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Reg. No. :

Name :

Campus: Vellore

Term End Lab Examination – November 2024

B.Tech – Computer Science Engineering - FFCS – V Semester

Course : BCSE308L – Computer Networks Lab

Time: 1 hour 30 minutes **Max.Marks:50**

Instructions:

1. Attempt the question number mentioned on your answer booklet.

2. Mandatory – Demonstrate any two lab assessments related to the question attempted with Viva-Voce

3. All the rough work should be done on answer booklet

4. Viva-Voce + Observation / Record:

1. What is the Hamming distance for each of the following codev

a. d (10000, 00000)

b. d (10101, 10000)

c. d (11111,11111)

d. d (000, 000)

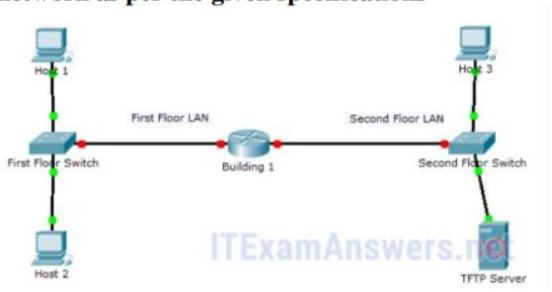
Using 5-bit sequence numbers, what is the maximum size of the send and receive windows for each of the following protocols?

a. Stop-and-Wait ARQ

b. Go-Back-*N* ARQ

c. Selective-Repeat ARQ

Configure the following network as per the given specifications



Addressing Table

Device	Interface	IPv4 Address / IPv6 Address	Subnet Mask	IPv6 Default Gateway / IPv6 Default Gateway
Building 1	G0/0	192.168.1.126	255.255.255.224	N/A
		2001:DB8:ACAD:A::1/64		N/A
	G0/1	192.168.1.158	255.255.255.240	N/A
		2001:DB8:ACAD:B::1/64		N/A
	Link Local	FE80::1		N/A
Second Floor Switch	Vlan 1	192.168.1.157	255.255.255.240	192.168.1.158
		N/A	N/A	N/A
Host 1	NIC	192.168.1.97	255.255.255.224	192.168.1.126
		2001:DB8:ACAD:A::FF		FE80::1
Host 2	NIC	192.168.1.98	255.255.255.224	192.168.1.126
		2001:DB8:ACAD:A::15		FE80::1
Host 3	NIC	192.168.1.145	255.255.255.240	192.168.1.158
		2001:DB8:ACAD:B::FF		FE80::1
TFTP Server	NIC	192.168.1.146	255.255.255.240	192.168.1.158
		2001:DB8:ACAD:B::15		FE80::1

Step 1: Determine the IP Addressing Scheme.

Design an IPv4 addressing scheme and complete the Addressing Table based on the following requirements. Use the table to help you organize your work.

Subnet Number	Hosts Available	Network Address	Beginning Address	Ending Address	Mask	Assignment
1	30	192.168.1.0	192.168.1.1	192.168.1.30	255.255.255.224	
2	30	192.168.1.32	192.168.1.33	192.168.1.62	255.255.255.224	
3	30	192.168.1.64	192.168.1.65	192.168.1.94	255.255.255.224	
4	30	192.168.1.96	192.168.1.97	192.168.1.126	255.255.255.224	First Floor LAN Subnet
5	14	192.168.1.128	192.168.1.129	192.168.1.142	255.255.255.240	
6	14	192.168.1.144	192.168.1.145	192.168.1.158	255.255.255.240	Second Floor LAN Subnet

a. Subnet the **192.168.1.0/24** network to provide **30 host** addresses per subnet while wasting the fewest addresses.
b. Assign the fourth subnet to the First Floor LAN.
c. Assign the last network host address (the highest) in this subnet to the **G0/0** interface on Building 1. (**192.168.1.126**)
d. Starting with the fifth subnet, subnet the network again so that the new subnets will provide 14 host addresses per subnet while wasting the fewest addresses.
e. Assign the second of these new 14-host subnets to the **Second Floor** LAN.
f. Assign the last network host address (the highest) in the **Second Floor LAN** subnet to the **G0/1** interface of the **Building 1** router. (**192.168.1.158**)
g. Assign the second to the last address (the second highest) in this subnet to the **VLAN 1** interface of the **Second Floor Switch**. (**192.168.1.157**)
h. Configure addresses on the hosts using any of the remaining addresses in their respective subnets.

