WiMax Experiments using OMF/OML

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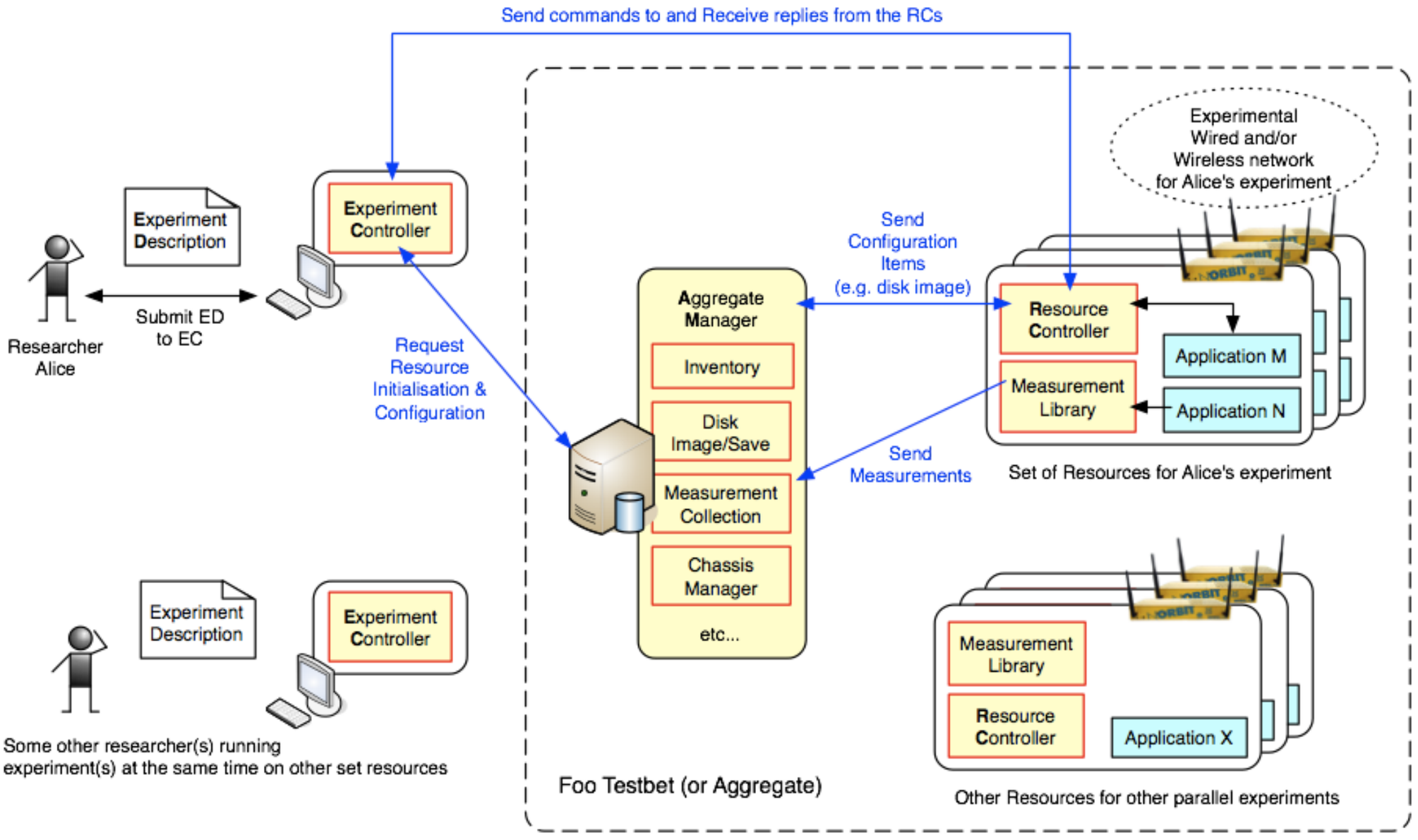
University of Massachusetts, Amherst

Raytheon
BBN Technologies

geni

OMF System


Send commands to and Receive replies from the RCs
Experimental
Wired and/or
Wireless network
for Alice's experiment
Experiment
Description
Experiment
Controller
Researcher
Alice
Submit ED
to EC
Request
Resource
Initialisation &
Configuration
Send
Configuration
Items
(e.g. disk image)
Aggregate
Manager
Inventory
Disk
Image/Save
Measurement
Collection
Chassis
Manager
etc...
Resource
Controller
Measurement
Library
Application M
Application N
Send
Measurements
Set of Resources for Alice's experiment
Experiment
Description
Experiment
Controller
Some other researcher(s) running
experiment(s) at the same time on other set resources
Measurement
Library
Resource
Controller
Application X
Foo Testbet (or Aggregate)
Other Resources for other parallel experiments

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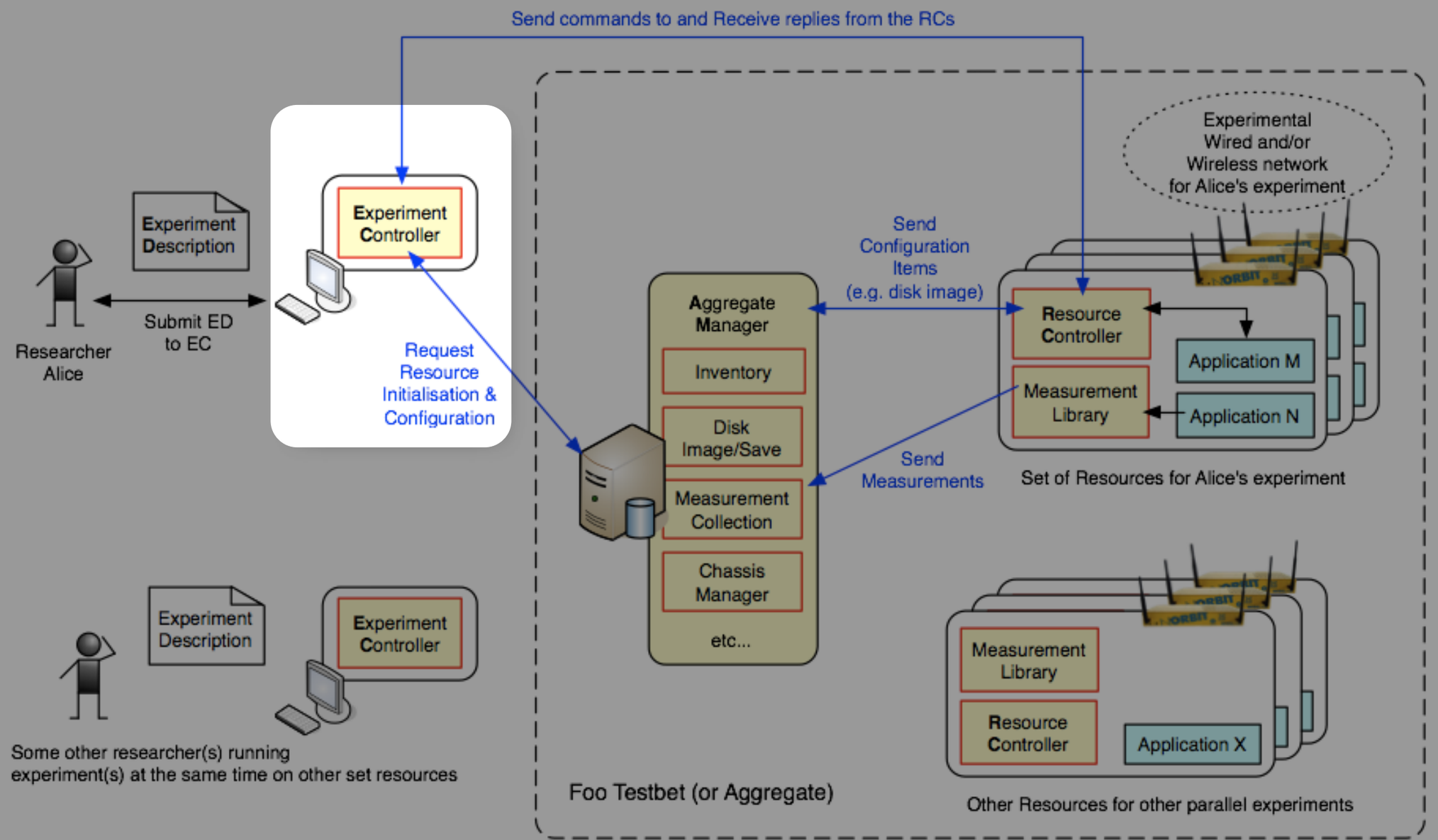
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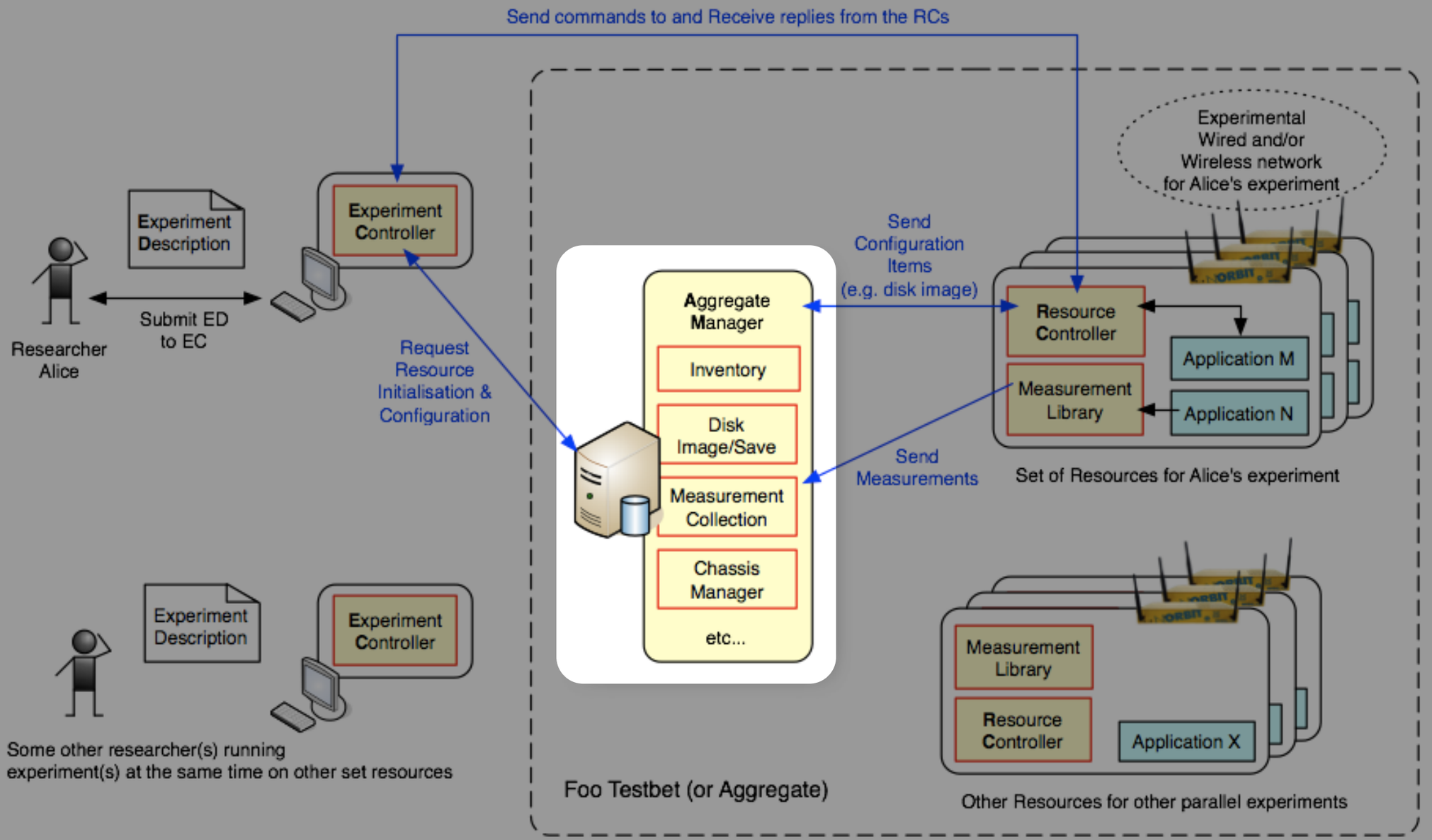
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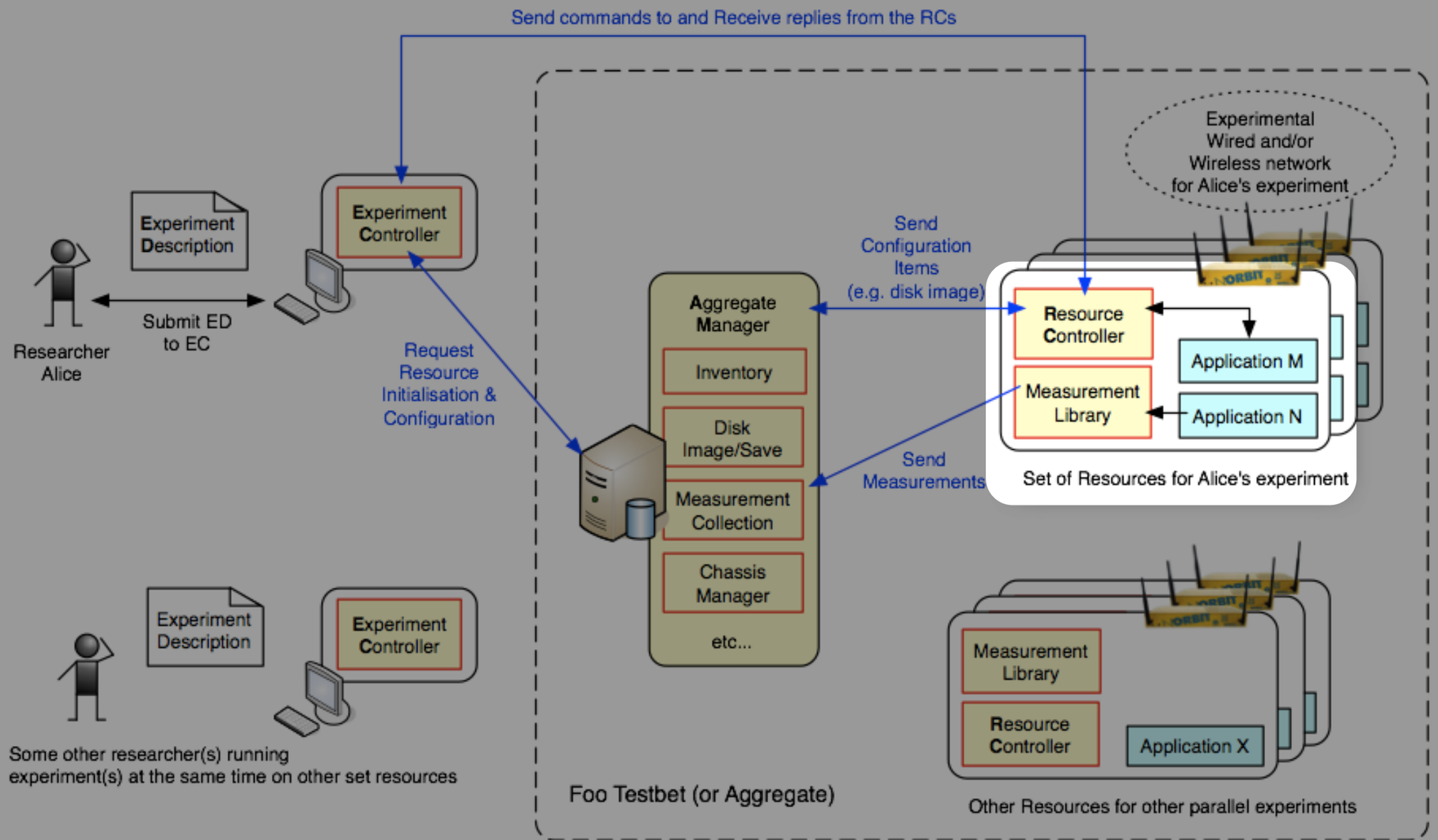
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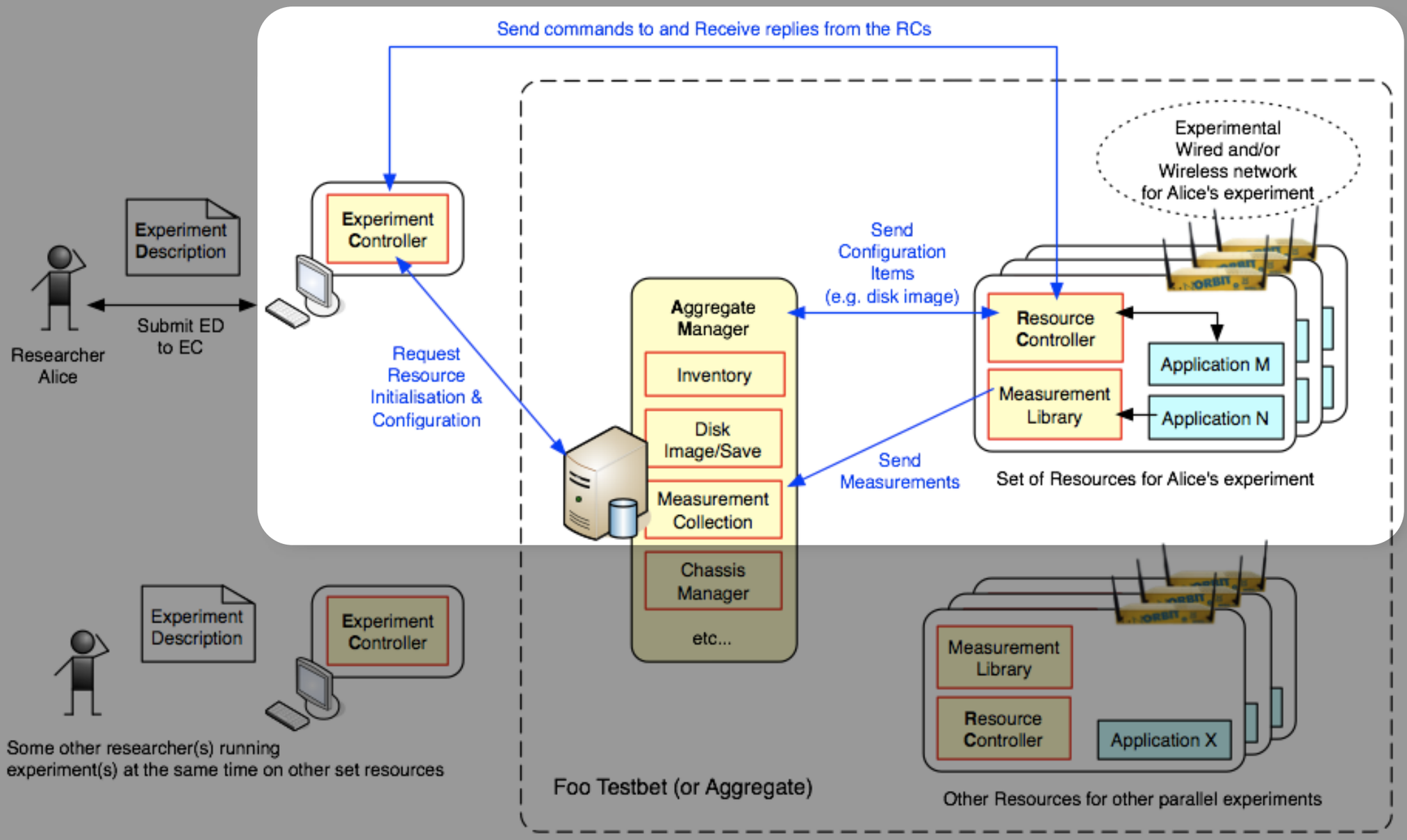
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```
# Experiment Definition File.
# Performing Downlink Throughput Measurements

