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Computer Networks

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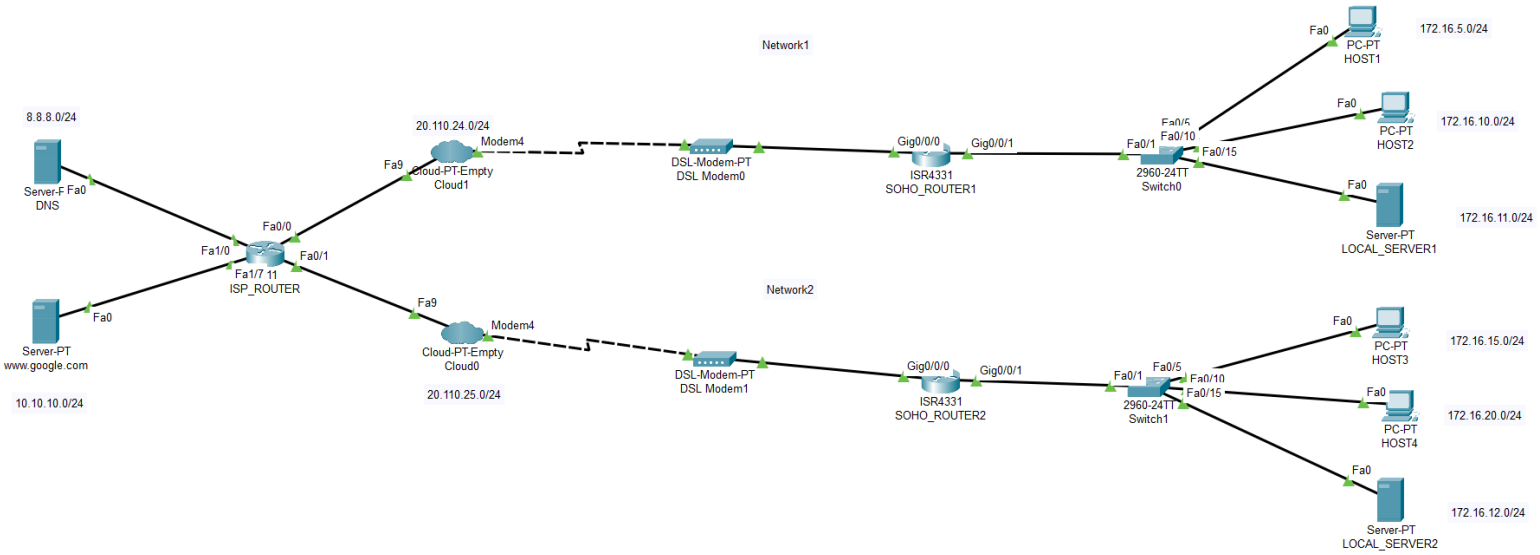
Port Forwarding Project in Cisco Packet Tracer

1. Description

1. Implement a topology that imitates internet
2. Create 2 different local networks to show how port forwarding works
3. Configure the networks using nat,acces lists,vlans,dhcp and other utilities
4. ISP router is expected to assign ip addresses to local routers using DHCP
5. Local routers expected to assign ip addresses to local devices using vlan DHCP
6. Local routers expected to route the traffic using nat and access lists
7. Switching should be made via VLANs
8. SOHO_ROUTER1 should forward the outbound traffic coming from 80 to LOCAL_SERVER1
9. SOHO_ROUTER2 should forward the outbound traffic coming from 80 to LOCAL_SERVER2



2. Topology

- ISP_ROUTER assigns ip addresses using DHCP to the networks connected to it
- NAT configured on the SOHO_ROUTER1 and SOHO_ROUTER2 to make the ip translation possible between private local ip addresses and the public ip address.Also it forwards all the traffic that's coming from port 80 to the local server in both routers
- Both SOHO_ROUTER1 and SOHO_ROUTER2 assigns ip addresses to local devices using vlan DHCP
- Fa0/1 interface on the switch0 configured as trunk and Fa0/5-Fa0/10-Fa0/15 interfaces configured as access ports
- Fa0/1 interface on the switch1 configured as trunk and Fa0/5-Fa0/10-Fa0/15 interfaces configured as access ports

