

## Assignment 1

### Network commands


#### 1. Ping Command

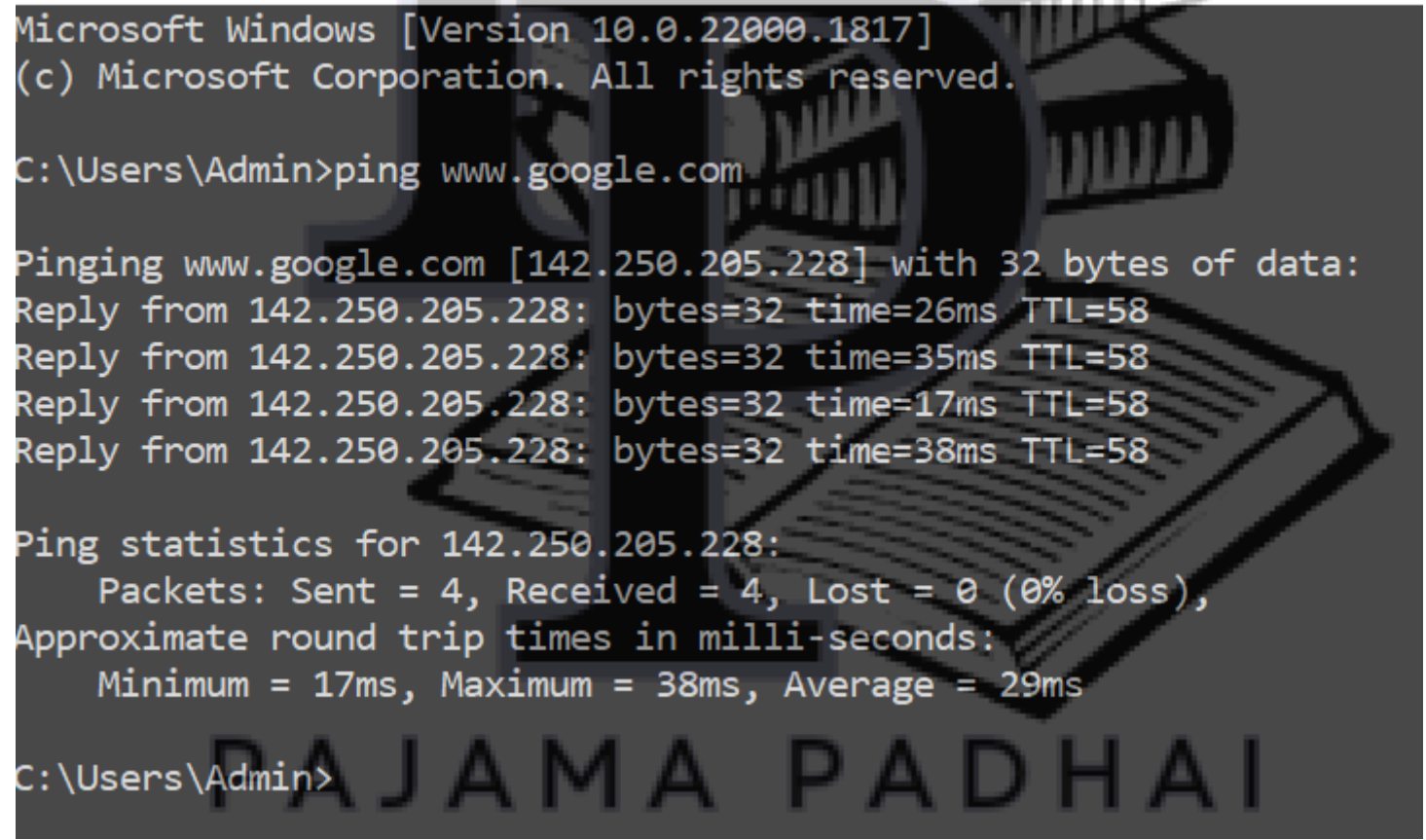
The ping command is one of the most often used networking utilities for detecting devices on a network and for troubleshooting network problems.

The general format is **ping hostname** or **ping IPaddress**.