defProperty('res1', "omf.bbn.node1", "ID of a node")
```

```
# Adding support for GPS logging
defApplication('gpslogger','gps') do |app|
  app.path="gpslogger"
  app.appPackage = "gpslogger.tar"
  app.version(1,0,0)
  app.shortDescription = "GPS Logger"
  app.description = "Retrieves GPS fix data from gpsd
                     and feeds it into OML."
  app.defMeasurement('gps_data') do |mp|
    mp.defMetric('lat', :float)
    mp.defMetric('lon', :float)
    mp.defMetric('ele', :float)
    mp.defMetric('fix', :string)
    mp.defMetric('time', :string)
  end
end
```

```
# Adding support for logging link status
defApplication('linkstatus_app','linkstatus') do |app|
  app.path="wiwrapper.rb"
  app.appPackage = "wiwrapper.tar"
  app.version(1,0,0)
  app.shortDescription = "Wrapper around wimaxcu link status"
  app.description = <<TEXT
      This is a wrapper around wimaxcu link status command
TEXT
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# Performing Downlink Throughput Measurements

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  app.defProperty('sampling','Sampling interval in sec', 's',
  {
    :type => :integer,
    :dynamic => false
  })
  app.defMeasurement('wimaxstat') do |m|
    m.defMetric('CenterFrequency', :long)
    m.defMetric('RSSI', :long)
    m.defMetric('CINR', :long)
    m.defMetric('TXPWR', :long)
  end
end


# Defining a group with one node, that utilizes above applications
defGroup('Actor', property.res1) { |node|
  node.prototype("test:proto:iperftcpreceiver",
    { 'report_interval' => 1, 'time' => 40})
  node.addApplication("gpslogger") { |app|
    app.measure('gps_data', :interval => 3)
```

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  node.addApplication("gpslogger") { |app|
    app.measure('gps_data', :interval => 3)
  }
  node.addApplication("linkstatus_app") { |app|
    app.setProperty('sampling', 5)
    app.measure('wimaxstat')
  }
  node.net.x0.profile = '51'
}


# Start up the experiment when all nodes are ready
onEvent(:ALL_UP_AND_INSTALLED) do |event|
```

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# Start up the experiment when all nodes are ready
onEvent(:ALL_UP_AND_INSTALLED) do |event|
  wait 5
  info "Press enter to continue"
  STDIN.gets
  group('Actor').startApplications
  wait 50
  group('Actor').stopApplications
  info "Experiment is done. Copying measurements to /home/geni/experiment_logs"
  info "Enter prefix: "
  prefix=STDIN.gets
  prefix.strip!
  FileUtils.cp "/tmp/#{Experiment.ID}.sq3" ,
               "/home/geni/experiment_logs/#{prefix}_#{Experiment.ID}.sq3"
  info "files copied."
  Experiment.done
end
```

```
# Adding support for visualization
addTab(:defaults)
  addTab(:graph2) do |tab|
  opts = { :postfix => %{This graph shows the throughput.},
           :updateEvery => 1
  }
  tab.addGraph("Throughput", opts) do |g|
    data = []
    mp = ms('iperf_TCP_Info')
    mp.project(:oml_ts_server, :Bandwidth).each do |sample|
      time, bw = sample.tuple
      data << [time, bw]
    end
    g.addLine(data, :label => "Bandwidth")
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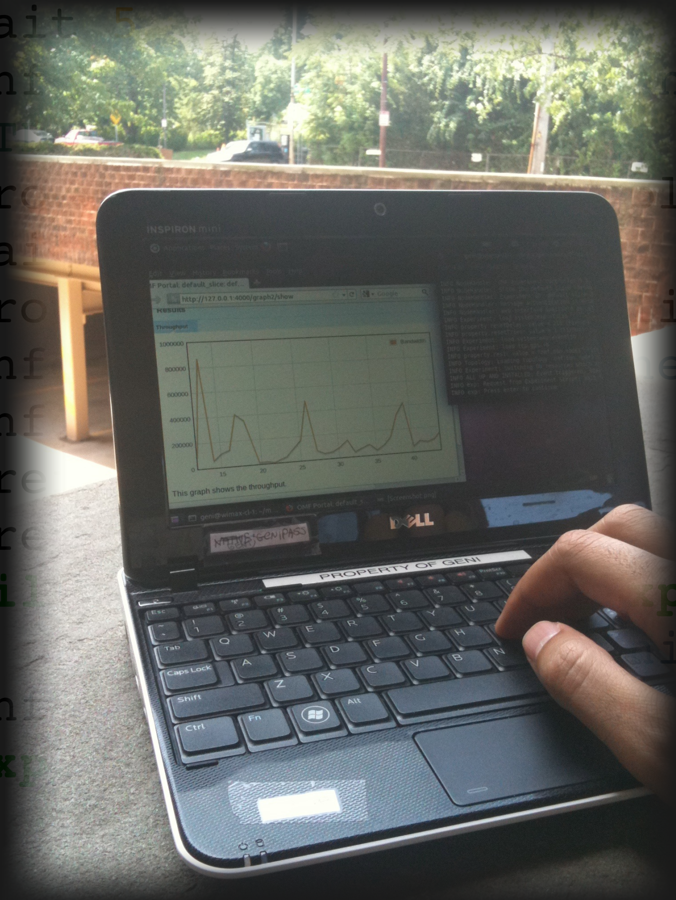


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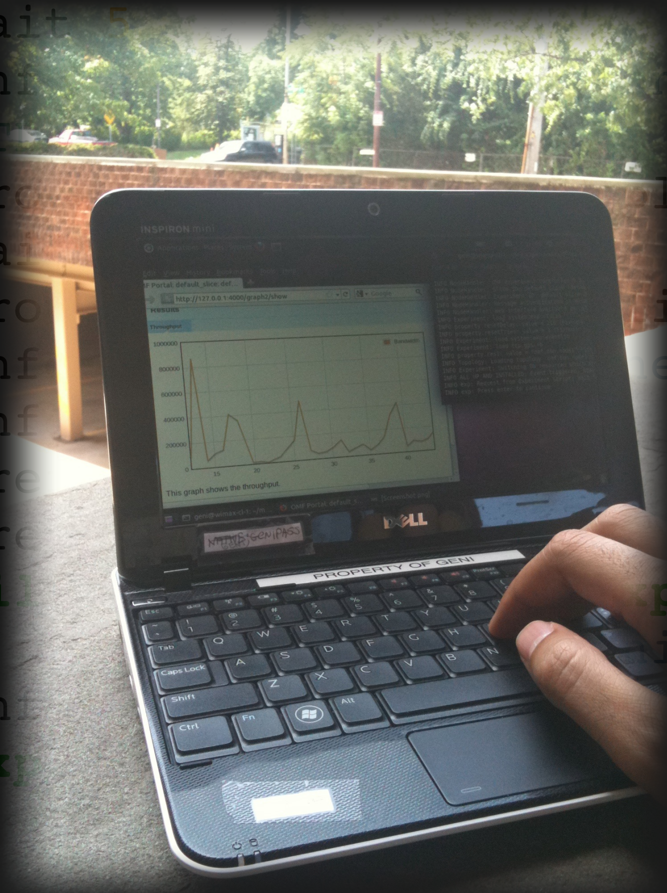