3. Screenshots of Configurations

3.1 ISP_ROUTER

```
interface FastEthernet0/0
 ip address 20.110.24.1 255.255.255.0
 duplex auto
 speed auto
 no cdp enable
!
interface FastEthernet0/1
 ip address 20.110.25.1 255.255.255.0
 duplex auto
 speed auto
 no cdp enable
!
interface FastEthernet1/0
 switchport access vlan 8
 switchport mode access
 switchport nonegotiate
 spanning-tree portfast
!
interface FastEthernet1/1
 switchport access vlan 8
 switchport mode access
 switchport nonegotiate
 spanning-tree portfast
!
interface FastEthernet1/2
 switchport access vlan 8
 switchport mode access
 switchport nonegotiate
 spanning-tree portfast
```

```
ip dhcp excluded-address 20.110.24.1
ip dhcp excluded-address 20.110.25.1
!
ip dhcp pool CUSTOMERS1
 network 20.110.24.0 255.255.255.0
 default-router 20.110.24.1
 dns-server 8.8.8.8
ip dhcp pool CUSTOMERS2
 network 20.110.25.0 255.255.255.0
 default-router 20.110.25.1
 dns-server 8.8.8.8
```

```
interface FastEthernet1/7
 switchport access vlan 10
 switchport mode access
 switchport nonegotiate
 spanning-tree portfast
!
interface FastEthernet1/8
 switchport access vlan 10
 switchport mode access
 switchport nonegotiate
 spanning-tree portfast
!
interface FastEthernet1/9
 switchport access vlan 10
 switchport mode access
 switchport nonegotiate
 spanning-tree portfast
!
interface FastEthernet1/10
 switchport access vlan 10
 switchport mode access
 switchport nonegotiate
 spanning-tree portfast
!
interface FastEthernet1/11
 switchport access vlan 10
 switchport mode access
 switchport nonegotiate
 spanning-tree portfast
```

3.2 SOHO_ROUTER1

```
hostname SOHO_ROUTER1
!
!
!
!
!
ip dhcp pool dhcpvlan5
 network 172.16.5.0 255.255.255.0
 default-router 172.16.5.1
ip dhcp pool dhcpvlan10
 network 172.16.10.0 255.255.255.0
 default-router 172.16.10.1
ip dhcp pool dhcpvlan11
 network 172.16.11.0 255.255.255.0
 default-router 20.110.24.2

interface GigabitEthernet0/0/0
 ip address dhcp
 ip nat outside
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/1
 no ip address
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/1.1
 encapsulation dot1Q 1 native
 ip address 172.16.1.2 255.255.255.0
!
interface GigabitEthernet0/0/1.5
 encapsulation dot1Q 5
 ip address 172.16.5.1 255.255.255.0
 ip nat inside
!
interface GigabitEthernet0/0/1.10
 encapsulation dot1Q 10
 ip address 172.16.10.1 255.255.255.0
 ip nat inside

interface GigabitEthernet0/0/1.11
 encapsulation dot1Q 11
 ip address 172.16.11.1 255.255.255.0
 ip nat inside

ip nat inside source list 1 interface GigabitEthernet0/0/0 overload
ip nat inside source list 2 interface GigabitEthernet0/0/0 overload
ip nat inside source list 3 interface GigabitEthernet0/0/0 overload
ip nat inside source static tcp 172.16.5.2 23 20.110.24.2 23
ip nat inside source static tcp 172.16.5.2 22 20.110.24.2 22
ip nat inside source static tcp 172.16.1.5 23 20.110.24.2 23
ip nat inside source static tcp 172.16.11.2 80 20.110.24.2 80
ip classless
!
ip flow-export version 9
!
!
access-list 1 permit 172.16.5.0 0.0.0.255
access-list 2 permit 172.16.10.0 0.0.0.255
access-list 3 permit 172.16.11.0 0.0.0.255
```

