1.

# Simulation Parameters

set val(chan) Channel/WirelessChannel

set val(prop) Propagation/TwoRayGround

set val(netif) Phy/WirelessPhy

set val(mac) Mac/802\_11

set val(ifq) Queue/DropTail/PriQueue

set val(ll) LL

set val(ant) Antenna/OmniAntenna

set val(x) 500

set val(y) 500

set val(ifqlen) 50

set val(nn) 2

set val(stop) 20.0

set val(rp) DSDV

# Simulator and trace file setup

set ns [new Simulator]

set tracefd [open 001.tr w]

$ns trace-all $tracefd

set namtrace [open 001.nam w]

$ns namtrace-all-wireless $namtrace $val(x) $val(y)

# Topography and propagation model setup

set topo [new Topography]

$topo load\_flatgrid $val(x) $val(y)

create-god $val(nn)

# Node Configuration

$ns node-config -adhocRouting $val(rp) \

-llType $val(ll) \

-macType $val(mac) \

-ifqType $val(ifq) \

-ifqLen $val(ifqlen) \

-antType $val(ant) \

-propType $val(prop) \

-phyType $val(netif) \

-channelType $val(chan) \

-topoInstance $topo \

-agentTrace ON \

-routerTrace ON \

-macTrace ON

# Node creation

for {set i 0} {$i < $val(nn)} {incr i} {

set node\_($i) [$ns node]

$node\_($i) random-motion 0

}

# Set node initial positions

for {set i 0} {$i < $val(nn)} {incr i} {

$ns initial\_node\_pos $node\_($i) 40

}

# Define node movements

$ns at 1.1 "$node\_(0) setdest 310.0 10.0 20.0"

$ns at 1.1 "$node\_(1) setdest 10.0 310.0 20.0"

# Traffic generation using TCP and FTP

set tcp0 [new Agent/TCP]

set sink0 [new Agent/TCPSink]

$ns attach-agent $node\_(0) $tcp0

$ns attach-agent $node\_(1) $sink0

$ns connect $tcp0 $sink0

set ftp0 [new Application/FTP]

$ftp0 attach-agent $tcp0

$ns at 1.0 "$ftp0 start"

$ns at 18.0 "$ftp0 stop"

# Reset nodes at simulation end

for {set i 0} {$i < $val(nn)} {incr i} {

$ns at $val(stop) "$node\_($i) reset"

}

# Finish procedure

proc finish {} {

global ns tracefd namtrace

$ns flush-trace

close $tracefd

close $namtrace

exec nam 001.nam &

exit 0

}

# Run simulation

puts "Starting simulation..."

$ns at $val(stop) "puts \"NS EXITING...\"; finish"

$ns run

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2.

set val(chan) Channel/WirelessChannel

set val(prop) Propagation/TwoRayGround

set val(netif) Phy/WirelessPhy

set val(mac) Mac/802\_11

set val(ifq) Queue/DropTail/PriQueue

set val(ll) LL

set val(ant) Antenna/OmniAntenna

set val(x) 500

set val(y) 400

set val(ifqlen) 50

set val(nn) 3

set val(stop) 60.0

set val(rp) AODV

set ns\_ [new Simulator]

set tracefd [open 002.tr w]

$ns\_ trace-all $tracefd

set namtrace [open 002.nam w]

$ns\_ namtrace-all-wireless $namtrace $val(x) $val(y)

set topo [new Topography]

$topo load\_flatgrid $val(x) $val(y)

create-god $val(nn)

# Node Configuration

$ns\_ node-config -adhocRouting $val(rp) \

-llType $val(ll) \

-macType $val(mac) \

-ifqType $val(ifq) \

-ifqLen $val(ifqlen) \

-antType $val(ant) \

-propType $val(prop) \

-phyType $val(netif) \

-channelType $val(chan) \

-topoInstance $topo \

-agentTrace ON \

-routerTrace ON \

-macTrace ON

# Create nodes

for {set i 0} {$i < $val(nn)} {incr i} {

set node\_($i) [$ns\_ node]

