



kytos

An Open Source SDN Platform

Beraldo Leal

beraldo.leal@cern.ch

beraldo@ncc.unesp.br

Sao Paulo State University - Unesp



SUISSE
FRANCE

CMS

LHCb

ATLAS

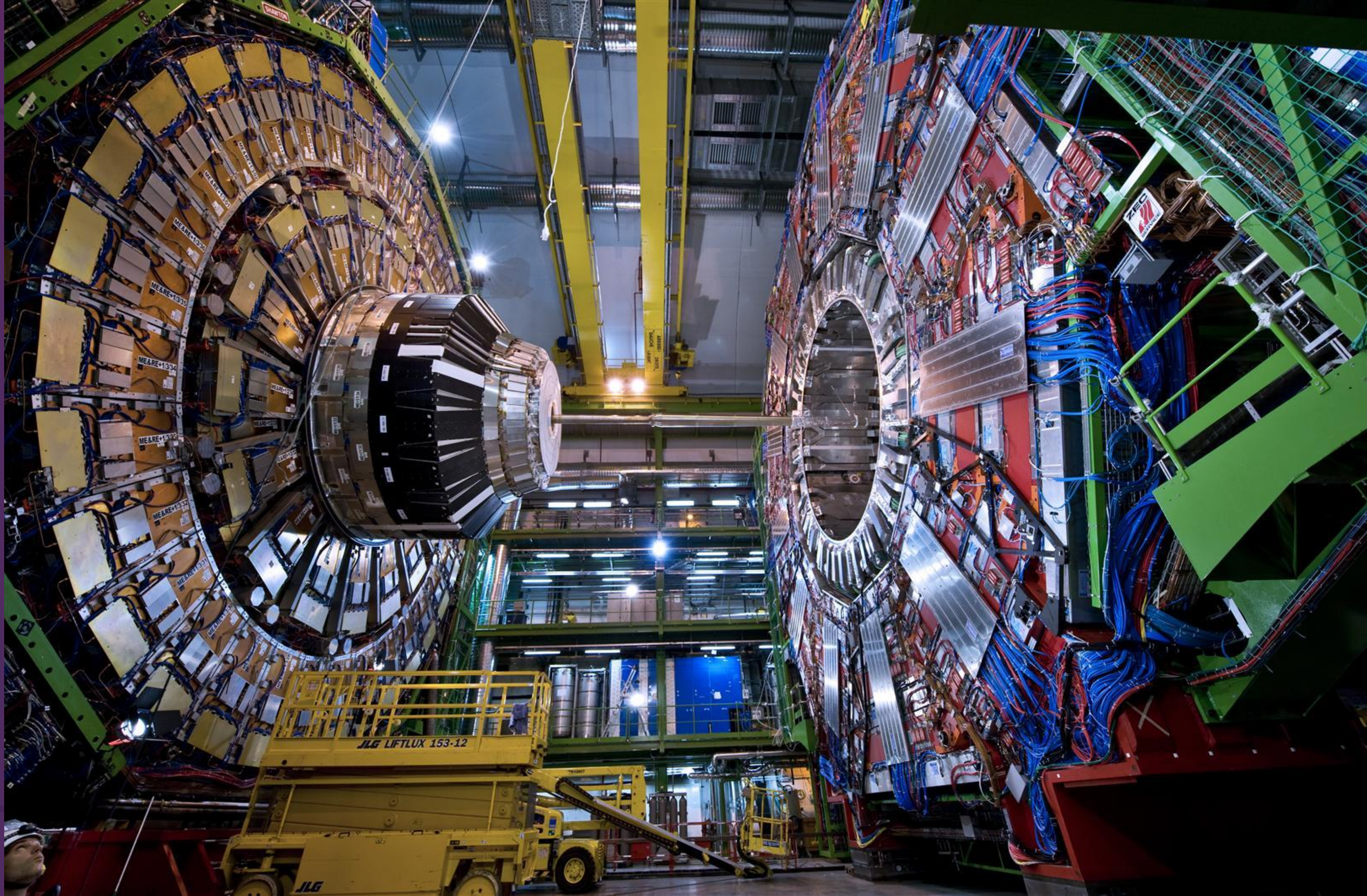
CERN Meyrin

CERN Provesin

SPS 7 km

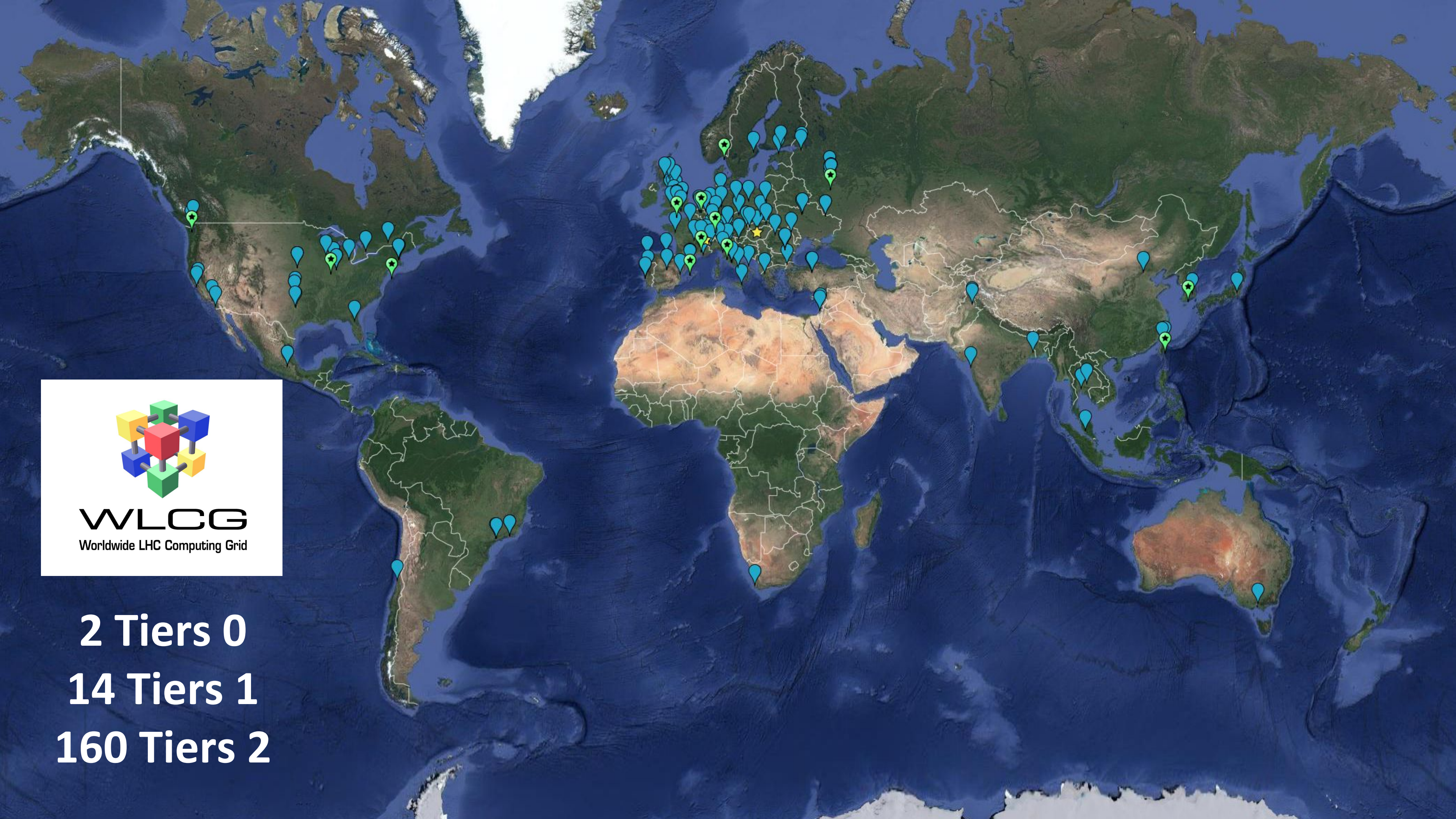
ALICE

LHC 27 km

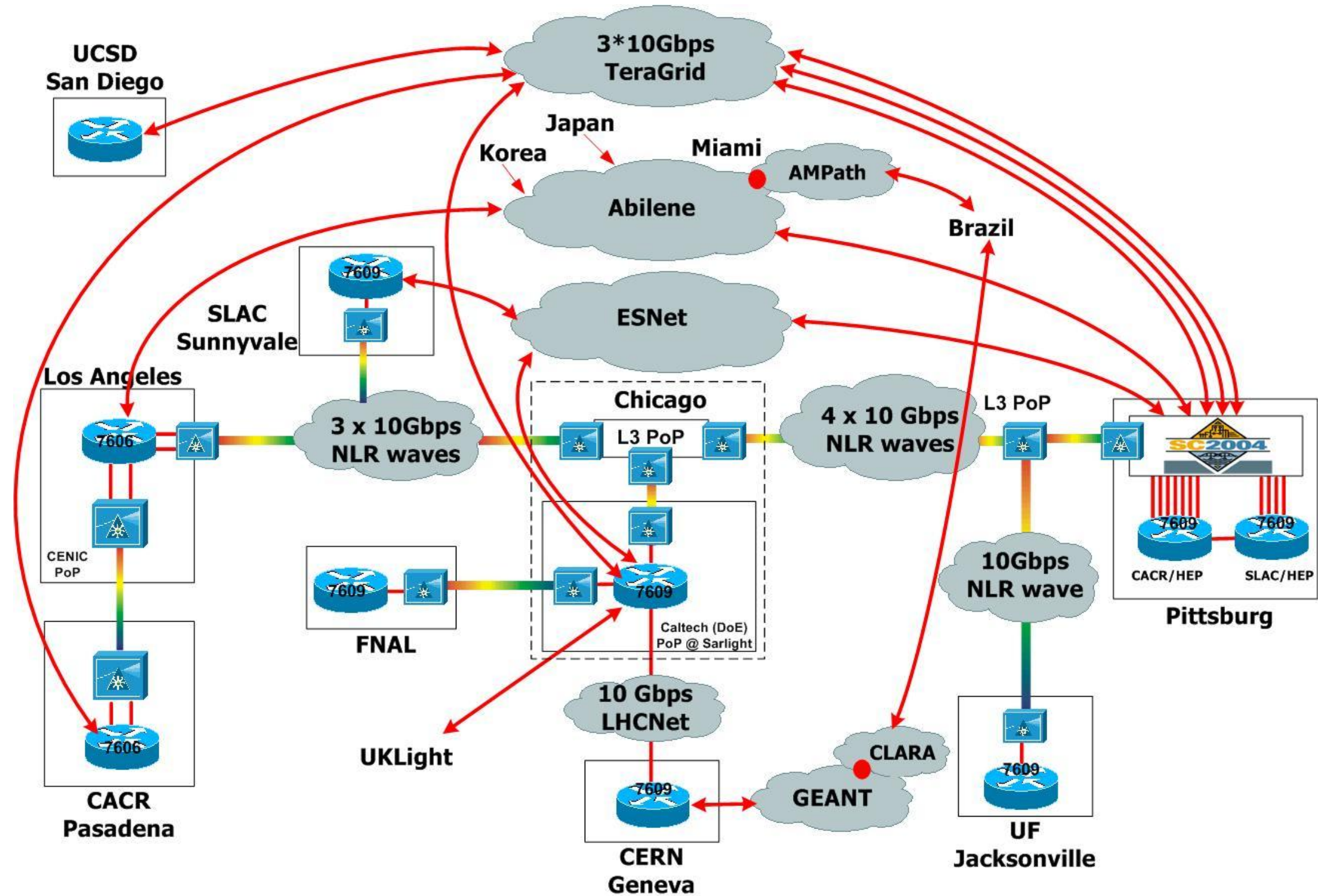


Background: WLCG

- WLCG - Worldwide LHC Computing Grid
 - Global collaboration of more than 170 computing centres (42 countries);
 - Unesp Center for Scientific Computing (NCC) hosts a "CERN CMS Tier2"
- Store, distribute and analyze ~50 Petabytes of data (2016);
- World's largest computing grid
- Four tiers (layered architecture)
 - Tier 0: CERN Data Centre, located in Geneva
 - Tier 1: safe-keeping of raw data, distributing data to Tier 2s and safe-keeping of a share of simulated data produced at Tier 2s
 - Tier 2: universities and research institutes, which can store sufficient data and provide adequate computing power for specific analysis tasks
 - Tier 3: Individual scientists accessing WLCG facilities using small computing resources
- We need fast and programmable networks!