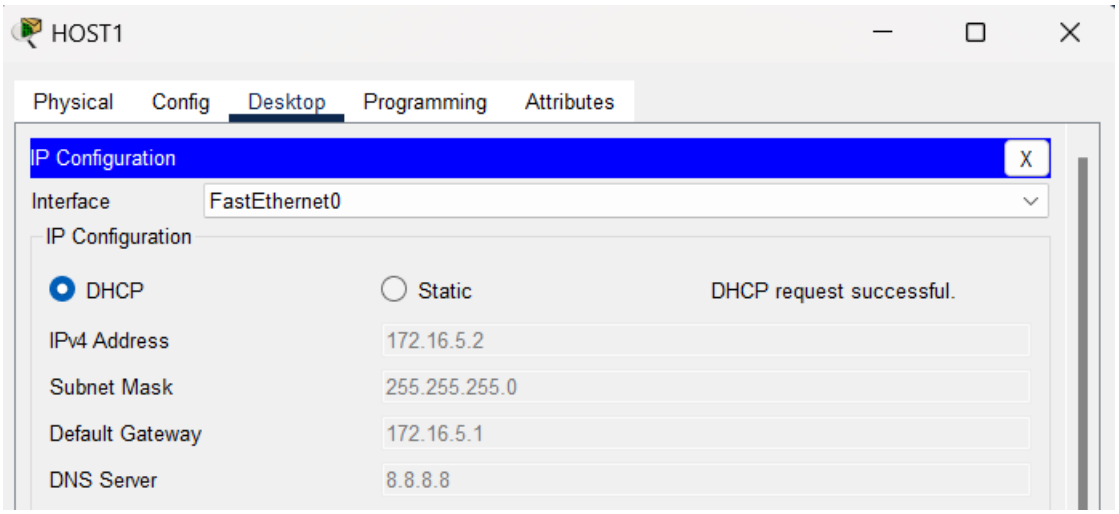
3.2 SOHO_ROUTER2

```
hostname SOHO_ROUTER2
!
!
!
!
!
ip dhcp pool dhcpvlan15
 network 172.16.15.0 255.255.255.0
 default-router 172.16.15.1
ip dhcp pool dhcpvlan20
 network 172.16.20.0 255.255.255.0
 default-router 172.16.20.1
ip dhcp pool dhcpvlan12
 network 172.16.12.0 255.255.255.0
 default-router 20.110.25.2

interface GigabitEthernet0/0/0
 ip address dhcp
 ip nat outside
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/1
 no ip address
 duplex auto
 speed auto
!
interface GigabitEthernet0/0/1.12
 encapsulation dot1Q 12
 ip address 172.16.12.1 255.255.255.0
 ip nat inside
!
interface GigabitEthernet0/0/1.15
 encapsulation dot1Q 15
 ip address 172.16.15.1 255.255.255.0
 ip nat inside
!
interface GigabitEthernet0/0/1.20
 encapsulation dot1Q 20
 ip address 172.16.20.1 255.255.255.0
 ip nat inside

ip nat inside source list 1 interface GigabitEthernet0/0/0 overload
ip nat inside source list 2 interface GigabitEthernet0/0/0 overload
ip nat inside source list 3 interface GigabitEthernet0/0/0 overload
ip nat inside source static tcp 172.16.12.2 80 20.110.25.2 80
ip classless
!
ip flow-export version 9
!
!
access-list 1 permit 172.16.15.0 0.0.0.255
access-list 2 permit 172.16.20.0 0.0.0.255
access-list 3 permit 172.16.12.0 0.0.0.255
```

4. Testing

4.1 Testing DHCP

```
SOHO_ROUTER1(config)#interface GigabitEthernet0/0/0
SOHO_ROUTER1(config-if)#
%DHCP-6-ADDRESS_ASSIGN: Interface GigabitEthernet0/0/0 assigned DHCP address
20.110.24.2, mask 255.255.255.0, hostname SOHO_ROUTER1
```