Example

**ping www.google.com** or **ping 216.58.208.68**

 Command Prompt



```
Microsoft Windows [Version 10.0.22000.1817]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin>ping www.google.com

Pinging www.google.com [142.250.205.228] with 32 bytes of data:
Reply from 142.250.205.228: bytes=32 time=26ms TTL=58
Reply from 142.250.205.228: bytes=32 time=35ms TTL=58
Reply from 142.250.205.228: bytes=32 time=17ms TTL=58
Reply from 142.250.205.228: bytes=32 time=38ms TTL=58

Ping statistics for 142.250.205.228:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 17ms, Maximum = 38ms, Average = 29ms

C:\Users\Admin>
```

#### 2. ipconfig Command

Another indispensable and frequently used utility that is used for finding network information about your local machine like IP addresses, DNS addresses etc

**Basic Use: Finding Your IP Address and Default Gateway**

```
C:\Users\Admin>ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::ae87:c020:71:abf4%16
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 

Wireless LAN adapter Local Area Connection* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Wireless LAN adapter Local Area Connection* 10:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . : 

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::3f32:d4a4:48a7:9ba%15
    IPv4 Address. . . . . : 172.16.120.34
    Subnet Mask . . . . . : 255.255.248.0
    Default Gateway . . . . . : 172.16.120.1

C:\Users\Admin>_
```

### 3. Hostname Command

A very simple command that displays the host name of your machine. This is much quicker than going to the control **panel>system** route.

```
C:\Users\Admin>hostname
DESKTOP-K10SJ9U

C:\Users\Admin>_
```

### 4. getmac Command

Another very simple command that shows the MAC address of your network interfaces

```
C:\Users\Admin>getmac

Physical Address      Transport Name
=====
90-32-4B-90-05-B1    \Device\Tcpip_{D4C8753C-954F-499F-BA19-3517C89D7D51}
0A-00-27-00-00-10    \Device\Tcpip_{E9030EC2-ED9D-4468-A0B8-3FC982EB4911}

C:\Users\Admin>_
```

### 5. arp Command

This is used for showing the **address resolution cache**. This command must be used with a command line switch **arp - a** is the most common.

C:\Users\Admin>arp -a

Interface: 172.16.120.34 --- 0xf

Internet Address	Physical Address	Type
172.16.120.1	c8-cb-b8-d4-5e-c9	dynamic
172.16.120.94	00-e9-3a-de-08-71	dynamic
172.16.120.99	dc-21-48-bd-40-1b	dynamic
172.16.120.127	58-96-1d-18-4b-e7	dynamic
172.16.120.143	cc-6b-1e-98-54-63	dynamic
172.16.122.89	00-e9-3a-d3-ad-fd	dynamic
172.16.122.183	34-6f-24-e2-22-9d	dynamic
172.16.123.78	34-6f-24-2b-86-73	dynamic
172.16.123.95	80-b6-55-ee-bb-73	dynamic
172.16.123.193	e0-2b-e9-2b-ce-a6	dynamic
172.16.124.134	dc-21-5c-3e-8e-4c	dynamic
172.16.124.157	28-cd-c4-c6-1b-9d	dynamic
172.16.124.159	ec-63-d7-db-f8-17	dynamic
172.16.125.40	cc-6b-1e-46-99-63	dynamic
172.16.125.146	ec-2e-98-e0-fe-27	dynamic
172.16.125.208	84-1b-77-19-d3-40	dynamic
172.16.125.227	c8-94-02-a8-50-75	dynamic
172.16.125.245	c8-b2-9b-0e-b2-b7	dynamic
172.16.127.239	c4-23-60-ae-0e-02	dynamic
172.16.127.255	ff-ff-ff-ff-ff-ff	static
224.0.0.22	01-00-5e-00-00-16	static
224.0.0.251	01-00-5e-00-00-fb	static
224.0.0.252	01-00-5e-00-00-fc	static
239.255.255.250	01-00-5e-7f-ff-fa	static
255.255.255.255	ff-ff-ff-ff-ff-ff	static

Interface: 192.168.56.1 --- 0x10

Internet Address	Physical Address	Type
192.168.56.255	ff-ff-ff-ff-ff-ff	static
224.0.0.22	01-00-5e-00-00-16	static
224.0.0.251	01-00-5e-00-00-fb	static
224.0.0.252	01-00-5e-00-00-fc	static
239.255.255.250	01-00-5e-7f-ff-fa	static

