OMF/OML, and their use in WiMAX

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from imagination to impact

OMF: Support the **entire** investigative life-cycle
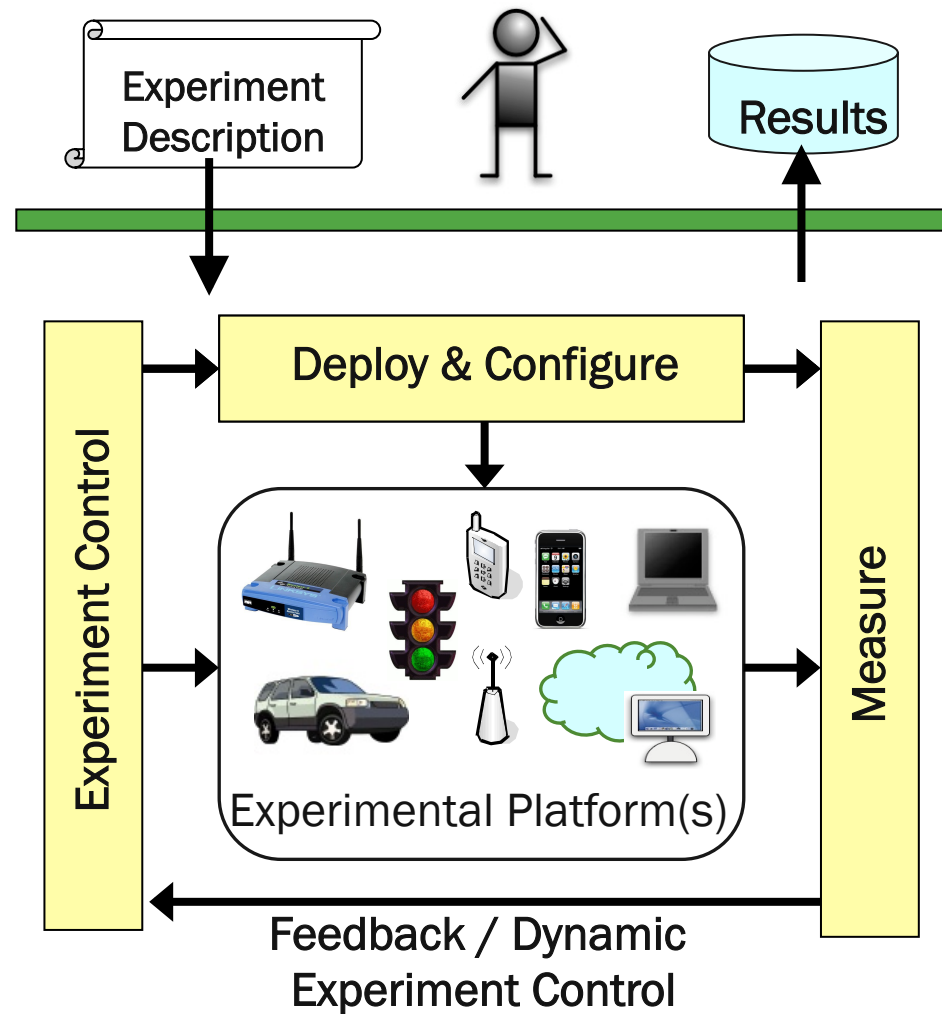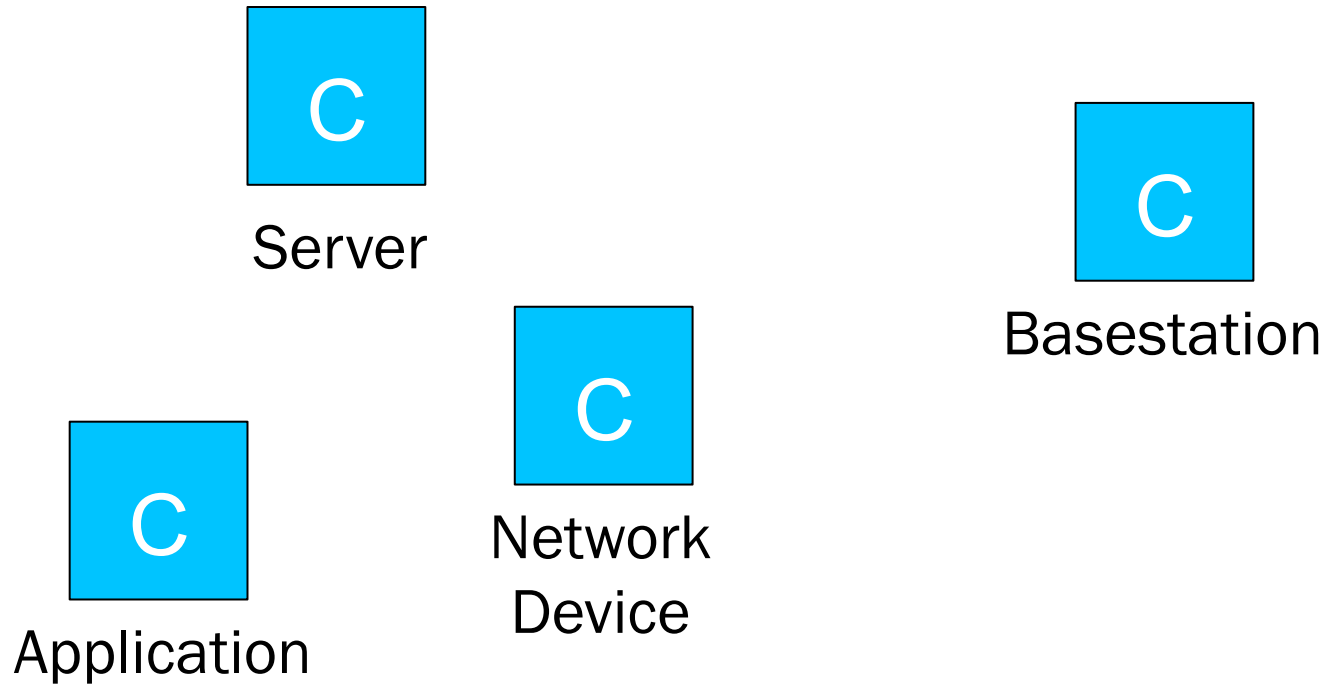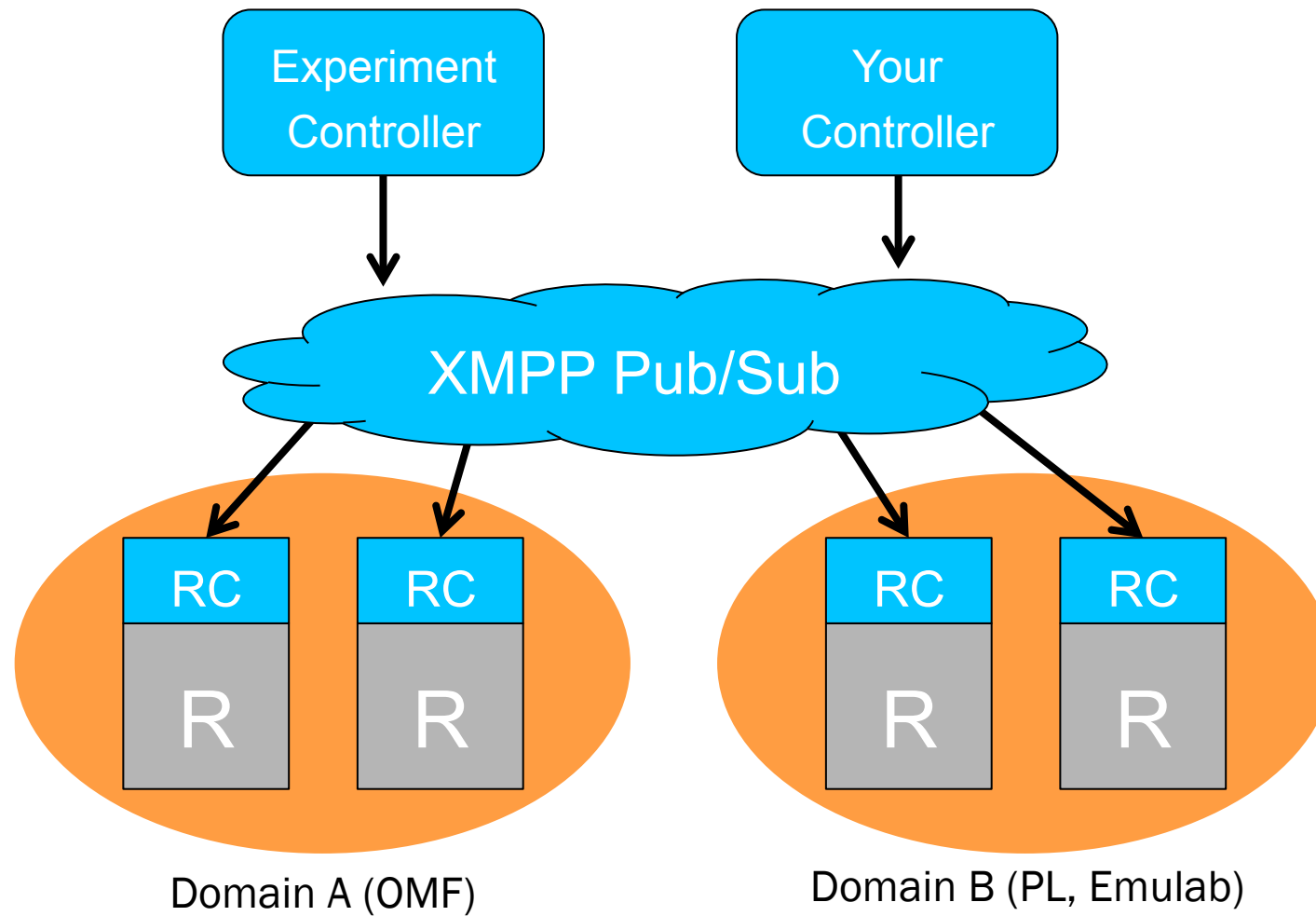
Everything is a Component

