

#5. Implement and study the performance of GSM on NS2/NS3 (Using MAC layer) or equivalent environment.

# General Parameters

set stop 100; # Stop time.

# Topology

set type gsm; #type of link

# AQM parameters

set minth 0;

set maxth 30;

set adaptive 1; # 1 for Adaptive RED, 0 for plain RED

# Traffic generation

set flows 0; # number of long-lived TCP flows

set window 30; # window for long-lived traffic

set web 2; # number of web sessions

# Plotting statistics.

set opt(wrap) 100; # wrap plots?

set opt(srcTrace) is; # where to plot traffic

set opt(dstTrace) bs2; # where to plot traffic

# default downlink bandwidth in bps

set bwDL(gsm) 9600

# default downlink bandwidth in bps

set bwUL(gsm) 9600

#default downlink propagation delay in seconds

set propDL(gsm) .500

#default uplink propagation delay in seconds

set propUL(gsm) .500

set ns [new Simulator]

set tf [open out.tr w]

\$ns trace-all \$tf

set nf [open out.nam w]

\$ns namtrace-all \$nf

set nodes(is) [\$ns node]

set nodes(ms) [\$ns node]

set nodes(bs1) [\$ns node]

set nodes(bs2) [\$ns node]

set nodes(lp) [\$ns node]

\$nodes(is) label "Sender"

\$nodes(ms) label "Mobile Station"

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$nodes(bs1) label "Base Station 1"
$nodes(bs2) label "Base Station 2"
$nodes(lp) label "Destination"
$nodes(is) color "magenta"

proc cell_topo {} {
    global ns nodes
    $ns duplex-link $nodes(lp) $nodes(bs1) 3Mbps 10nodes(ms) DropTail
    $ns duplex-link $nodes(bs1) $nodes(ms) 1 1 RED
    $ns duplex-link $nodes(ms) $nodes(bs2) 1 1 RED
    $ns duplex-link $nodes(bs2) $nodes(is) 3Mbps 50nodes(ms) DropTail
    puts "GSM Cell Topology"
}

proc set_link_para {t} {
    global ns nodes bwUL bwDL propUL propDL buf
    $ns bandwidth $nodes(bs1) $nodes(ms) $bwDL($t) duplex
    $ns bandwidth $nodes(bs2) $nodes(ms) $bwDL($t) duplex
    $ns delay $nodes(bs1) $nodes(ms) $propDL($t) duplex
    $ns delay $nodes(bs2) $nodes(ms) $propDL($t) duplex
    $ns queue-limit $nodes(bs1) $nodes(ms) 10
    $ns queue-limit $nodes(bs2) $nodes(ms) 10
}

# RED and TCP parameters
Queue/RED set adaptive_ $adaptive
Queue/RED set thresh_ $minth
Queue/RED set maxthresh_ $maxth
Agent/TCP set window_ $window

source web.tcl

switch $type {
    gsm {cell_topo}
}

set_link_para $type
$ns insert-delayer $nodes(ms) $nodes(bs1) [new Delayer]
$ns insert-delayer $nodes(ms) $nodes(bs2) [new Delayer]

# Set up forward TCP connection
if {$flows == 0} {
    set tcp1 [$ns create-connection TCP/Sack1 $nodes(is) TCPSink/Sack1 $nodes(lp) 0]
    set ftp1 [[set tcp1] attach-app FTP]
    $ns at 0.8 "[set ftp1] start"
}

if {$flows > 0} {
    set tcp1 [$ns create-connection TCP/Sack1 $nodes(is) TCPSink/Sack1 $nodes(lp) 0]
    set ftp1 [[set tcp1] attach-app FTP]
}

```

```
$tcp1 set window_ 100
$ns at 0.0 "[set ftp1] start"
$ns at 3.5 "[set ftp1] stop"
```

```
set tcp2 [$ns create-connection TCP/Sack1 $nodes(is) TCPSink/Sack1 $nodes(lp) 0]
set ftp2 [[set tcp2] attach-app FTP]
$tcp2 set window_ 3
$ns at 1.0 "[set ftp2] start"
$ns at 8.0 "[set ftp2] stop"
}
```

```
proc stop {} {
global nodes opt
set wrap $opt(wrap)
set sid [$nodes($opt(srcTrace)) id]
set did [$nodes($opt(dstTrace)) id]
set a "out.tr"
set GETRC "/home/cs/ns-allinone-2.35/ns-2.35/bin/getrc"
set RAW2XG "/home/cs/ns-allinone-2.35/ns-2.35/bin/raw2xg"
exec $GETRC -s $sid -d $did -f 0 out.tr | \
$RAW2XG -s 0.01 -m $wrap -r > plot.xgr
exec $GETRC -s $did -d $sid -f 0 out.tr | \
$RAW2XG -a -s 0.01 -m $wrap >> plot.xgr
exec xgraph -x time -y packets plot.xgr &
exec nam out.nam &
exit 0
}
```

```
$ns at $stop "stop"
$ns run
```