C:\Users\Admin>

## 6. NSlookup

Used for checking DNS record entries.

```
C:\Users\Admin>NSlookup
Default Server:  UnKnown
Address:  172.16.120.1
```

## 7. Nbtstat

Diagnostic tool for troubleshooting netBIOS problems.

```
C:\Users\Admin>Nbtstat
```

Displays protocol statistics and current TCP/IP connections using NBT (NetBIOS over TCP/IP).

```
NBTSTAT [ [-a RemoteName] [-A IP address] [-c] [-n]
          [-r] [-R] [-RR] [-s] [-S] [interval] ]
```

-a (adapter status) Lists the remote machine's name table given its name  
-A (Adapter status) Lists the remote machine's name table given its IP address.  
-c (cache) Lists NBT's cache of remote [machine] names and their IP addresses  
-n (names) Lists local NetBIOS names.  
-r (resolved) Lists names resolved by broadcast and via WINS  
-R (Reload) Purges and reloads the remote cache name table  
-S (Sessions) Lists sessions table with the destination IP addresses  
-s (sessions) Lists sessions table converting destination IP addresses to computer NETBIOS names.  
-RR (ReleaseRefresh) Sends Name Release packets to WINS and then, starts Refresh

RemoteName Remote host machine name.  
IP address Dotted decimal representation of the IP address.  
interval Redisplays selected statistics, pausing interval seconds between each display. Press Ctrl+C to stop redisplaying statistics.

## 8. Netstat Command

Used for displaying information about tcp and udp connections and ports.

```
C:\Users\Admin>Netstat
```

Active Connections

Proto	Local Address	Foreign Address	State
TCP	127.0.0.1:49673	DESKTOP-K10SJ9U:49674	ESTABLISHED
TCP	127.0.0.1:49674	DESKTOP-K10SJ9U:49673	ESTABLISHED
TCP	127.0.0.1:49675	DESKTOP-K10SJ9U:49676	ESTABLISHED
TCP	127.0.0.1:49676	DESKTOP-K10SJ9U:49675	ESTABLISHED

## 9. net statistics

Use the net statistics command to show the network statistics log for the *Server* or *Workstation* service.

```
C:\Users\Admin>net statistics
```

Statistics are available for the following running services:

Workstation

The command completed successfully.

### 10. net user

The net user command is used to add, delete, and otherwise manage the users on a computer.

```
C:\Users\Admin>net user

User accounts for \\DESKTOP-K10SJ9U

-----
Admin                Administrator          DefaultAccount
Guest                WDAGUtilityAccount
The command completed successfully.
```

### 11. net accounts

The net accounts command is used to set password and logon requirements for users. For example, the net accounts command can be used to set the minimum number of characters that users can set their password to. Also supported is password expiration, minimum number of days before a user can change their password again, and the unique password count before the user can use the same old password.

```
C:\Users\Admin>net accounts
Force user logoff how long after time expires?:      Never
Minimum password age (days):                        0
Maximum password age (days):                        42
Minimum password length:                             0
Length of password history maintained:               None
Lockout threshold:                                   Never
Lockout duration (minutes):                          30
Lockout observation window (minutes):                 30
Computer role:                                       WORKSTATION
The command completed successfully.
```

### 12. net config

Use the net config command to show information about the configuration of the *Server* or *Workstation* service.

```
C:\Users\Admin>net config
The following running services can be controlled:

Server
Workstation

PAJAMA PADHAI

The command completed successfully.
```