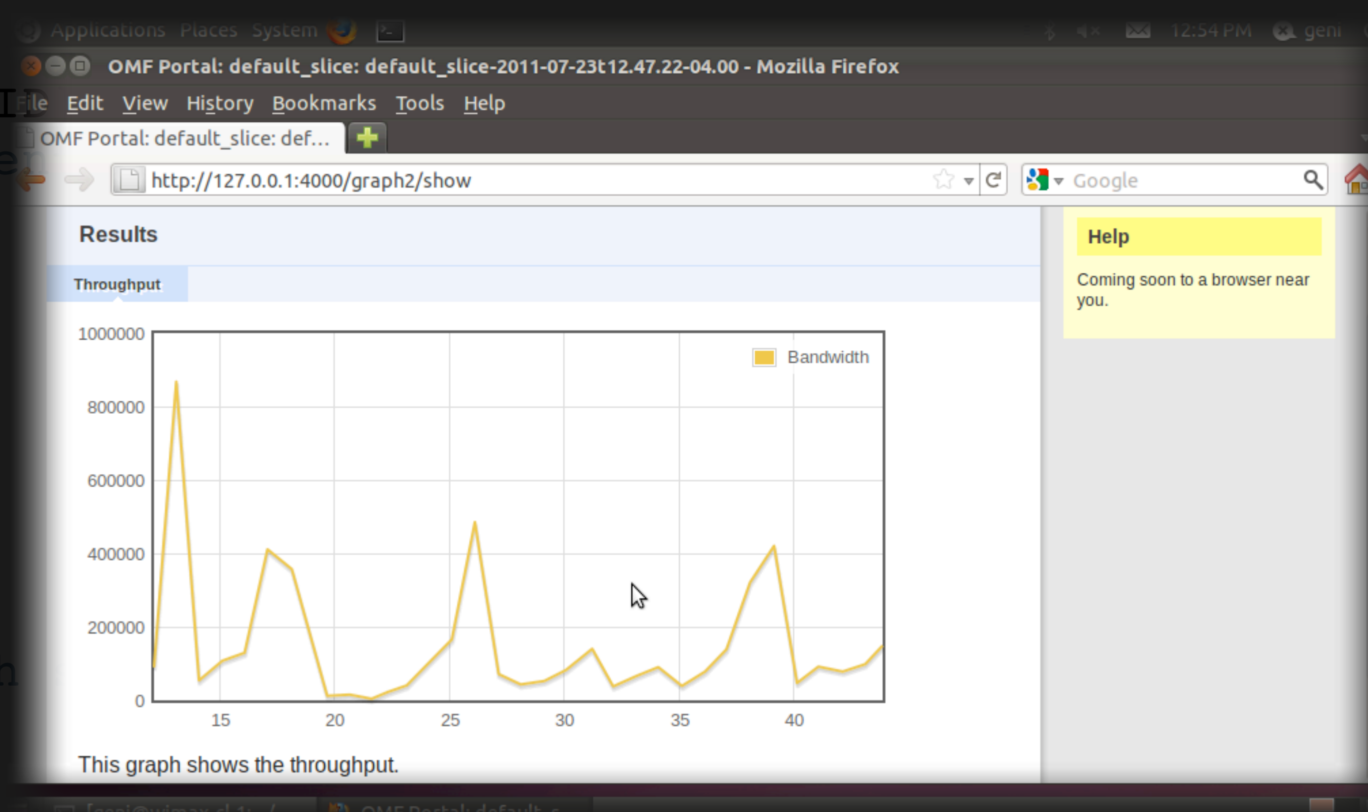


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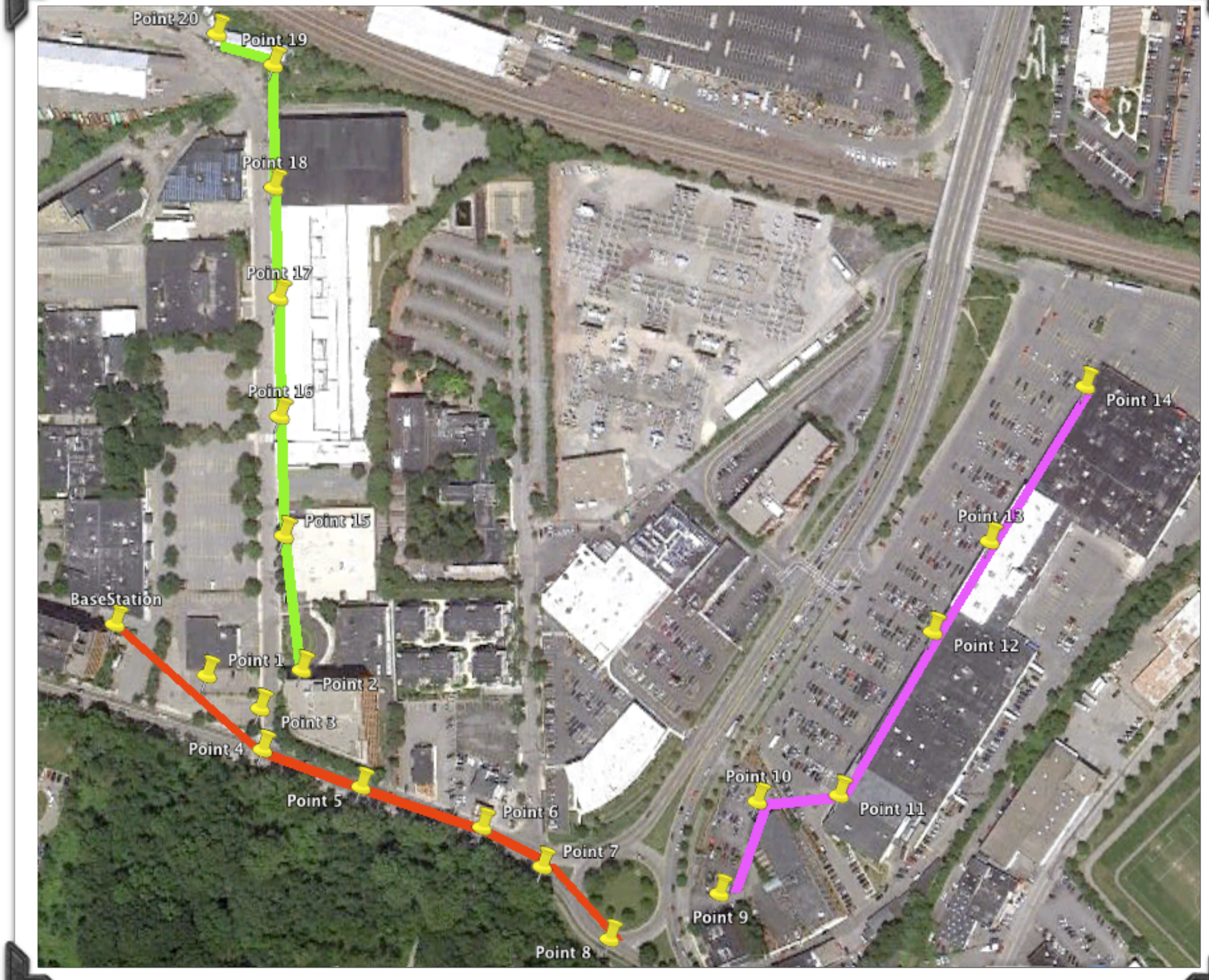
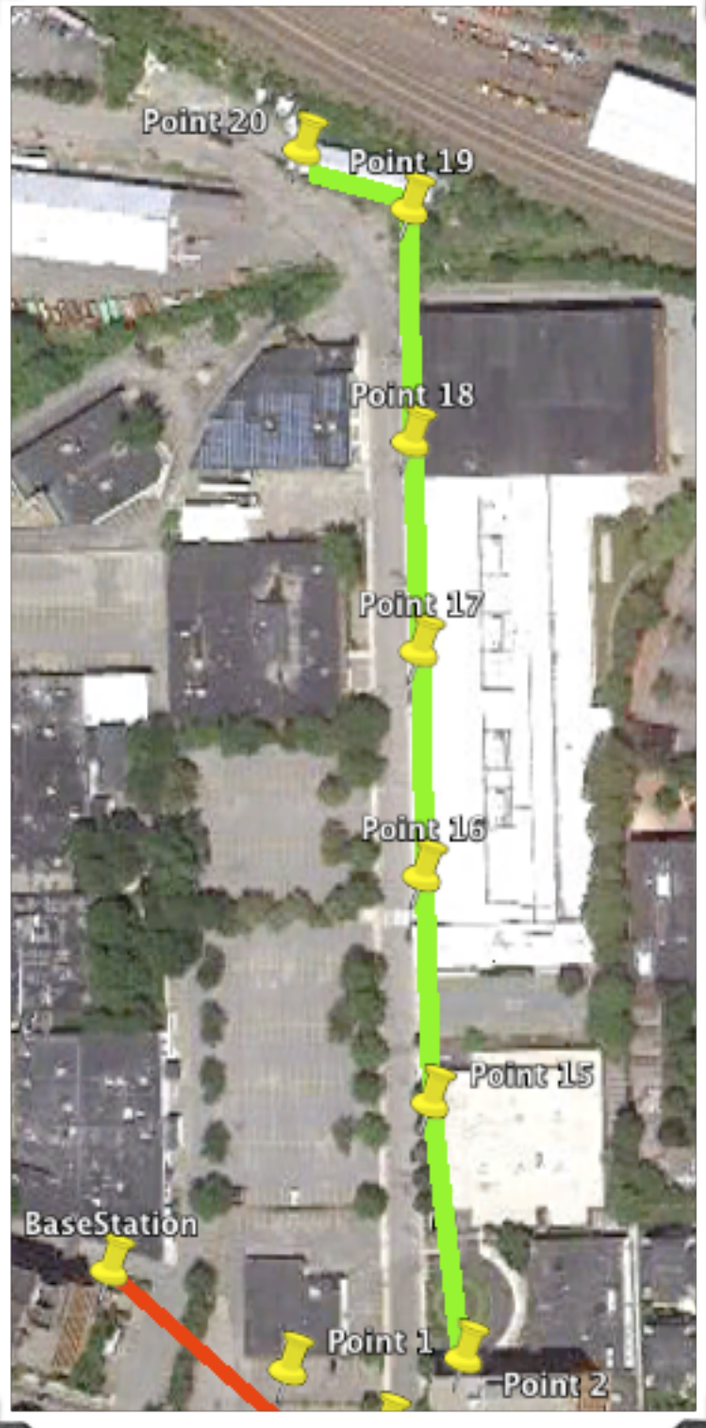

