

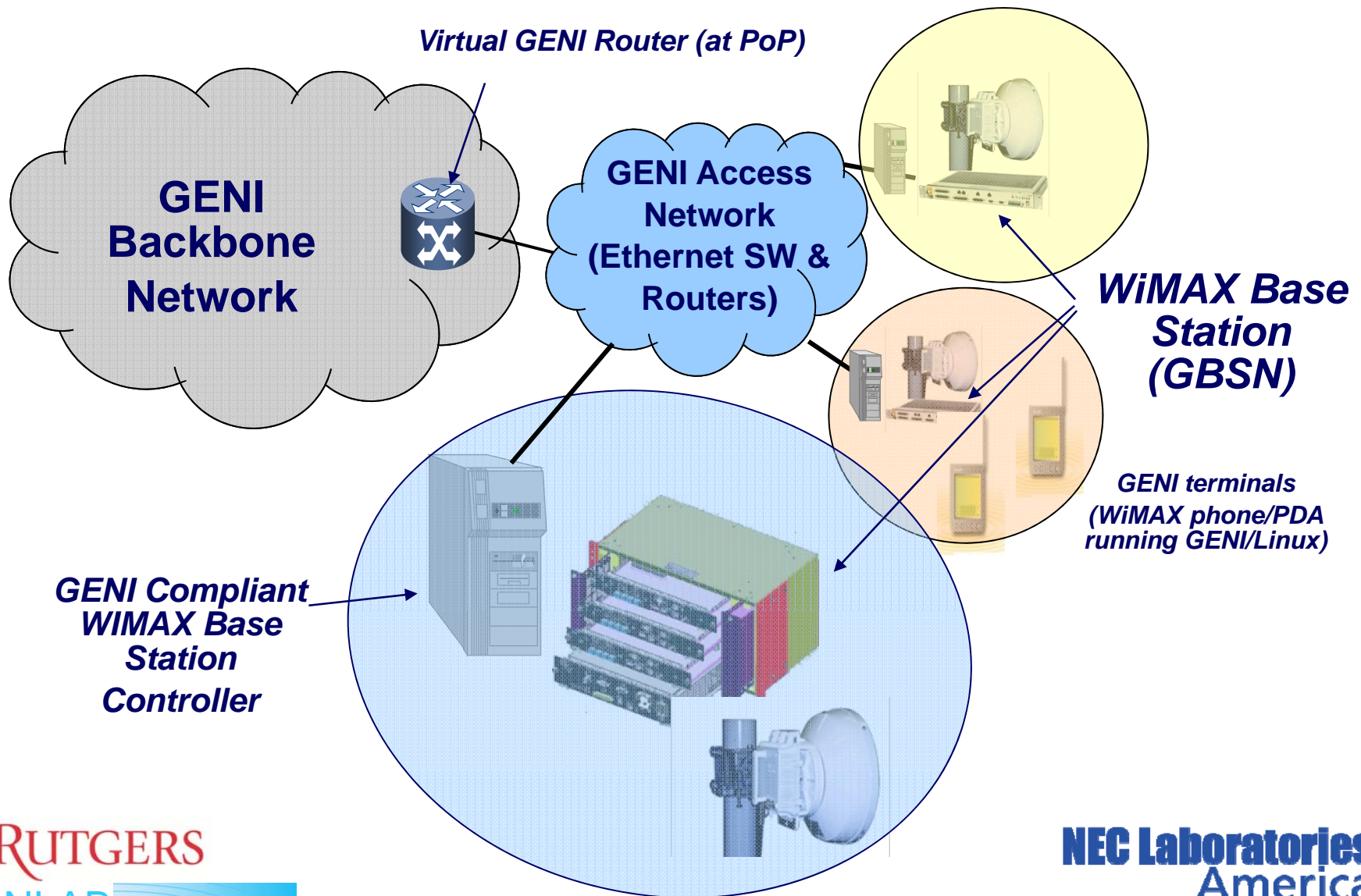
Integration & Meso-Scale: WiMax Base Station

