Project 3 – Design Document
Design Document for Evaluate MAC random transmission protocol using NS-2

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Design:

Objective is to create a simple MAC protocol with one sink and multiple sources. Source sends a single packet every T seconds. A single packet is sent X times at random time within T seconds to achieve a higher probability of packet delivery. The earlier packet should be delivered before a new packet is created.

Created a new MAC protocol named MAC_GRP11. New files namely, MAC_GRP11.h and MAC_GRP11.cc were created in ns-allinone-2.35/ns-2.35/mac folder wherein the new MAC functionality has been implemented. The simulation file to test implemented protocol is created with name MAC_GRP11.tcl at ns-allinone-2.35/ns-2.35 location.

The design details of MAC_GRP11 protocol are given below:

MAC_GRP11 protocol works similar to mac-simple protocol which can be found in ns-allinone-2.35/ns-2.35/mac folder, except MAC_GRP11 protocols sending functionality. Most functionalities of mac-simple protocol have been adopted. The major implementations and differences are stated below.

MAC_GRP11.h :

Declared variables for duration T (seconds) and number of packets (X) where T is the number of seconds within which a packet is generated and has to be delivered to the sink before the next packet is generated and X is the number of times a packet is sent within a span of T seconds.

MAC_GRP11.cc :

Bind duration(T) and X with variables in the tcl file.

Function send() should send a packet X times within T seconds with random delays. This is achieved by the following code:

```
double* delay = new double[rval_];
for (int i = 0; i < rval_; i++)
{
        delay[i] = (rand()  / RAND_MAX) *
duration_;
        if (delay[i] > mdelay)
        {
                mdelay = delay[i];
        }
}
for (int i = 0; i < rval_; i++)
{
        if (delay[i] != mdelay)
        {
        Scheduler::instance().schedule(this,
(Event*)p->copy(), delay[i]);
        }
}
```

Packets are scheduled to be sent X times within T seconds using the delays generated from code above.

MAC_GRP11.tcl :

TCL file includes the simulation details of MAC_GRP11 protocol.

101 nodes (100 source and 1 sink node) are created and configured with channel (Wireless), protocol (MAC_GRP11), routing protocol (DSDV) etc. Variables such as T and X are set up along with trace and stat files. Link the variables T and X from .cc file with variable in tcl file.

Configure one sink node and 100 source nodes. The sink node is placed in center and all the

source nodes are placed in a circle with a constant radius around the sink node. This

reduces the probability of collision. Following code places the nodes as described.

set angle [expr $i*$val(pi)/50]

set angulardist_x [expr cos($angle)]

set angulardist_y [expr sin($angle)]

set x [expr $angulardist_x * $val(dimx)/2]

set y [expr $angulardist_y * $val(dimy)/2]

$src_node($i) set X_ $x

$src_node($i) set Y_ $y

$src_node($i) set Z_ 0

Every T seconds the simulation is reset.

References:

1. http://www.isi.edu/nsnam/ns/tutorial/
2. http://www.isi.edu/nsnam/ns/
3. http://www.isi.edu/nsnam/ns/ns-documentation.html
4. http://jhshi.me/home/