Open Wireless Lab

2019-06-12

WINLAB at Rutgers University – ONAP Community Lab

WINLAB Tech Center Facility

WINLAB founded in 1989 as a collaborative industry-university research center with specialized focus on wireless networking

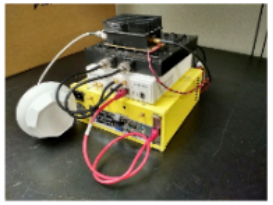
~25 faculty/staff, most from the ECE and CS departments at Rutgers

~40-50 grad students (80% PhD, 20% MS)

- Center's research portfolio spans information theory, radio technology, wireless systems, mobile networks and computing
- Extensive experimental research infrastructure including ORBIT & GENI testbeds, SDR, SDN, …

Low Power IoT Device

Massive MIMO



SDR

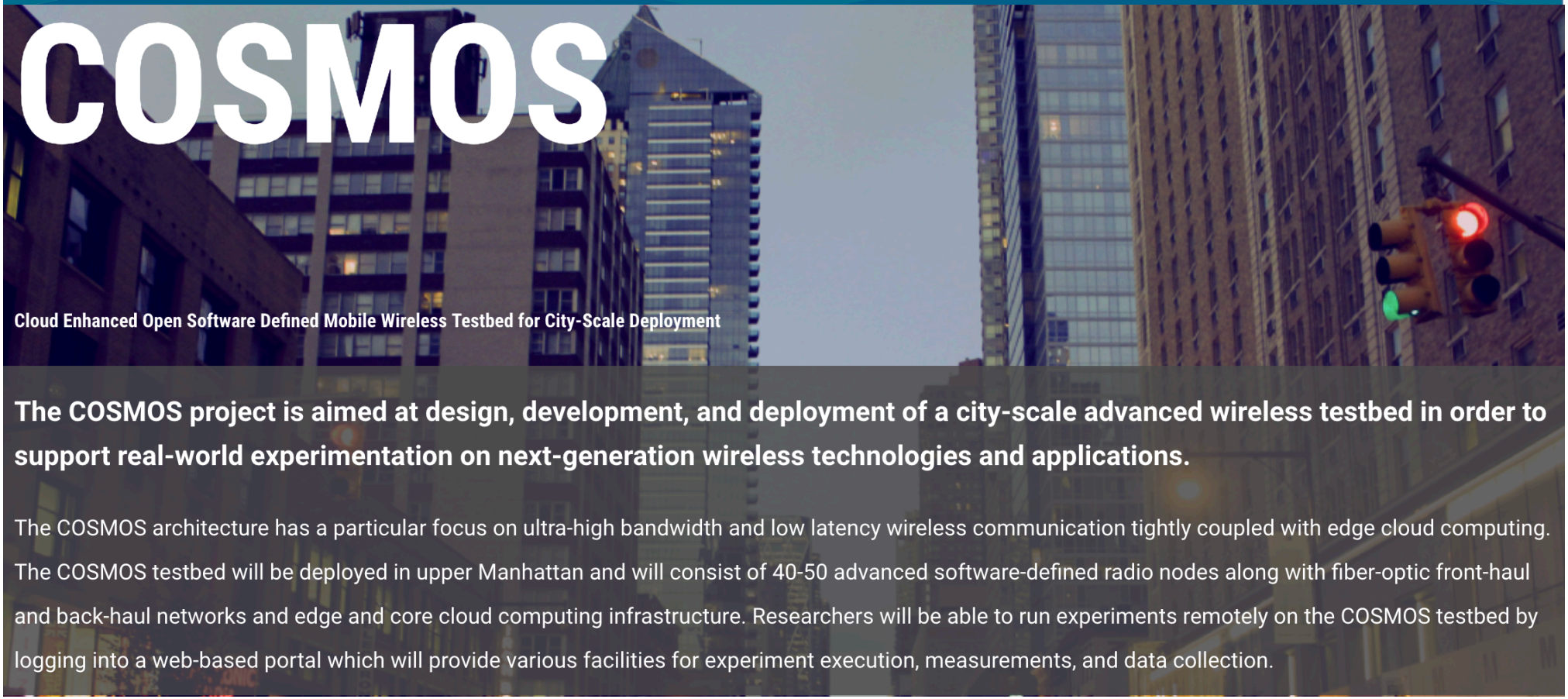
ORBIT Radio Grid Testbed

GENI Rack

SDN

CloudLab Rack

WINLAB Designated by NSF as NJ/NYC PAWR Testbed

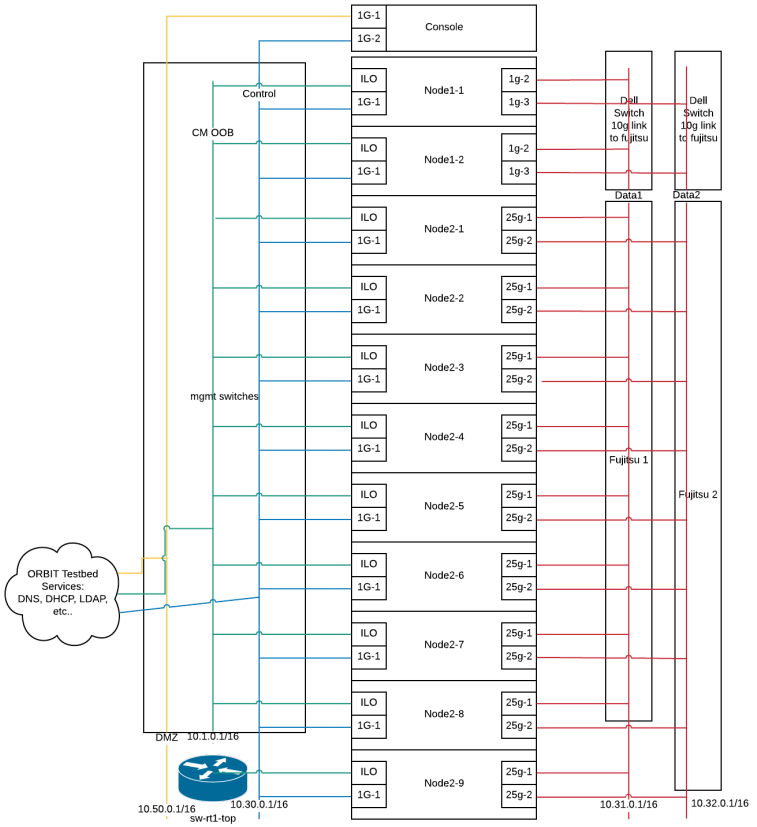


The COSMOS project is aimed at design, development, and deployment of a city-scale advanced wireless testbed in order to support real-world experimentation on next-generation wireless technologies and applications.

The COSMOS architecture has a particular focus on ultra-high bandwidth and low latency wireless communication tightly coupled with edge cloud computing. The COSMOS testbed will be deployed in upper Manhattan and will consist of 40-50 advanced software-defined radio nodes along with fiber-optic front-haul and back-haul networks and edge and core cloud computing infrastructure. Researchers will be able to run experiments remotely on the COSMOS testbed by logging into a web-based portal which will provide various facilities for experiment execution, measurements, and data collection.