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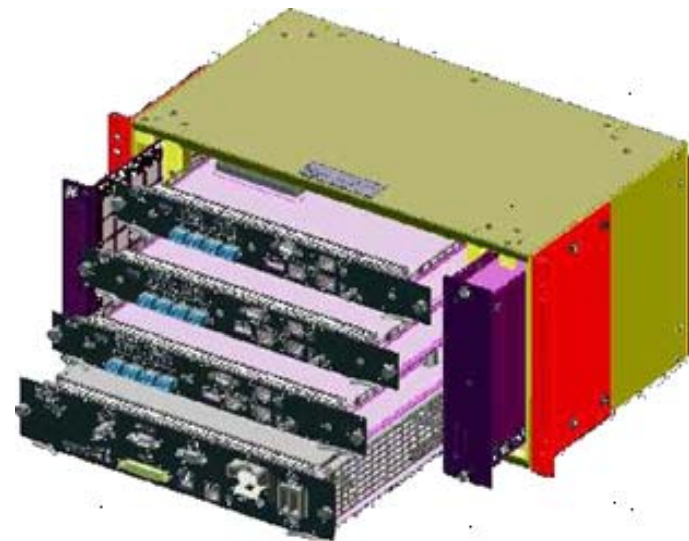
GENI WiMAX: System Overview



BS Technical Specs

PHY	Access mode	SOFDMA/TDD
	Frequency	2535 ~ 2605 MHz
	DL:UL ratio	35:12, 26:21, 29:18
	Channel BW	10 MHz , 8.75 MHz
	FFT size	1024, 512
	Frame duration	5ms
	TX output Power	35dBm (max)
	# of sectors	3
MAC	Head compression	PHS
	ARQ	HARQ/CC, ARQ
	MBS support	Single BS, multiple BS-MBS
	Resource management	Power control, mode control (idle, sleep etc.)
Networking	IP protocols	IPv4, IPv6
	Bridging/Routing	Transparent L2 switch, Bridging
	Packet handling	802.1Q VLAN, PHS**)