Point 20
Point 19
Point 18
Point 17
Point 16
Point 15
BaseStation
Point 1
Point 2
Point 3
Point 4
Point 5
Point 6
Point 7
Point 8
Point 9
Point 10
Point 11
Point 12
Point 13
Point 14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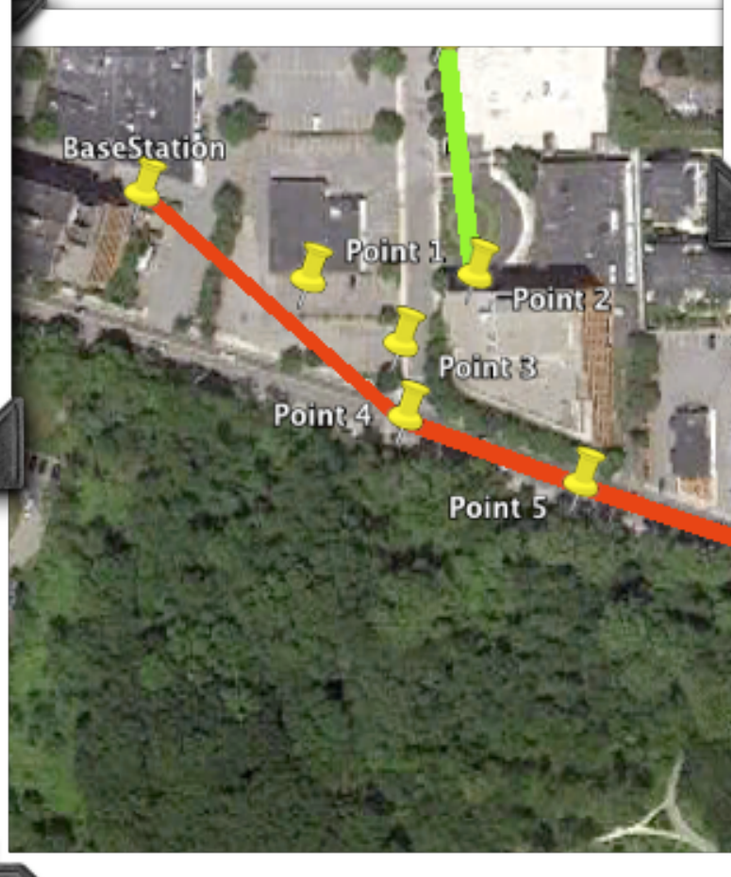
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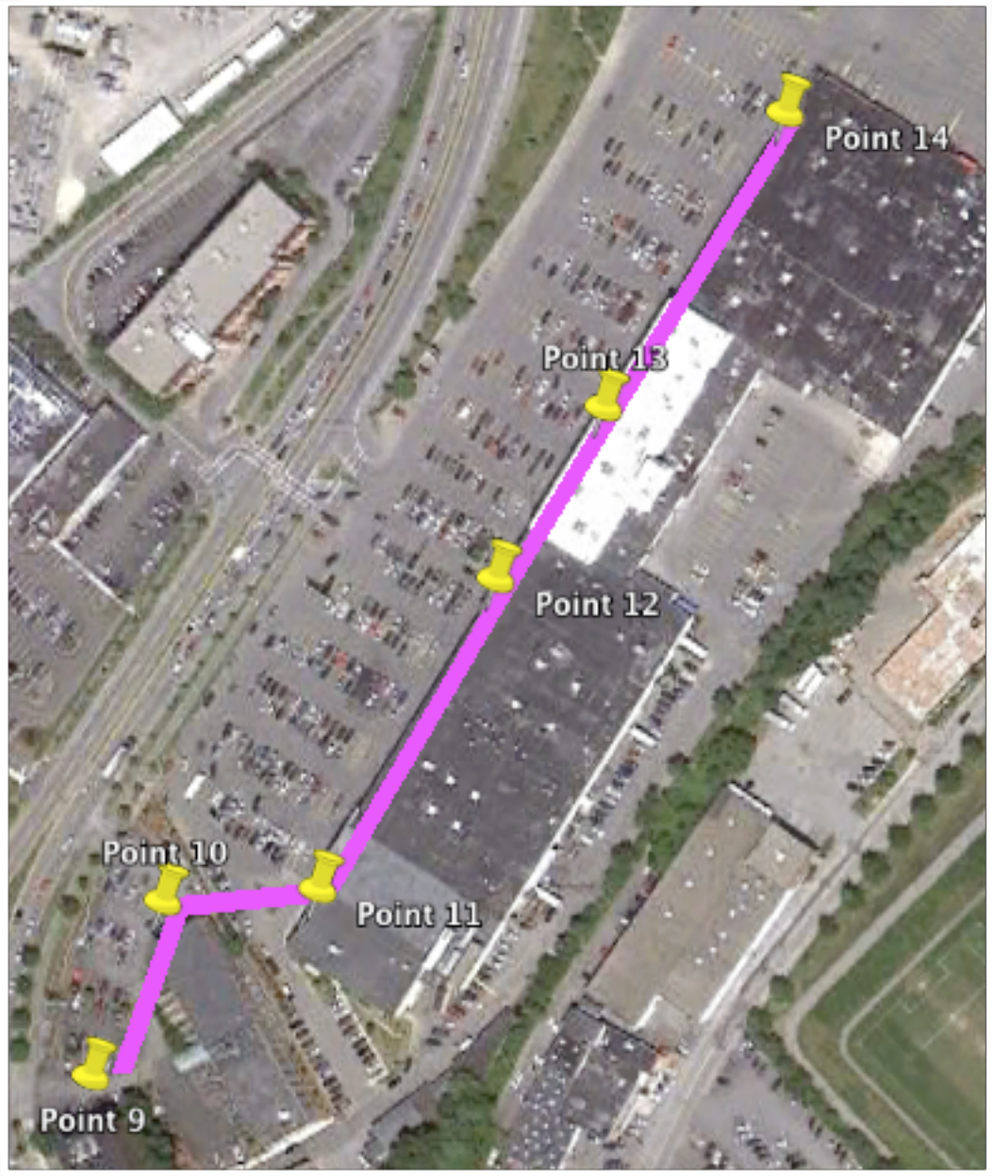
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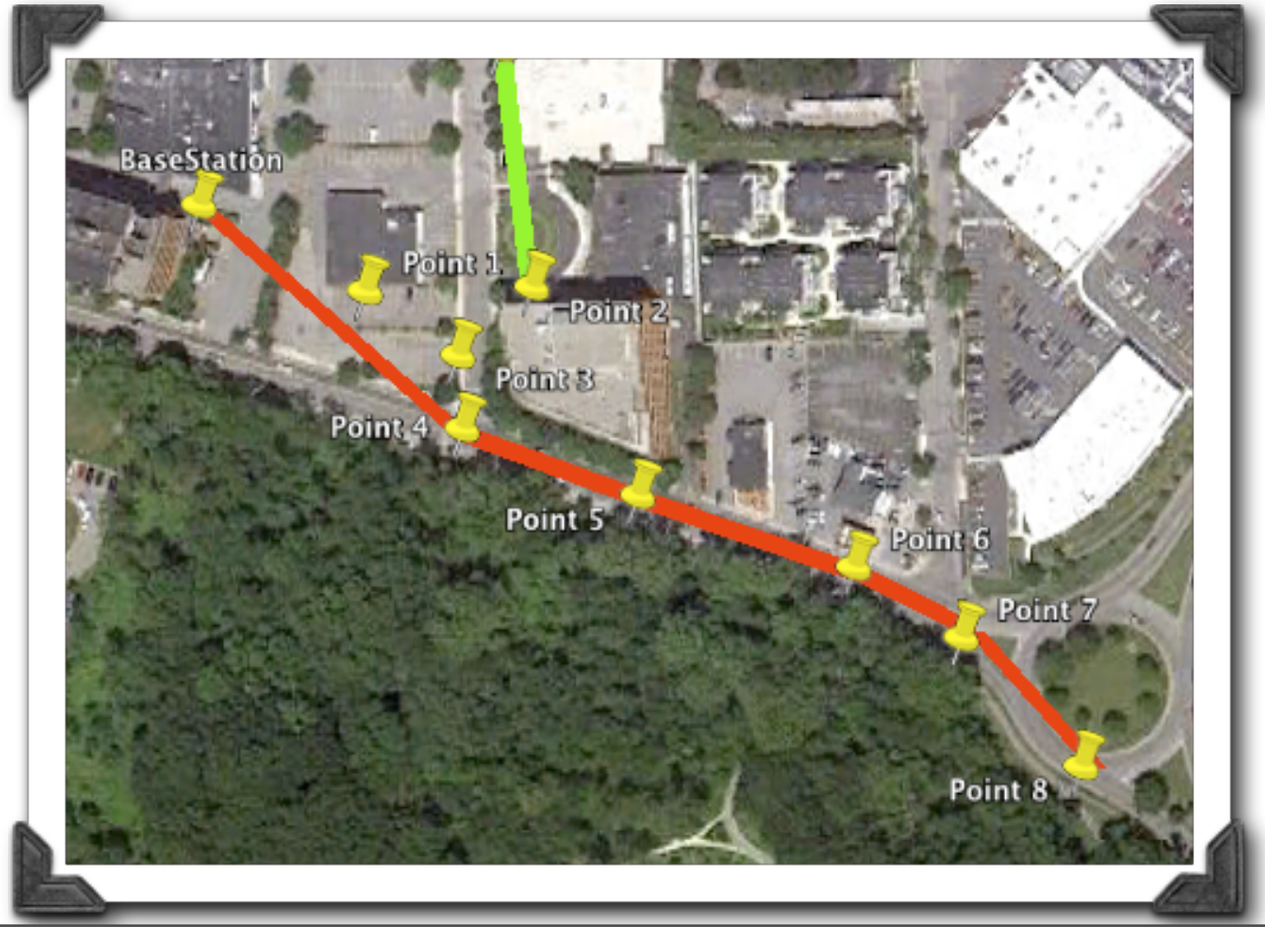
