Access Control Lists

What are ACLs?

ACLs are lists of conditions that are applied to traffic traveling across a router's interface.   These lists tell the router what types of packets to accept or deny. Acceptance and denial can be based on specified conditions.

ACLs can be created for all routed network protocols, such as Internet Protocol (IP) and Internetwork Packet Exchange (IPX).

ACLs can be configured at the router to control access to a network or subnet.

Some ACL decision points are source and destination addresses, protocols, and upper-layer port numbers.

ACLs must be defined on a per-protocol, per direction, or per port basis.

Reasons to Create ACLs

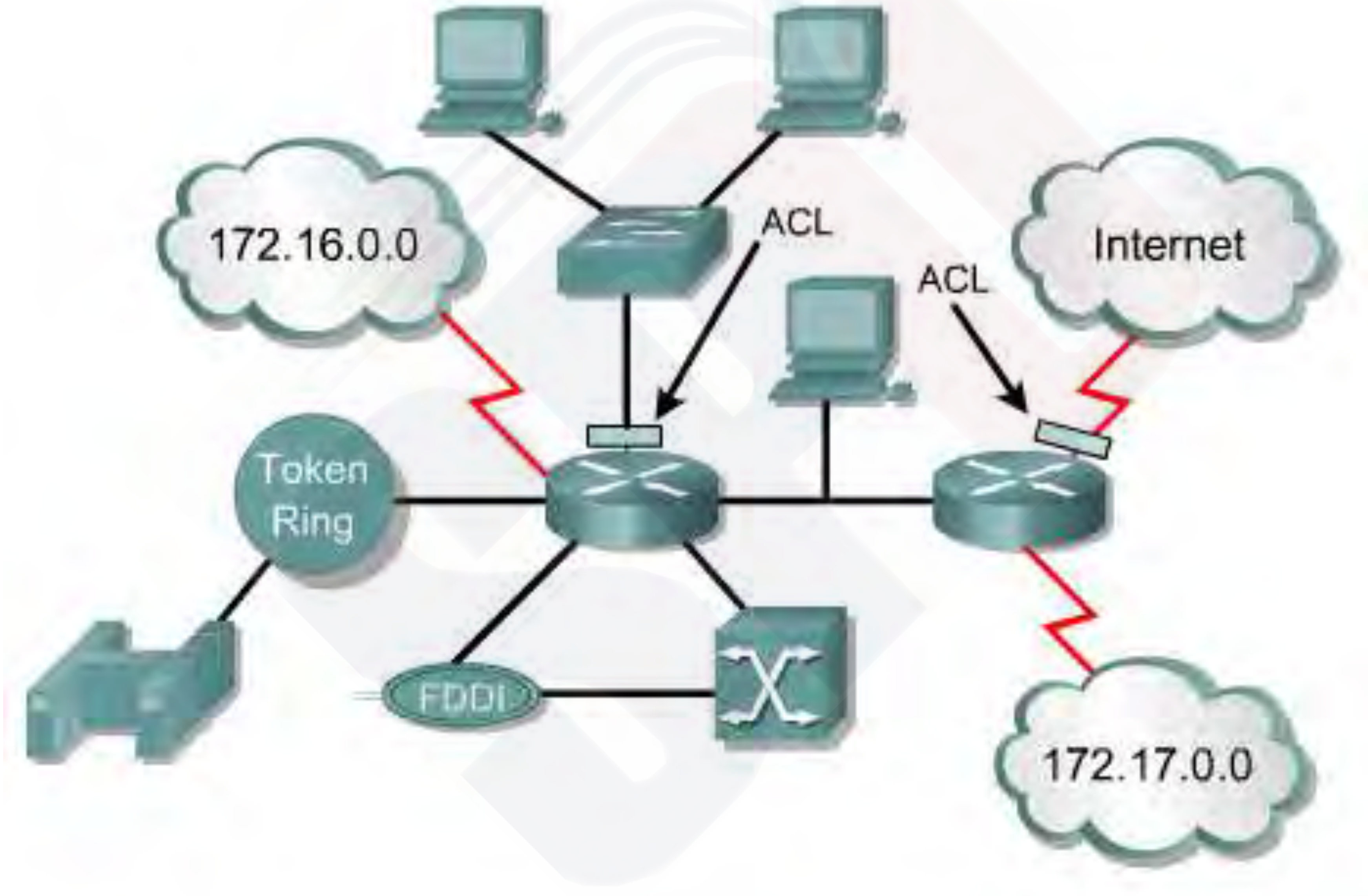
The following are some of the primary reasons to create ACLs:

- Limit network traffic and increase network performance.
- Provide traffic flow control.
- Provide a basic level of security for network access.
- Decide which types of traffic are forwarded or blocked at the router interfaces. For example: Permit e-mail traffic to be routed, but block all telnet traffic.