Base Station Features

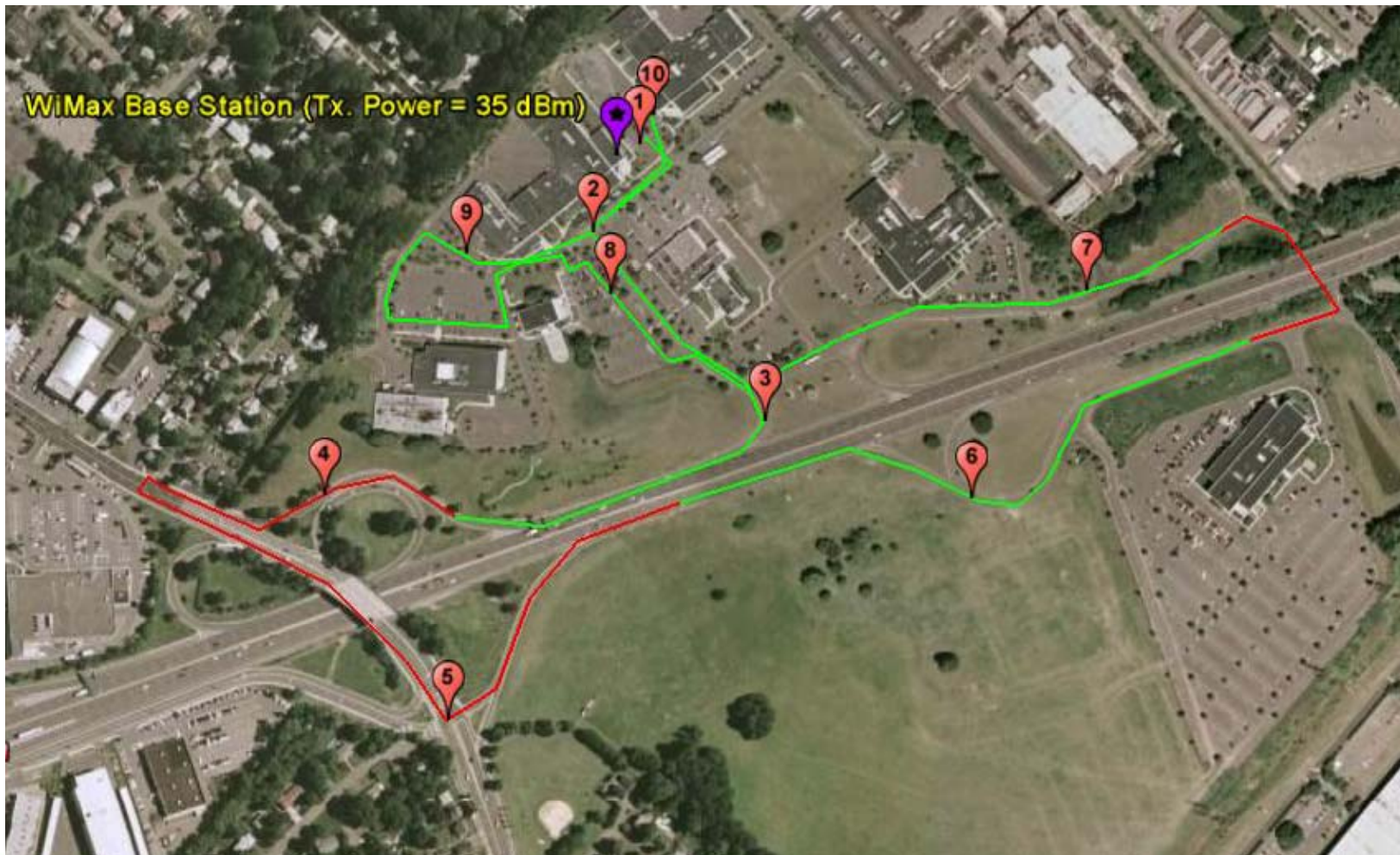


rtPS	real-time polling service
ertPS	enhanced real-time polling service
nrtPS	non real-time polling service
UGS	unsolicited grant service
BE	best effort