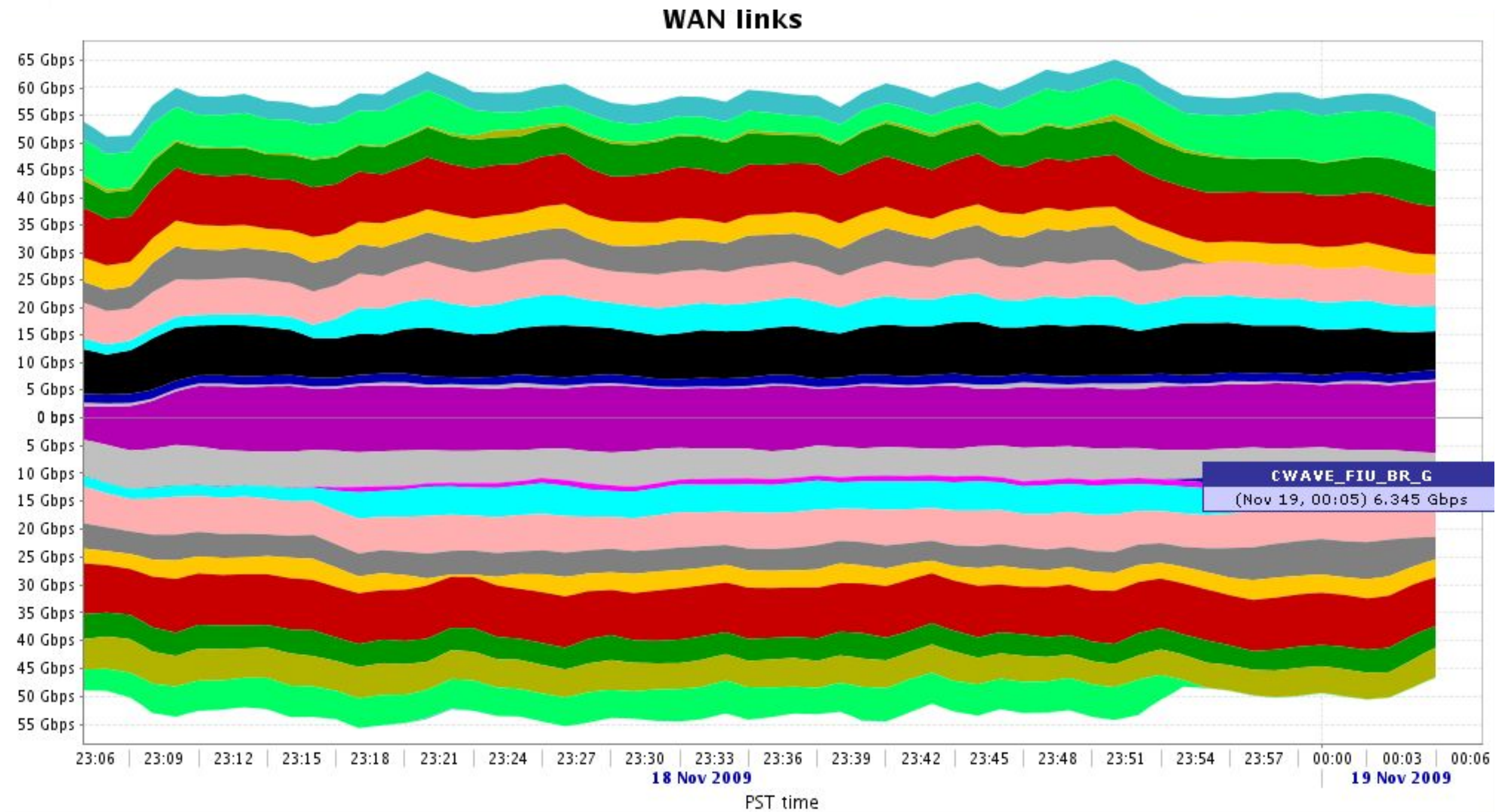


2 Tiers 0
14 Tiers 1
160 Tiers 2