4.2 Ping Test

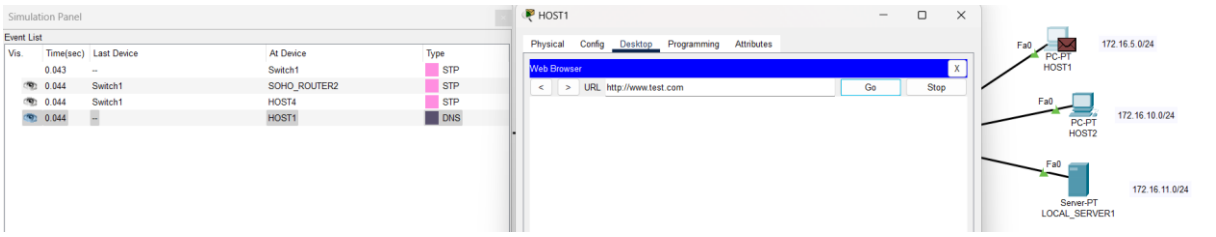
```
C:\>ping 20.110.24.1

Pinging 20.110.24.1 with 32 bytes of data:

Request timed out.
Reply from 20.110.24.1: bytes=32 time=58ms TTL=254
Reply from 20.110.24.1: bytes=32 time=60ms TTL=254
Reply from 20.110.24.1: bytes=32 time=58ms TTL=254

Ping statistics for 20.110.24.1:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 58ms, Maximum = 60ms, Average = 58ms
```

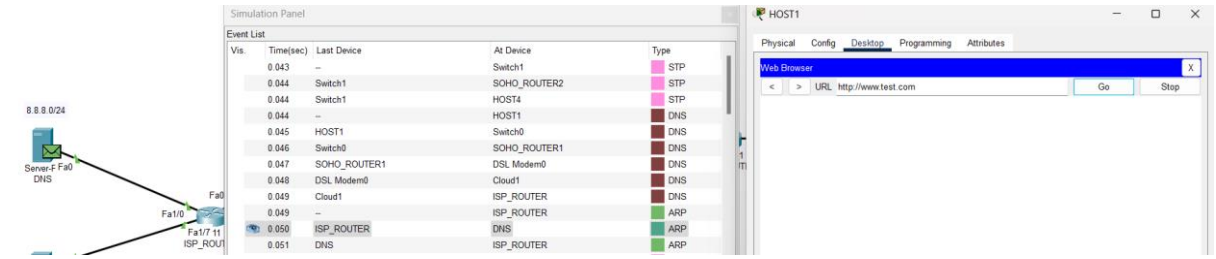
```
SOHO_ROUTER1#ping 20.110.25.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 20.110.25.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 96/110/144 ms
```

4.3 Testing NAT

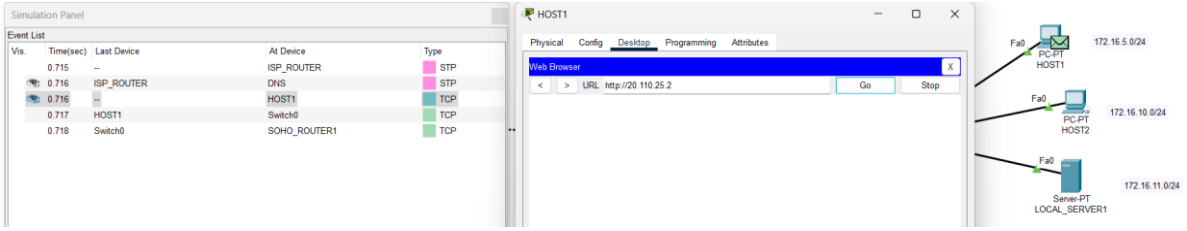
```
SOHO_ROUTER1#show ip nat translations
Pro  Inside global     Inside local       Outside local      Outside global
tcp 20.110.24.2:1026   172.16.10.2:1026   20.110.25.2:80     20.110.25.2:80
tcp 20.110.24.2:1027   172.16.10.2:1027   20.110.25.2:80     20.110.25.2:80
tcp 20.110.24.2:1028   172.16.10.2:1028   20.110.25.2:80     20.110.25.2:80
tcp 20.110.24.2:1029   172.16.10.2:1029   10.10.10.10:80     10.10.10.10:80
tcp 20.110.24.2:22     172.16.5.2:22      ---                ---
tcp 20.110.24.2:23     172.16.1.5:23      ---                ---
tcp 20.110.24.2:80     172.16.11.2:80     ---                ---
tcp 20.110.24.2:80     172.16.11.2:80     20.110.25.2:1037   20.110.25.2:1037
tcp 20.110.24.2:80     172.16.11.2:80     20.110.25.2:1038   20.110.25.2:1038


SOHO_ROUTER2#sh ip nat tr
Pro  Inside global     Inside local       Outside local      Outside global
tcp 20.110.25.2:1037   172.16.15.2:1037   20.110.24.2:80     20.110.24.2:80
tcp 20.110.25.2:1038   172.16.15.2:1038   20.110.24.2:80     20.110.24.2:80
tcp 20.110.25.2:80     172.16.12.2:80     ---                ---
tcp 20.110.25.2:80     172.16.12.2:80     20.110.24.2:1026   20.110.24.2:1026
tcp 20.110.25.2:80     172.16.12.2:80     20.110.24.2:1027   20.110.24.2:1027
tcp 20.110.25.2:80     172.16.12.2:80     20.110.24.2:1028   20.110.24.2:1028
```