C

Server

C

Basestation

C

Network Device

C

Application

Uniform Control

Experiment Controller

Your Controller

XMPP Pub/Sub

RC

RC

RC

RC

R

R

R

R

Domain A (OMF)

Domain B (PL, Emulab)

Uniform Control – Not Exactly
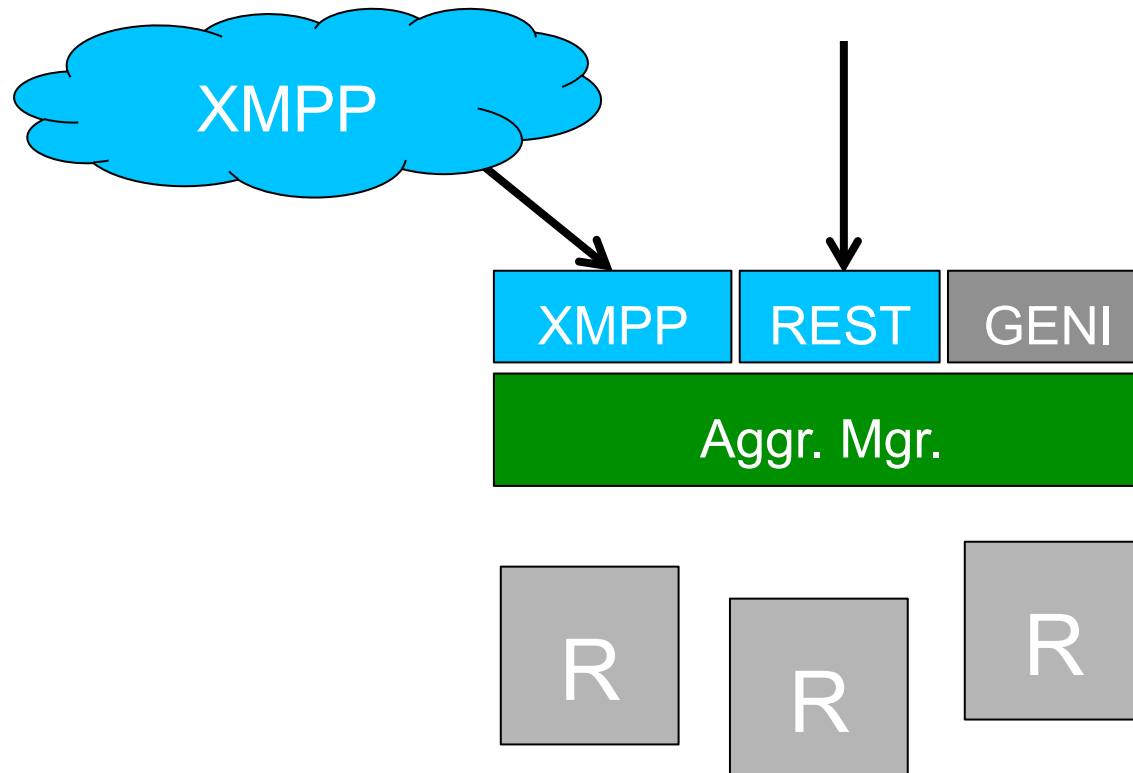
OML: Integrated Measurements