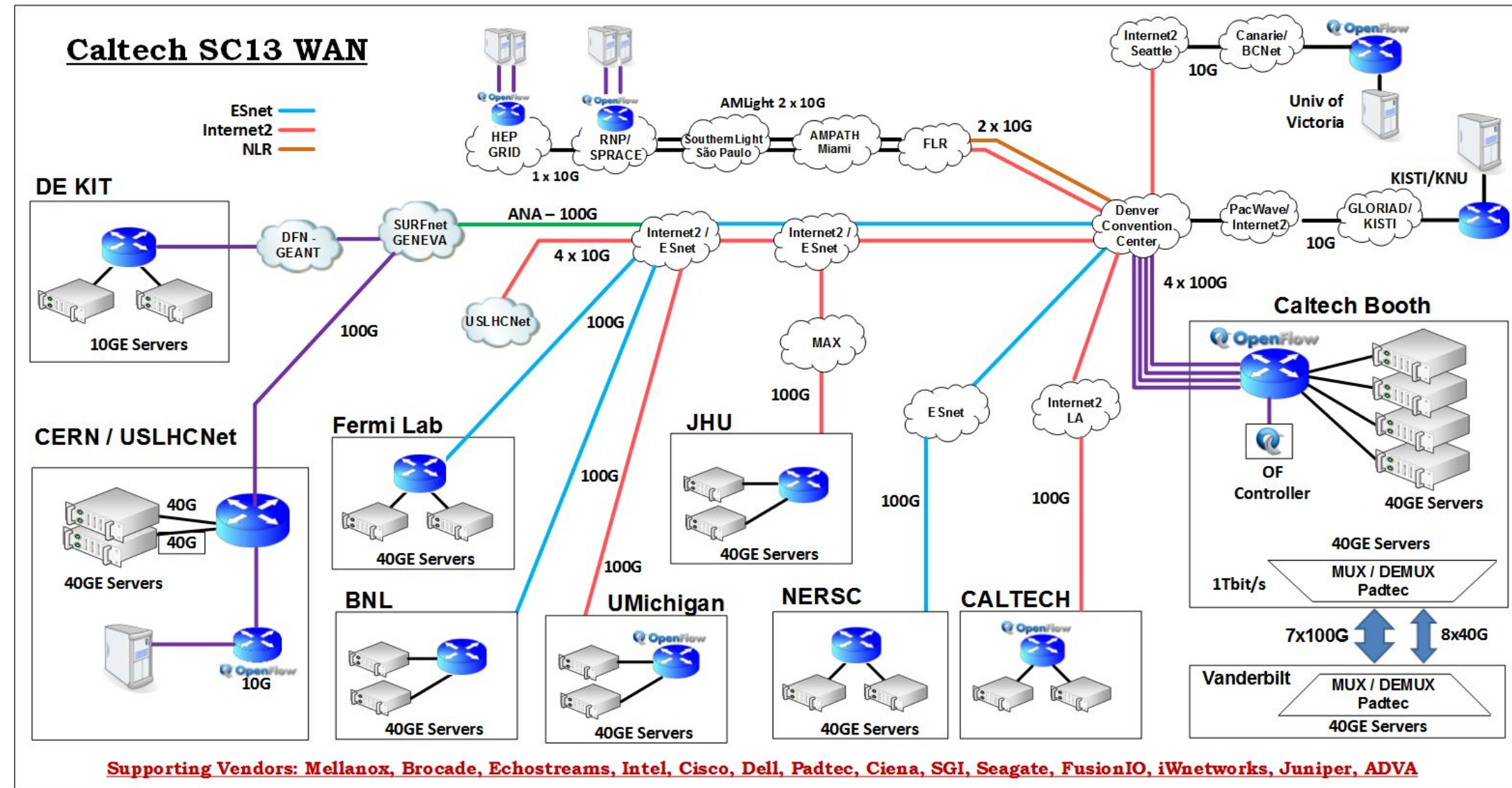
We reached **2 Gbps** from São Paulo to Pittsburgh