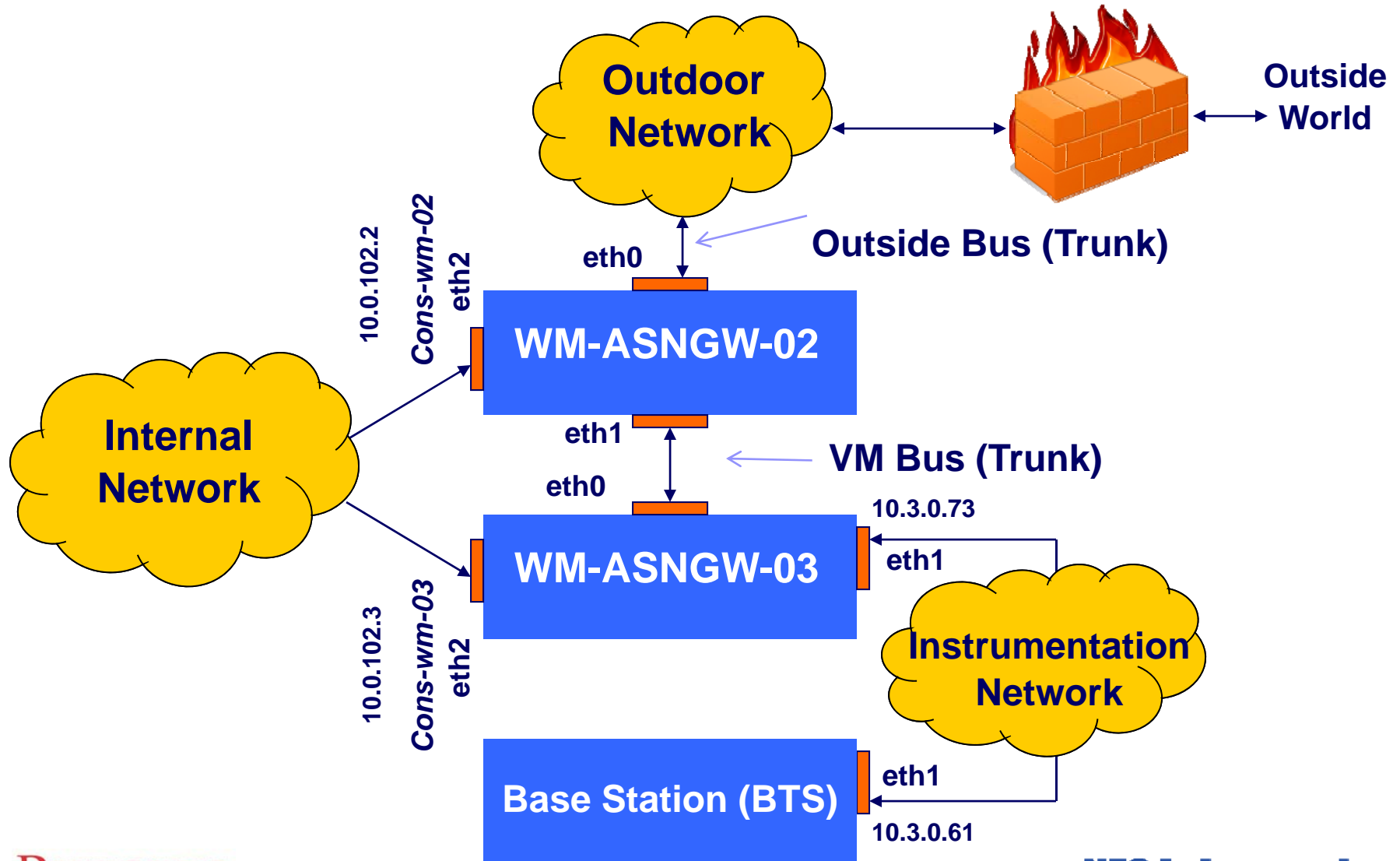
Supported Service Classes

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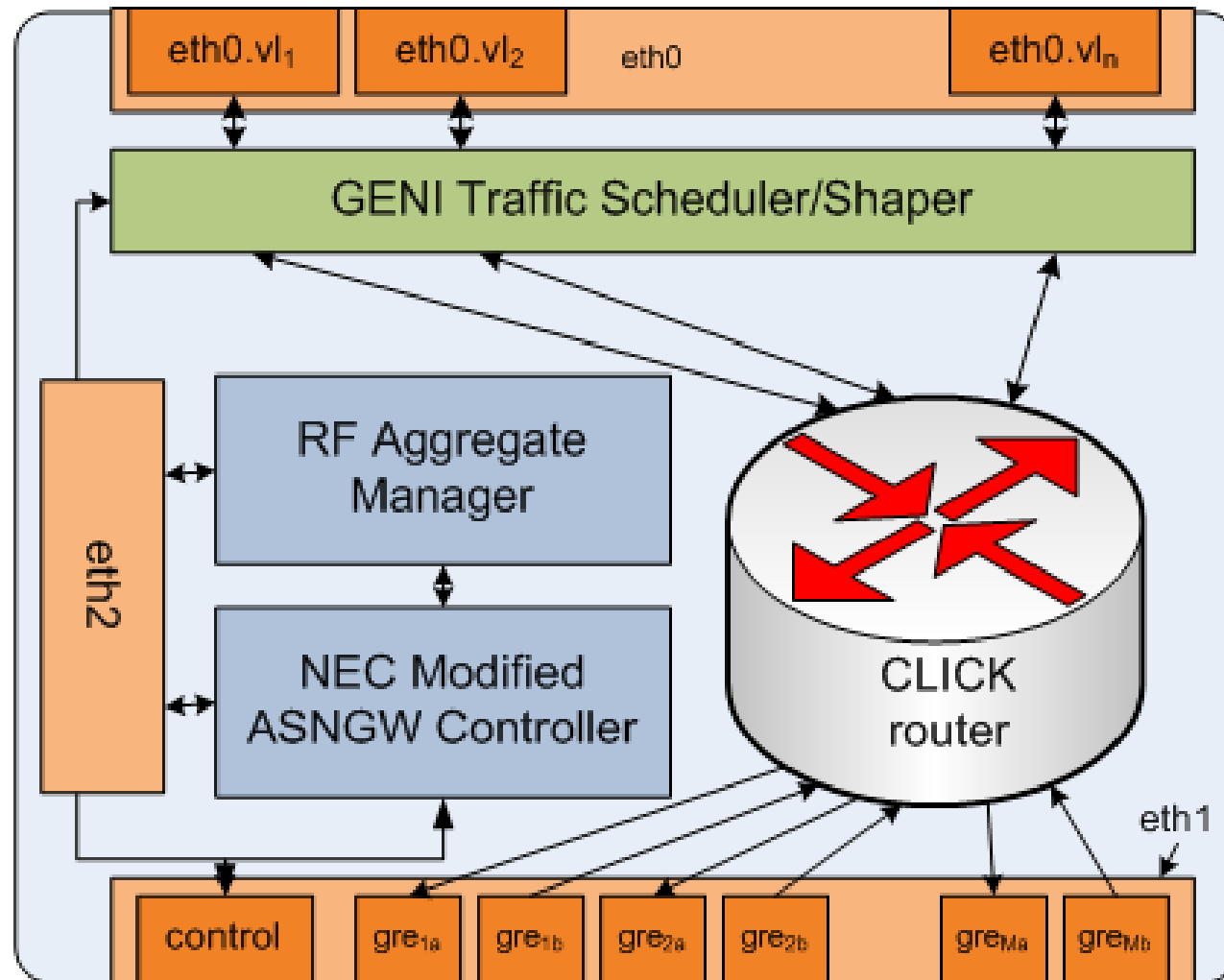
Coverage: Drive-by Connectivity Trace



