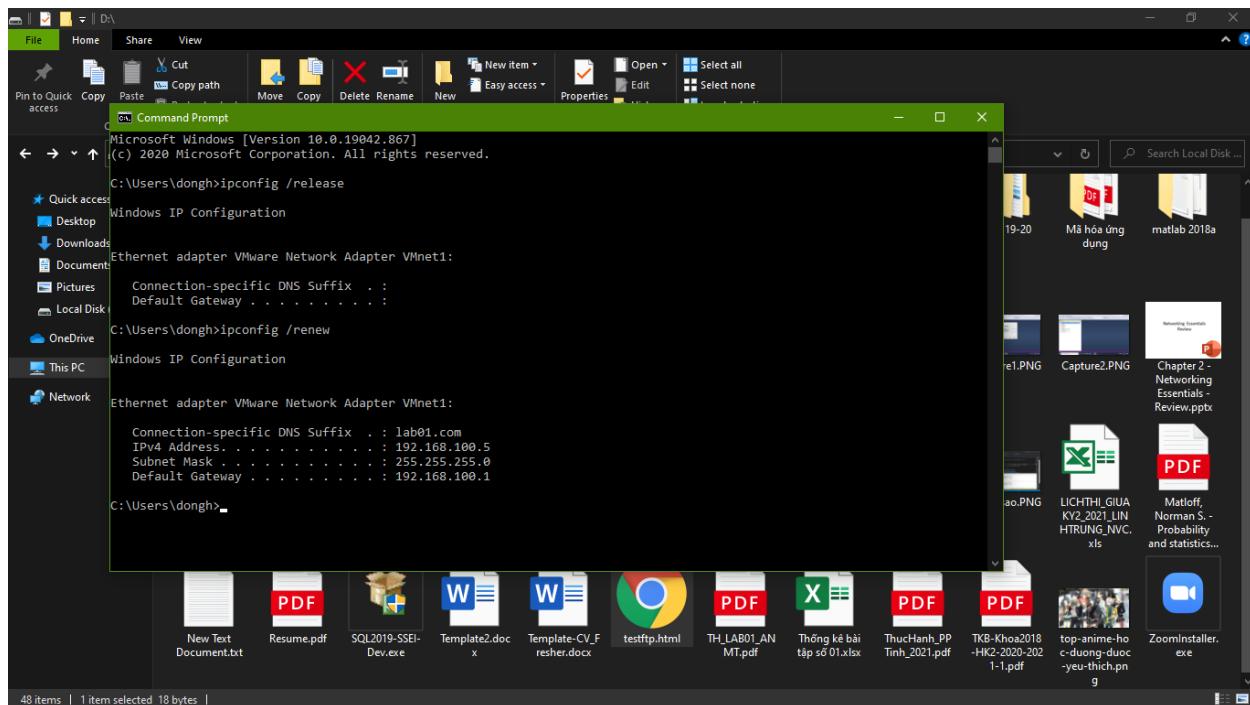


f. Kiểm tra tổng quan các dịch vụ

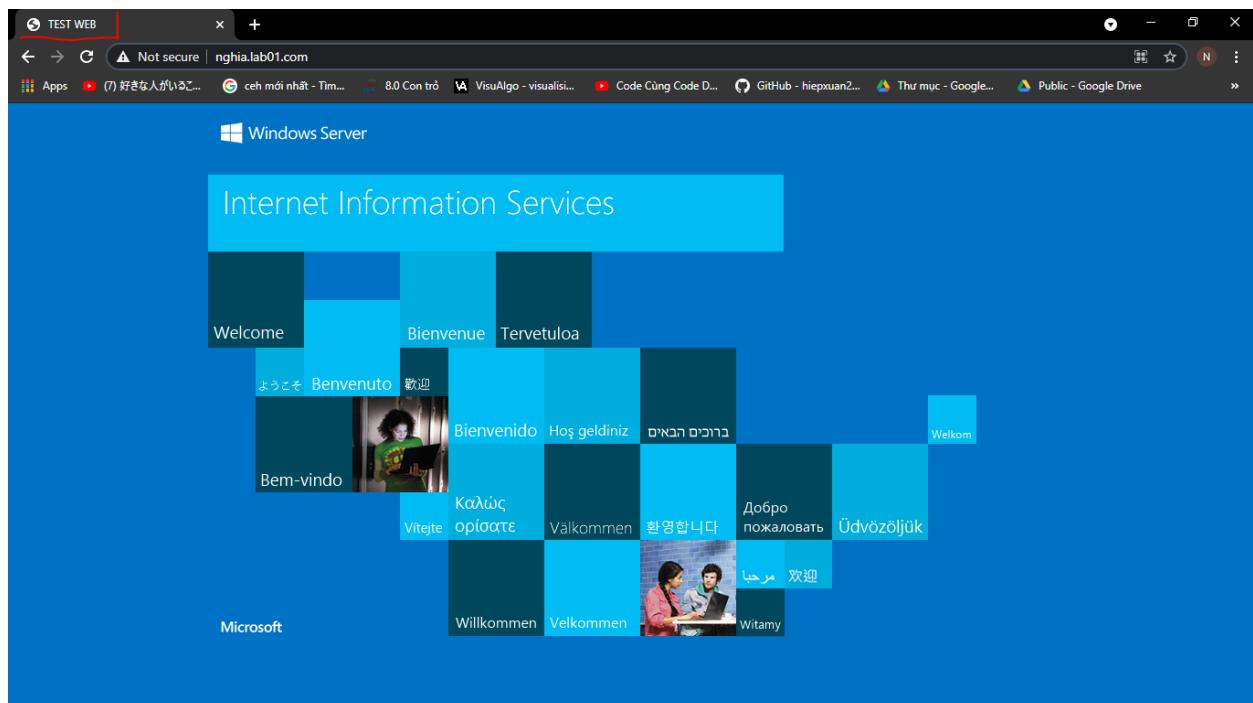