Steerable Experiments


```
defEvent(:ERROR_TOO_HIGH) ...

onEvent(:ERROR_TOO_HIGH) do |ev|
    ....
end
```
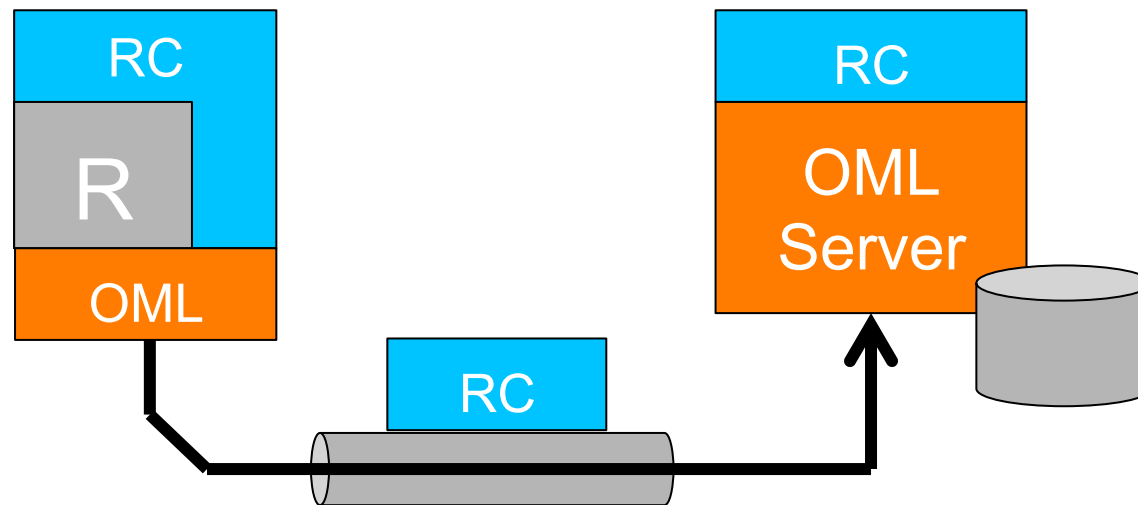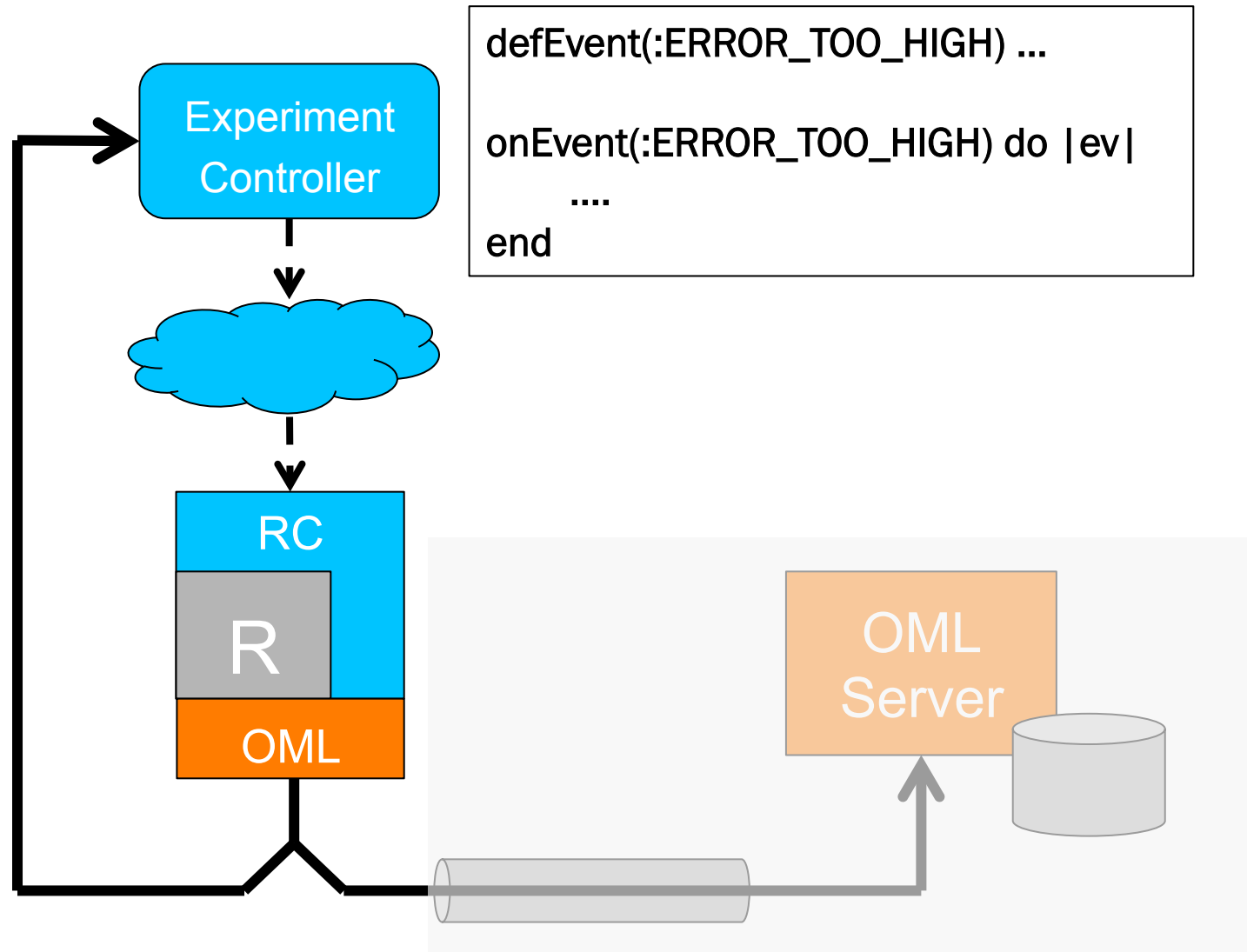
Integrated Visualization