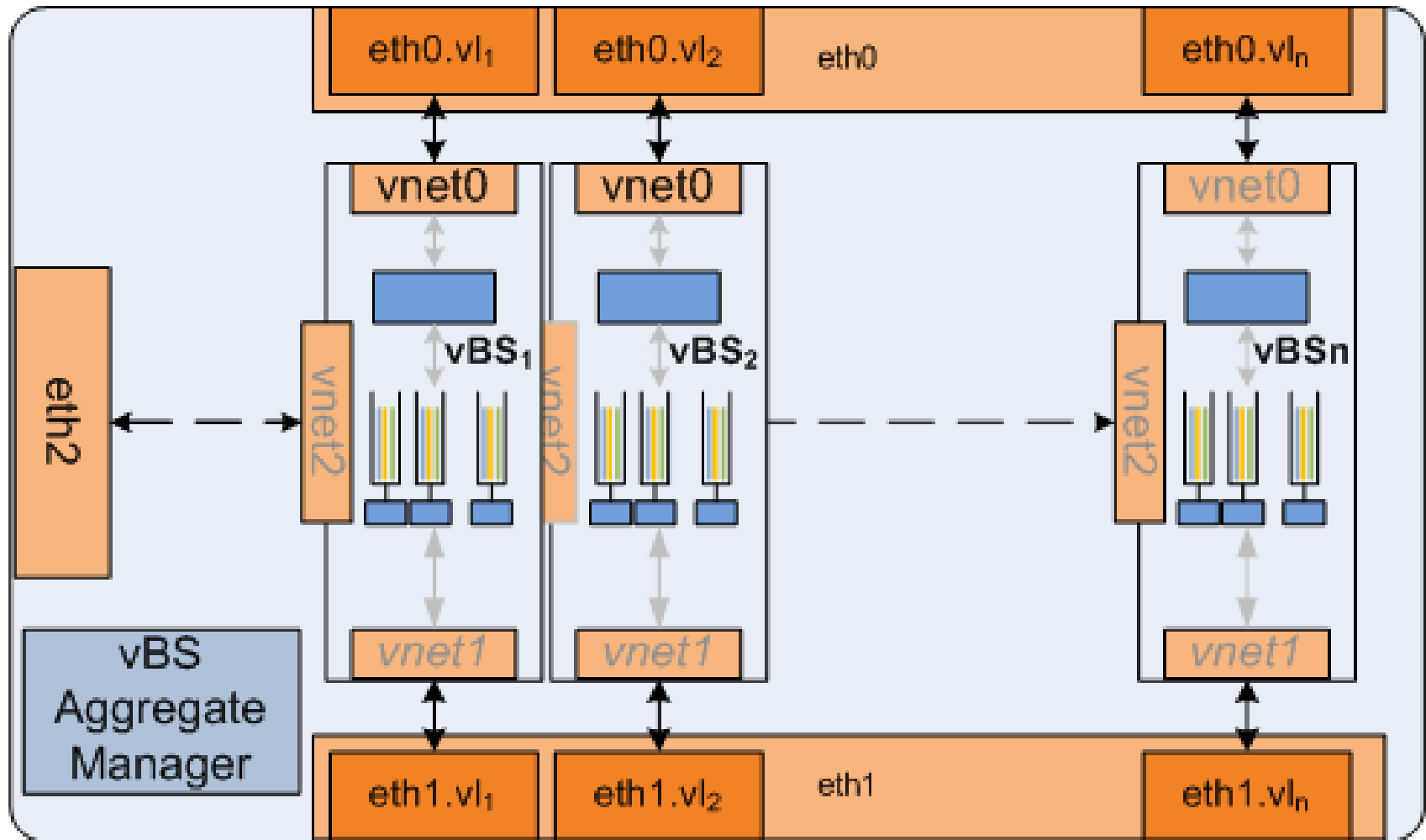
Experimental Setup: Network Layout



Experimental Setup: GENI WiMAX Gateway



Experimental Setup: vBS Substrate



Experimental Setup: Experiment

```
#
# Experiment Description for GEC 6 Demo
#
defProperty('wimaxbase', 1, "ID of base station")
defProperty('baseip', "192.168.122.55", "IP of base station")
defProperty('wimaxsta', 2, "ID of wireless station, i.e. receiver node")
defProperty('staip', "10.42.100.3", "IP of wireless station")
...