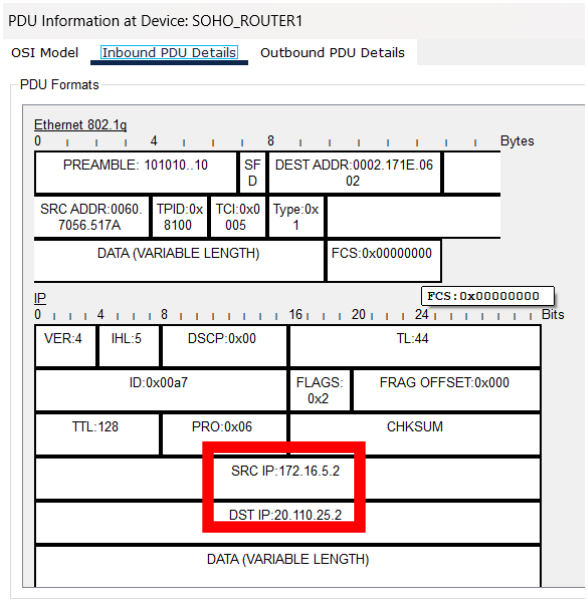
4.4 Testing DNS

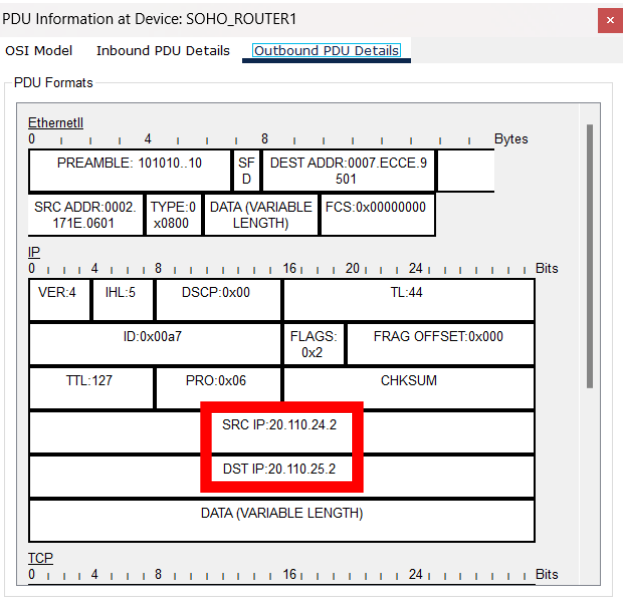


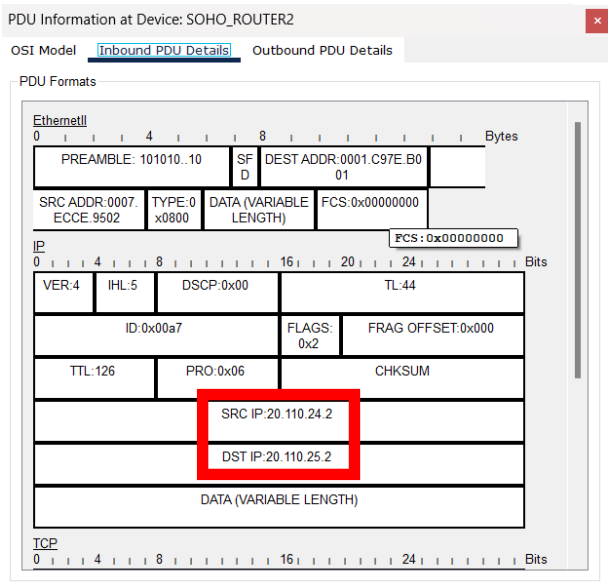


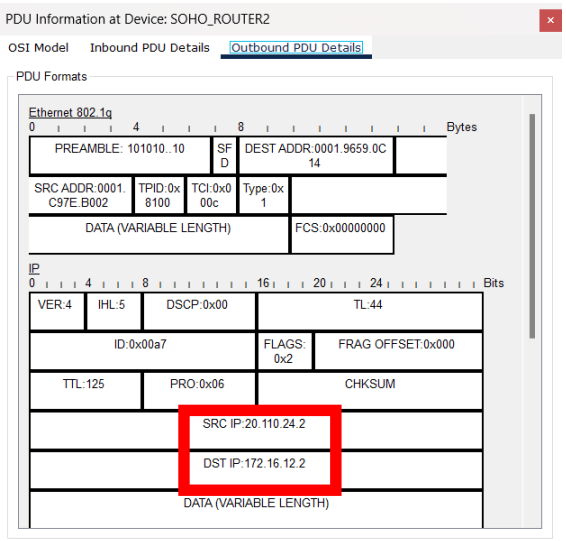
4.5 Testing Port Forwarding




PDU Information at Device: SOHO_ROUTER1
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
Ethernet 802.1q
Bytes
PREAMBLE: 101010..10
SFD
DEST ADDR:0002.171E.0602
SRC ADDR:0060.7056.517A
TPID:0x8100
TCI:0x0005
Type:0x1
DATA (VARIABLE LENGTH)
FCS:0x00000000
IP
Bits
FCS:0x00000000
VER:4
IHL:5
DSCP:0x00
TL:44
ID:0x00a7
FLAGS:0x2
FRAG OFFSET:0x000
TTL:128
PRO:0x06
CHKSUM
SRC IP:172.16.5.2
DST IP:20.110.25.2
DATA (VARIABLE LENGTH)


PDU Information at Device: SOHO_ROUTER1
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
EthernetII
Bytes
PREAMBLE: 101010..10
SFD
DEST ADDR:0007.ECCE.9501
SRC ADDR:0002.171E.0601
TYPE:0x0800
DATA (VARIABLE LENGTH)
FCS:0x00000000
IP
Bits
VER:4
IHL:5
DSCP:0x00
TL:44
ID:0x00a7
FLAGS:0x2