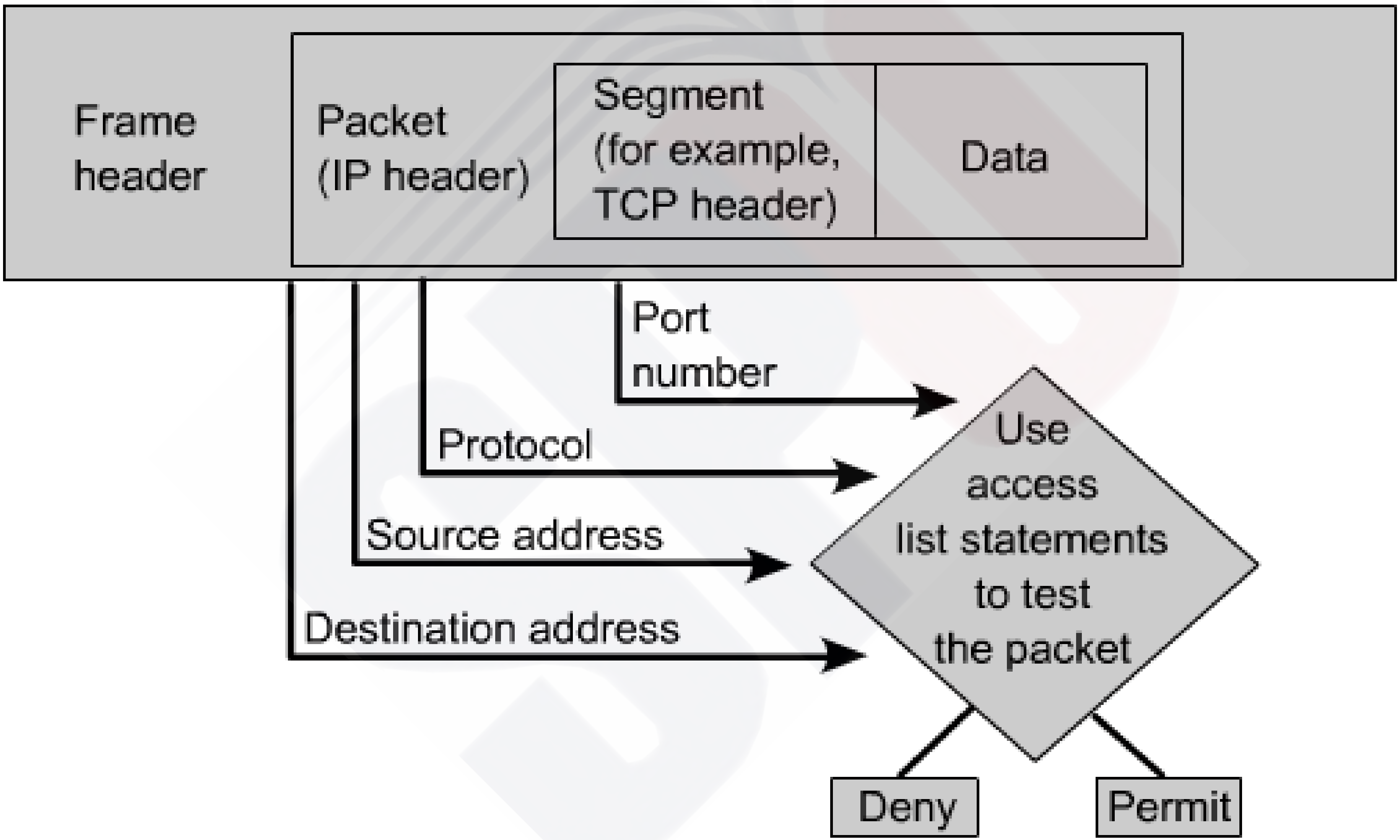
Allow an administrator to control what areas a client can access on a network.

If ACLs are not configured on the router, all packets passing through the router will be allowed onto all parts of the network.

