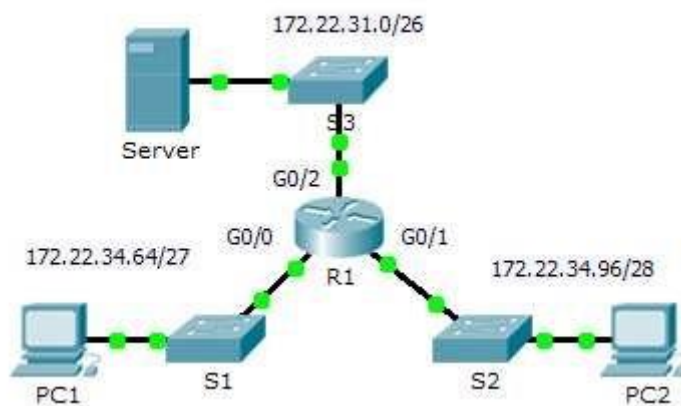


## Practical 3: Configuring Extended ACLs - Scenario 1

### Topology



### Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	172.22.34.65	255.255.255.224	N/A
	G0/1	172.22.34.97	255.255.255.240	N/A
	G0/2	172.22.34.1	255.255.255.192	N/A
Server	NIC	172.22.34.62	255.255.255.192	172.22.34.1
PC1	NIC	172.22.34.66	255.255.255.224	172.22.34.65
PC2	NIC	172.22.34.98	255.255.255.240	172.22.34.97

### Objectives

**Part 1: Configure, Apply and Verify an Extended Numbered ACL**

**Part 2: Configure, Apply and Verify an Extended Named ACL**

### Background / Scenario

Two employees need access to services provided by the server. **PC1** needs only FTP access while **PC2** needs only web access. Both computers are able to ping the server, but not each other.

## Part 1: Configure, Apply and Verify an Extended Numbered ACL

### Step 1: Configure an ACL to permit FTP and ICMP.

- From global configuration mode on **R1**, enter the following command to determine the first valid number for an extended access list.

```
R1(config)# access-list ?
<1-99>      IP standard access list
<100-199>  IP extended access list
```

- b. Add **100** to the command, followed by a question mark.

```
R1(config)# access-list 100 ?
deny      Specify packets to reject
permit    Specify packets to forward
remark    Access list entry comment
```

- c. To permit FTP traffic, enter **permit**, followed by a question mark.

```
R1(config)# access-list 100 permit ?
ahp       Authentication Header Protocol
eigrp     Cisco's EIGRP routing protocol
esp       Encapsulation Security Payload
gre       Cisco's GRE tunneling
icmp      Internet Control Message Protocol
ip        Any Internet Protocol
ospf      OSPF
routing   tcp      Transmission
Control   udp      User Datagram
Protocol
```

- d. This ACL permits FTP and ICMP. ICMP is listed above, but FTP is not, because FTP uses TCP. Therefore, enter **tcp** to further refine the ACL help.

```
R1(config)# access-list 100 permit tcp ?
A.B.C.D   Source address   any
Any source host   host     A
single source host
```

- e. Notice that we could filter just for **PC1** by using the **host** keyword or we could allow **any** host. In this case, any device is allowed that has an address belonging to the 172.22.34.64/27 network. Enter the network address, followed by a question mark.

```
R1(config)# access-list 100 permit tcp 172.22.34.64 ?
A.B.C.D   Source wildcard bits
```

- f. Calculate the wildcard mask determining the binary opposite of a subnet mask.

```
11111111.11111111.11111111.11100000 = 255.255.255.224
00000000.00000000.00000000.00011111 = 0.0.0.31
```

- g. Enter the wildcard mask, followed by a question mark.

```
R1(config)# access-list 100 permit tcp 172.22.34.64 0.0.0.31 ?
A.B.C.D   Destination address   any       Any destination
host      eq                    Match only packets on a given port number
gt        Match only packets with a greater port number
host      A single destination host   lt        Match only
packets with a lower port number      neq       Match only
packets not on a given port number     range    Match only
packets in the range of port numbers
```

- h. Configure the destination address. In this scenario, we are filtering traffic for a single destination, which is the server. Enter the **host** keyword followed by the server's IP address.

```
R1(config)# access-list 100 permit tcp 172.22.34.64 0.0.0.31 host 172.22.34.62
?
dscp      Match packets with given dscp value      eq
Match only packets on a given port number          established
established gt Match only packets with a greater
```

```
port number lt           Match only packets with a lower port
number neq             Match only packets not on a given port
number precedence      Match packets with given precedence value
range                 Match only packets in the range of port numbers
<cr>
```