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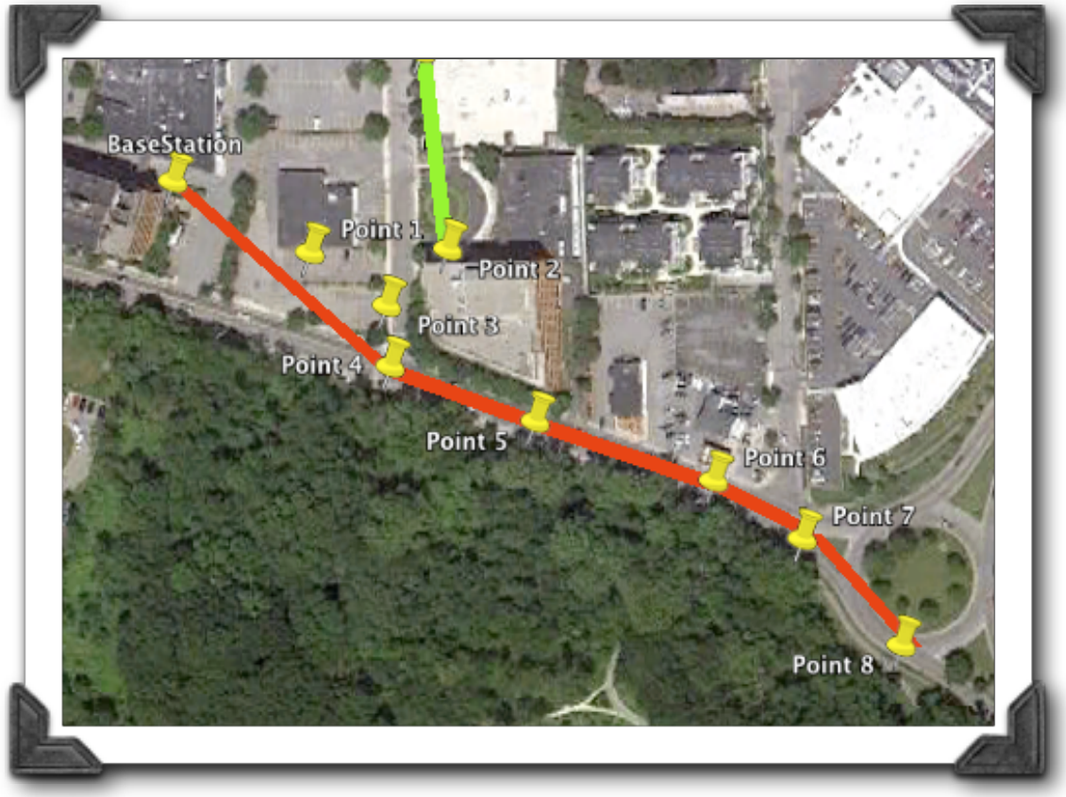
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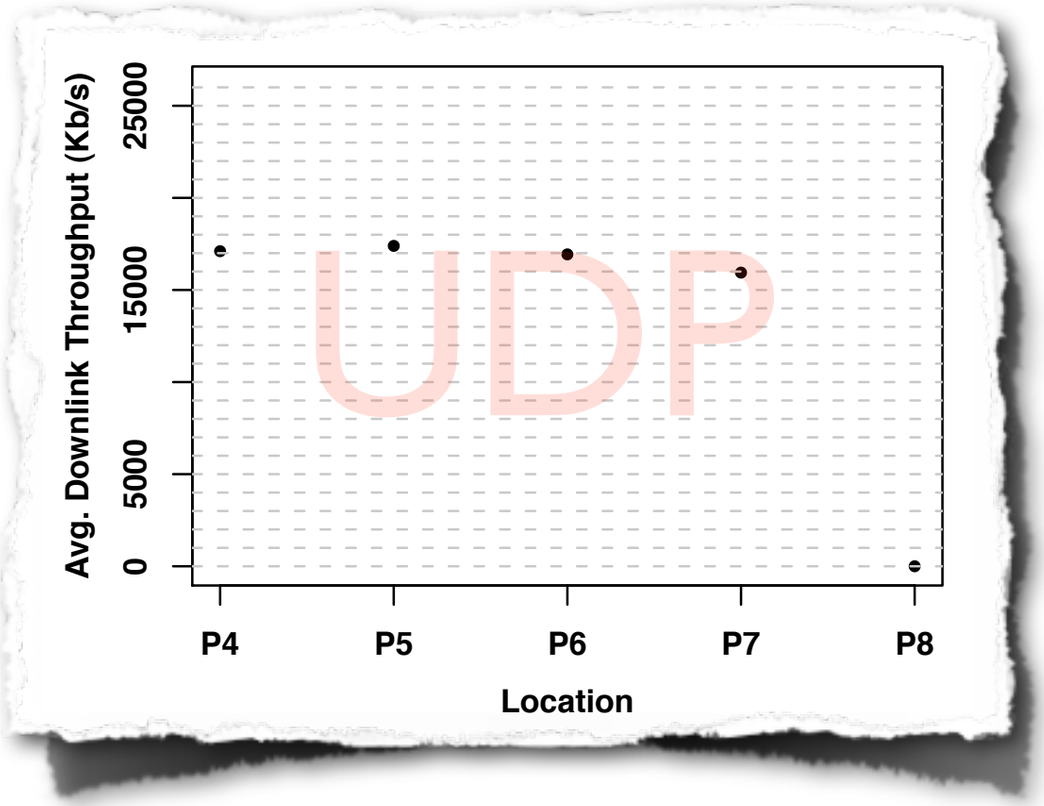
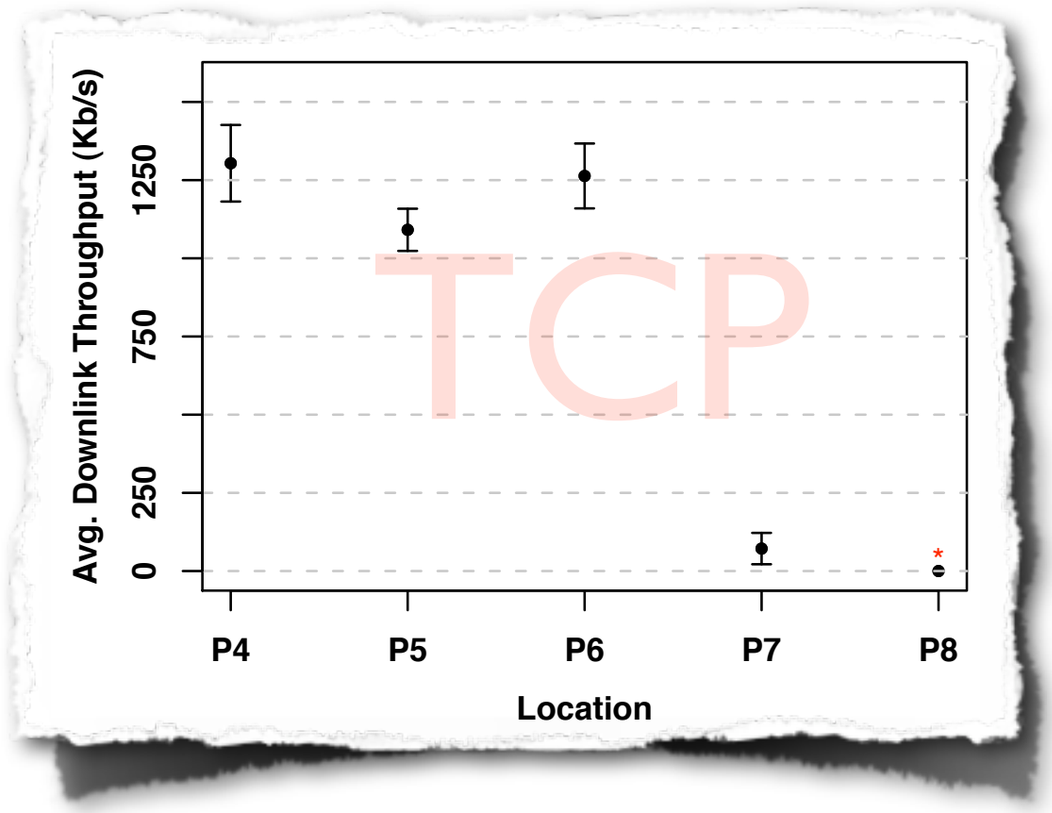
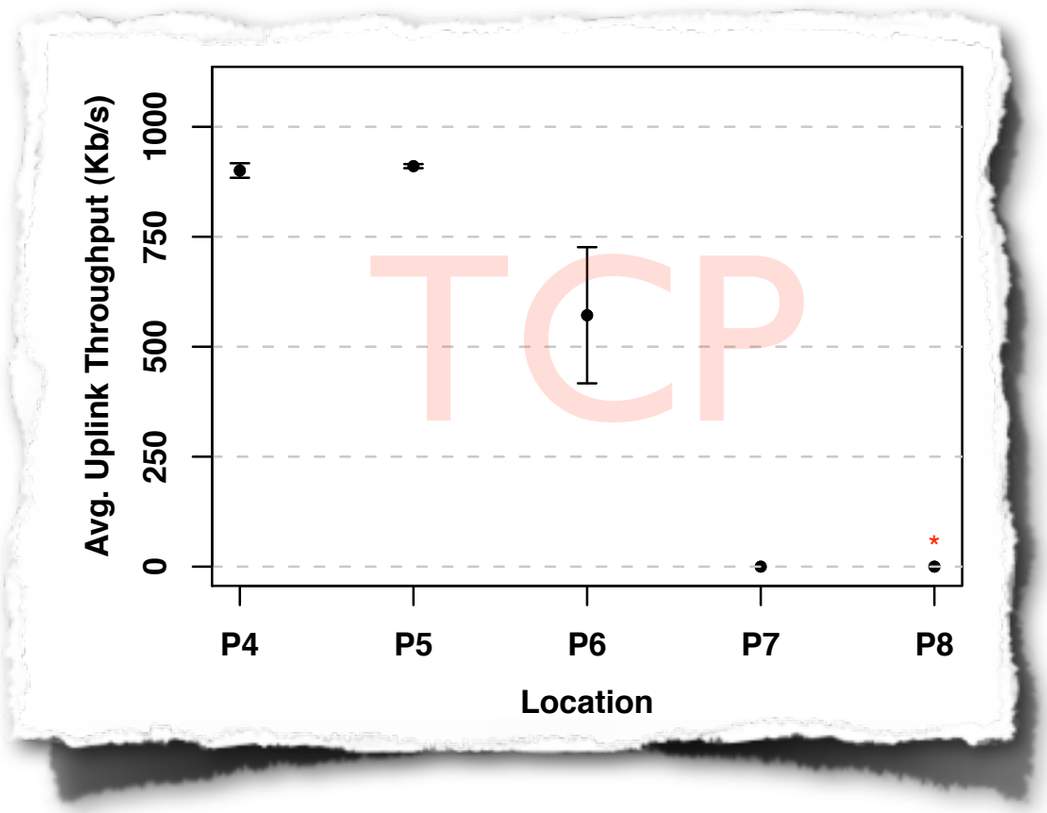
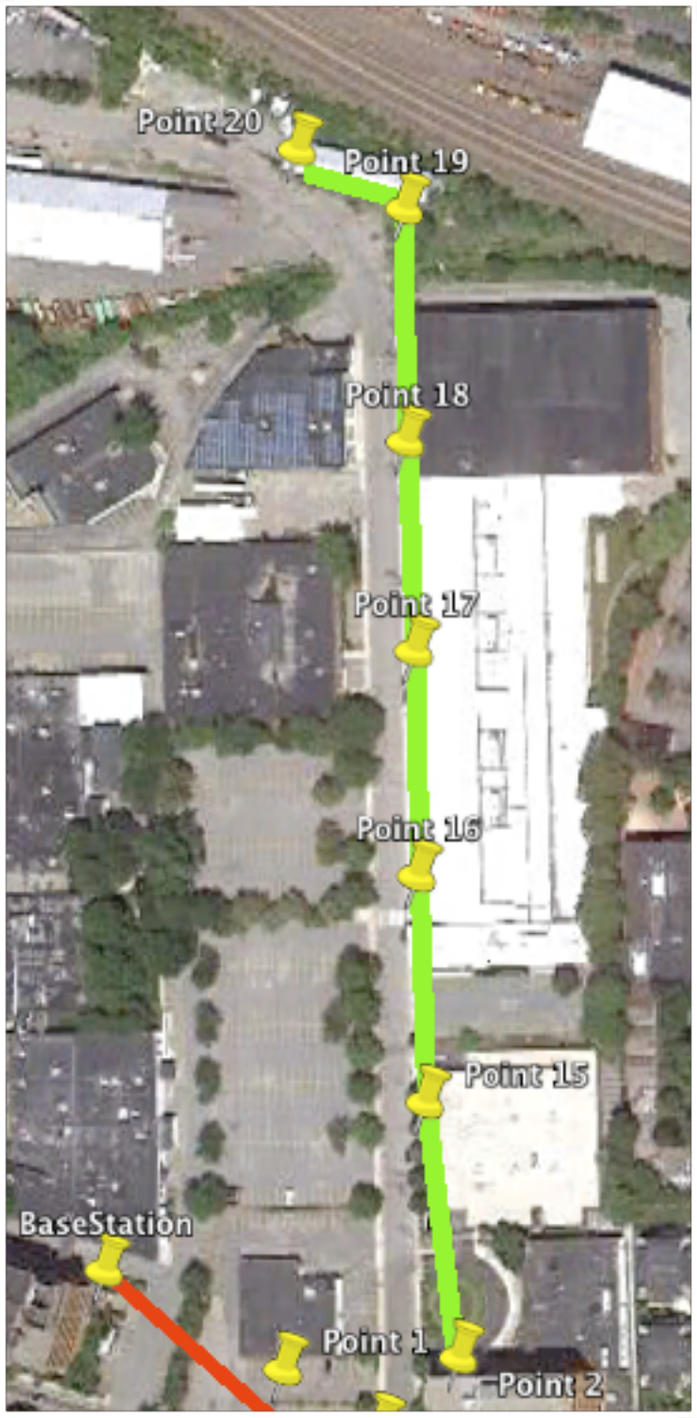
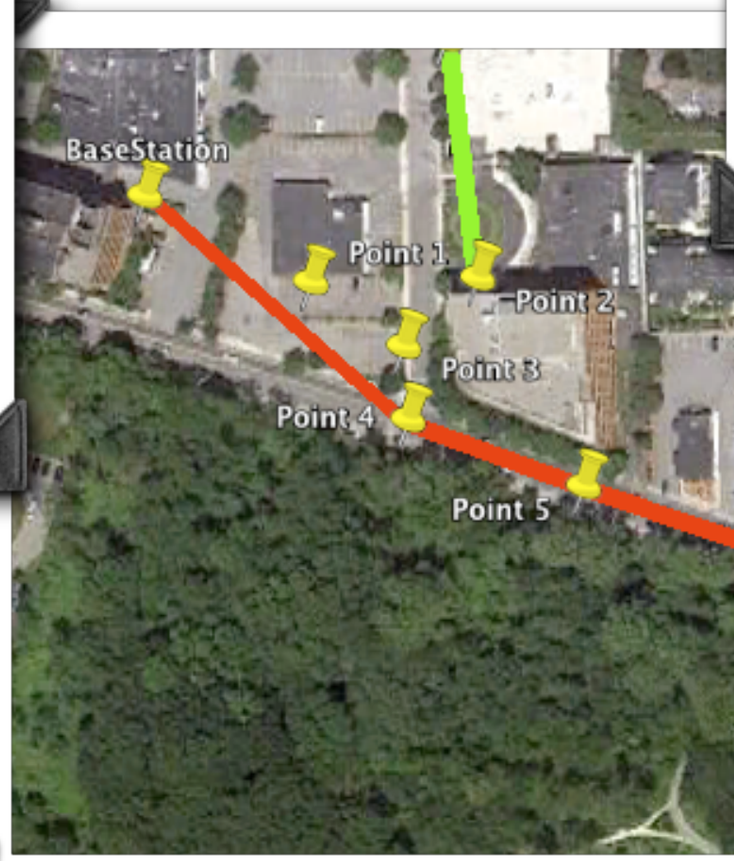
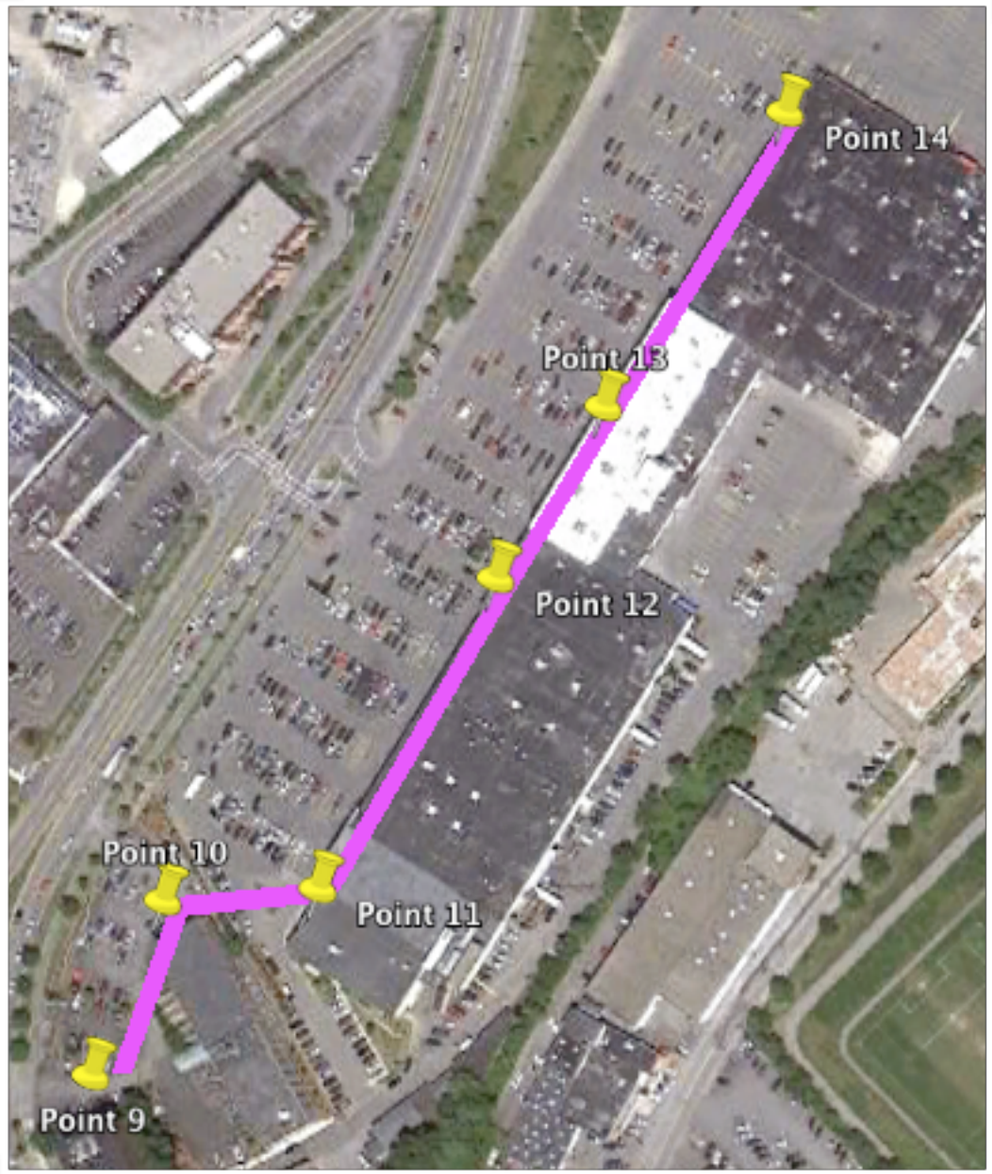