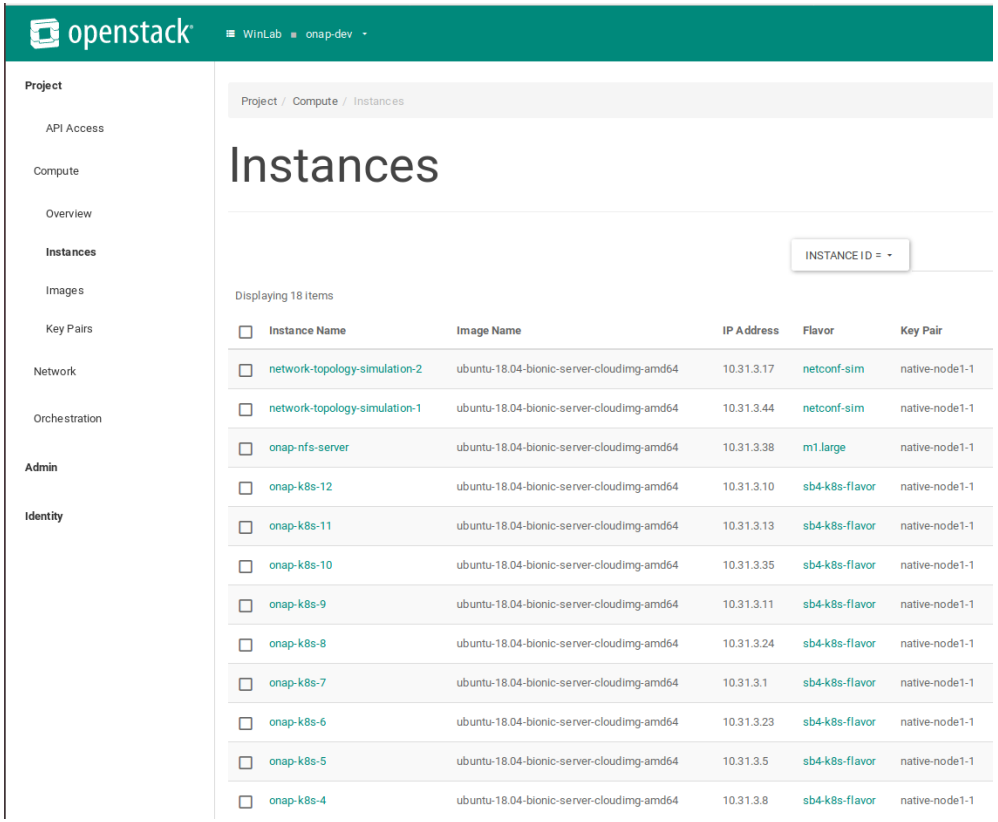
Open Wireless Lab (OWL) at WINLAB/COSMOS

- Environment
  - Entry point at console located at console.sb10.orbit-lab.org
  - 10 Ubuntu servers, all managed by OpenStack
  - Control Node: Node 1-1
  - Compute Nodes: Node 2-1 through 2-9
- Access Methods
  - One can gain access by requesting an account at WINLAB
