Guide for measurements of Mobile Communications and Quantum Technologies Laboratory

TCP over Wireless

Transport protocols

The two old big protocols in the transport layer are TCP (Transmission Control Protocol) [1] and UDP (User Datagram Protocol) [2]. These protocols are still defining the data transfer between computers and computer networks, even though they are 25 years old standards since both TCP and UDP were developed in the early 1980s. This is the reason that both standards are designed for wired networks with relatively low error probability, but the characteristics of wireless networks that became more widely used today differ significantly from the data transmission characteristics of wired networks. Wired computer networks have also evolved greatly over the years. For this reason, old protocols need to be revised and adapted to new requirements, or new standards need to be developed.

Nowadays the Internet protocols have been developed for wired connections with the following characteristics: high bandwidth, low latency, low probability of error. However, for the transmission of wireless networks that have appeared recently and have become increasingly popular, the opposite is true: lower bandwidth, higher latency and higher probability of error.

Measurement tasks

Topology:
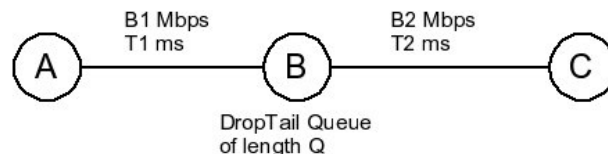
Task 1

Rewrite the script according to the figure above! Make FTP/TCP conncection between A and C! Set TCP window size to 100000: `Agent/TCP set window_ 100000`

Parameters: packet size=1250 byte, B1=25, B2=10, T1=10, T2=20, Q=10

TCP versions: TCP Tahoe, TCP Reno, TCP Vegas

Simulation duration: 50 sec

Depict the congestion window and the throughput!

```
proc record {} {
global sink0 f0 f1
     #Get an instance of the simulator
       set ns [Simulator instance]
     #Set the time after which the procedure is called again
```

```
        set time 0.5
    #How many bytes have been received by the traffic sinks?
        set bw0 [$sink0 set bytes_]
    #Get the current time
        set now [$ns now]
    #Calculate bandwidth (MBit/s) and write it to the files
        puts $f0 "$now [expr $bw0/$time*8/1000000]"
    #Reset the bytes_ values on the traffic sinks
        $sink0 set bytes_ 0
    #Congestion window size
        set cwnd [$tcp set cwnd_]
        puts $f1 "$cwnd"
    #Re-schedule the procedure
        $ns at [expr $now+$time] "record"
}
```

Task 2

Set a loss model with 5% between B and C!

Parameters: B1=2, B2=1, T1=10, T2=40, Q=5

Create loss modul:

```
set loss_module [new ErrorModel]
$loss_module set rate_ 0.01
$loss_module unit pkt
$loss_module ranvar [new RandomVariable/Uniform]
$loss_module drop-target [new Agent/Null]
```

Include loss module between nodes:

```
$ns lossmodel $loss_module $n0 $n1
```

Compare the quantity of overall transmitted data with and without the loss module!

References

[1]   J. Postel: "Transmission Control Protocol", RFC-793, September 1981.

[2]   J. Postel: "User Datagram Protocol", RFC-768, August 1980.