Avg. Downlink Throughput (Kb/s)
0
5000
15000
25000
P4
P5
P6
P7
P8
Location
UDP

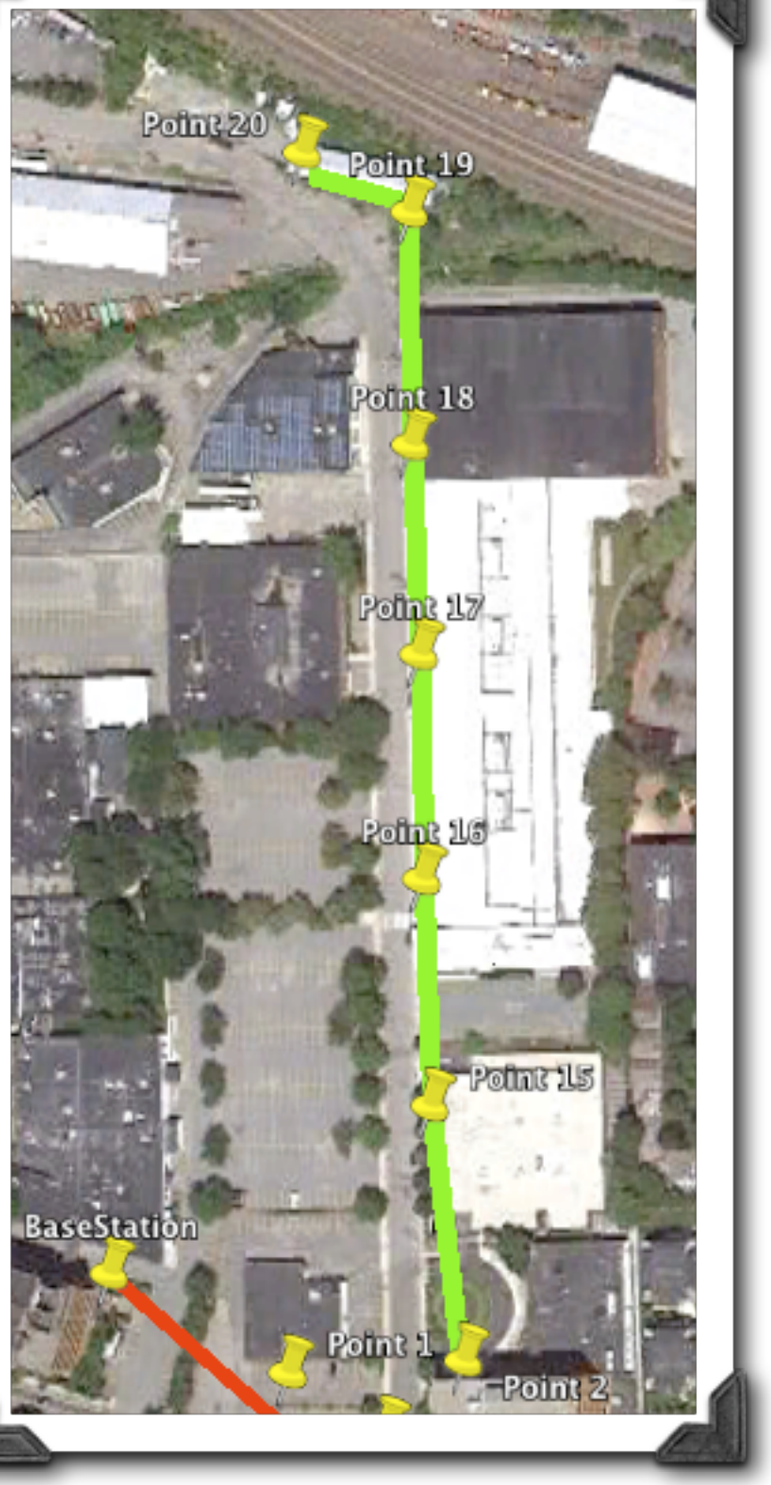

Avg. Downlink Throughput (Kb/s)
0
250
750
1250
P4
P5
P6
P7
P8
Location
TCP

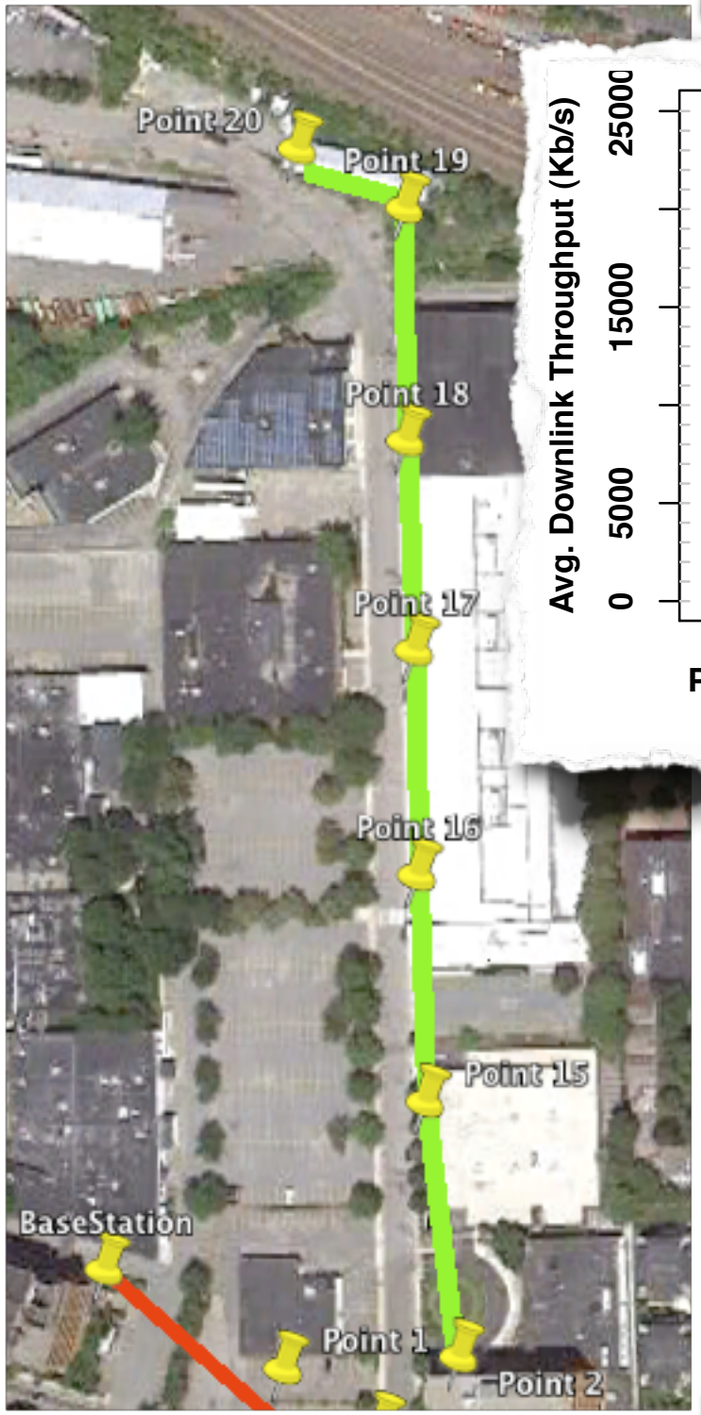

Avg. Uplink Throughput (Kb/s)
0
250
500
750
1000
P4
P5
P6
P7
P8
Location
TCP

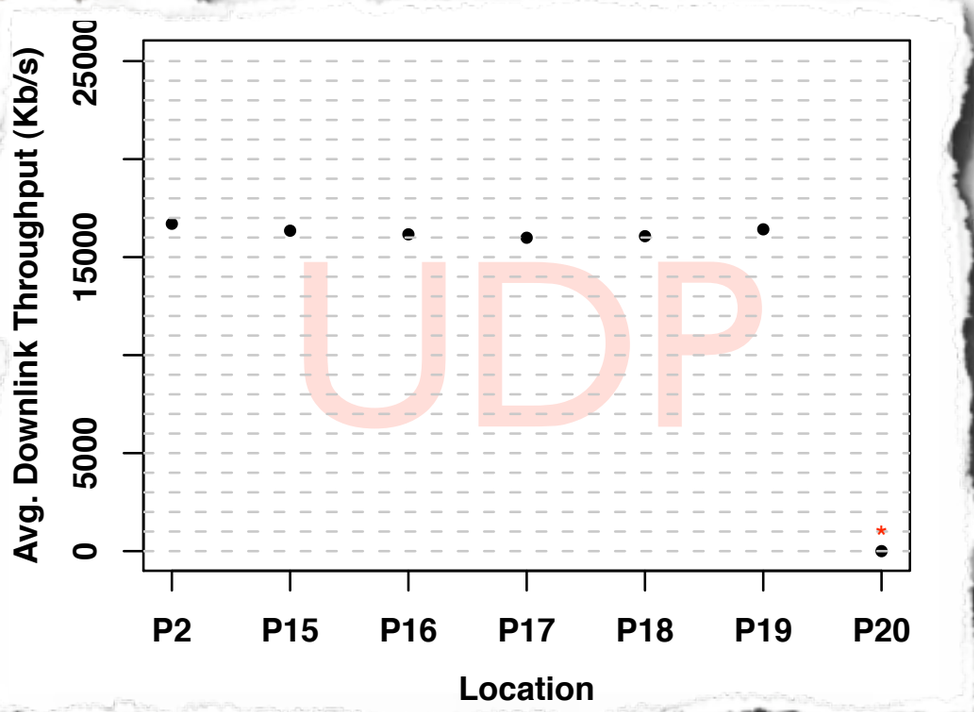

Point 20
Point 19
Point 18
Point 17
Point 16
Point 15
BaseStation
Point 1
Point 2