defProperty('runtime', 30, "Time in second for the experiment is to run")

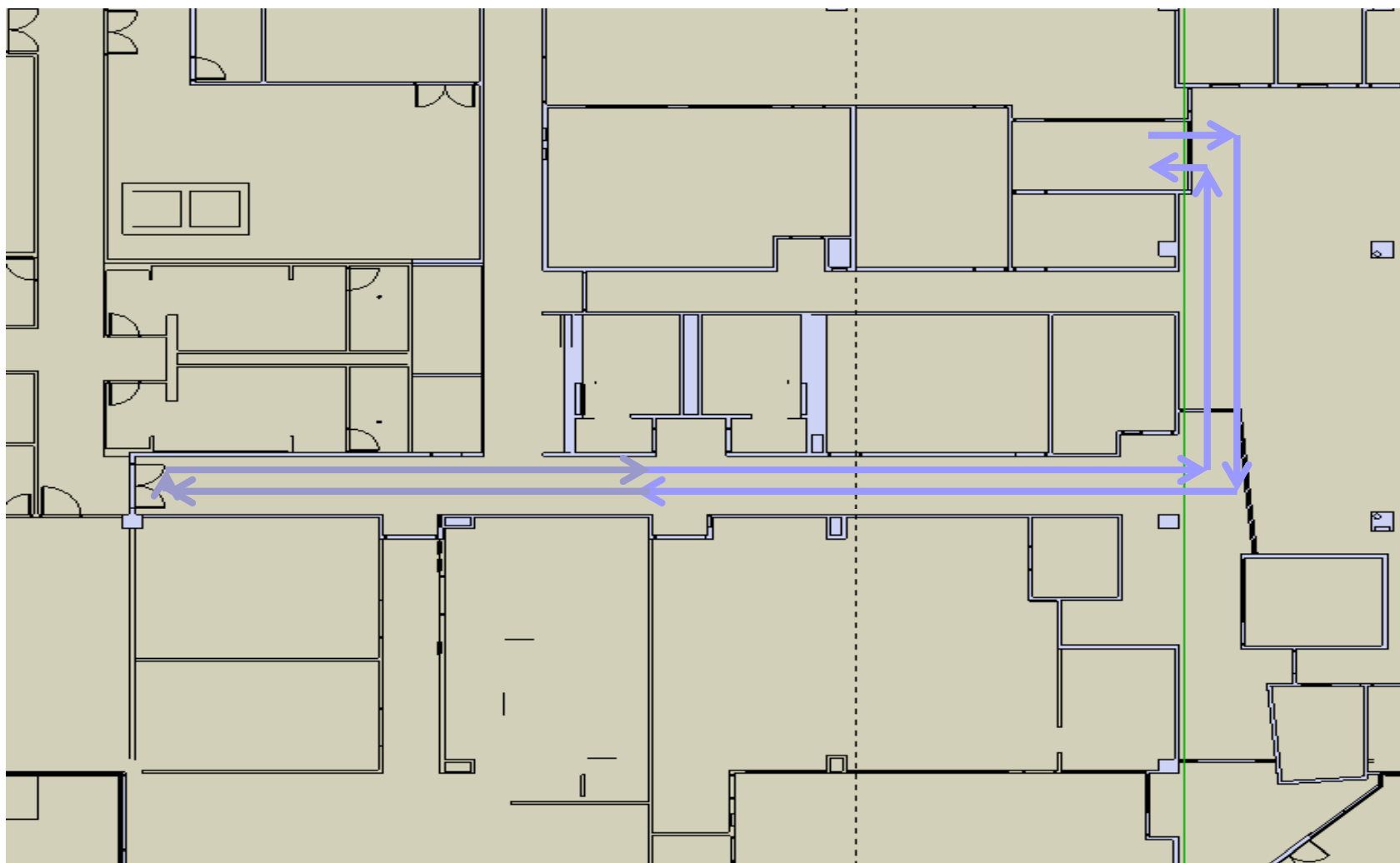
defTopology("wimaxTopology") { |t|
  t.addNode("theBase", [1, prop.wimaxbase])
  t.addNode("theStation", [1, prop.wimaxsta])
  t.addLink("theBase", "theStation")
}
defGroup('basestation', [1,prop.wimaxbase]) {|base|
  base.net.e0.ip = prop.baseip
  base.net.e0.enforce_link = {:topology => 'wimaxTopology', :method => 'wimax'}
}
```


Experimental Setup: Experiment (cont.)