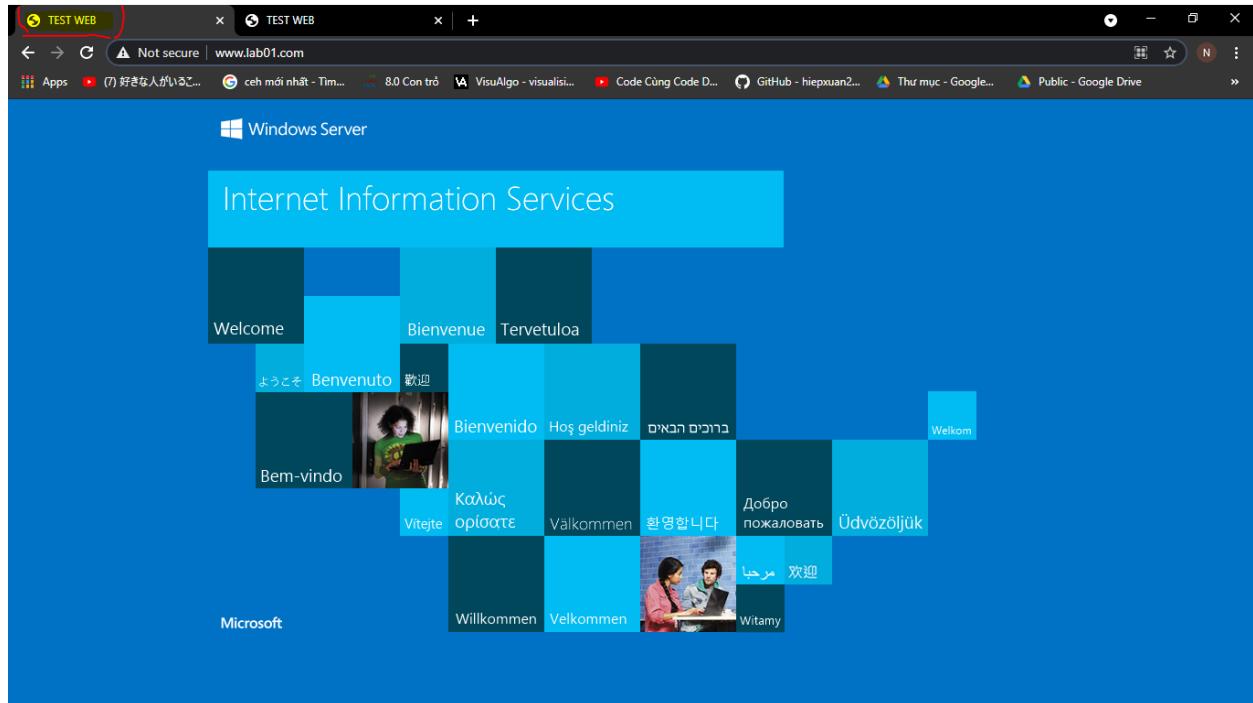
- Kiểm tra các host và CNAME (DNS => nslookup)