  - https://wiki.onap.org/pages/viewpage.action?pageId=45298557



Open Wireless Lab (OWL)

- ONAP Dublin Installation
  - Three Rancher servers
  - Twelve Kubernetes nodes
  - One NFS server
  - Two VMs hosting 10,000 NETCONF simulators (in progress)



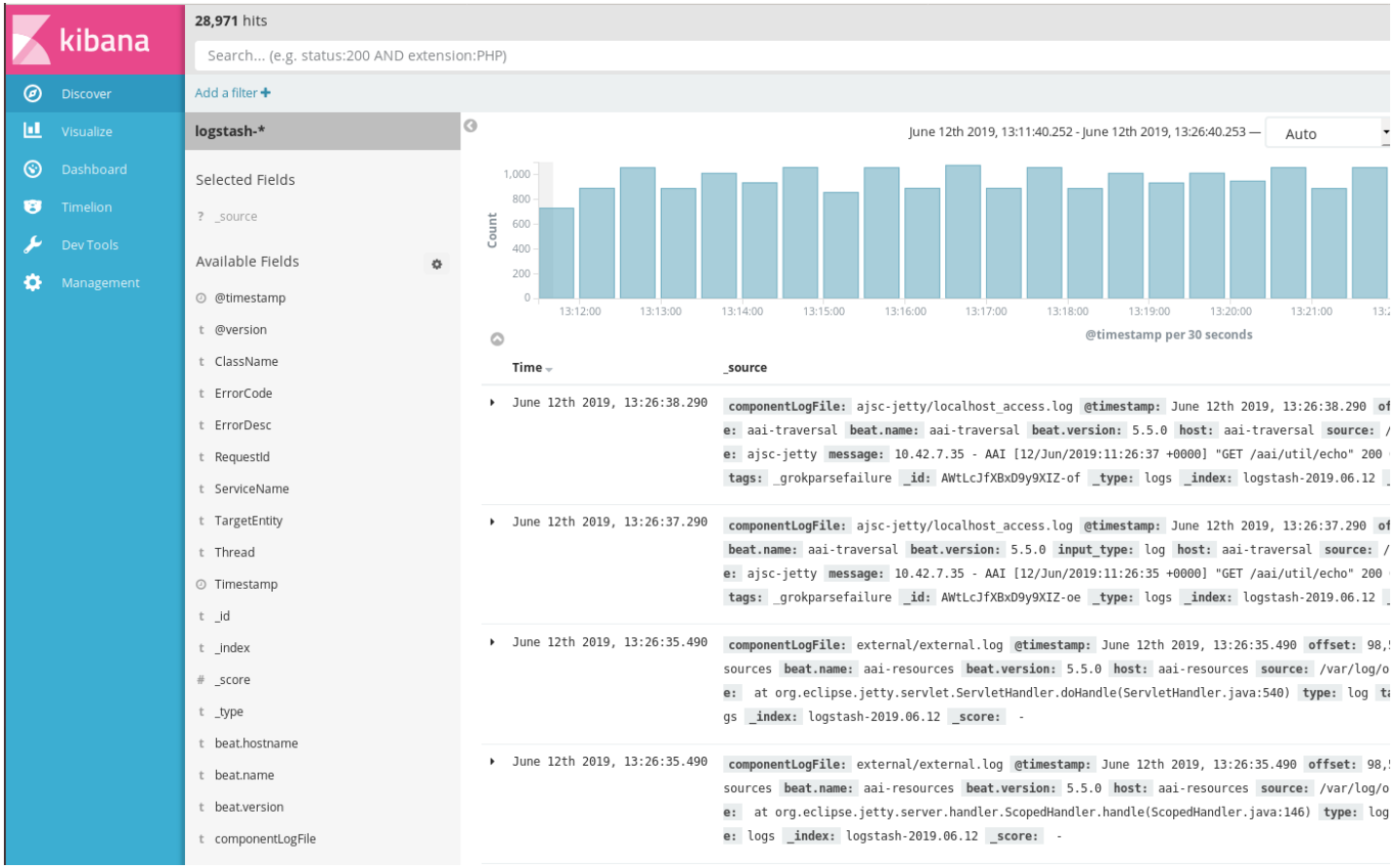
Open Wireless Lab (OWL)