FRAG OFFSET:0x000
TTL:127
PRO:0x06
CHKSUM
SRC IP:20.110.24.2
DST IP:20.110.25.2
DATA (VARIABLE LENGTH)
TCP


PDU Information at Device: SOHO_ROUTER2
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
EthernetII
Bytes
PREAMBLE: 101010..10
SFD
DEST ADDR:0001.C97E.B001
SRC ADDR:0007.ECCE.9502
TYPE:0x0800
DATA (VARIABLE LENGTH)
FCS:0x00000000
IP
Bits
FCS:0x00000000
VER:4
IHL:5
DSCP:0x00
TL:44
ID:0x00a7
FLAGS:0x2
FRAG OFFSET:0x000
TTL:126
PRO:0x06
CHKSUM
SRC IP:20.110.24.2
DST IP:20.110.25.2
DATA (VARIABLE LENGTH)
TCP


PDU Information at Device: SOHO_ROUTER2
OSI Model
Inbound PDU Details
Outbound PDU Details
PDU Formats
Ethernet 802.1q
Bytes
PREAMBLE: 101010..10
SFD
DEST ADDR:0001.9659.0C14
SRC ADDR:0001.C97E.B002
TPID:0x8100
TCI:0x000c
Type:0x1
DATA (VARIABLE LENGTH)
FCS:0x00000000
IP
Bits
VER:4
IHL:5
DSCP:0x00
TL:44
ID:0x00a7
FLAGS:0x2
FRAG OFFSET:0x000
TTL:125
PRO:0x06
CHKSUM
SRC IP:20.110.24.2
DST IP:172.16.12.2
DATA (VARIABLE LENGTH)