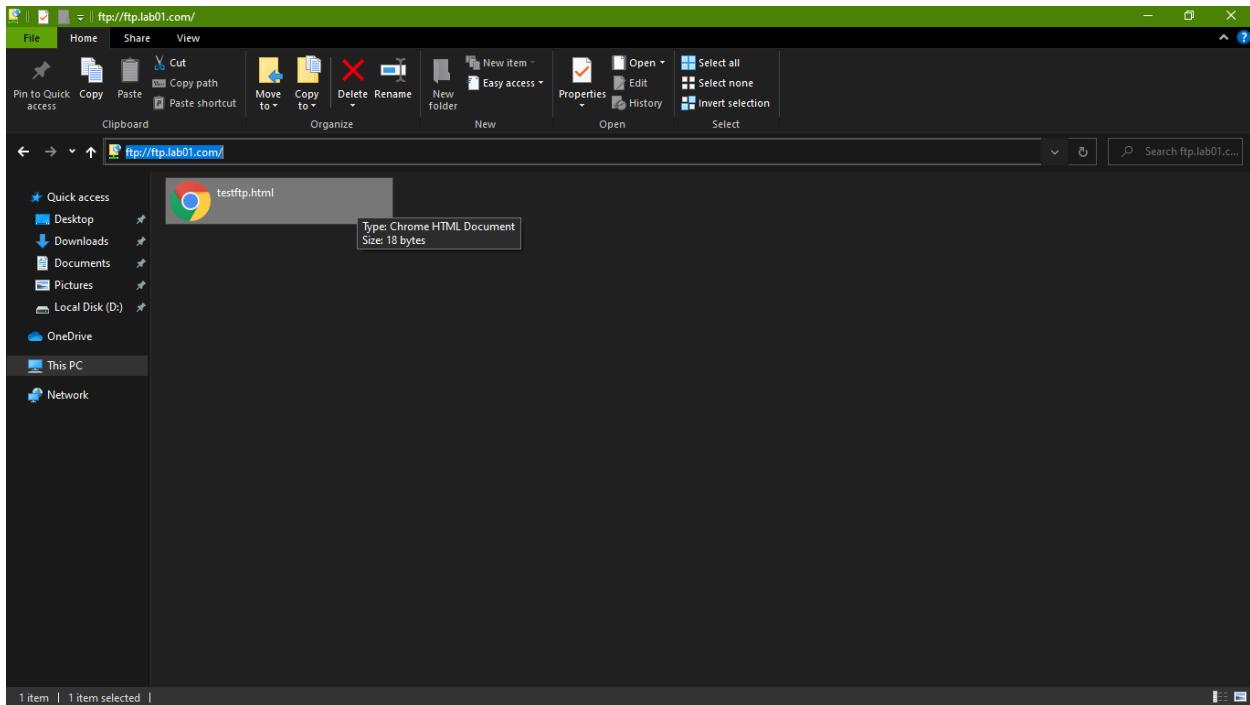
- Kiểm tra cấp phát dịch vụ DHCP



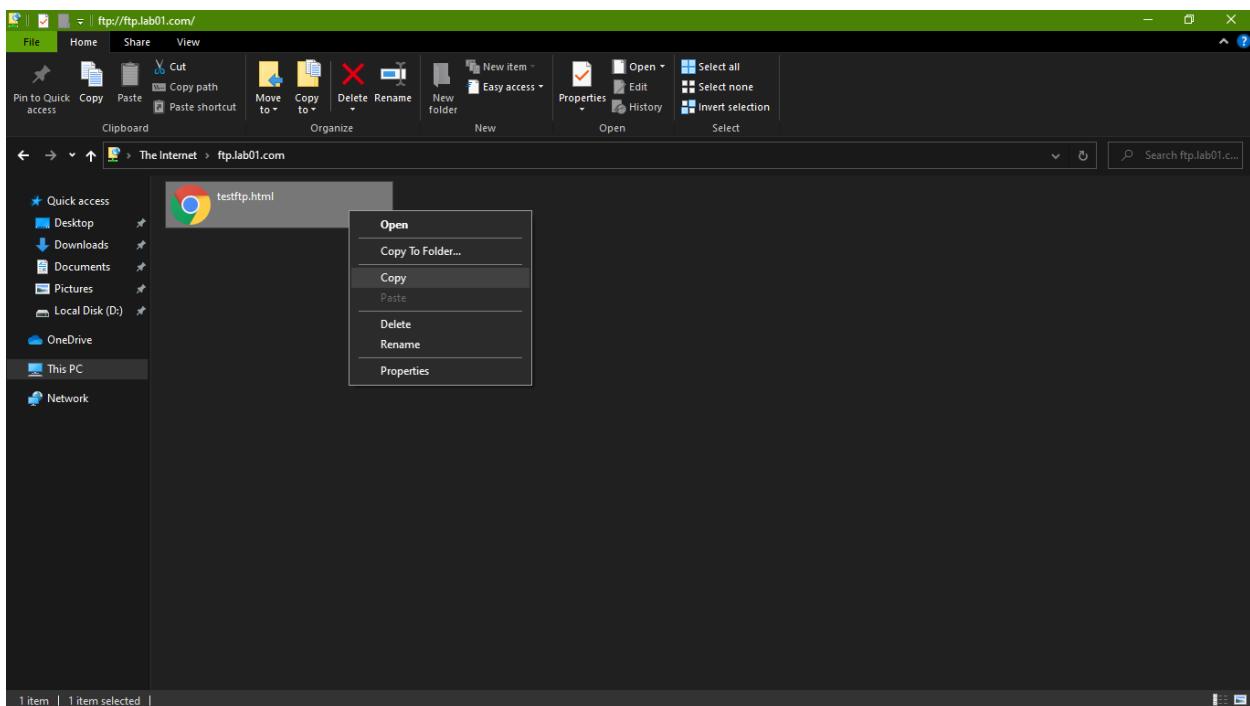
- Kiểm tra dịch vụ Web