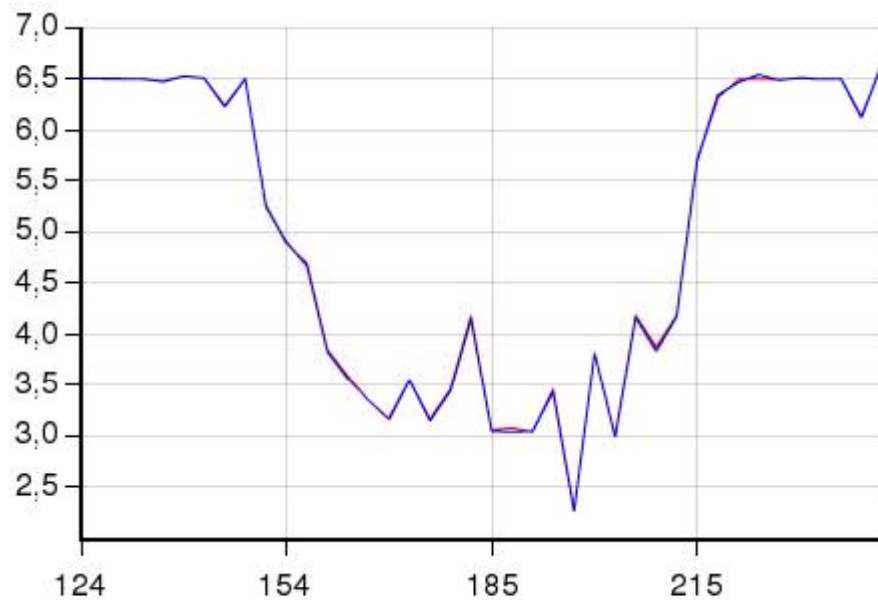
...

```
whenAllInstalled() {  
  |node|  
  wait prop.configtime  
  group('receiver').startApplications  
  group('sender').startApplications  
  # Uncomment this if you want to change generator parameter on-  
the-fly  
  # wait prop.runtime / 2  
  # property.pktsize = 512  
  # property.bitrate = 8192  
  wait prop.runtime  
  allGroups.stopApplications  
  Experiment.done  
}
```

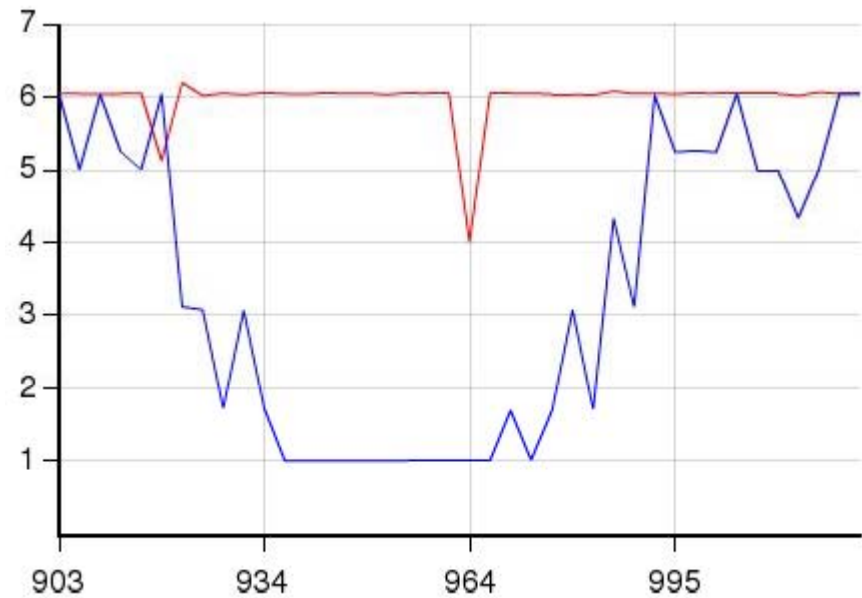
Experimental Setup: Mobility



Results



Throughput without shaping



Throughput with shaping