ACLs Filter Traffic Graphic



How ACLs Filter Traffic

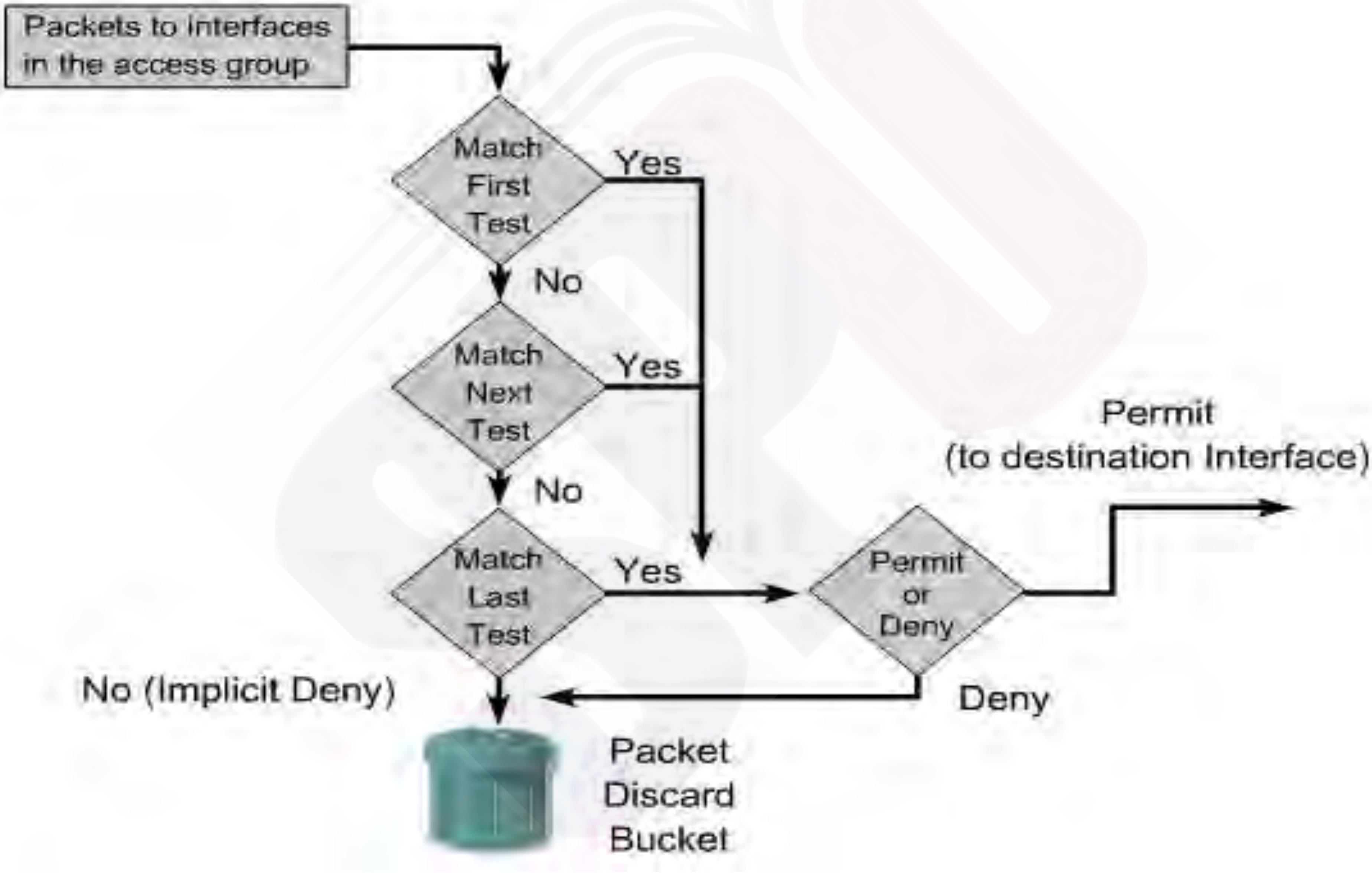


One List per Port, per Destination, per Protocol...

One list, per port, per direction, per protocol

With two interfaces and three protocols running, this router could have a total of 12 separate ACLs applied.

How ACLs work.



Creating ACLs

ACLs are created in the global configuration mode. There are many different types of ACLs including standard, extended, IPX, AppleTalk, and others. When configuring ACLs on a router, each ACL must be uniquely identified by assigning a number to it. This number identifies the type of access list created and must fall within the specific range of numbers that is valid for that type of list.

Protocol	Range
IP	1-99
Extended IP	100-199
AppleTalk	600-699
IPX	800-899
Extended IPX	900-999
IPX Service Advertising Protocol	1000-1099

Since IP is by far the most popular routed protocol, addition ACL numbers have been added to newer router IOSs.

Standard IP: 1300-1999

Extended IP: 2000-2699

The access-list command

Define the ACL by using the following command:

```
Router(config)#access-list access-list-number
  {permit | deny} {test-conditions}
```

The ip access-group **command**

Next, you need to apply ACLs to an interface by using the **`access-group`** command, as in this example:

`Router(config-if)#{`*`protocol`*`}` **`access-group`** *`access-list-number`* { **in** | **out** }

All the ACL statements identified by *`access-list-number`* are associated with one or more interfaces. Any packets that pass the ACL test conditions can be permitted to use any interface in the access group of interfaces.

ACL Example

```
Router(config)#
access-list 2 deny   172.16.1.1
access-list 2 permit 172.16.1.0  0.0.0.255
access-list 2 deny   172.16.0.0  0.0.255.255
access-list 2 permit 172.0.0.0   0.255.255.255
interface ethernet 0
  ip access-group 2 in
```

Wildcard Mask Examples

5 Examples follow that demonstrate how a wildcard mask can be used to permit or deny certain IP addresses, or IP address ranges.

While subnet masks start with binary 1s and end with binary 0s, wildcard masks are the reverse meaning they typically start with binary 0s and end with binary 1s.

In the examples we represent the binary 1s in the wilcard masks with Xs to focus on the specific bits being shown in each example.

You will see that while subnet masks were ANDed with ip addresses, wildcard masks are ORed with IP addresses.

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Wildcard Mask Example #1

Access-list 1 permit 172.16.0.0   0.0.255.255

IP Address	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0
Wildcard mask	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	X X X X X X X X	X X X X X X X X
Match Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X X

Incoming Packet 172.18.4.2

IP Address	1 0 1 0 1 1 0 0	0 0 0 1 0 0 1 0	0 0 0 0 0 1 0 0	0 0 0 0 0 0 1 0
Wildcard mask	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	X X X X X X X X	X X X X X X X X
Match Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 1 0	X X X X X X X X	X X X X X X X X

Compares To

Match Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X X

No Match—Packet Rejected

In this case, the two values do not match. In the comparison the second bit in the second octet of the two match values are different. This causes the packet to be rejected since it doesn't match.

