

# EEC 687/787 Mobile Computing (Spring, 2007)

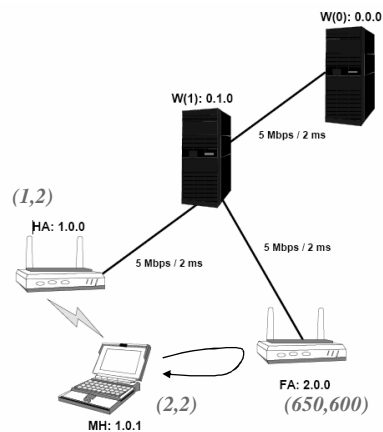
**Ns-2 Laboratory (Mar. 28)**

Chansu Yu

Cleveland State University

## Lab Exercise: Mobile IP

- ❑ 5 nodes
  - 2 wired nodes, W(0) and W(1)
  - 2 mobile agents, HA and FA
  - A mobile host, MH
- ❑ Traffic: W(0) ⇒ MH
  - W(0) → W(1) → HA → MH
- ❑ Mobility
  - MH moves toward FA
  - Then, moves back to HA
  - Routing path changes to
    - W(0) → W(1) → FA → MH and then
    - W(0) → W(1) → HA → MH again



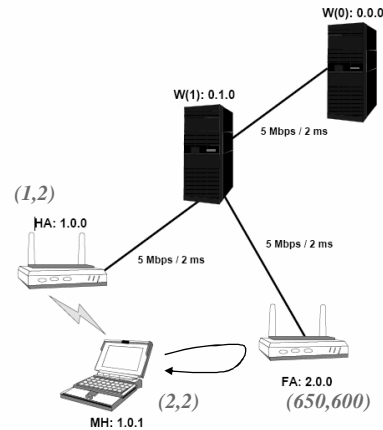
## Lab Exercise: Scenario

### ❑ Traffic

- A wired node W(0), with address 0.0.0 is sending TCP packets to a MH associated to its HA.

### ❑ Mobility

- MH starts moving towards FA, gets disconnected from the HA (~ 113s), then connects to the FA later on (~ 139s).
- While moving back towards the HA, the MH gets disconnected again (~ 213s) then reconnects to the HA's network (~ 239s).



```
$ns_at 100.00 "$MH setdest 640.00 610.00 20.00"
$ns_at 200.00 "$MH setdest 2.00 2.00 20.00"
```

c.yu91@csuohio.edu

## Lab Exercise: Nodes

```
set W(0) [$ns_node 0.0.0]
set W(1) [$ns_node 0.1.0]
```

} Wired nodes,  
W(0) and W(1)

```
$ns_node-config -mobileIP ON \
-wiredRouting ON \
-adhocRouting DSDV \
-macType Mac/802_11 \
-antType Antenna/OmniAntenna \
-propType Propagation/TwoRayGround \
-phyType Phy/WirelessPhy \
-channelType Channel/WirelessChannel \
...
```

} Mobile agents,  
HA and FA

```
set HA [$ns_node 1.0.0]
set FA [$ns_node 2.0.0]
```

```
set MH [$ns_node 1.0.1]
set HAAddress [AddrParams addr2id [$HA node-addr]]
[$MH set regagent_] set home_agent_ $HAAddress
```

} Mobile node,  
MH (Ch. 16.2 of  
ns-2 manual)

4

c.yu91@csuohio.edu

## Hierarchical Addresses (Ch. 32 of ns-2 manual)

- ❑ In this topology we are using hierarchical addresses:  
`$ns_ node-config -addressType hierarchical`
- ❑ Composed of 3 domains (0.x.x to which the wired nodes belong, 1.x.x where HA and MH belong, and 2.x.x where the FA belongs), therefore:  
`AddrParams set domain_num_ 3`
- ❑ The first of the 3 domains has 2 clusters: 0.0.x and 0.1.x. The second domain (1.x.x) has only 1 cluster (i.e. 1.0.x), and the last domain also has 1 cluster (i.e. 2.0.x), therefore:  
`lappend cluster_num 2 1 1`
- ❑ Finally, cluster 0.0.x has 1 node; cluster 0.1.x has 1 node; cluster 1.0.x has 2 nodes; and cluster 2.0.x has 1 node. Therefore:  
`lappend eilastlevel 1 1 2 1`

5

c.yu91@csuohio.edu

## Lab Exercise: Wired Links

- ❑ All wired links are 5Mbps and have 2ms delays (Ch.6 Links: Simple Links, ns-2 manual)

```
$ns_ duplex-link $W(0) $W(1) 5Mb 2ms DropTail
$ns_ duplex-link $W(1) $HA 5Mb 2ms DropTail
$ns_ duplex-link $W(1) $FA 5Mb 2ms DropTail
```

- ❑ We can control how these wired links look like in *NAM* by setting:

```
$ns_ duplex-link-op $W(0) $W(1) orient down
$ns_ duplex-link-op $W(1) $HA orient left-down
$ns_ duplex-link-op $W(1) $FA orient right-down
```

W(0) ●  
W(1) ●  
HA ● ● FA

6

c.yu91@csuohio.edu

## Lab Exercise: Mobile IP

- Download

  - infra.tcl
  - fil-tcp.awk

- Run

  - ns infra.tcl

- Source files

  - `~ns/mip.{cc,h}`, `~ns/mip-reg.cc`, `~ns/tcl/lib/ns-mip.tcl`, and `~ns/tcl/lib/ns-wireless-mip.tcl`

7

c.yu91@csuohio.edu

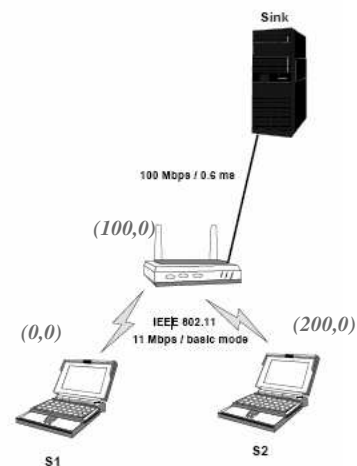
## Additional Exercise

- Mobility: none

- Traffic: S1 and S2 can send traffic to sink either

  - 1448-byte packets every 0.002 second
  - 724-bytes packets every 0.001 second
  - Or, TCP traffic

- Compare throughput from S1 and S2 with various combinations of traffic



8

c.yu91@csuohio.edu