- The Bandwidth Challenge Demo reached ~100 Gbps at the showfloor

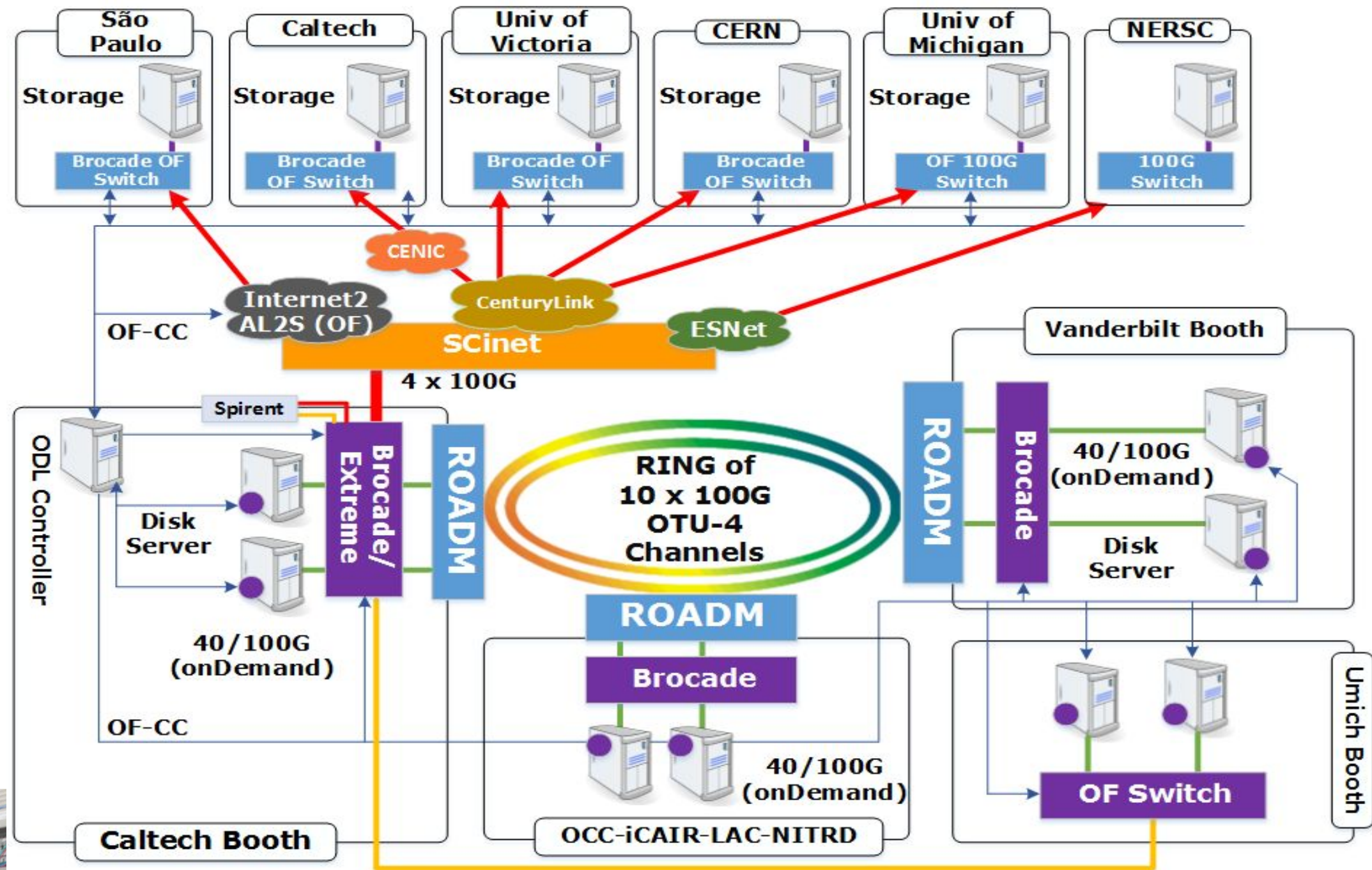


We reached **16 Gbps** from São Paulo to Pittsburgh