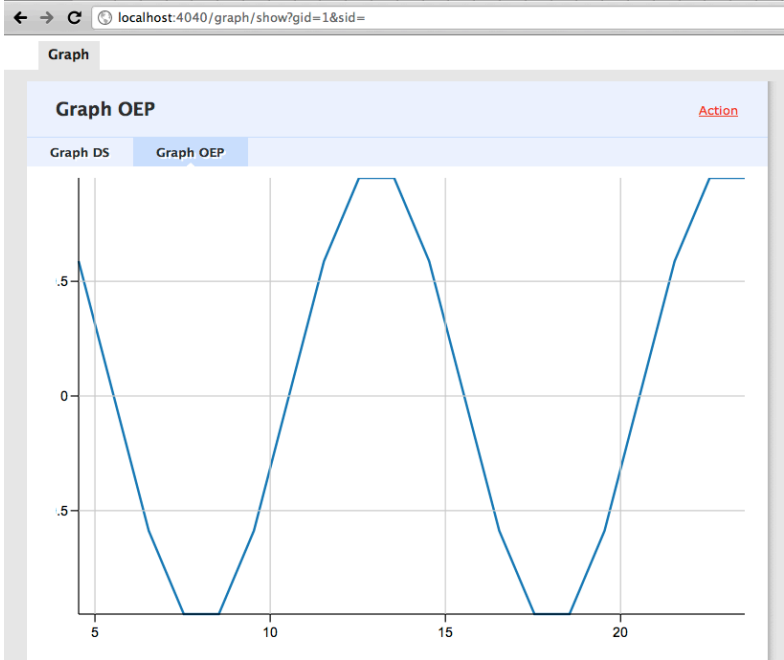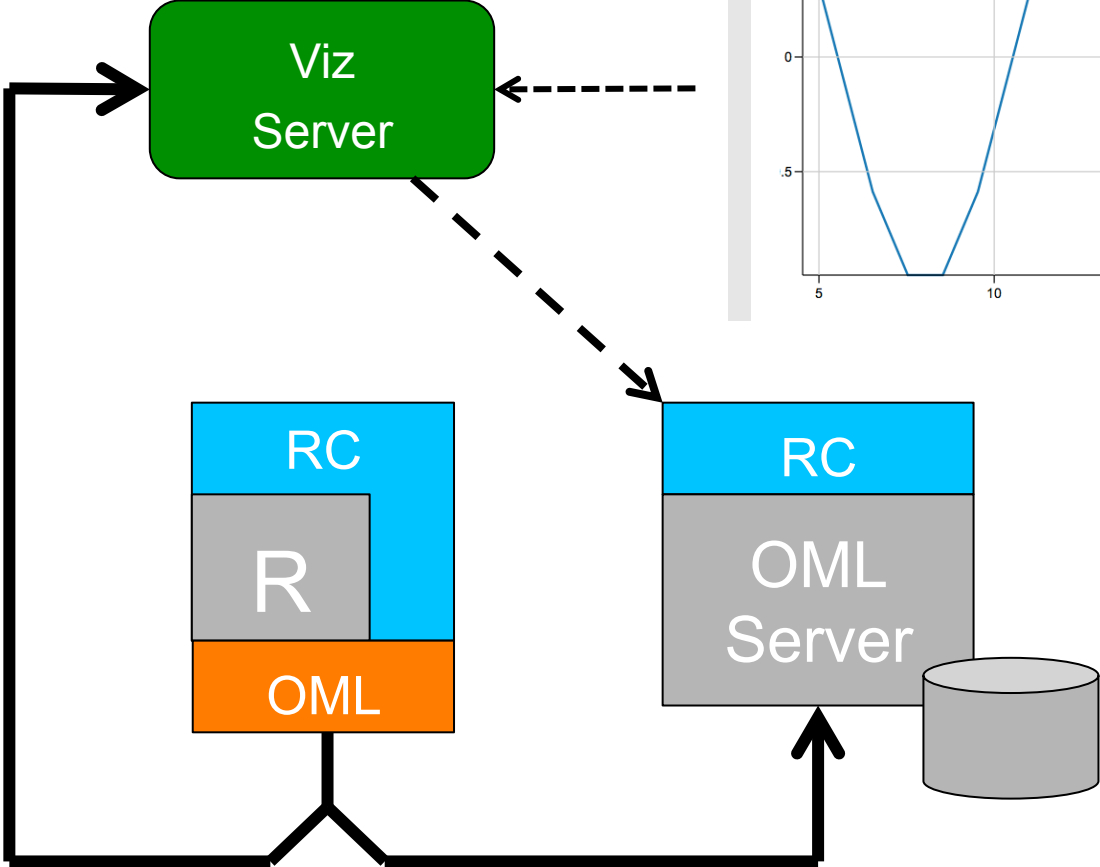
Integrated Analysis

```
t <- oml$repo('ol_rtt')$table('rtt_roundtrip')
q <- t$project(t['oml_ts_server']$as('time'), t['addr'],          ip'] ...
```