Step 2: Configure the Building 1 Router.

a. Configure the Building 1 router with all initial configurations that you have learned in the course so far:
• Configure the router hostname: **Middle**
• Protect device configurations from unauthorized access with the encrypted privileged exec password.
• Secure all access lines into the router using methods covered in the course and labs.
• Require newly-entered passwords must have a minimum length of 10 characters.
• Prevent all passwords from being viewed in clear text in device configuration files.
• Configure the router to only accept in-band management connections over the protocol that is more secure than Telnet, as was done in the labs. Use the value **1024** for encryption key strength.
• Configure local user authentication for in-band management connections. Create a user with the name **netadmin** and a secret password of **Cisco_CCNA5** Give the user the highest administrative privileges. Your answer must match these values exactly.
b. Configure the two Gigabit Ethernet interfaces using the IPv4 addressing values you calculated and the IPv6 values provided in the addressing table.
• Reconfigure the link local addresses to the value shown in the table.

Step 3: Configure the Second Floor Switch.

Configure Second Floor Switch for remote management over Telnet.

Step 4: Configure and Verify Host Addressing.

a. Use the IPv4 addressing from Step 1 and the IPv6 addressing values provided in the addressing table to configure all host PCs with the correct addressing.
b. Use the router interface link-local address as the IPv6 default gateways on the hosts.

Step 5: Backup the Configuration of the Building 1 Router to TFTP.

a. Complete the configuration of the TFTP server using the IPv4 addressing values from Step 1 and the values in the addressing table.
b. Backup the running configuration of **Building 1** to the **TFTP Server**. Use the default file name.

1.

Ans.

Code:

```python
def hamming_distance(s1, s2):
    # Calculate the Hamming distance between two strings
    hamming_dist = 0
    for i in range(len(s1)):
        if s1[i] != s2[i]:
            hamming_dist += 1
    return hamming_dist

def find_min_hamming_distance(codes):
    # Initialize the minimum Hamming distance with a large number
    hmin = float('inf')
    n = len(codes)

    # Compare each code with every other code
    for i in range(n):
        for j in range(i + 1, n):
            dist = hamming_distance(codes[i], codes[j])
            if dist < hmin:
                hmin = dist
    return hmin

# Get input from user
n = int(input("Enter number of codes: "))
codes = []

# Read the codes
for i in range(n):
    code = input(f"Enter code {i+1}: ")
    codes.append(code)

# Ensure all codes have the same length
if all(len(code) == len(codes[0]) for code in codes):
    print("Minimum Hamming distance between given codes is:",
find_min_hamming_distance(codes))
else:
    print("Error: All codes must be of the same length.")

# Test Case
# Input:
# Enter number of codes: 3
# Enter code 1: 10101
# Enter code 2: 10011
# Enter code 3: 11100
# Expected Output:
# Minimum Hamming distance between given codes is: 2
```

Output:

```
"D:\newlatestchar\CN NETWORKS PROJECT\.venv\Scripts\python.exe" "D:\newlatestchar\CN NETWORKS PROJECT\finding min hamming dis.py"
Enter number of codes: 2
Enter code 1: 11111
Enter code 2: 11111
Minimum Hamming distance between given codes is: 0

Process finished with exit code 0
```

```
"D:\newlatestchar\CN NETWORKS PROJECT\.venv\Scripts\python.exe" "D:\newlatestchar\CN NETWORKS PROJECT\finding min hamming dis.py"
Enter number of codes: 2
Enter code 1: 10101
Enter code 2: 10000
Minimum Hamming distance between given codes is: 2

Process finished with exit code 0
```

```
"D:\newlatestchar\CN NETWORKS PROJECT\.venv\Scripts\python.exe" "D:\newlatestchar\CN NETWORKS PROJECT\finding min hamming dis.py"
Enter number of codes: 2
Enter code 1: 00000
Enter code 2: 00000
Minimum Hamming distance between given codes is: 0
```

3.

