# Computer Engineering

## Experiment 9

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**Aim:** Implement stop and wait protocol in NS2

**Theory:**

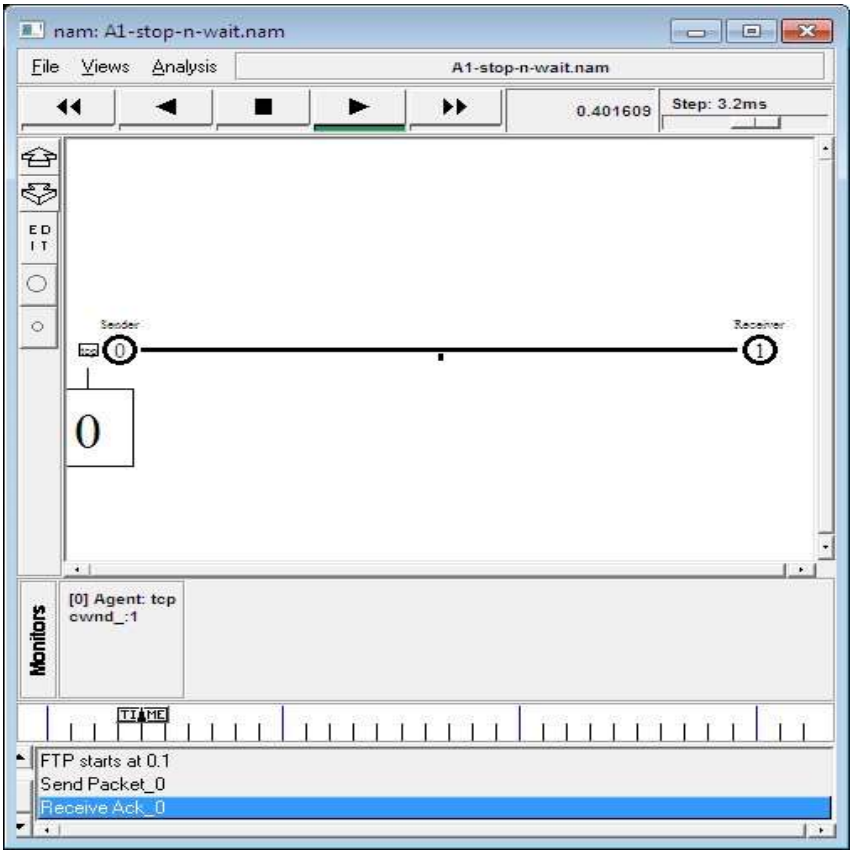
Stop-and-wait ARQ, also referred to as alternating bit protocol, is a method in telecommunications to send information between two connected devices. It ensures that information is not lost due to dropped packets and that packets are received in the correct order. It is used in Connection-oriented communication. It offers error and flows control. It can be used in data Link and transport Layers. Stop and Wait ARQ executes Sliding Window Protocol with Window Size 1

**Code:**

```
# stop and wait protocol in normal situation
 # features : labeling, annotation, nam-graph, and window size monitoring
 set ns [new Simulator]

 set n0 [$ns node]
 set n1 [$ns node]

 $ns at 0.0 "$n0 label Sender"
 $ns at 0.0 "$n1 label Receiver"

 set nf [open A1-stop-n-wait.nam w]
 $ns namtrace-all $nf set f
 [open A1-stop-n-wait.tr w]
 $ns trace-all $f

 $ns duplex-link $n0 $n1 0.2Mb 200ms DropTail
 $ns duplex-link-op $n0 $n1 orient

 right $ns queue-limit $n0 $n1 10

 Agent/TCP set nam_tracevar_ true

 set tcp [new Agent/TCP]
 $tcp set window_ 1
 $tcp set maxcwnd_ 1
```

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

set sink [new Agent/TCPSink]
$ns attach-agent $n1 $sink

$ns connect $tcp $sink

set ftp [new Application/FTP]
$ftp attach-agent $tcp

$ns add-agent-trace $tcp tcp
$ns monitor-agent-trace $tcp
$tcp tracevar cwnd_

$ns at 0.1 "$ftp start"
$ns at 3.0 "$ns detach-agent $n0 $tcp ; $ns detach-agent $n1 $sink"
$ns at 3.5 "finish"

$ns at 0.0 "$ns trace-annotate \"Stop and Wait with normal operation\""

$ns at 0.05 "$ns trace-annotate \"FTP starts at 0.1\""

$ns at 0.11 "$ns trace-annotate \"Send Packet_0\""
$ns at 0.35 "$ns trace-annotate \"Receive Ack_0\""
$ns at 0.56 "$ns trace-annotate \"Send Packet_1\""
$ns at 0.79 "$ns trace-annotate \"Receive Ack_1\""
$ns at 0.99 "$ns trace-annotate \"Send Packet_2\""
$ns at 1.23 "$ns trace-annotate \"Receive Ack_2 \""
$ns at 1.43 "$ns trace-annotate \"Send Packet_3\""
$ns at 1.67 "$ns trace-annotate \"Receive Ack_3\""
$ns at 1.88 "$ns trace-annotate \"Send Packet_4\""
$ns at 2.11 "$ns trace-annotate \"Receive Ack_4\""
$ns at 2.32 "$ns trace-annotate \"Send Packet_5\""
$ns at 2.55 "$ns trace-annotate \"Receive Ack_5      \""
$ns at 2.75 "$ns trace-annotate \"Send Packet_6\""
$ns at 2.99 "$ns trace-annotate \"Receive Ack_6\""

$ns at 3.1 "$ns trace-annotate \"FTP stops\""

proc finish {} {
 global ns nf
 $ns flush-trace
close $nf
puts "filtering..."
exec tclsh ../ns-allinone-2.1b5/nam-1.0a7/bin/namfilter.tcl A1-stop-n-wait.nam
puts "running nam..." exec nam A1-stop-n-wait.nam & exit 0
}
 $ns run
```

**Output:**




**Conclusion:** Implemented stop and wait protocol in NS2