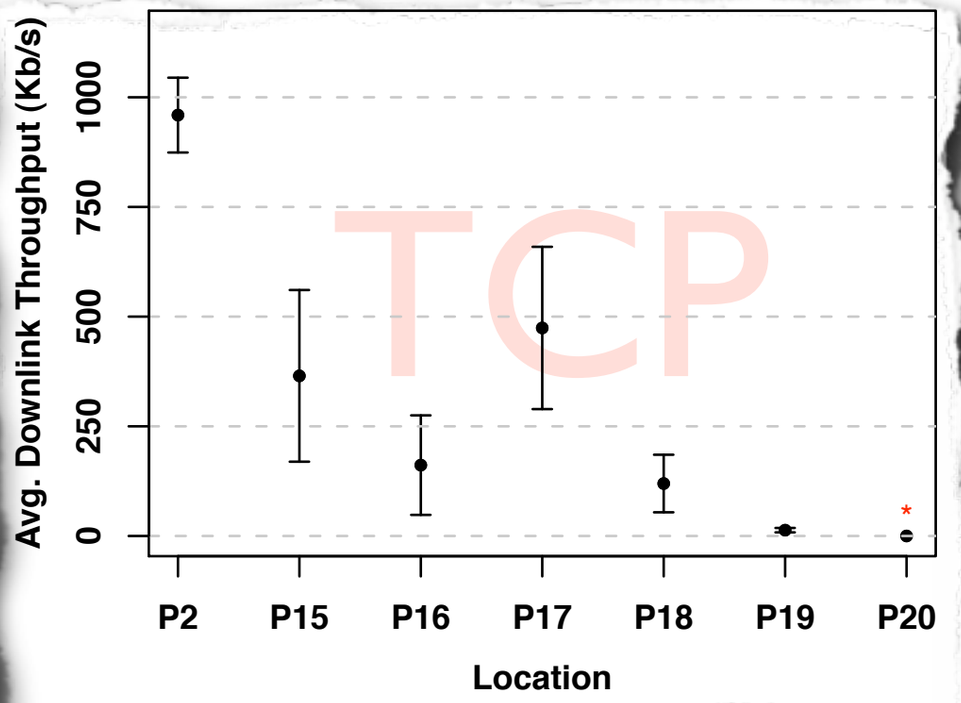

BaseStation
Point 1
Point 2
Point 3
Point 4
Point 5
Point 6
Point 7
Point 8

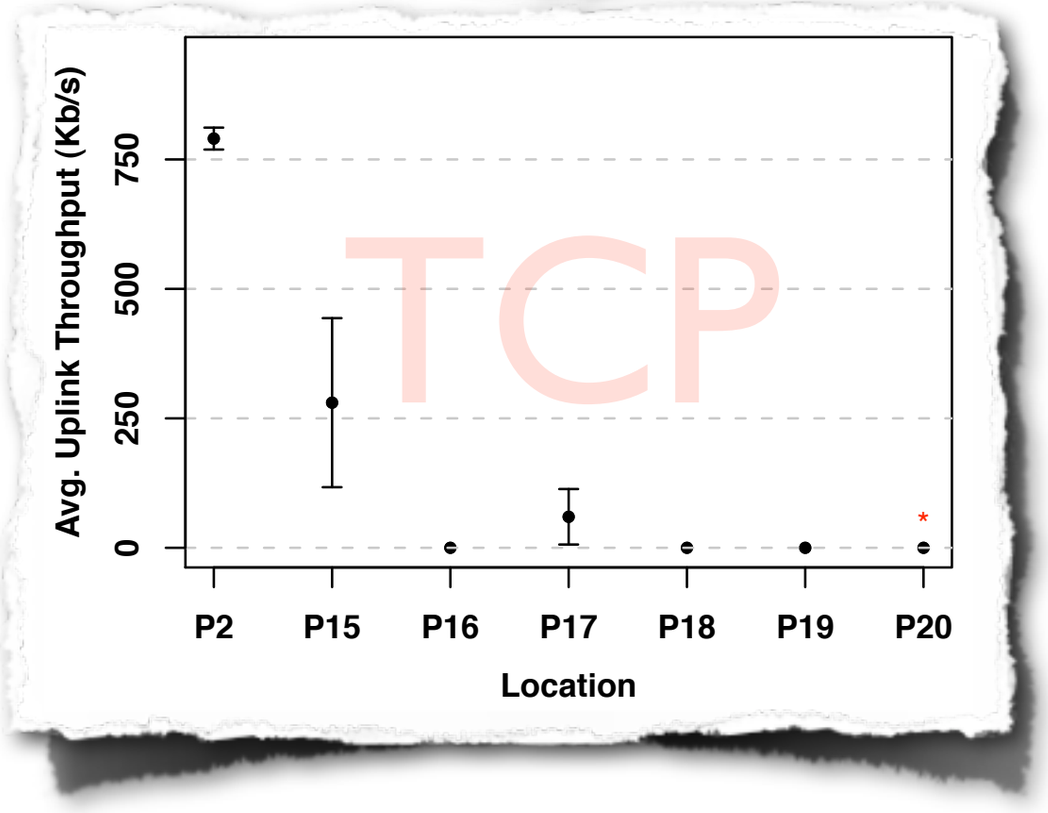

Point 14
Point 13
Point 12
Point 10
Point 11
Point 9

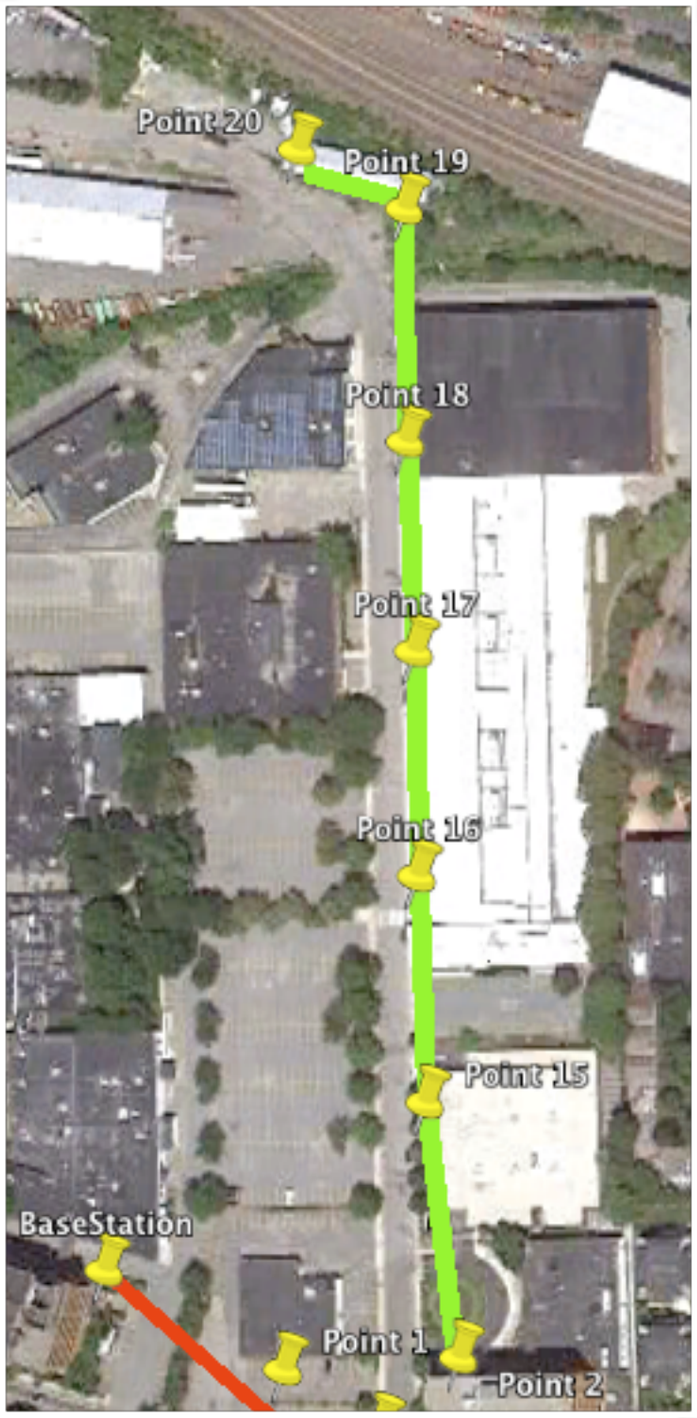

Point 20
Point 19
Point 18
Point 17
Point 16
Point 15
BaseStation
Point 1
Point 2

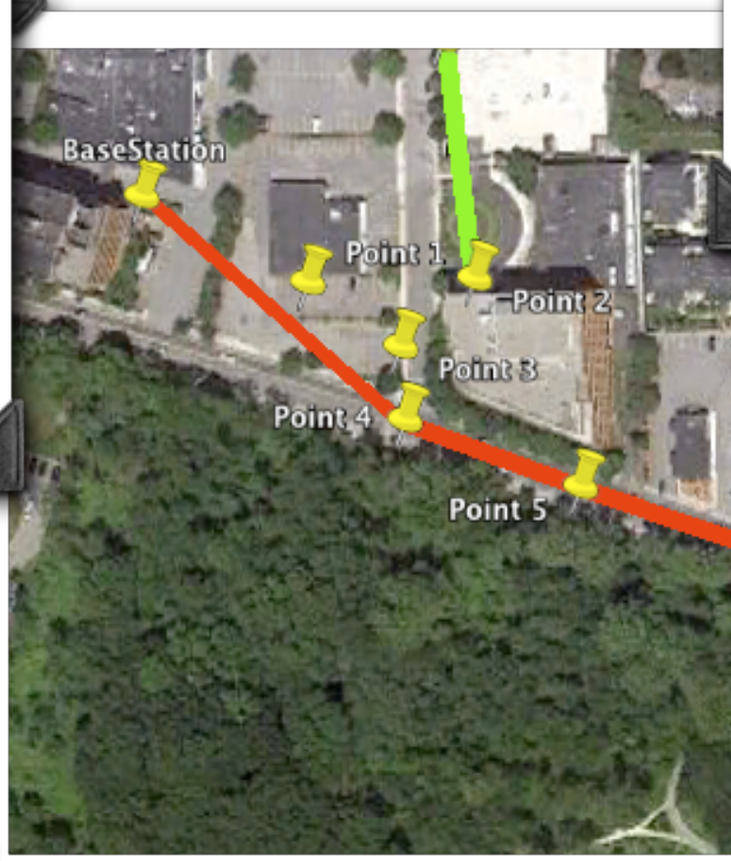

Point 20
Point 19
Point 18
Point 17
Point 16
Point 15
BaseStation
Point 1
Point 2

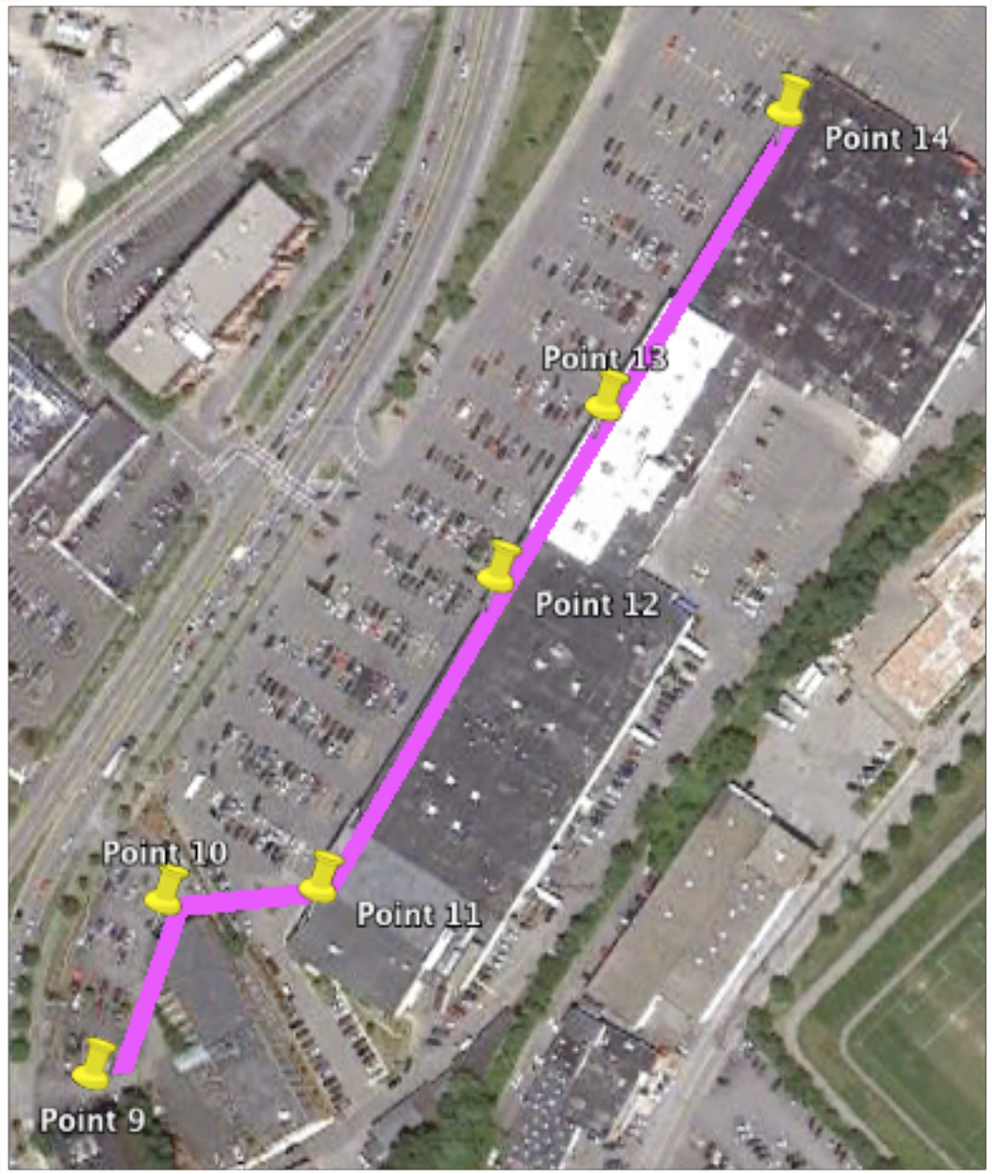

Avg. Downlink Throughput (Kb/s)
0
5000
15000
25000
UDP
P2
P15
P16
P17
P18
P19
P20
Location

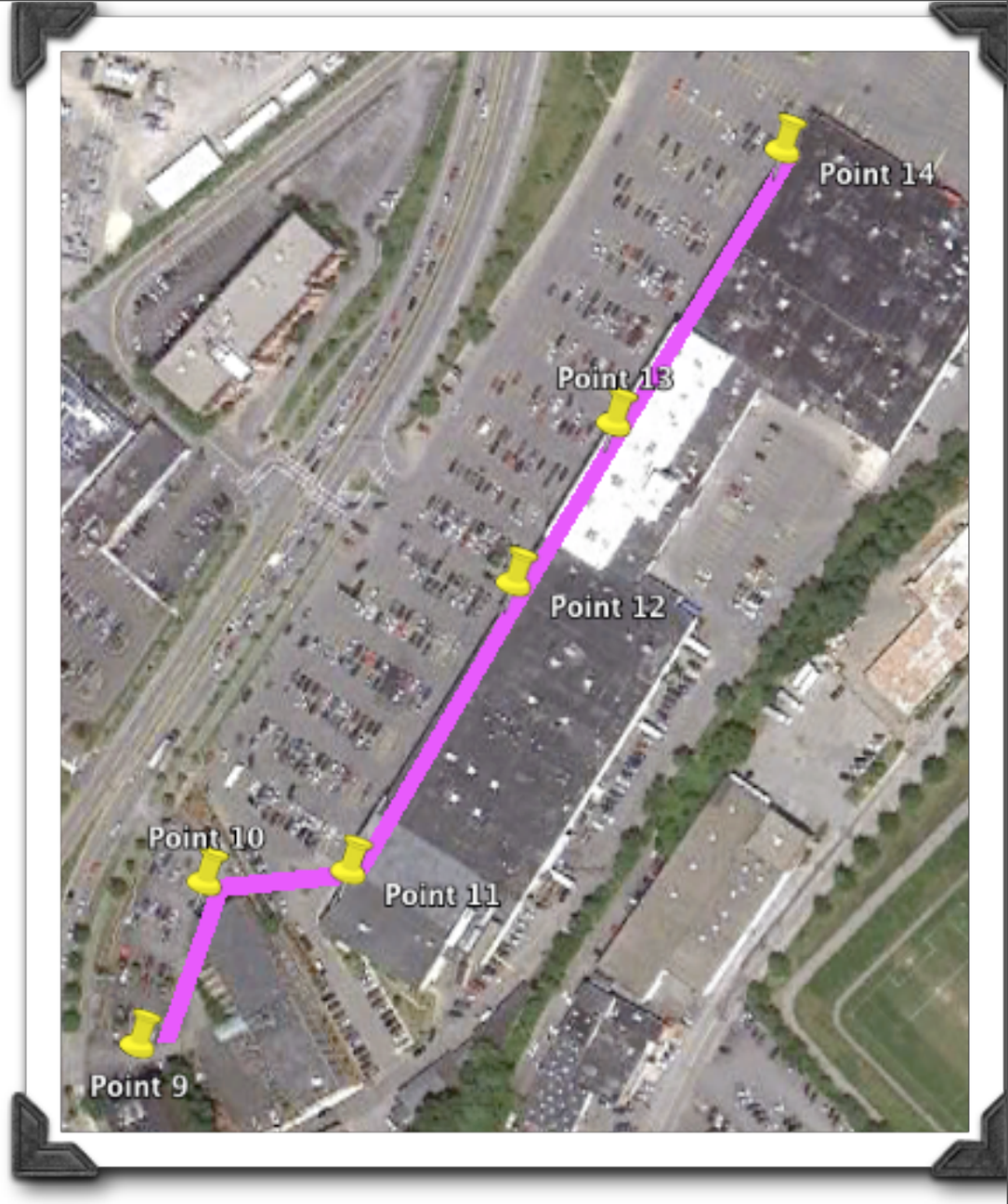

Avg. Downlink Throughput (Kb/s)
0
250
500
750
1000
TCP
P2
P15
P16
P17
P18
P19
P20
Location