### 13. net start

Executing the net start command without any options following it (e.g., net start "print spooler") is useful if you want to see a list of currently running services. This list can be helpful when managing services because you don't have to leave the command line to see which services are running.



```
Command Prompt
Microsoft Windows [Version 10.0.22000.1817]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin>net start
These Windows services are started:

Application Information
AppX Deployment Service (AppXSVC)
AVCTP service
Background Tasks Infrastructure Service
Base Filtering Engine
Bluetooth Audio Gateway Service
Bluetooth Support Service
Brightdata Service (win_freesnippingtool.com)
Capability Access Manager Service
Certificate Propagation
Clipboard User Service_dc17a94
CNG Key Isolation
COM+ Event System
Connected Devices Platform Service
Connected Devices Platform User Service_dc17a94
Connected User Experiences and Telemetry
CoreMessaging
Credential Manager
Cryptographic Services
Data Sharing Service
Data Usage
DCOM Server Process Launcher
Delivery Optimization
Device Association Service
DHCP Client
Diagnostic Policy Service
Diagnostic Service Host
Diagnostic System Host
Display Enhancement Service
Display Policy Service
Distributed Link Tracking Client
DNS Client
Function Discovery Provider Host
Function Discovery Resource Publication
```

#### 14. net localgroup

The net localgroup command is used to add, delete, and manage local groups on computers.

```
C:\Users\Admin>net localgroup

Aliases for \\DESKTOP-K10SJ9U

-----

*Administrators
*Device Owners
*Distributed COM Users
*Event Log Readers
*Guests
*Hyper-V Administrators
*IIS_IUSRS
*Performance Log Users
*Performance Monitor Users
*Remote Management Users
*System Managed Accounts Group
*Users

The command completed successfully.
```

#### 15. net share

The net share command is used to create, remove, and otherwise manage shared resources on the computer.

```
C:\Users\Admin>net share
```

Share name	Resource	Remark
-----		
C\$	C:\	Default share
D\$	D:\	Default share
E\$	E:\	Default share
IPC\$		Remote IPC
ADMIN\$	C:\WINDOWS	Remote Admin
The command completed successfully.		

Topology using NS2

Types of Network Topology:

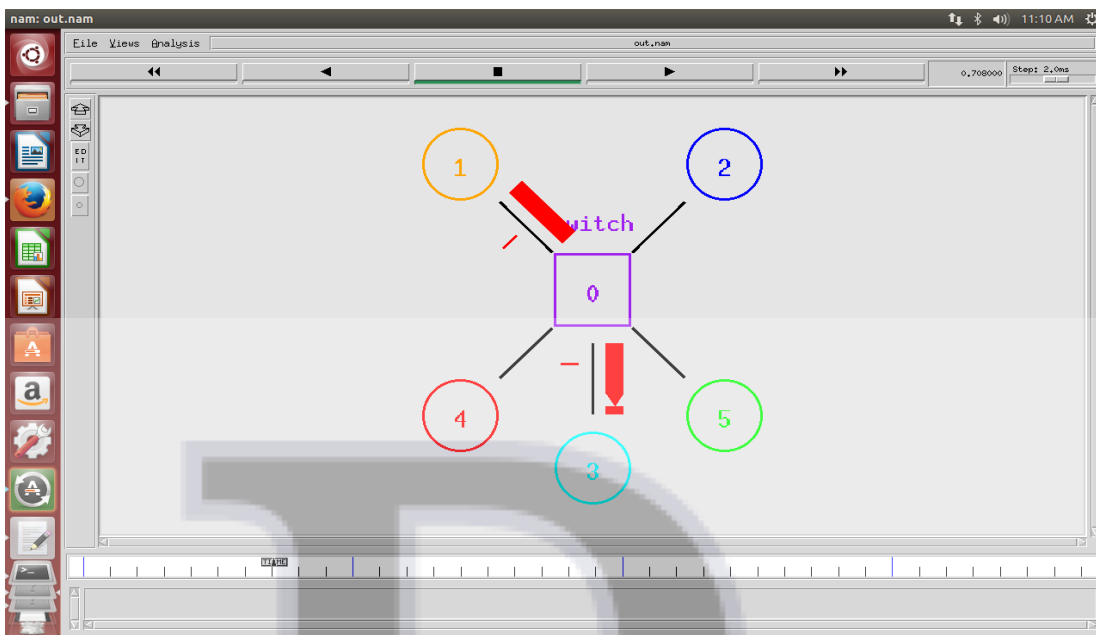
```
1. Star Topology:
# Creating nodes
set ns [new Simulator]
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]

# Creating links
$ns duplex-link $n0 $n1 10Mb 10ms DropTail
$ns duplex-link $n0 $n2 10Mb 10ms DropTail
$ns duplex-link $n0 $n3 10Mb 10ms DropTail
$ns duplex-link $n0 $n4 10Mb 10ms DropTail

# Setting up traffic
set tcp [new Agent/TCP]
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n4 $sink
$ns connect $tcp $sink

# Setting simulation parameters
$ns at 0.1 "$tcp set packetSize_ 1000"
$ns at 0.2 "$tcp send 1000"

# Running the simulation
$ns run
```



