Ex. No : 1	Implement a network topology with NS2 involving a set of nodes (4 nodes).
Date :	

Aim:-

To implement the bus topology in Network Simulator 2 (NS2).

Procedure :-

To develop a network where each node shares an individual communication channel. In bus topology, all nodes are linked to a one central cable ("bus") and interaction from one node is broadcast to all other nodes. Yet, ns2 mainly simulates point-to-point links, so we have to replicate the bus topology with the help of shared link including broadcast medium or shared duplex links.

Steps to Simulate a Bus Topology in NS2 :-

1. **Define the Network Topology:**
    - You can use a hub-and-spoke style of link connections where all nodes link to a central hub or switch to mimic the shared communication medium in a bus topology.
2. **Simulate a Shared Medium:**
    - Rather than using separate point-to-point links, you replicate a bus topology by building multiple duplex links amongst all the nodes and a single "hub" node. This hub node indicates the shared bus in the topology.
3. **Simulate Broadcast Communication:**
    - Any communication from one node can be broadcast to all other nodes via the hub.

Example of Bus Topology Implementation in NS2 (Hub-Based) :-

```
# Create a new simulator

set ns [new Simulator]

# Open the trace file for output

set tracefile [open out.tr w]

$ns trace-all $tracefile

# Define nodes in the network (4 nodes for simplicity)

set n0 [$ns node]  ;# Node 0

set n1 [$ns node]  ;# Node 1

set n2 [$ns node]  ;# Node 2
```

```
set n3 [$ns node]  ;# Node 3
set hub [$ns node] ;# The hub representing the shared bus
# Create duplex links between nodes and the central hub (simulating the bus)
$ns duplex-link $n0 $hub 1Mb 10ms DropTail
$ns duplex-link $n1 $hub 1Mb 10ms DropTail
$ns duplex-link $n2 $hub 1Mb 10ms DropTail
$ns duplex-link $n3 $hub 1Mb 10ms DropTail
# Set up TCP agents and sinks for node-to-node communication
set tcp0 [new Agent/TCP]
set sink0 [new Agent/TCPSink]
$ns attach-agent $n0 $tcp0
$ns attach-agent $n1 $sink0
$ns connect $tcp0 $sink0
# Simulate traffic from node 0 to node 1
set ftp0 [new Application/FTP]
$ftp0 attach-agent $tcp0
$ns at 1.0 "$ftp0 start"
# Repeat the process for communication between other nodes
set tcp1 [new Agent/TCP]
set sink1 [new Agent/TCPSink]
$ns attach-agent $n2 $tcp1
$ns attach-agent $n3 $sink1
$ns connect $tcp1 $sink1
# Simulate traffic from node 2 to node 3
set ftp1 [new Application/FTP]
$ftp1 attach-agent $tcp1
$ns at 2.0 "$ftp1 start"
# Schedule simulation end after 10 seconds
$ns at 10.0 "finish"
```

```
proc finish {} {
global ns tracefile
$ns flush-trace
close $tracefile
exit 0
}
# Run the simulation
$ns run
```

Result :-

Thus, the implementation of network topology using Network Simulator 2 (NS2).