Ans SIMULATION:

5. Configure End Devices:

HOST 1 (First Floor):

- IP: 192.168.1.2
- Subnet Mask: 255.255.255.224
- Default Gateway: 192.168.1.1

HOST 2 (First Floor):

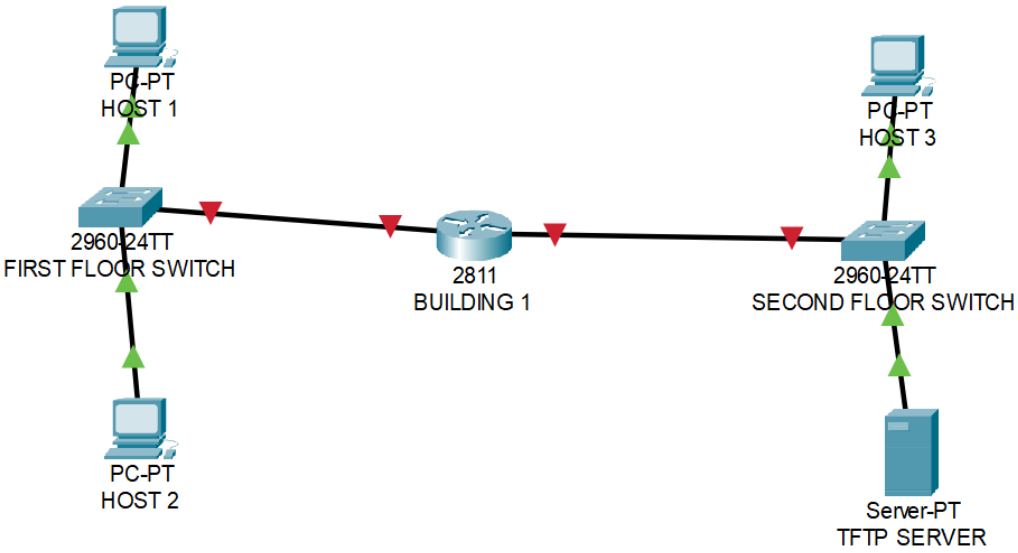
- IP: 192.168.1.3
- Subnet Mask: 255.255.255.224
- Default Gateway: 192.168.1.1

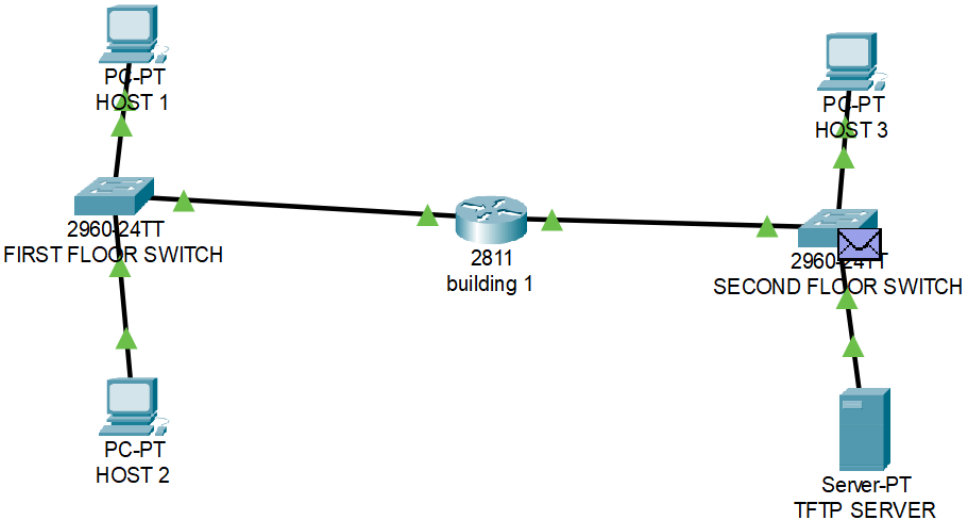
HOST 3 (Second Floor):