## 2. Ring Topology:

### # Creating nodes

```
set ns [new Simulator]
```

```
set n0 [$ns node]
```

```
set n1 [$ns node]
```

```
set n2 [$ns node]
```

```
set n3 [$ns node]
```

```
set n4 [$ns node]
```

### # Creating links

```
$ns duplex-link $n0 $n1 10Mb 10ms DropTail
```

```
$ns duplex-link $n1 $n2 10Mb 10ms DropTail
```

```
$ns duplex-link $n2 $n3 10Mb 10ms DropTail
```

```
$ns duplex-link $n3 $n4 10Mb 10ms DropTail
```

```
$ns duplex-link $n4 $n0 10Mb 10ms DropTail
```

### # Setting up traffic

```
set tcp [new Agent/TCP]
```

```
$ns attach-agent $n0 $tcp
```

```
set sink [new Agent/TCPSink]
```

```
$ns attach-agent $n2 $sink
```

```
$ns connect $tcp $sink
```

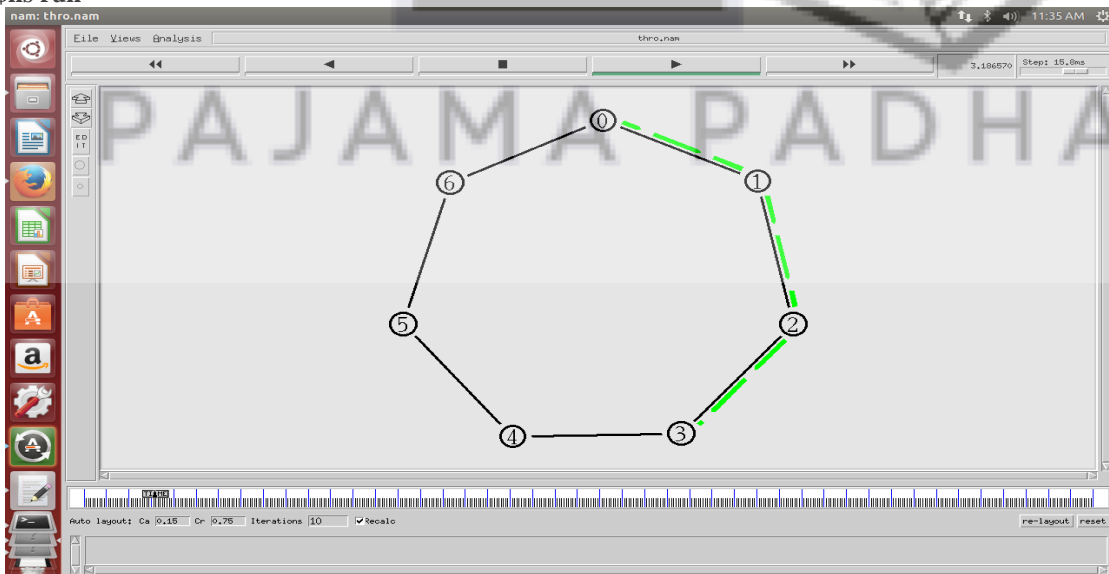
### # Setting simulation parameters

```
$ns at 0.1 "$tcp set packetSize_ 1000"
```

```
$ns at 0.2 "$tcp send 1000"
```

### # Running the simulation

```
$ns run
```





### 3. Bus Topology:

#### # Creating nodes

```
set ns [new Simulator]
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]
```

#### # Creating links

```
$ns duplex-link $n0 $n1 10Mb 10ms DropTail
$ns duplex-link $n1 $n2 10Mb 10ms DropTail
$ns duplex-link $n2 $n3 10Mb 10ms DropTail
$ns duplex-link $n3 $n4 10Mb 10ms DropTail
```