	Df	Sum Sq	Mean Sq	F value	Pr(>F)	Signifiance
Algorithm	1	597.53	597.53	2895.8	< 2e-16	***
Time	3	935.88	311.96	1511.8	< 2e-16	***
Space	1	24.02	24.02	116.41	< 2e-16	***
Algorithm:Time	3	20.53	6.84	33.17		
Algorithm:Space	1	0.49	0.49	2.37		
Time:Space	3	1.67	0.56	2.70		
Algorithm:Time:Space	3	0.48	0.16	0.78		
Residuals		304	62.73	0.21		

Signifiance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

R

RC

OML
Server
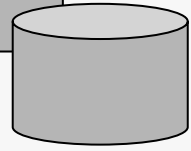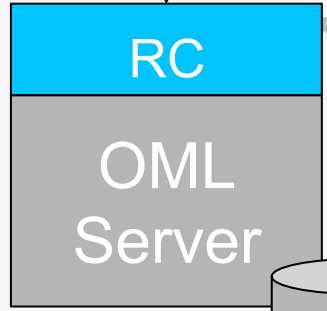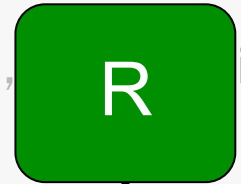
OEDL: Experiment Description Language

```
defTopology('topo') do |t|