Wildcard Mask Example #2

Access-list 1 permit 172.16.0.0   0.0.255.255

IP Address	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0
Wildcard mask	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	X X X X X X X X	X X X X X X X X
Match Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X X

Incoming Packet 172.16.4.2

IP Address	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	0 0 0 0 0 1 0 0	0 0 0 0 0 0 1 0
Wildcard mask	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	X X X X X X X X	X X X X X X X X
Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X X
Compares To				
Match Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X X

Match—Packet Permitted

In this case, the two values match and the packet is permitted.

Wildcard Mask Example #3

Access-list 1 permit 172.16.0.0 0.0.255.254

IP Address	10101100	00010000	00000000	00000000
Wildcard mask	00000000	00000000	XXXXXXXX	XXXXXXX0
Match Value	10101100	00010000	XXXXXXXX	XXXXXXX0

Incoming Packet 172.16.4.1

IP Address	10101100	00010000	00000100	00000001
Wildcard mask	00000000	00000000	XXXXXXXX	XXXXXXXX
Value	10101100	00010000	XXXXXXXX	XXXXXXX1

Compares To

Match Value	10101100	00010000	XXXXXXXX	XXXXXXX0

No Match—Packet Rejected

For this comparison the left most 16 bits match, but the rightmost bit does not. This causes the packet to be rejected. Remember that the match comparison must be an exact match.

Wildcard Mask Example #4 - Even IPs

Access-list 1 permit 172.16.0.0 0.0.255.254

IP Address	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0
Wildcard mask	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	X X X X X X X X	X X X X X X X 0
Match Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X 0

Incoming Packet 172.16.4.2

IP Address	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	0 0 0 0 0 1 0 0	0 0 0 0 0 0 1 0
Wildcard mask	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	X X X X X X X X	X X X X X X X X
Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X 0

Compares To

Match Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X 0

Match—Packet Permitted

With an even address the last bit position will always be zero. Since the composite value and the match value are the same the packet is accepted by the router. A question, how would the ACL statement above be changed to allow only the odd hosts in the address range of 172.16.0.0 to 172.16.255.255.

Wildcard Mask Example #5 - Odd IP#s

Access-list 1 permit 172.16.0.1 0.0.255.254

IP Address	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 1
Wildcard mask	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	X X X X X X X X	X X X X X X X 0
Match Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X 1

Incoming Packet 172.16.4.1

IP Address	1 0 1 0 1 1 0 0	0 0 0 1 0 0 1 0	0 0 0 0 0 1 0 0	0 0 0 0 0 0 0 1
Wildcard mask	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0	X X X X X X X X	X X X X X X X 0
Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X 1

Compares To

Match Value	1 0 1 0 1 1 0 0	0 0 0 1 0 0 0 0	X X X X X X X X	X X X X X X X 1

Match—Packet Permitted

You permit only the odd addresses by just changing the IP address in the ACL statement to an odd number. This sets the right most bit to a one and only odd numbers will have that position be a one.

The any **and** host **Keywords**

```
Router(config)#access-list 1 permit 0.0.0.0 255.255.255.255
```

Can be written as:

```
Router(config)#access-list 1 permit any
```

```
Router(config)#access-list 1 permit 172.30.16.29 0.0.0.0
```

Can be written as:

```
Router(config)#access-list 1 permit host 172.30.16.29
```

This is the format of the any and host optional keywords in an ACL statement.

Verifying ACLs

There are many **show** commands that will verify the content and placement of ACLs on the router.

The **show ip interface** command displays IP interface information and indicates whether any ACLs are set.

The **show access-lists** command displays the contents of all ACLs on the router.

show access-list 1 shows just access-list 1.

The **show running-config** command will also reveal the access lists on a router and the interface assignment information.

Standard ACLs

Standard ACLs check the source address of IP packets that are routed.

The comparison will result in either permit or deny access for an entire protocol suite, based on the network, subnet, and host addresses.

The standard version of the **access-list** global configuration command is used to define a standard ACL with a number in the range of 1 to 99 (also from 1300 to 1999 in recent IOS).

If there is no wildcard mask. the default mask is used, which is 0.0.0.0.
(This only works with Standard ACLs and is the same thing as using **host**.)

The full syntax of the standard ACL command is:

Router(config)#**access-list** *access-list-number* {deny | permit} source [*source-wildcard*] [**log**]

The no form of this command is used to remove a standard ACL. This is the syntax:
Router(config)#**no access-list** *access-list-number*

Extended ACLs

Extended ACLs are used more often than standard ACLs because they provide a greater range of control.   Extended ACLs check the source and destination packet addresses as well as being able to check for protocols and port numbers.

The syntax for the extended ACL statement can get very long and often will wrap in the terminal window.

The wildcards also have the option of using the **host** or **any** keywords in the command.

At the end of the extended ACL statement, additional precision is gained from a field that specifies the optional Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) port number.

Logical operations may be specified such as, equal (eq), not equal (neq), greater than (gt), and less than (lt), that the extended ACL will perform on specific protocols.

Extended ACLs use an access-list-number in the range 100 to 199 (also from 2000 to 2699 in recent IOS).