#### # Setting up traffic

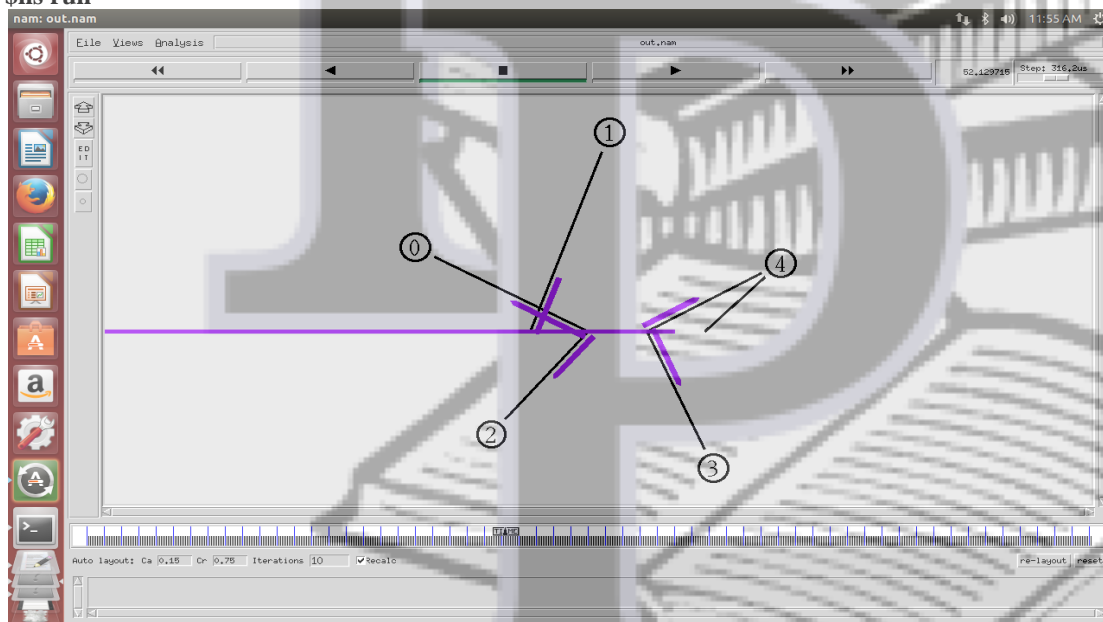
```
set tcp [new Agent/TCP]
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n4 $sink
$ns connect $tcp $sink
```

#### # Setting simulation parameters

```
$ns at 0.1 "$tcp set packetSize_ 1000"
$ns at 0.2 "$tcp send 1000"
```

#### # Running the simulation

```
$ns run
```



### 4. Mesh Topology:

#### # Creating nodes

```
set ns [new Simulator]
set n0 [$ns node]
set n1 [$ns node]
set n2 [$ns node]
set n3 [$ns node]
set n4 [$ns node]
```