- Network Capacities
  - Two Fujitsu switches
    - 25g access
    - 100g interconnect
- Storage Capacities
  - Node 1-1: 3900 GB
  - Node 2-1, Node 2-2: 14 TB/48 cores/700 GB RAM
  - Node 2-3 through Node 2-9: 480 GB/48 cores/186 GB RAM
  - ***Note:*** Node 2-3 through Node 2-9 will be receiving a 4 TB (two 2 TB SSDs each) storage upgrade by mid-July

High-Availability ONAP Installation

- OpenStack Pike for cloud infrastructure
- Open source software Rancher, Helm, Kubernetes and docker are deployed in the VMs to create high-availability Rancher and Kubernetes Cluster environment.
- The deployment of the ONAP components is done using ONAP helm charts from the “oom” git repository
- https://onap.readthedocs.io/en/latest/submodules/oom.git/docs/oom_cloud_setup_guide.html
- Currently deployed ONAP components at OWL:
  - AAI
  - Log
  - OOF
  - Policy
  - Portal
  - Robot
  - SDNC
  - SNIRO Emulator
  - SO

ONAP Logs


kibana
28,971 hits
Search... (e.g. status:200 AND extension:PHP)
Discover
Visualize
Dashboard
Timelion
Dev Tools
Management
Add a filter +
logstash-*
Selected Fields
? _source
Available Fields
@timestamp
t @version
t ClassName
t ErrorCode
t ErrorDesc
t RequestId
t ServiceName
t TargetEntity
t Thread
Timestamp
t _id
t _index
_score
t _type
t beat.hostname
t beat.name
t beat.version
t componentLogFile
June 12th 2019, 13:11:40.252 - June 12th 2019, 13:26:40.253 — Auto
Count
1,000
800
600
400
200
0
13:12:00
13:13:00
13:14:00
13:15:00
13:16:00
13:17:00
13:18:00
13:19:00
13:20:00
13:21:00
@timestamp per 30 seconds
Time
_source
June 12th 2019, 13:26:38.290
componentLogFile: ajsc-jetty/localhost_access.log @timestamp: June 12th 2019, 13:26:38.290
e: aai-traversal beat.name: aai-traversal beat.version: 5.5.0 host: aai-traversal source:
e: ajsc-jetty message: 10.42.7.35 - AAI [12/Jun/2019:11:26:37 +0000] "GET /aai/util/echo" 200
tags: _grokparsefailure _id: AWtLcJfXBxD9y9XIZ-of _type: logs _index: logstash-2019.06.12
June 12th 2019, 13:26:37.290
componentLogFile: ajsc-jetty/localhost_access.log @timestamp: June 12th 2019, 13:26:37.290
beat.name: aai-traversal beat.version: 5.5.0 input_type: log host: aai-traversal source:
e: ajsc-jetty message: 10.42.7.35 - AAI [12/Jun/2019:11:26:35 +0000] "GET /aai/util/echo" 200
tags: _grokparsefailure _id: AWtLcJfXBxD9y9XIZ-oe _type: logs _index: logstash-2019.06.12
June 12th 2019, 13:26:35.490
componentLogFile: external/external.log @timestamp: June 12th 2019, 13:26:35.490 offset: 98,
sources beat.name: aai-resources beat.version: 5.5.0 host: aai-resources source: /var/log/o
e: at org.eclipse.jetty.servlet.ServletHandler.doHandle(ServletHandler.java:540) type: log
gs _index: logstash-2019.06.12 _score: -
June 12th 2019, 13:26:35.490
componentLogFile: external/external.log @timestamp: June 12th 2019, 13:26:35.490 offset: 98,
sources beat.name: aai-resources beat.version: 5.5.0 host: aai-resources source: /var/log/o
e: at org.eclipse.jetty.server.handler.ScopedHandler.handle(ScopedHandler.java:146) type: log
e: logs _index: logstash-2019.06.12 _score: -

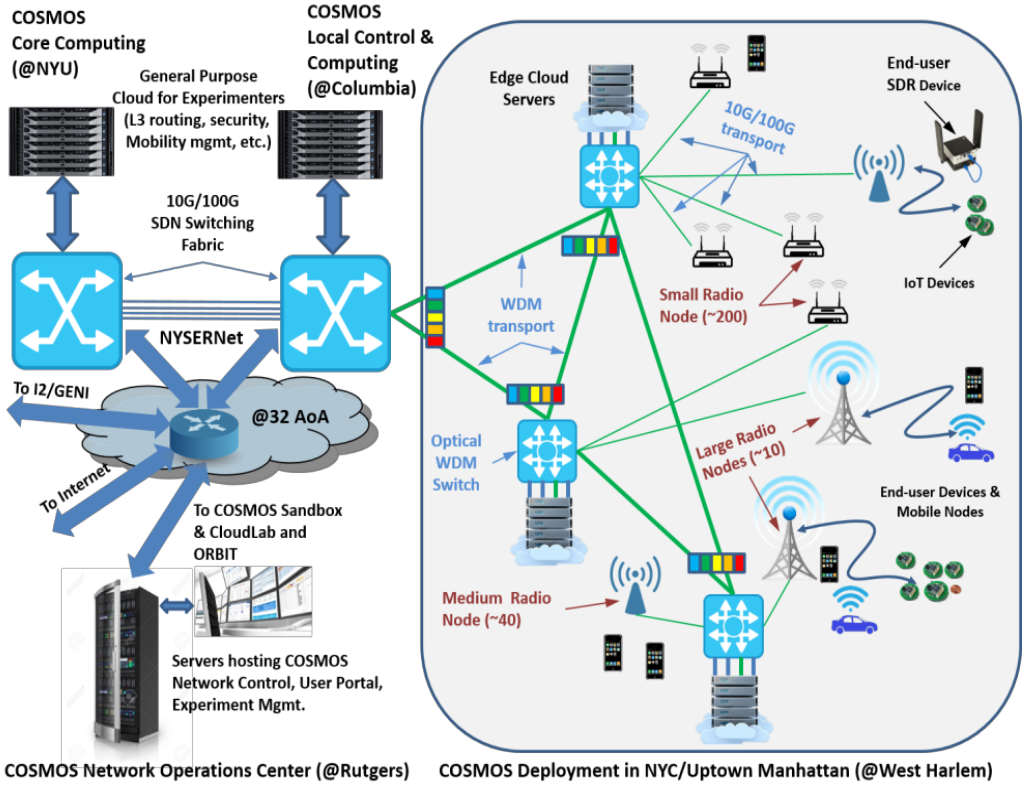
Future Considerations and References

- Goal: Three ONAP Installations
  - Stable
  - Developer
  - Sandbox
    - Short experiments, wiped and refreshed every day
  - Only stable instance is currently installed
- WINLAB: http://www.winlab.rutgers.edu/
- ORBIT Lab: https://www.orbit-lab.org/
- COSMOS: https://www.cosmos-lab.org/