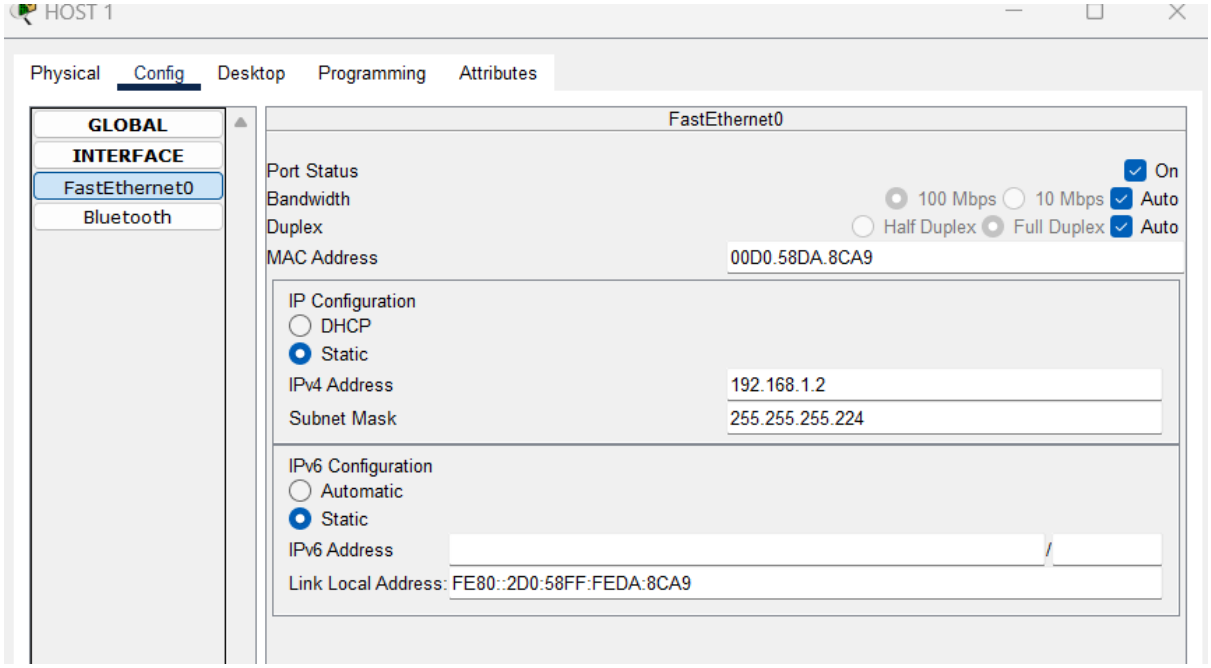
- IP: 192.168.1.34
- Subnet Mask: 255.255.255.224
- Default Gateway: 192.168.1.33