Extended ACL Syntax

```
Router(config)#access-list access-list-number {permit | deny}
protocol source
[source-mask destination destination-mask operator operand]
[established]
```

Paramter	Description
access-list-number	Identifies the list using a number in the range 100 to 199.
permit | deny	Indicates whether this entry allows or blocks the specified address.
protocol	The protocol, such as IP, TCP, UDP, ICMP, GRE, or IGRP.
source and **destination**	Identifies source and destination addresses.
source-mask and *destination-mask*	Wildcard mask; zeros indicate positions that must match, ones indicate do not care positions.
operator operand	lt, gt, eq, neq (less than, greater than, equal, not equal), and a port number.
established	Allows TCP traffic to pass if the packet uses an established connection (for example, has ACK bits set).

Extended ACL Example

This extended ACL will allow people in network 200.100.50.0 to surfing the internet, but not allow any other protocols like email, ftp, etc.

access-list 101 permit tcp 200.100.50.0 0.0.0.255 any eq 80

or

access-list 101 permit tcp 200.100.50.0 0.0.0.255 any eq www

or

access-list 101 permit tcp 200.100.50.0 0.0.0.255 any eq http

NOTE: Just like all Standard ACLs end with an implicit "deny any", all Extended ACLs end with an implicit "deny ip any any" which means deny the entire internet from anywhere to anywhere.

ip access-group

The **ip access-group** command links an existing standard or extended ACL to an interface.

Remember that only one ACL per interface, per direction, per protocol is allowed.

The format of the command is:

```
Router(config-if)#ip access-group
access-list-number {in | out}
```

Named ACLs

IP named ACLs were introduced in Cisco IOS Software Release 11.2, allowing standard and extended ACLs to be given names instead of numbers.

The advantages that a named access list provides are:

- Intuitively identify an ACL using an alphanumeric name.
- Eliminate the limit of 798 simple and 799 extended ACLs
- Named ACLs provide the ability to modify ACLs without deleting them completely and then reconfiguring them.

Named ACLs are not compatible with Cisco IOS releases prior to Release 11.2.

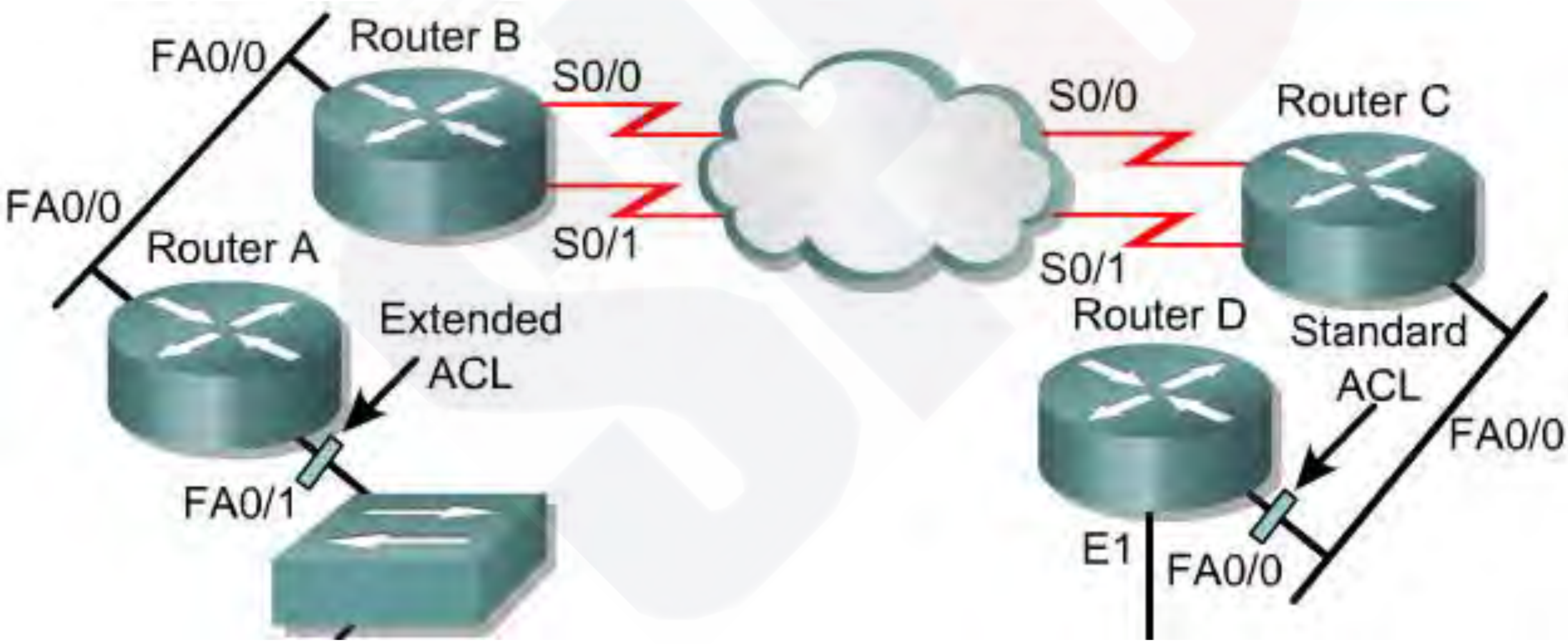
The same name may not be used for multiple ACLs.