  t.addGroup('sender') do |g|
    g.add( t.where(t.net.x0.type == …
  end
end

group('sender') do |g|
  g.applyProto("test:proto:sender",
    'destinationHost' => '192.168.1.4',
    'packetSize' => 1024,
    'rate' => 100,
    'protocol' => 'udp'
  )
  g.net.x0.ssid = "foo"
end
```
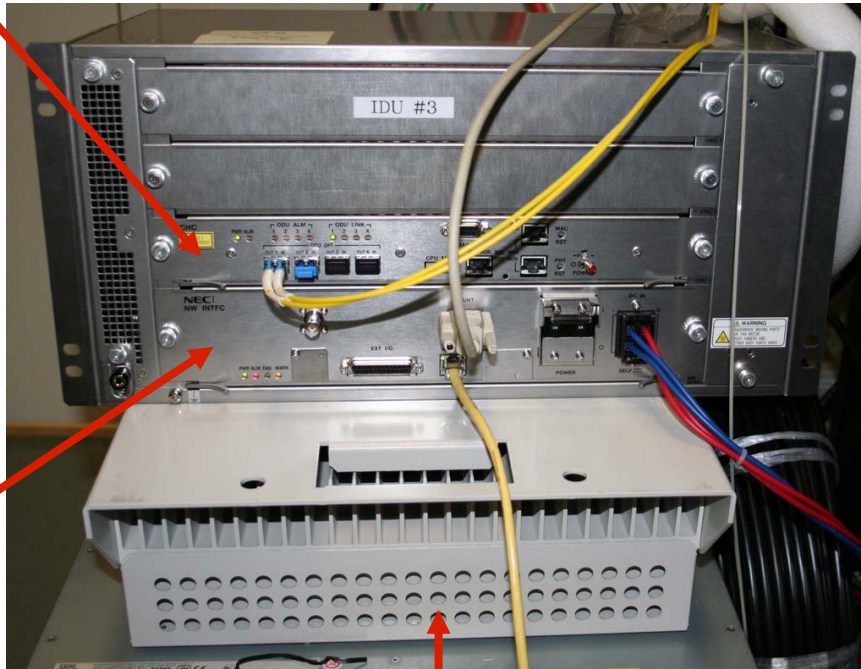
```
#
# Now, start the application
#
whenAllReady() do
  wait 30 # time to associate
  allGroups.applications.start
  wait 30
  Experiment.done
end
```
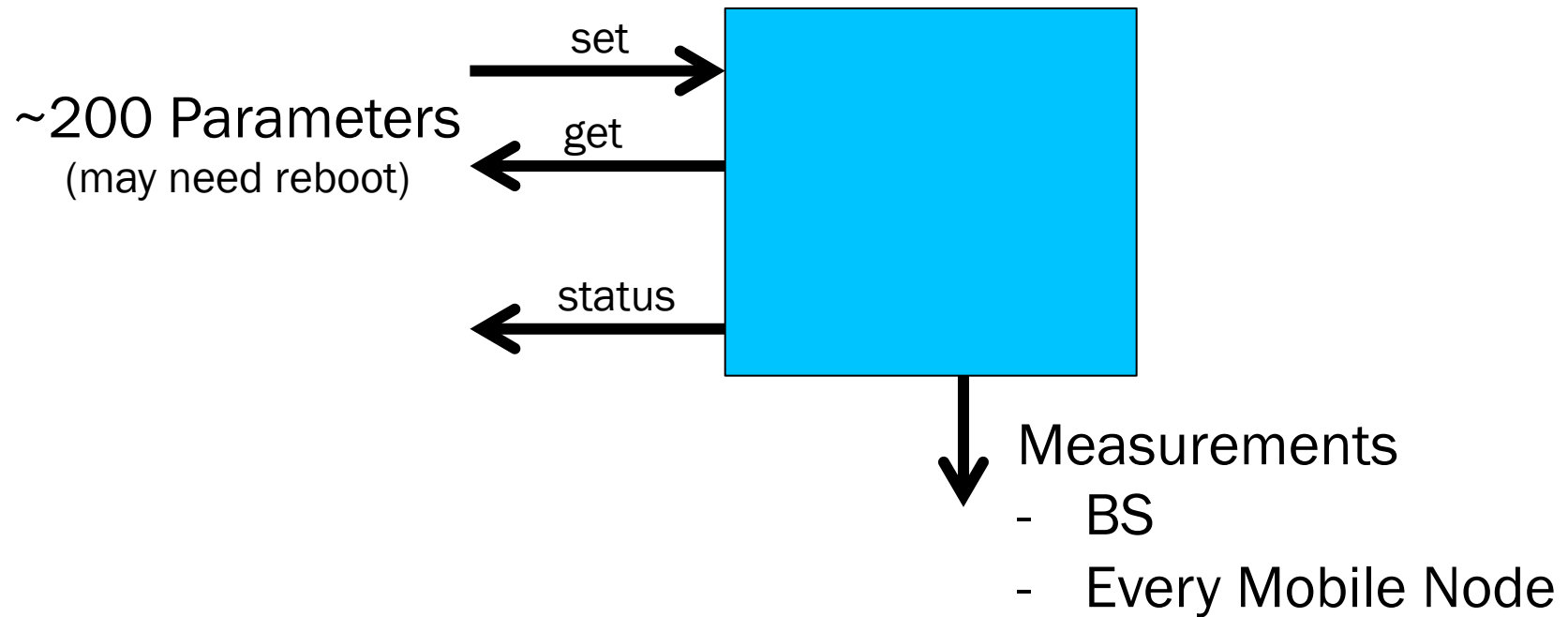
WiMAX

RF Module
(sector)

Base
Module

Omni-directional antenna
(elev. < 6ft above roof!)