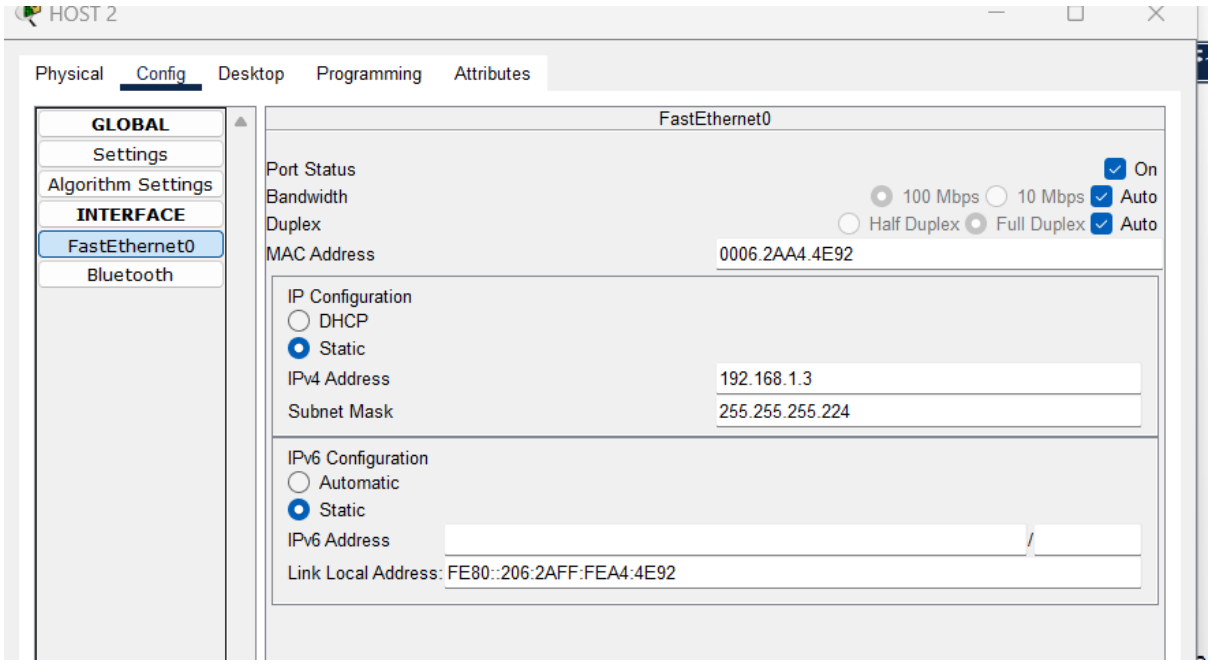
TFTP Server (Second Floor):

- IP: 192.168.1.35
- Subnet Mask: 255.255.255.224
- Default Gateway: 192.168.1.33


PC-PT
HOST 1
PC-PT
HOST 3
2960-24TT
FIRST FLOOR SWITCH
2811
BUILDING 1
2960-24TT
SECOND FLOOR SWITCH
PC-PT
HOST 2
Server-PT
TFTP SERVER


PC-PT
HOST 1
PC-PT
HOST 3
2960-24TT
FIRST FLOOR SWITCH
2811
building 1
SECOND FLOOR SWITCH
PC-PT
HOST 2
Server-PT
TFTP SERVER


HOST 1
Physical
Config
Desktop
Programming
Attributes
GLOBAL
INTERFACE
FastEthernet0
Bluetooth
FastEthernet0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00D0.58DA.8CA9
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.2
Subnet Mask
255.255.255.224
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address:
FE80::2D0:58FF:FEDA:8CA9