Named ACL Example

```
Rt1(config)#ip access-list extended server-access
Rt1(config-ext-nacl)#permit TCP any host 131.108.101.99 eq
smtp
Rt1(config-ext-nacl)#permit UDP any host 131.108.101.99 eq
domain
Rt1(config-ext-nacl)#deny ip any any log
Rt1(config-ext-nacl)#^Z
Applying the named list:
Rt1(config)#interface fastethernet 0/0
Rt1(config-if)#ip access-group server-access out
Rt1(config-if)#^Z
```

Placing ACLs

The general rule is to put the extended ACLs as close as possible to the source of the traffic denied. Standard ACLs do not specify destination addresses, so they should be placed as close to the destination as possible. For example, in the graphic a standard ACL should be placed on Fa0/0 of Router D to prevent traffic from Router A.



Standard ACLS: Permitting/Denying Hosts, Networks and Subnets

Permitting a Single Host

Router(config)# **access-list 1 permit 200.100.50.23 0.0.0.0**

or

Router(config)# **access-list 1 permit host 200.100.50.23**

or

Router(config)# **access-list 1 permit 200.100.50.23**

(The implicit “deny any” ensures that everyone else is denied.)

Router(config)# **int e0**

Router(config-if)# **ip access-group 1 in**

or

Router(config-if)# **ip access-group 1 out**

Denying a Single Host

Router(config)# **access-list 1 deny 200.100.50.23 0.0.0.0**
Router(config)# **access-list 1 permit 0.0.0.0 255.255.255.255**
or
Router(config)# **access-list 1 deny host 200.100.50.23**
Router(config)# **access-list 1 permit any**

(The implicit "deny any" is still present, but totally irrelevant.)

Router(config)# **int e0**
Router(config-if)# **ip access-group 1 in**
or
Router(config-if)# **ip access-group 1 out**

Permitting a Single Network

<u>Class C</u>

Router(config)# **access-list 1 permit 200.100.50.0 0.0.0.255**

or

<u>Class B</u>

Router(config)# **access-list 1 permit 150.75.0.0 0.0.255.255**

or

<u>Class A</u>

Router(config)# **access-list 1 permit 13.0.0.0 0.255.255.255**

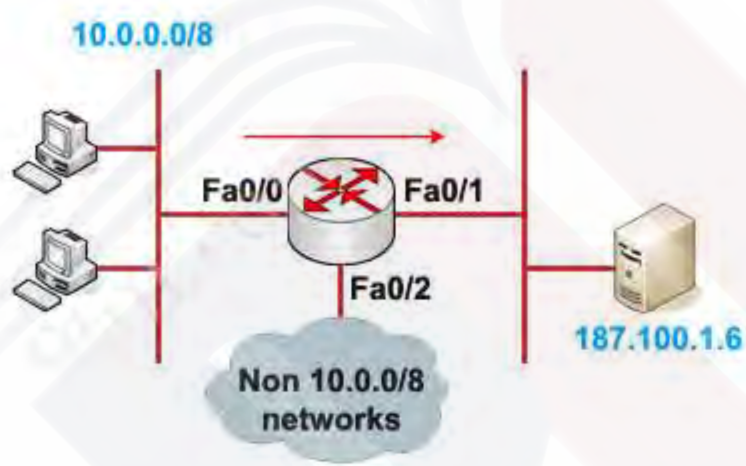
(The implicit "deny any" ensures that everyone else is denied.)

Router(config)# **int e0**

Router(config-if)# **ip access-group 1 in**

or

Router(config-if)# **ip access-group 1 out**



Configuration:

In this example we will define a standard access list that will only allow network 10.0.0.0/8 to access the server (located on the Fa0/1 interface)

Define which source is allowed to pass:

Router(config)#**access-list 1 permit 10.0.0.0 0.255.255.255**

(there is always an implicit deny all other traffic at the end of each ACL so we don't need to define forbidden traffic)

Apply this ACL to an interface:

Router(config)#**interface Fa0/1**

Router(config-if)#**ip access-group 1 out**

Denying a Single Network

Class C

Router(config)# **access-list 1 deny 200.100.50.0 0.0.0.255**

Router(config)# **access-list 1 permit any**

or

Class B

Router(config)# **access-list 1 deny 150.75.0.0 0.0.255.255**

Router(config)# **access-list 1 permit any**

or

Class A

Router(config)# **access-list 1 deny 13.0.0.0 0.255.255.255**

Router(config)# **access-list 1 permit any**

(The implicit "deny any" is still present, but totally irrelevant.)

Permitting a Class C Subnet

200.100.50.0/28 Network Address/Subnet Mask:

3rd Desired Subnet:

Process:

2^4 = 16 32-28=4

1st Usable Subnet address range it 200.100.50.16-31

2nd Usable Subnet address range it 200.100.50.32-47

3rd Usable Subnet address range it 200.100.50.48-63

Inverse Mask is 0.0.0.15 Subnet Mask is 255.255.255.240

or subtract 200.100.50.48 from 200.100.50.63 to get 0.0.0.15

Router(config)# **access-list 1 permit 200.100.50.48 0.0.0.15**

(The implicit “deny any” ensures that everyone else is denied.)