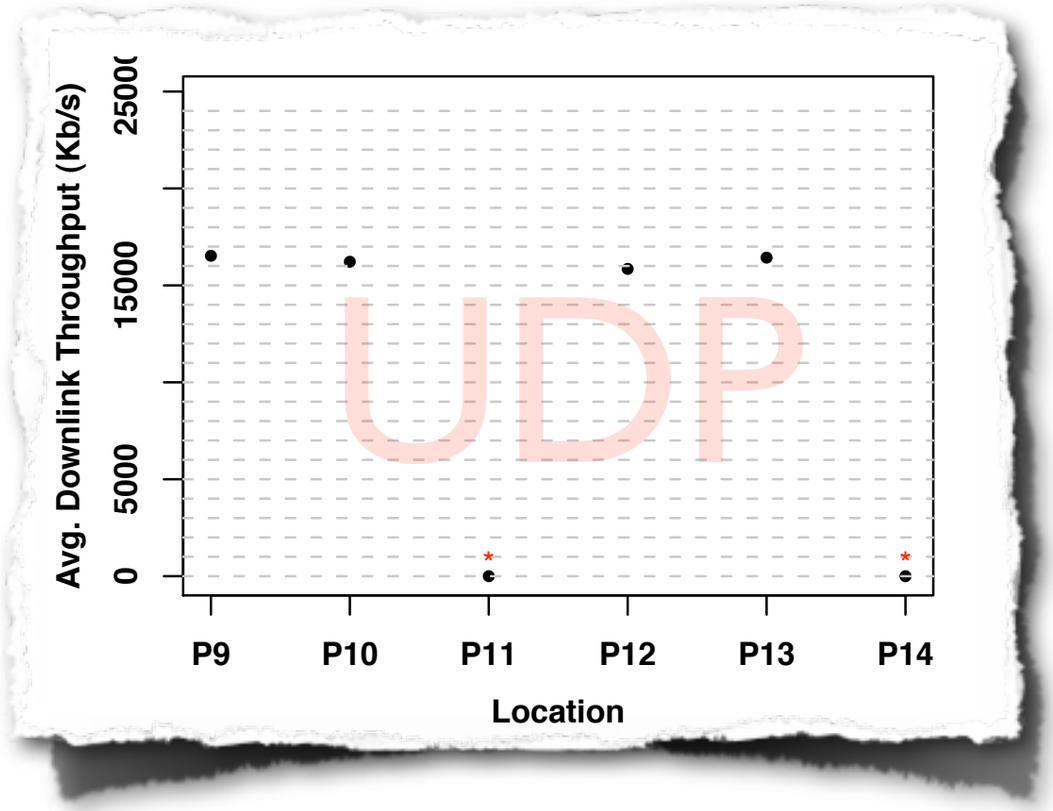

Avg. Uplink Throughput (Kb/s)
0
250
500
750
TCP
P2
P15
P16
P17
P18
P19
P20
Location

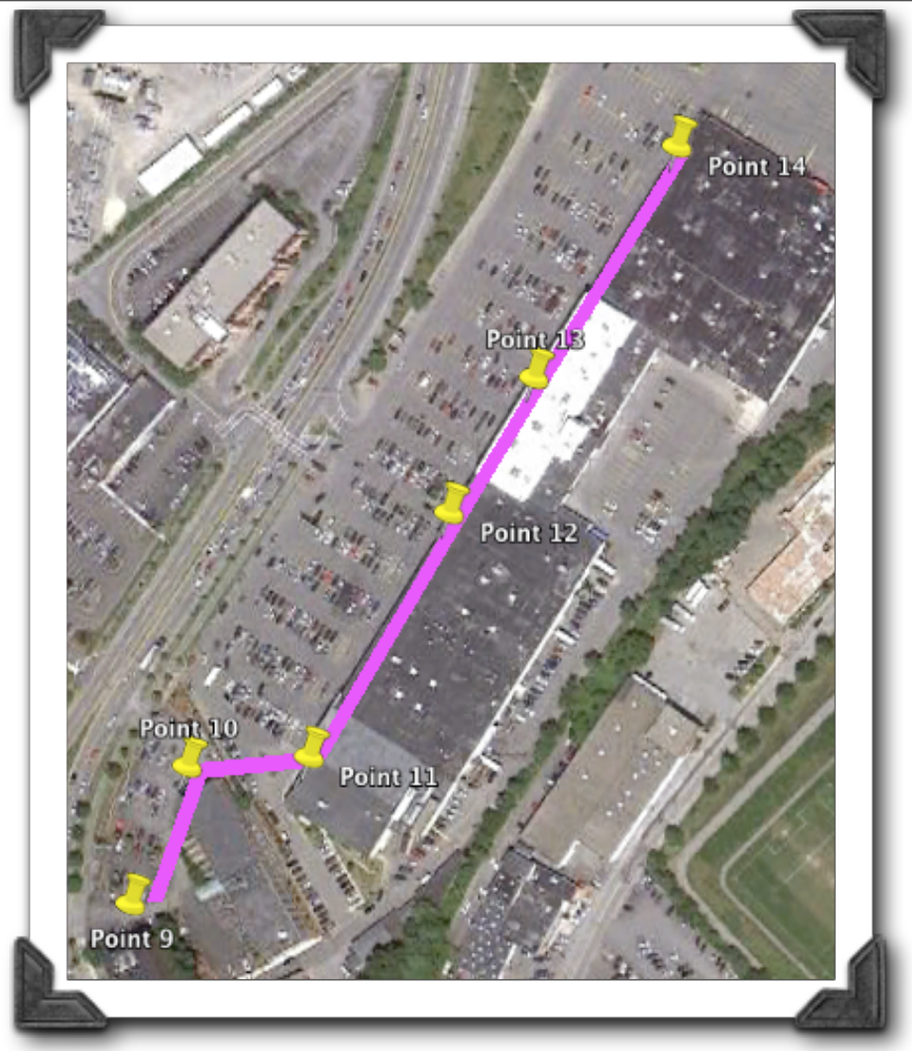

Point 20
Point 19
Point 18
Point 17
Point 16
Point 15
BaseStation
Point 1
Point 2

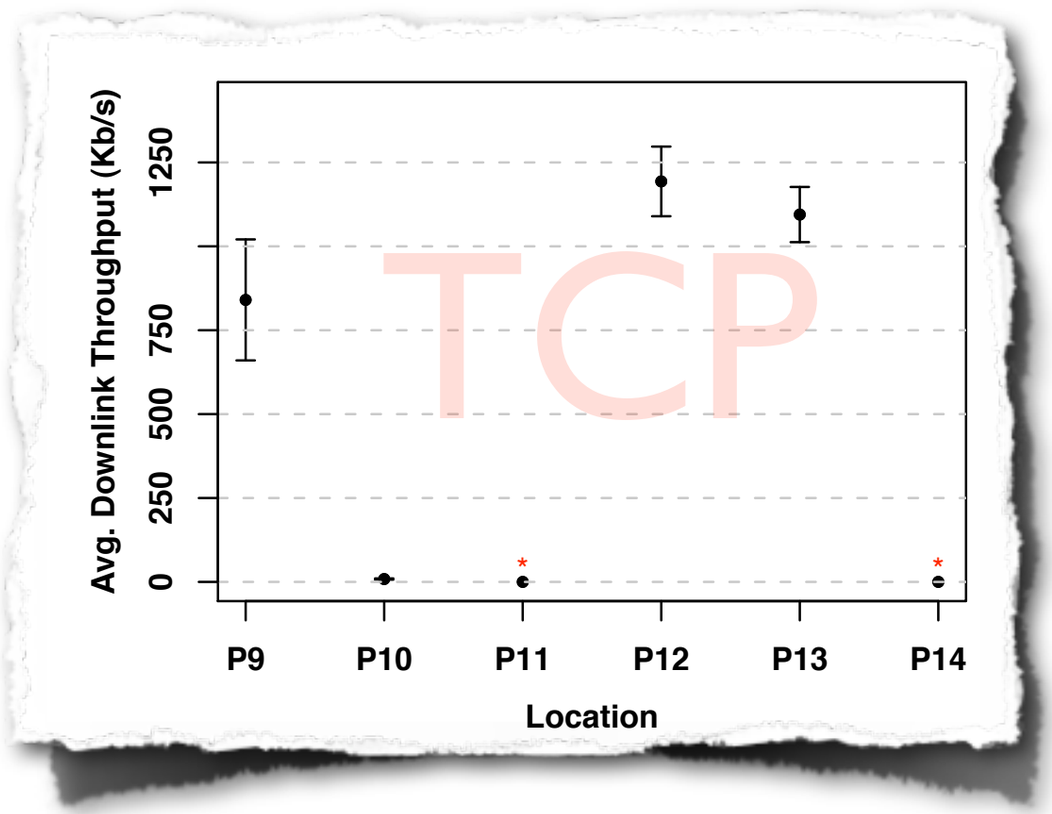

BaseStation
Point 1
Point 2
Point 3
Point 4
Point 5
Point 6
Point 7
Point 8

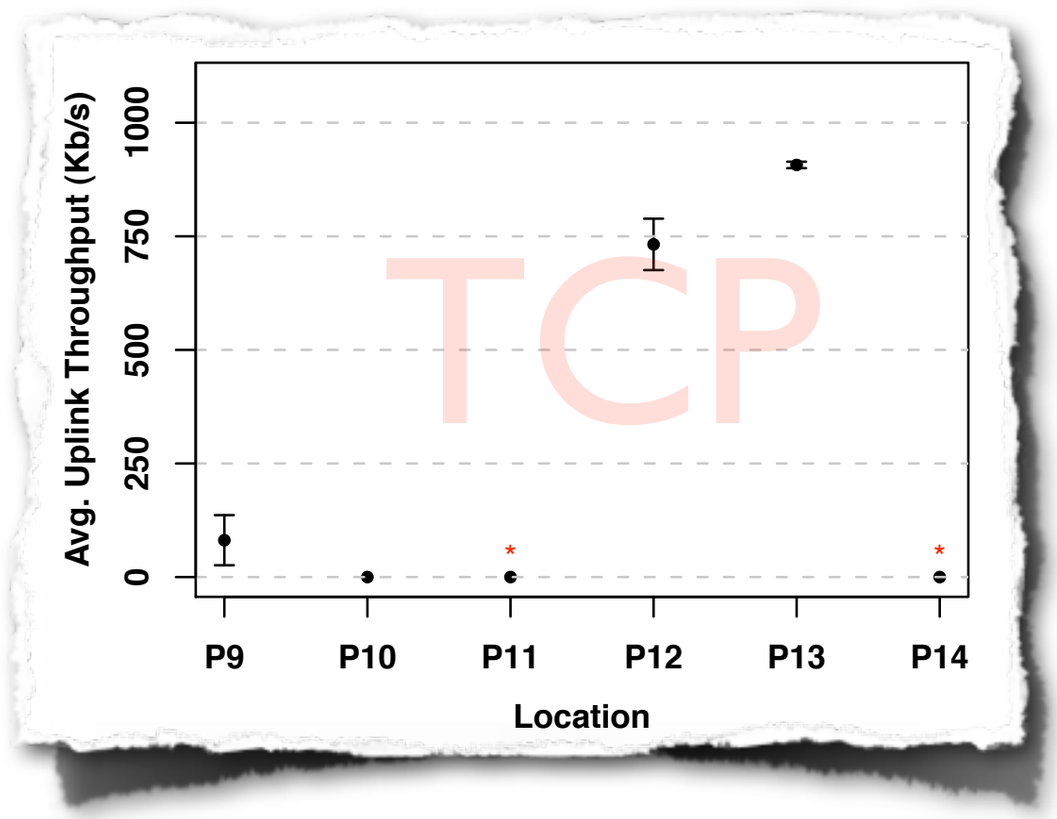

Point 14
Point 13
Point 12
Point 10
Point 11
Point 9


Point 14
Point 13
Point 12
Point 11
Point 10
Point 9


Avg. Downlink Throughput (Kb/s)
0
5000
15000
25000
P9
P10
P11
P12
P13
P14
Location
UDP


Point 14
Point 13
Point 12
Point 11
Point 10
Point 9


Avg. Downlink Throughput (Kb/s)
0
250
500
750
1250
P9
P10
P11
P12
P13
P14
Location
TCP


Avg. Uplink Throughput (Kb/s)
0
250
500
750
1000
P9
P10
P11
P12
P13
P14
Location
TCP