HOST 2
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
FastEthernet0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0006.2AA4.4E92
IP Configuration
DHCP
Static
IPv4 Address
192.168.1.3
Subnet Mask
255.255.255.224
IPv6 Configuration
Automatic
Static
IPv6 Address
Link Local Address:
FE80::206:2AFF:FEA4:4E92

```
Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname middle
middle(config)#enable secret middadmin
middle(config)#line console 0
middle(config-line)#password Cisco_CCNA5
middle(config-line)#login
middle(config-line)#exit
middle(config)#interface fa0/0
middle(config-if)#ip address 192.168.1.1 255.255.255.224
middle(config-if)#no shutdown

middle(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
exit
middle(config)#interface fa0/1
middle(config-if)#ip address 192.168.1.33 255.255.255.224
middle(config-if)#noshutdown
                  ^
% Invalid input detected at '^' marker.

middle(config-if)#no shutdown

middle(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

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

Router>enable

Router#configure terminal

Router(config)#hostname Middle

2. Configure Security:

Middle(config)#enable secret middadmin

Middle(config)#line console 0

Middle(config-line)#password Cisco_CCNA5

Middle(config-line)#login

Middle(config-line)#exit

Middle(config)#line vty 0 15

Middle(config-line)#password Cisco_CCNA5

Middle(config-line)#login

Middle(config-line)#exit

Middle(config)#service password-encryption

3. First Floor Interface Configuration:

Middle(config)#interface Fa0/0

Middle(config-if)#ip address 192.168.1.1 255.255.255.224

Middle(config-if)#description First Floor LAN

Middle(config-if)#no shutdown

Middle(config-if)#exit

4. Second Floor Interface Configuration:

Middle(config)#interface Fa0/1

Middle(config-if)#ip address 192.168.1.33 255.255.255.224

Middle(config-if)#description Second Floor LAN

Middle(config-if)#no shutdown

Middle(config-if)#exit

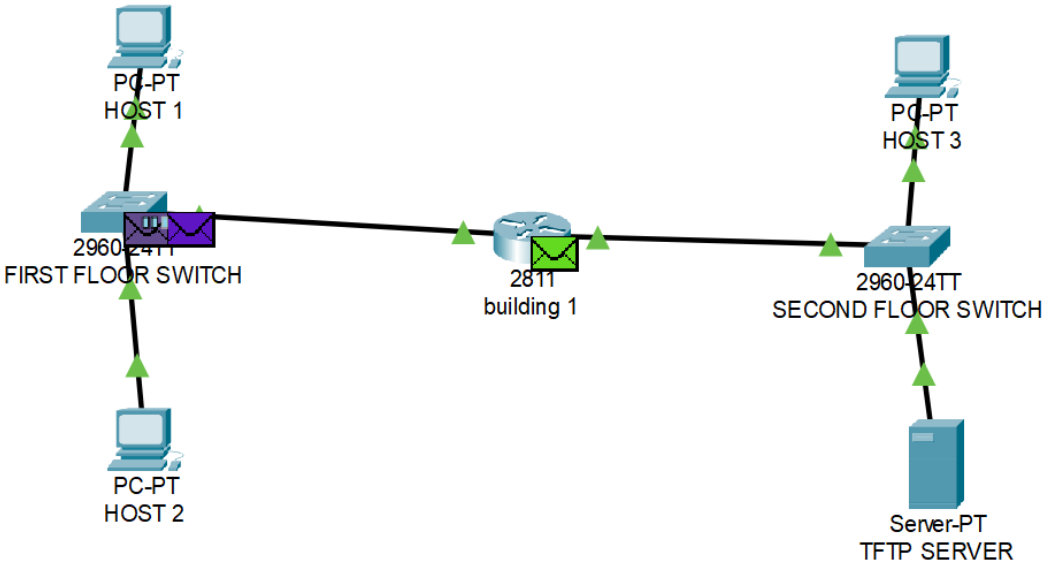
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.35

Pinging 192.168.1.35 with 32 bytes of data:

Request timed out.
Reply from 192.168.1.35: bytes=32 time=12ms TTL=127
Reply from 192.168.1.35: bytes=32 time<1ms TTL=127
Reply from 192.168.1.35: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.1.35:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 12ms, Average = 4ms

C:\>
```



Event List

Vis.	Time(sec)	Last Device	At Device
	0.004	SECOND FLOOR SWITCH	HOST 3
	0.005	building 1	SECOND FLOOR SWITCH
	0.005	SECOND FLOOR SWITCH	HOST 3
	0.005	HOST 3	SECOND FLOOR SWITCH
	0.006	SECOND FLOOR SWITCH	HOST 3
	0.006	HOST 3	SECOND FLOOR SWITCH
	0.006	SECOND FLOOR SWITCH	building 1
	0.007	HOST 3	SECOND FLOOR SWITCH
	0.007	SECOND FLOOR SWITCH	building 1
	0.007	building 1	FIRST FLOOR SWITCH
	0.008	SECOND FLOOR SWITCH	building 1
	0.008	building 1	FIRST FLOOR SWITCH
	0.008	FIRST FLOOR SWITCH	HOST 1
	0.009	building 1	FIRST FLOOR SWITCH
	0.009	FIRST FLOOR SWITCH	HOST 2

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	HOST 1	HOST 3	ICMP		0.000	N	0	(edit)	(delete)
	Successful	HOST 1	HOST 3	ICMP		0.000	N	1	(edit)	(delete)
	Successful	HOST 2	HOST 3	ICMP		0.000	N	2	(edit)	(delete)