Denying a Class C Subnet

192.68.72.0/27 Network Address/Subnet Mask:

2nd Undesired Subnet:

Process:

2^5=32 32-27=5

1st Usable Subnet address range it 192.68.72.32-63

2nd Usable Subnet address range it 192.68.72.64-95

Inverse Mask is 0.0.0.31 Subnet Mask is 255.255.255.224

or subtract 192.68.72.64 from 192.68.72.95 to get 0.0.0.31

Router(config)# **access-list 1 deny 192.68.72.64 0.0.0.31**

Router(config)# **access-list 1 permit any**

(The implicit “deny any” is still present, but totally irrelevant.)

Permitting a Class B Subnet

150.75.0.0/24 Network Address/Subnet Mask:
129th Desired Subnet:

Process:
Since exactly 8 bits are borrowed the 3rd octet will denote the subnet number.
129th Usable Subnet address range it 150.75.129.0-255

Inverse Mask is 0.0.0.255 Subnet Mask is 255.255.255.0
or subtract 150.75.129.0 from 150.75.129.255 to get 0.0.0.255

Router(config)# **access-list 1 permit 150.75.129.0 0.0.0.255**

(The implicit "deny any" ensures that everyone else is denied.)

Denying a Class B Subnet

160.88.0.0/22 Network Address/Subnet Mask:
50th Undesired Subnet:

Process:
32-22=10 (more than 1 octet) 10-8=2 2^2=4
1st Usable Subnet address range it 160.88.4.0-160.88.7.255
2nd Usable Subnet address range it 160.88.8.0-160.88.11.255

50 * 4 = 200 50th subnet is 160.88.200.0-160.88.203.255

Inverse Mask is 0.0.3.255 Subnet Mask is 255.255.252.0
or subtract 160.88.200.0 from 160.88.203.255 to get 0.0.3.255

Router(config)# **access-list 1 deny 160.88.200.0 0.0.3.255**
Router(config)# **access-list 1 permit any**

Permitting a Class A Subnet

111.0.0.0/12 Network Address/Subnet Mask:

13th Desired Subnet:

Process:

20-16=4 2^4=16 32-12=20

1st Usable Subnet address range is 111.16.0.0-111.31.255.255

13*16=208

13th Usable Subnet address range is 111.208.0.0-111.223.255.255

Subnet Mask is 255.240.0.0 Inverse Mask is 0.15.255.255

or subtract 111.208.0.0 from 111.223.255.255 to get 0.15.255.255

Router(config)# **access-list 1 permit 111.208.0.0 0.15.255.255**

(The implicit “deny any” ensures that everyone else is denied.)

Denying a Class A Subnet

40.0.0.0/24 Network Address/Subnet Mask:
500th Undesired Subnet:

Process:
Since exactly 16 bits were borrowed the 2nd and 3rd octet will denote the subnet.

1st Usable Subnet address range is 40.0.1.0-40.0.1.255
255th Usable Subnet address range is 40.0.255.0-40.0.255.255
256th Usable Subnet address range is 40.1.0.0-40.1.0.255
300th Usable Subnet address range is 40.1.44.0-40.1.44.255
500th Usable Subnet address range is 40.1.244.0-40.1.244.255

Router(config)# **access-list 1 deny 40.1.244.0 0 0.0.0.255**
Router(config)# **access-list 1 permit any**

Standard ACLS: Permitting/Denying Ranges of Addresses that cross subnets.

Permit 200.100.50.24-100 Plan A

access-list 1 permit host 200.100.50.24

access-list 1 permit host 200.100.50.25

access-list 1 permit host 200.100.50.26

access-list 1 permit host 200.100.50.27

access-list 1 permit host 200.100.50.28

: : : : : : :

access-list 1 permit host 200.100.50.96

access-list 1 permit host 200.100.50.97

access-list 1 permit host 200.100.50.98

access-list 1 permit host 200.100.50.99

access-list 1 permit host 200.100.50.100

This would get very tedious!

Permit 200.100.50.24-100 Plan B

(24-31) **access-list 1 permit 200.100.50.24 0.0.0.7**

(32-63) **access-list 1 permit 200.100.50.32 0.0.0.31**

(64-95) **access-list 1 permit 200.100.50.64 0.0.0.31**

(96-99) **access-list 1 permit 200.100.50.96 0.0.0.3**

(100) **access-list 1 permit host 200.100.50.100**

(The implicit "deny any" ensures that everyone else is denied.)

Permit 200.100.50.16-127 Plan A

(16-31) **access-list 1 permit 200.100.50.16 0.0.0.15**

(32-63) **access-list 1 permit 200.100.50.32 0.0.0.31**

(64-127) **access-list 1 permit 200.100.50.64 0.0.0.63**

(The implicit "deny any" ensures that everyone else is denied.)

Permit 200.100.50.16-127 Plan B

(0-15) **access-list 1 deny 200.100.50.0 0.0.0.15**

(0-127) **access-list 1 permit 200.100.50.0 0.0.0.127**

First we make sure that addresses 0-15 are denied.