#### # Creating links

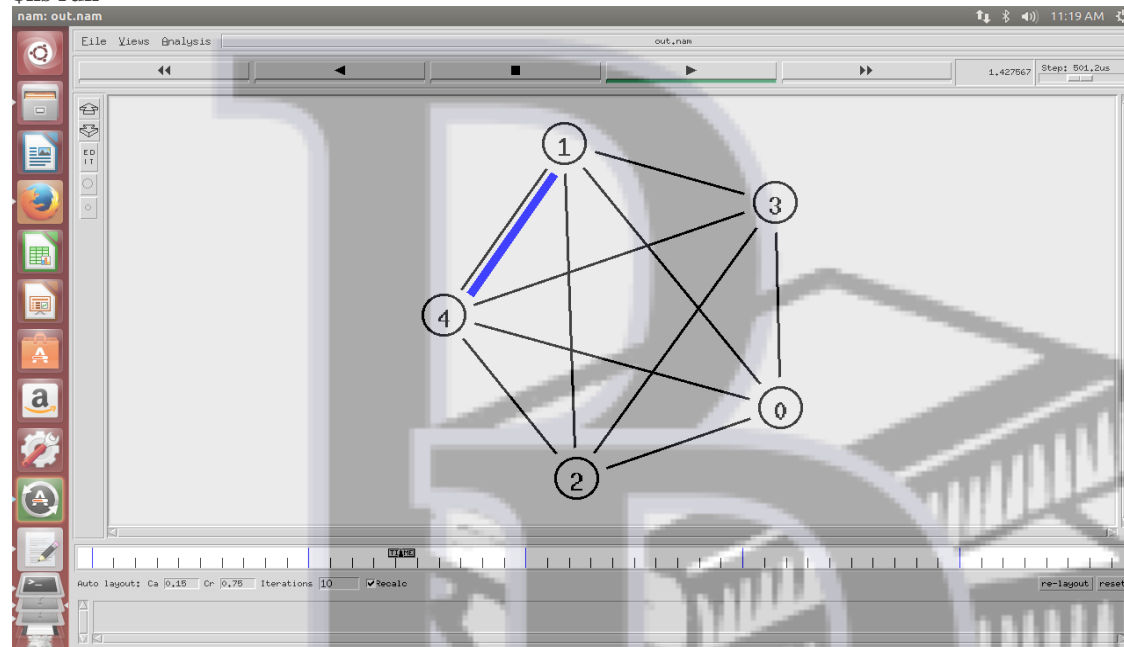
```
$ns duplex-link $n0 $n1 10Mb 10ms DropTail
$ns duplex-link $n0 $n2 10Mb 10ms DropTail
$ns duplex-link $n0 $n3 10Mb 10ms DropTail
$ns duplex-link $n0 $n4 10Mb 10ms DropTail
$ns duplex-link $n1 $n2 10Mb 10ms DropTail
$ns duplex-link $n1 $n3 10Mb 10ms DropTail
$ns duplex-link $n1 $n4 10Mb 10ms DropTail
$ns duplex-link $n2 $n3 10Mb 10ms DropTail
$ns duplex-link $n2 $n4 10Mb 10ms DropTail
$ns duplex-link $n3 $n4 10Mb 10ms DropTail
```

```
# Setting up traffic
set tcp [new Agent/TCP]
$ns attach-agent $n0 $tcp
set sink [new Agent/TCPSink]
$ns attach-agent $n4 $sink
$ns connect $tcp $sink

# Setting simulation parameters
$ns at 0.1 "$tcp set packetSize_ 1000"
$ns at 0.2 "$tcp send 1000"
```

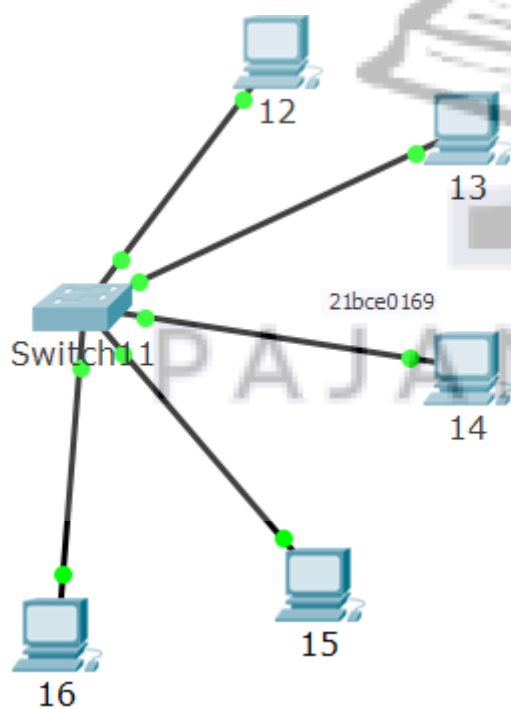
```
# Running the simulation
```

```
$ns run
```