$node\_($i) random-motion 0

}

# Initial Positions

$node\_(0) set X\_ 5.0; $node\_(0) set Y\_ 5.0; $node\_(0) set Z\_ 0.0

$node\_(1) set X\_ 490.0; $node\_(1) set Y\_ 285.0; $node\_(1) set Z\_ 0.0

$node\_(2) set X\_ 150.0; $node\_(2) set Y\_ 240.0; $node\_(2) set Z\_ 0.0

for {set i 0} {$i < $val(nn)} {incr i} {

$ns\_ initial\_node\_pos $node\_($i) 40

}

# Traffic setup

set tcp0 [new Agent/TCP]

set sink0 [new Agent/TCPSink]

$ns\_ attach-agent $node\_(0) $tcp0

$ns\_ attach-agent $node\_(2) $sink0

$ns\_ connect $tcp0 $sink0

set ftp0 [new Application/FTP]

$ftp0 attach-agent $tcp0

$ns\_ at 10.0 "$ftp0 start"

$ns\_ at $val(stop) "$node\_(0) reset"

$ns\_ at $val(stop) "puts \"NS EXITING...\" ; finish"

# Finish Procedure

proc finish {} {

global ns\_ tracefd namtrace

$ns\_ flush-trace

close $tracefd

close $namtrace

exec nam 002.nam &

exit 0

}

$ns\_ run

3.

# Simulation Parameters

set val(chan) Channel/WirelessChannel

set val(prop) Propagation/TwoRayGround

set val(netif) Phy/WirelessPhy

set val(mac) Mac/802\_11

set val(ifq) Queue/DropTail/PriQueue

set val(ll) LL

set val(ant) Antenna/OmniAntenna

set val(x) 500

set val(y) 500

set val(ifqlen) 50

set val(nn) 50

set val(stop) 100.0

set val(rp) AODV

set val(mob) "mob"

set val(cp) "static"

# Create simulator and trace files

set ns\_ [new Simulator]

set tracefd [open 003.tr w]

$ns\_ trace-all $tracefd

set namtrace [open 003.nam w]

$ns\_ namtrace-all-wireless $namtrace $val(x) $val(y)

# Create topography and propagation model

set topo [new Topography]

$topo load\_flatgrid $val(x) $val(y)

set prop [new $val(prop)]

# Create God (Global Simulation Object) for the nodes

set god\_ [create-god $val(nn)]

# Node configuration

$ns\_ node-config -adhocRouting $val(rp) \

-llType $val(ll) \

-macType $val(mac) \

-ifqType $val(ifq) \

-ifqLen $val(ifqlen) \

-antType $val(ant) \

-propType $val(prop) \

-phyType $val(netif) \

-channelType $val(chan) \

-topoInstance $topo \

-agentTrace ON \

-routerTrace ON \

-macTrace ON

# Create nodes and set initial positions

for {set i 0} {$i < $val(nn)} {incr i} {

set node\_($i) [$ns\_ node]

$node\_($i) random-motion 0

}

# Set random initial positions for nodes

for {set i 0} {$i < $val(nn)} {incr i} {

set xx [expr rand() \* $val(x)]

set yy [expr rand() \* $val(y)]

$node\_($i) set X\_ $xx

$node\_($i) set Y\_ $yy

}

# Set initial node positions for movement

for {set i 0} {$i < $val(nn)} {incr i} {

$ns\_ initial\_node\_pos $node\_($i) 40

}

# Load mobility and connection files

puts "Loading connection file..."

source $val(cp)

puts "Loading mobility file..."

source $val(mob)

# Simulation finish procedure

proc finish {} {

global ns\_ tracefd namtrace

$ns\_ flush-trace

close $tracefd

close $namtrace

exec nam 003.nam &

puts "Simulation Finished."

exit 0

}

# Reset nodes and stop simulation

for {set i 0} {$i < $val(nn)} {incr i} {

$ns\_ at $val(stop) "$node\_($i) reset"

}

# End simulation and execute finish procedure

$ns\_ at $val(stop) "finish"

puts "Starting Simulation..."

# Run the simulation

$ns\_ run

4.