Then we can permit any address in the range 0-127.

Since only the first matching statement in an ACL is applied an address in the range of 0-15 will be denied by the first statement before it has a chance to be permitted by the second.

(The implicit “deny any” ensures that everyone else is denied.)

Permit 200.100.50.1,5,13,29,42,77

access-list 1 permit host 200.100.50.1

access-list 1 permit host 200.100.50.5

access-list 1 permit host 200.100.50.13

access-list 1 permit host 200.100.50.29

access-list 1 permit host 200.100.50.42

access-list 1 permit host 200.100.50.77

Sometimes a group of addresses has no pattern and the best way to deal with them is individually.

(The implicit "deny any" ensures that everyone else is denied.)

Extended ACLS: Permitting/Denying Source Addresses, Destination Addresses, and Protocols

Permit Source Network

access-list 101 permit ip 200.100.50.0 0.0.0.255 0.0.0.0 255.255.255.255

or

access-list 101 permit ip 200.100.50.0 0.0.0.255 any

Implicit deny ip any any

Deny Source Network

access-list 101 deny ip 200.100.50.0 0.0.0.255 0.0.0.0 255.255.255.255

access-list 101 permit ip 0.0.0.0 255.255.255.255 0.0.0.0 255.255.255.255

or

access-list 101 deny ip 200.100.50.0 0.0.0.255 any
access-list 101 permit ip any any

Implicit deny ip any any is present but irrelevant.

Permit Destination Network

access-list 101 permit ip 0.0.0.0 255.255.255.255
200.100.50.0 0.0.0.255

or

access-list 101 permit ip any 200.100.50.0 0.0.0.255

Implicit deny ip any any

Deny Destination Network

access-list 101 deny ip 0.0.0.0 255.255.255.255
200.100.50.0 0.0.0.255

access-list 101 permit ip 0.0.0.0 255.255.255.255 0.0.0.0
255.255.255.255

or

access-list 101 deny ip any 200.100.50.0 0.0.0.255
access-list 101 permit ip any any

Implicit deny ip any any is present but irrelevant.

Permit one Source Network to another Destination Network

Assume the only traffic you want is traffic from network 200.100.50.0 to network 150.75.0.0

access-list 101 permit ip 200.100.50.0 0.0.0.255 150.75.0.0 0.0.255.255

Implicit deny ip any any

To allow 2 way traffic between the networks add this statement:

access-list 101 permit ip 150.75.0.0 0.0.255.255 200.100.50.0 0.0.0.255

Deny one Source Network to another Destination Network

Assume you want to allow all traffic EXCEPT from network 200.100.50.0 to network 150.75.0.0

access-list 101 deny ip 200.100.50.0 0.0.0.255 150.75.0.0 0.0.255.255

access-list 101 permit ip any any

To deny 2 way traffic between the networks add this statement:

access-list 101 deny ip 150.75.0.0 0.0.255.255 200.100.50.0 0.0.0.255

Deny FTP

Assume you do not want anyone FTPing on the network.

access-list 101 deny tcp any any eq 21

access-list 101 permit ip any any

or

access-list 101 deny tcp any any eq ftp

access-list 101 permit ip any any

Deny Telnet

Assume you do not want anyone telnetting on the network.

access-list 101 deny tcp any any eq 23

access-list 101 permit ip any any

or

access-list 101 deny tcp any any eq telnet

access-list 101 permit ip any any

Deny Web Surfing

Assume you do not want anyone surfing the internet.

access-list 101 deny tcp any any eq 80

access-list 101 permit ip any any

or

access-list 101 deny tcp any any eq www

access-list 101 permit ip any any

You can also use <u>http</u> instead of <u>www</u>.

Complicated Example #1

Suppose you have the following conditions:

- No one from Network 200.100.50.0 is allowed to FTP anywhere
- Only hosts from network 150.75.0.0 may telnet to network 50.0.0.0
- Subnetwork 100.100.100.0/24 is not allowed to surf the internet

access-list 101 deny tcp 200.100.50.0 0.0.0.255 any eq 21

access-list 101 permit tcp 150.75.0.0 0.0.255.255 50.0.0.0 0.255.255.255 eq 23

access-list 101 deny tcp any any eq 23

access-list 101 deny tcp 100.100.100.0 0.0.0.255 any eq 80

access-list 101 permit ip any any

Complicated Example #2

Suppose you are the admin of network 200.100.50.0. You want to permit Email only between your network and network 150.75.0.0. You wish to place no restriction on other protocols like web surfing, ftp, telnet, etc.

Email server send/receive Protocol: SMTP, port 25 •

User Check Email Protocol: POP3, port 110 •

This example assumes the your Email server is at addresses 200.100.50.25

access-list 101 permit tcp 200.100.50.0 0.0.0.255 150.75.0.0 0.0.255.255 eq 25

access-list 101 permit tcp 150.75.0.0 0.0.255.255 200.100.50.0 0.0.0.255 eq 25

access-list 101 permit tcp 200.100.50.0 0.0.0.255 200.100.50.0 0.0.0.255 eq 110

access-list 101 deny tcp any any smtp

access-list 101 deny tcp any any pop3

access-list 101 permit ip any any