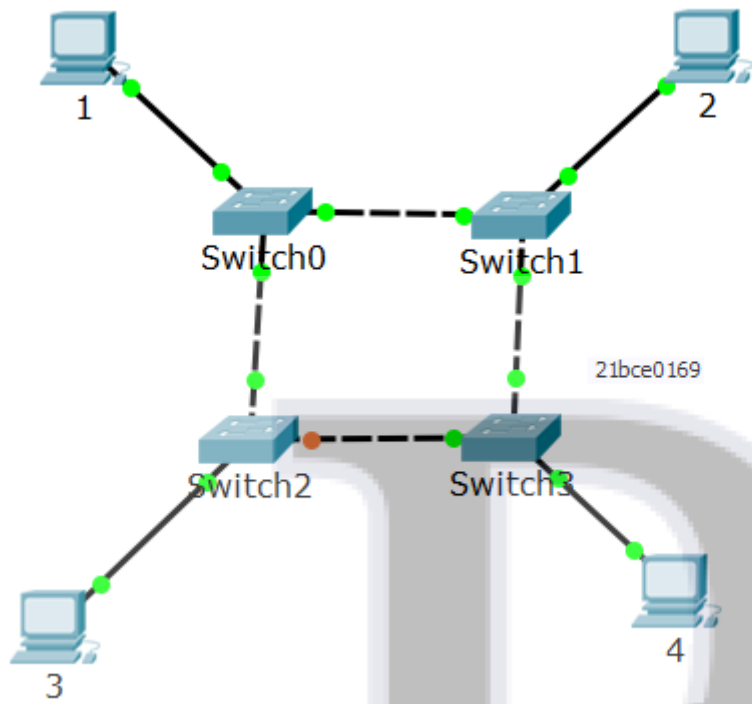


## Topology using Packet Tracer

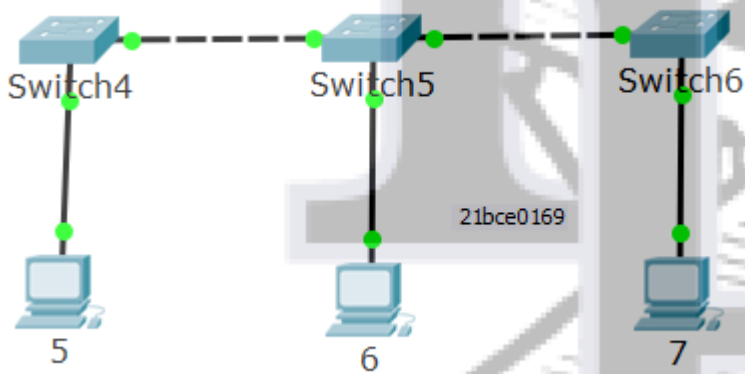
### Star topology



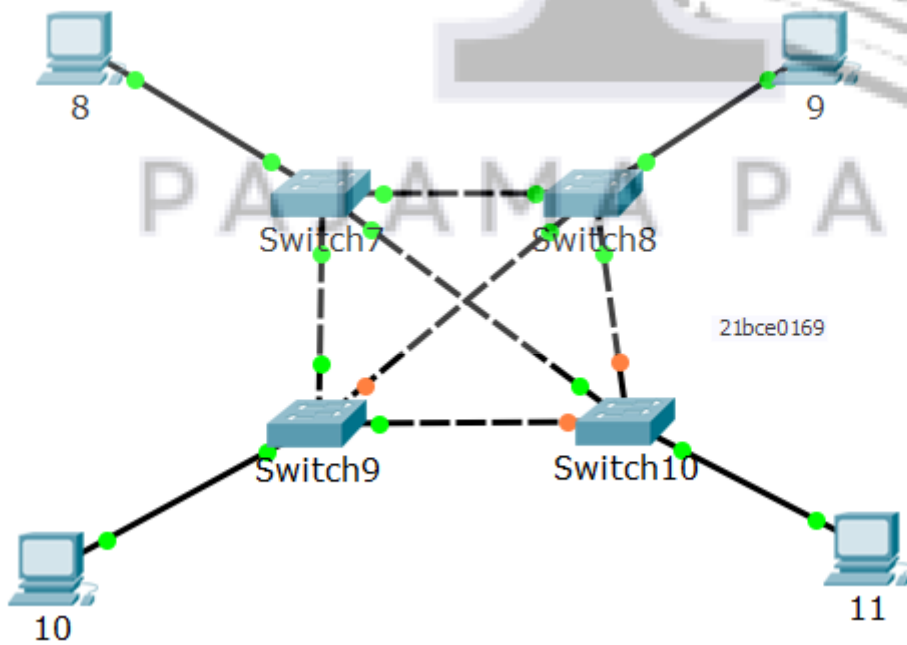
### Ring topology



**Bus topology**



**Mesh topology**



# Hybrid topology