# Simulation Parameters

set val(chan) Channel/WirelessChannel

set val(prop) Propagation/TwoRayGround

set val(netif) Phy/WirelessPhy

set val(mac) Mac/802\_11

set val(ifq) CMUPriQueue

set val(ll) LL

set val(ant) Antenna/OmniAntenna

set val(x) 700

set val(y) 700

set val(ifqlen) 50

set val(nn) 6

set val(stop) 60.0

set val(rp) DSR

# Create simulator and trace files

set ns\_ [new Simulator]

set tracefd [open 004.tr w]

$ns\_ trace-all $tracefd

set namtrace [open 004.nam w]

$ns\_ namtrace-all-wireless $namtrace $val(x) $val(y)

# Create topography and propagation model

set topo [new Topography]

$topo load\_flatgrid $val(x) $val(y)

set prop [new $val(prop)]

# Create God (Global Simulation Object) for the nodes

set god\_ [create-god $val(nn)]

# Node Configuration

$ns\_ node-config -adhocRouting $val(rp) \

-llType $val(ll) \

-macType $val(mac) \

-ifqType $val(ifq) \

-ifqLen $val(ifqlen) \

-antType $val(ant) \

-propType $val(prop) \

-phyType $val(netif) \

-channelType $val(chan) \

-topoInstance $topo \

-agentTrace ON \

-routerTrace ON \

-macTrace ON

# Creating Nodes

for {set i 0} {$i < $val(nn)} {incr i} {

set node\_($i) [$ns\_ node]

$node\_($i) random-motion 0

}

# Initial Positions of Nodes

$node\_(0) set X\_ 150.0

$node\_(0) set Y\_ 300.0

$node\_(0) set Z\_ 0.0

$node\_(1) set X\_ 300.0

$node\_(1) set Y\_ 500.0

$node\_(1) set Z\_ 0.0

$node\_(2) set X\_ 500.0

$node\_(2) set Y\_ 500.0

$node\_(2) set Z\_ 0.0

$node\_(3) set X\_ 300.0

$node\_(3) set Y\_ 100.0

$node\_(3) set Z\_ 0.0

$node\_(4) set X\_ 500.0

$node\_(4) set Y\_ 100.0

$node\_(4) set Z\_ 0.0

$node\_(5) set X\_ 650.0

$node\_(5) set Y\_ 300.0

$node\_(5) set Z\_ 0.0

# Initial Positions of Nodes (on start)

for {set i 0} {$i < $val(nn)} {incr i} {

$ns\_ initial\_node\_pos $node\_($i) 40

}

# Topology Design (Set destinations)

$ns\_ at 1.0 "$node\_(0) setdest 160.0 300.0 2.0"

$ns\_ at 1.0 "$node\_(1) setdest 310.0 150.0 2.0"

$ns\_ at 1.0 "$node\_(2) setdest 490.0 490.0 2.0"

$ns\_ at 1.0 "$node\_(3) setdest 300.0 120.0 2.0"

$ns\_ at 1.0 "$node\_(4) setdest 510.0 90.0 2.0"

$ns\_ at 1.0 "$node\_(5) setdest 640.0 290.0 2.0"

$ns\_ at 4.0 "$node\_(3) setdest 300.0 500.0 5.0"

# Generating Traffic

set tcp0 [new Agent/TCP]

set sink0 [new Agent/TCPSink]

$ns\_ attach-agent $node\_(0) $tcp0

$ns\_ attach-agent $node\_(5) $sink0

$ns\_ connect $tcp0 $sink0

set ftp0 [new Application/FTP]

$ftp0 attach-agent $tcp0

$ns\_ at 5.0 "$ftp0 start"

$ns\_ at 60.0 "$ftp0 stop"

# Simulation Termination

for {set i 0} {$i < $val(nn)} {incr i} {

$ns\_ at $val(stop) "$node\_($i) reset"

}

# Final simulation commands

$ns\_ at $val(stop) "puts \"NS EXITING...\"; $ns\_ halt"

# Starting Simulation message

puts "Starting Simulation..."