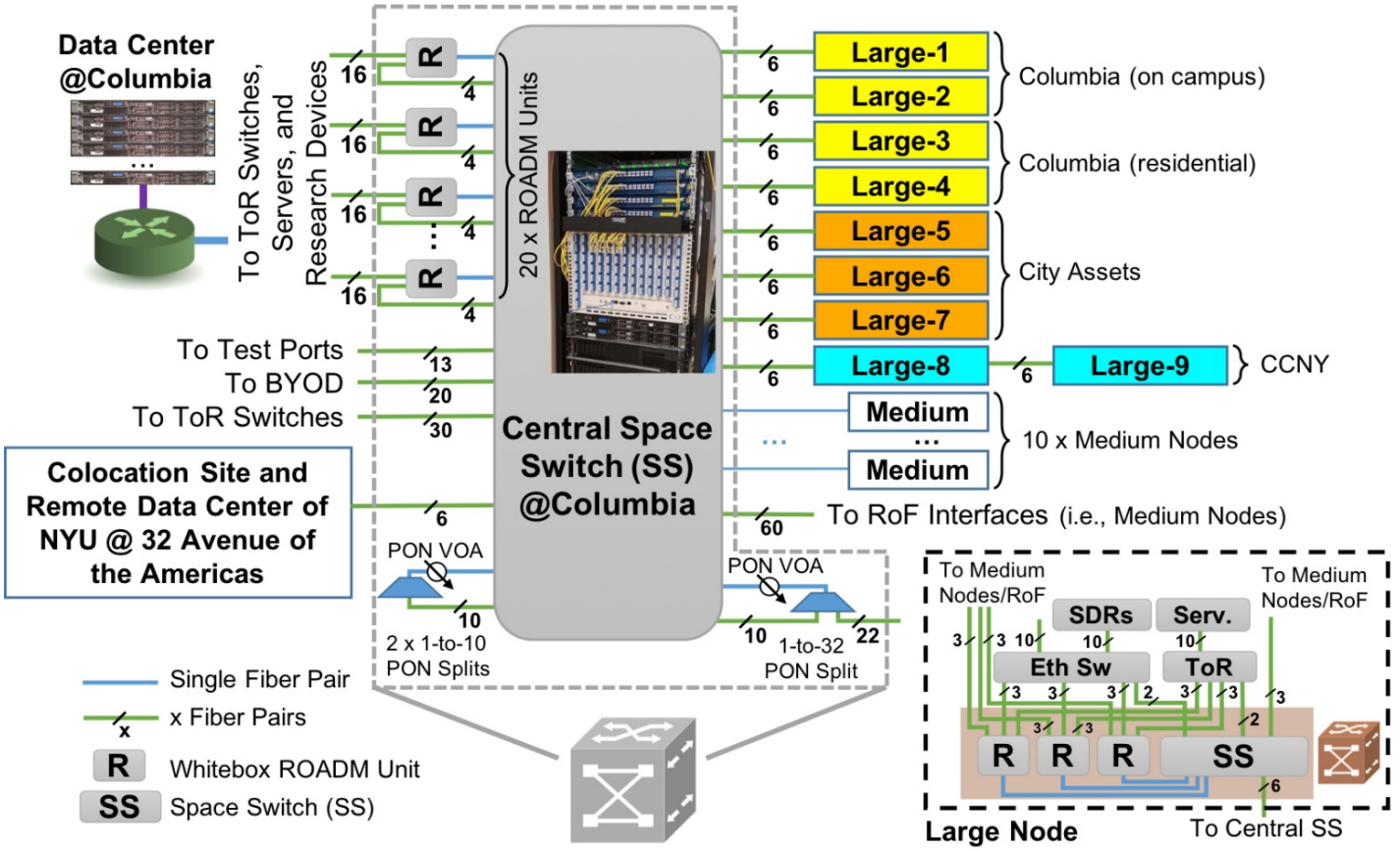
BACKUP

COSMOS: System Architecture

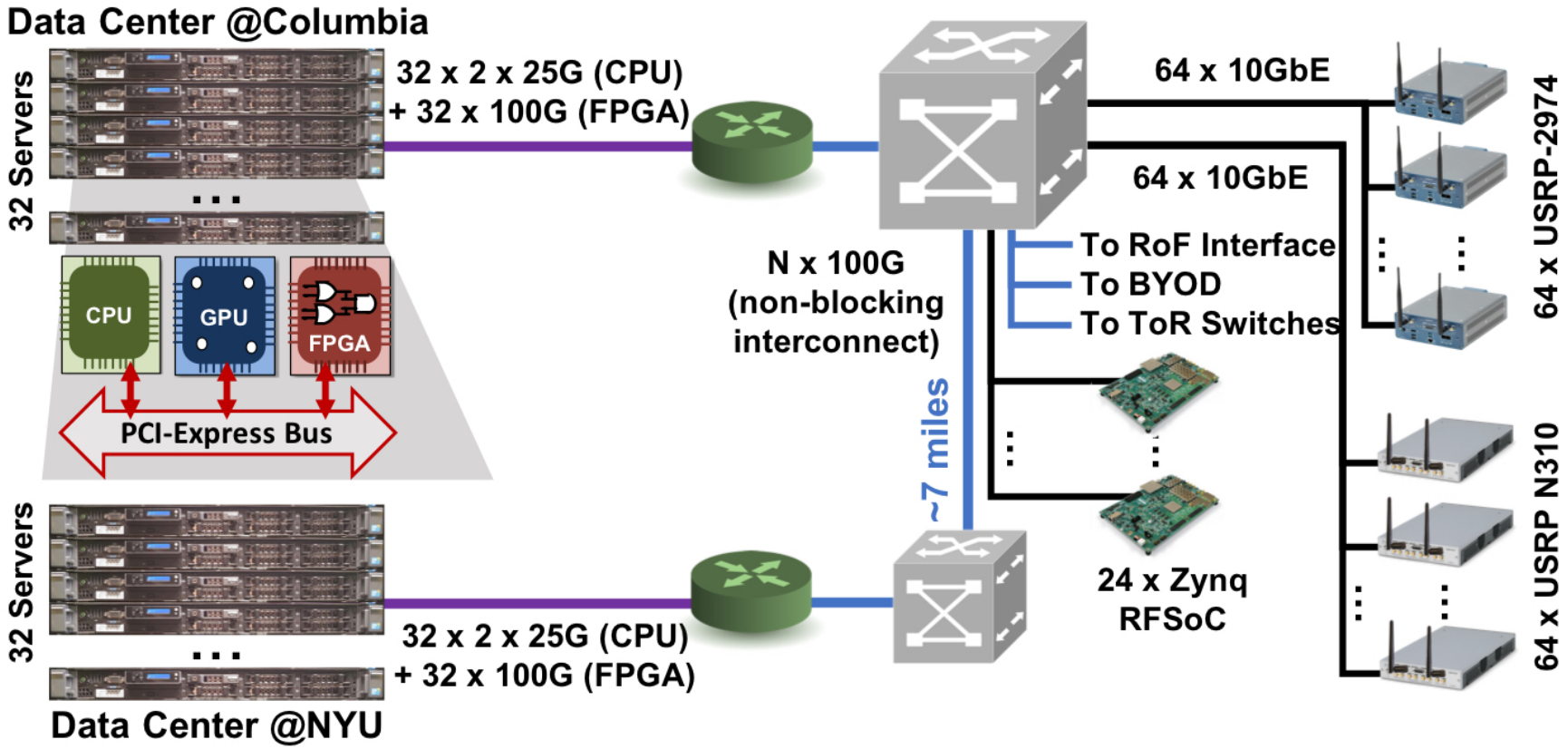
- System design based on three levels of SDR radio node (S,M,L) with M,L connected via fiber to optical WDM transport
- SDN-based backhaul and compute services, with access to ORBIT, GENI…
- COSMOS control center and general purpose cloud at Rutgers via 32 AoA PoP



COSMOS: Optical Deployment View



COSMOS: Cloud Architecture



COSMOS: Layer-2 Deployment View