Outdoor Unit (ODU)

WiMAX Basestation – The Über Resource

~200 Parameters
(may need reboot)

set

get

status

Measurements
- BS
- Every Mobile Node

WiMAX Measurement Sources

- Client
  - mac: MAC address
  - ul-rssi: Uplink RSSI
  - ul-cinr: Uplink CINR
  - dl-rssi: Downlink RSSI
  - dl-cinr: Downlink CINR
  - mcs-ul: Modulation on uplink (translates to rate)
  - mcs-dl: Modulation on downlink

Biggest Experiment may be under the Hood
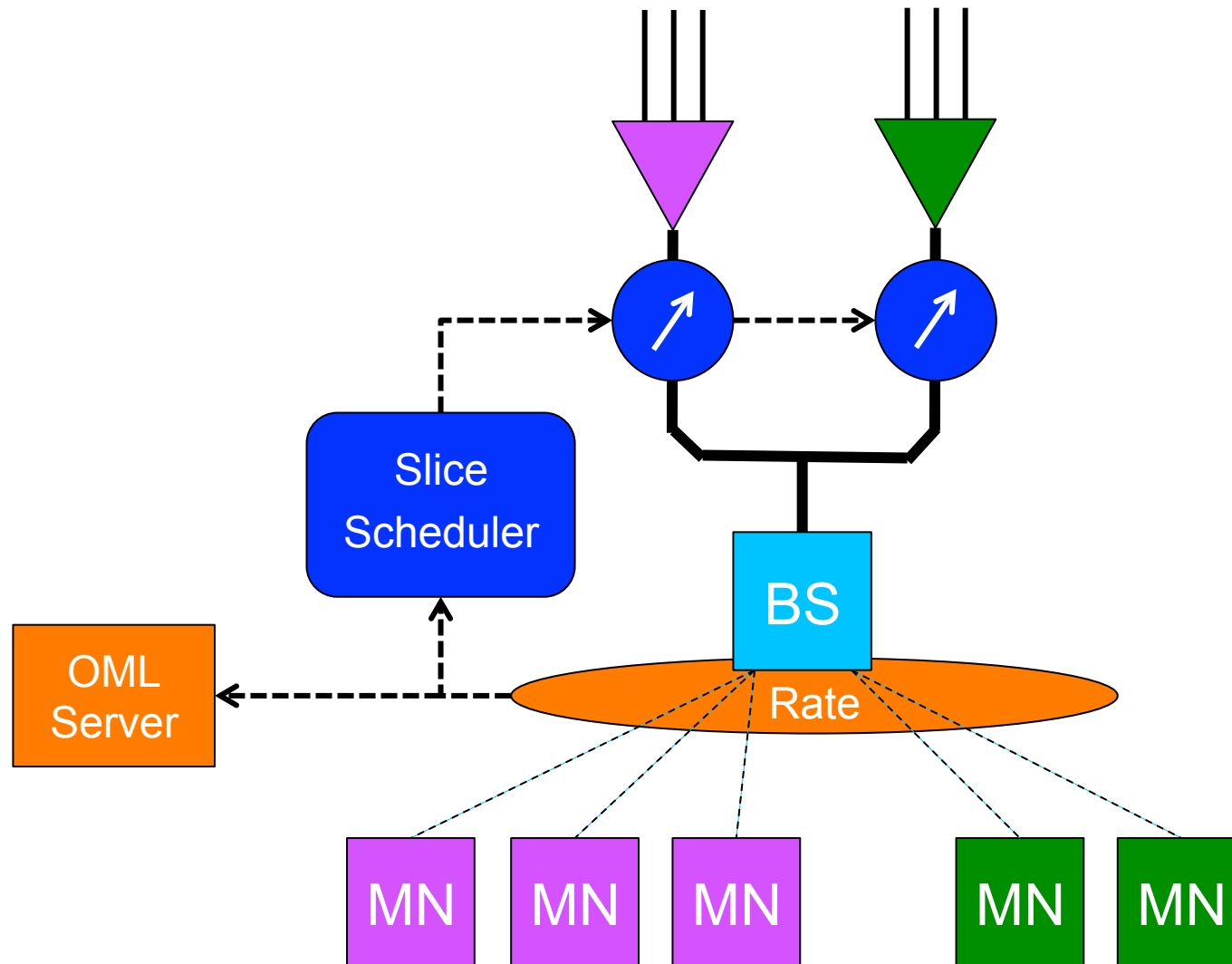
The Road Forward

- Need to work out BS parameters

  – Needs to be a community effort

- Coordinate Tool Support

  – Many of you may develop the same tool

- Understand common use cases

  – Will drive our development

- Talk to us

  – We can't solve what we don't know

  – We may already have solved your problem (it's in the master)

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http://wimax.orbit-lab.org

http://omf.mytestbed.net

from imagination to impact