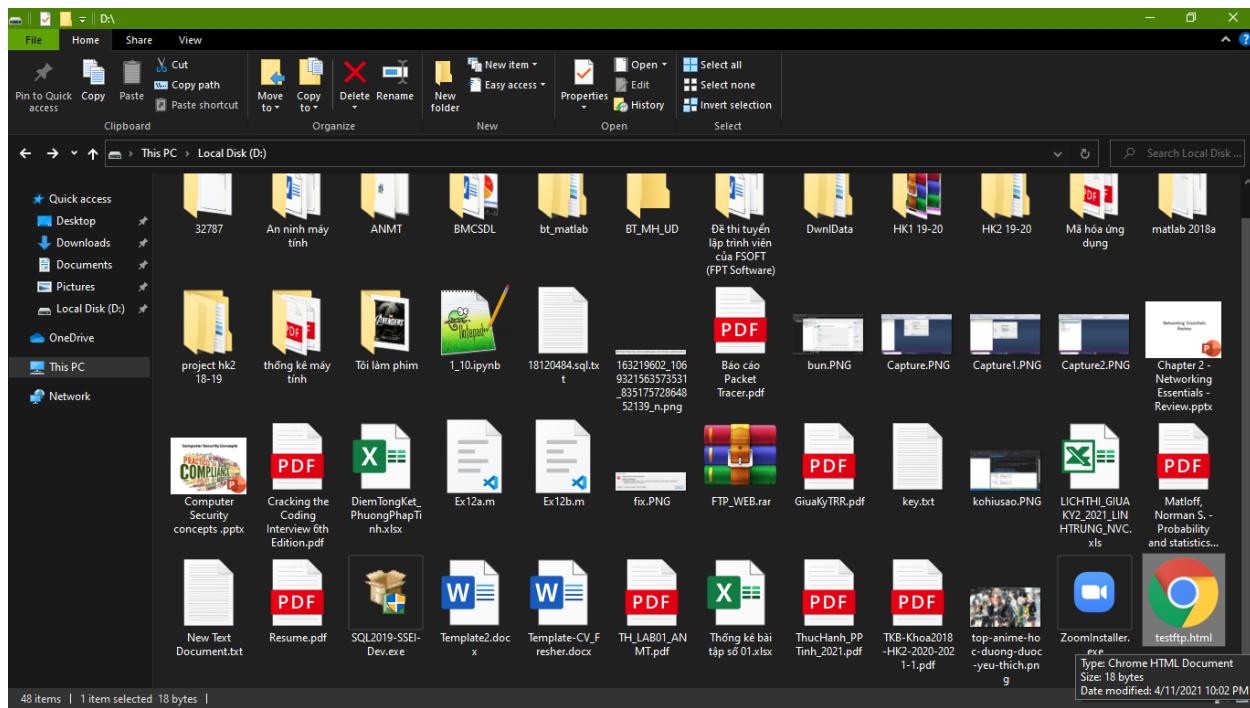


- Kiểm tra dịch vụ FTP (dùng File Explorer của máy Client)



- Copy về máy Client





- Mở ra file đã copy và kiểm tra thử