# Finish procedure for simulation end

proc finish {} {

global ns\_ tracefd namtrace

$ns\_ flush-trace

close $tracefd

close $namtrace

exec nam 004.nam &

puts "Simulation Finished."

exit 0

}

# Run the simulation

$ns\_ run

5.

set val(chan) Channel/WirelessChannel

set val(prop) Propagation/TwoRayGround

set val(netif) Phy/WirelessPhy

set val(mac) Mac/802\_11

set val(ifq) Queue/DropTail/PriQueue

set val(ll) LL

set val(ant) Antenna/OmniAntenna

set val(x) 500

set val(y) 500

set val(ifqlen) 50

set val(nn) 5

set val(stop) 50.0

set val(rp) AODV

set ns [new Simulator]

set tracefd [open 005.tr w]

$ns trace-all $tracefd

set namtrace [open 005.nam w]

$ns namtrace-all-wireless $namtrace $val(x) $val(y)

set cwind1 [open win51.tr w]

set cwind2 [open win52.tr w]

set prop [new $val(prop)]

set topo [new Topography]

$topo load\_flatgrid $val(x) $val(y)

create-god $val(nn)

$ns node-config -adhocRouting $val(rp)\

-llType $val(ll)\

-macType $val(mac)\

-ifqType $val(ifq)\

-ifqLen $val(ifqlen)\

-antType $val(ant)\

-propType $val(prop)\

-phyType $val(netif)\

-channelType $val(chan)\

-topoInstance $topo\

-agentTrace ON\

-routerTrace ON\

-macTrace ON\

-IncomingErrProc "uniformErr"\

-OutgoingErrProc "uniformErr"

proc uniformErr {} {

set err [new ErrorModel]

$err unit pkt

$err set rate\_ 0.01

return $err

}

for {set i 0} {$i<$val(nn)} {incr i} {

set node\_($i) [$ns node]

$node\_($i) random-motion 0

}

for {set i 0} {$i<$val(nn)} {incr i} {

$ns initial\_node\_pos $node\_($i) 40

}

$ns at 1.0 "$node\_(0) setdest 10.0 10.0 50.0"

$ns at 1.0 "$node\_(1) setdest 10.0 100.0 50.0"

$ns at 1.0 "$node\_(4) setdest 50.0 50.0 50.0"

$ns at 1.0 "$node\_(2) setdest 100.0 100.0 50.0"

$ns at 1.0 "$node\_(3) setdest 100.0 10.0 50.0"

set tcp0 [new Agent/TCP]

$ns attach-agent $node\_(0) $tcp0

set sink0 [new Agent/TCPSink]

$ns attach-agent $node\_(2) $sink0

$ns connect $tcp0 $sink0

set ftp0 [new Application/FTP]

$ftp0 attach-agent $tcp0

$ns at 1.0 "$ftp0 start"

$ns at 50.0 "$ftp0 stop"

set tcp1 [new Agent/TCP]

$ns attach-agent $node\_(1) $tcp1

set sink1 [new Agent/TCPSink]

$ns attach-agent $node\_(2) $sink1

$ns connect $tcp1 $sink1

set ftp1 [new Application/FTP]

$ftp1 attach-agent $tcp1

$ns at 1.0 "$ftp1 start"

$ns at 50.0 "$ftp1 stop"

$ns at 1.0 "plotWindow $tcp0 $cwind1"

$ns at 1.0 "plotWindow $tcp1 $cwind2"

for {set i 0} {$i<$val(nn)} {incr i} {

$ns at $val(stop) "$node\_($i) reset";

}

$ns at $val(st

op) "puts \"NS EXITING...\"; finish"

puts "Starting Simulation"

proc plotWindow {tcpSource file} {

global ns

set time 0.1

set now [$ns now]

set cwnd [$tcpSource set cwnd\_]

puts $file "$now $cwnd"

$ns at [expr $now + $time] "plotWindow $tcpSource $file"

}

proc finish {} {

global ns tracefd namtrace

$ns flush-trace

close $tracefd

close $namtrace

exec nam 005.nam &

exec xgraph win51.tr &

exec xgraph win52.tr &

exit 0

}

$ns run