- i. Notice that one of the options is **<cr>** (carriage return). In other words, you can press **Enter** and the statement would permit all TCP traffic. However, we are only permitting FTP traffic; therefore, enter the **eq** keyword, followed by a question mark to display the available options. Then, enter **ftp** and press **Enter**.

```
R1(config)# access-list 100 permit tcp 172.22.34.64 0.0.0.31 host 172.22.34.62
eq ?
```

```
<0-65535> Port number  ftp           File
Transfer Protocol (21)  pop3         Post Office
Protocol v3 (110)      smtp         Simple Mail
Transport Protocol (25) telnet       Telnet (23)
www                   World Wide Web (HTTP, 80)
```

```
R1(config)# access-list 100 permit tcp 172.22.34.64 0.0.0.31 host
172.22.34.62 eq ftp
```

- j. Create a second access list statement to permit ICMP (ping, etc.) traffic from **PC1** to **Server**. Note that the access list number remains the same and no particular type of ICMP traffic needs to be specified.

```
R1(config)# access-list 100 permit icmp 172.22.34.64 0.0.0.31 host
172.22.34.62
```

- k. All other traffic is denied, by default.

### Step 2: Apply the ACL on the correct interface to filter traffic.

From **R1**'s perspective, the traffic that ACL 100 applies to is inbound from the network connected to Gigabit Ethernet 0/0 interface. Enter interface configuration mode and apply the ACL.

```
R1(config)# interface gigabitEthernet 0/0
```

```
R1(config-if)# ip access-group 100 in Step 3:
```

### Verify the ACL implementation.

- Ping from **PC1** to **Server**. If the pings are unsuccessful, verify the IP addresses before continuing.
- FTP from **PC1** to **Server**. The username and password are both **cisco**.  

```
PC> ftp 172.22.34.62
```
- Exit the FTP service of the **Server**.  

```
ftp> quit
```
- Ping from **PC1** to **PC2**. The destination host should be unreachable, because the traffic was not explicitly permitted.

## Part 2: Configure, Apply and Verify an Extended Named ACL

### Step 1: Configure an ACL to permit HTTP access and ICMP.

- Named ACLs start with the **ip** keyword. From global configuration mode of **R1**, enter the following command, followed by a question mark.

```
R1(config)# ip access-list ?
```

```
extended      Extended      Access      List
standard      Standard      Access      List
```

- b. You can configure named standard and extended ACLs. This access list filters both source and destination IP addresses; therefore, it must be extended. Enter **HTTP\_ONLY** as the name. (For Packet Tracer scoring, the name is case-sensitive.)

```
R1(config)# ip access-list extended HTTP_ONLY
```

- c. The prompt changes. You are now in extended named ACL configuration mode. All devices on the **PC2** LAN need TCP access. Enter the network address, followed by a question mark.

```
R1(config-ext-nacl)# permit tcp 172.22.34.96 ?
A.B.C.D Source wildcard bits
```

- d. An alternative way to calculate a wildcard is to subtract the subnet mask from 255.255.255.255.

```
255.255.255.255
- 255.255.255.240
-----
= 0. 0. 0. 15
```

```
R1(config-ext-nacl)# permit tcp 172.22.34.96 0.0.0.15 ?
```

- e. Finish the statement by specifying the server address as you did in Part 1 and filtering **www** traffic.

```
R1(config-ext-nacl)# permit tcp 172.22.34.96 0.0.0.15 host 172.22.34.62 eq www
```

- f. Create a second access list statement to permit ICMP (ping, etc.) traffic from **PC2** to **Server**. Note: The prompt remains the same and a specific type of ICMP traffic does not need to be specified.

```
R1(config-ext-nacl)# permit icmp 172.22.34.96 0.0.0.15 host 172.22.34.62
```

- g. All other traffic is denied, by default. Exit out of extended named ACL configuration mode.

### Step 2: Apply the ACL on the correct interface to filter traffic.

From **R1**'s perspective, the traffic that access list **HTTP\_ONLY** applies to is inbound from the network connected to Gigabit Ethernet 0/1 interface. Enter the interface configuration mode and apply the ACL.

```
R1(config)# interface gigabitEthernet 0/1
R1(config-if)# ip access-group HTTP_ONLY in Step
```

### 3: Verify the ACL implementation.

- Ping from **PC2** to **Server**. The ping should be successful, if the ping is unsuccessful, verify the IP addresses before continuing.
- FTP from **PC2** to **Server**. The connection should fail.
- Open the web browser on **PC2** and enter the IP address of **Server** as the URL. The connection should be successful.