- The Bandwidth Challenge Demo reached ~120 Gbps at the showfloor



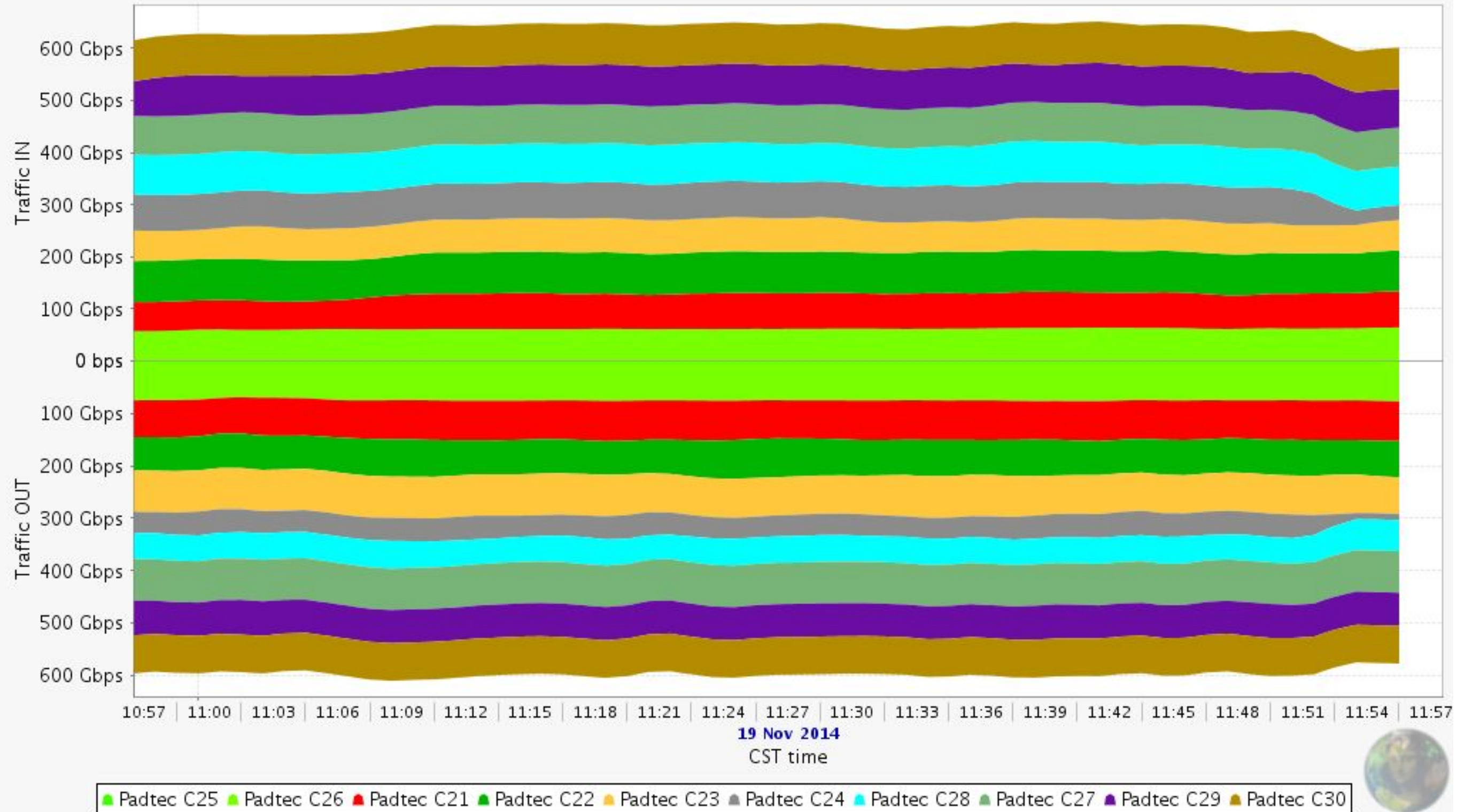
We reached 1 Tbps at the showfloor

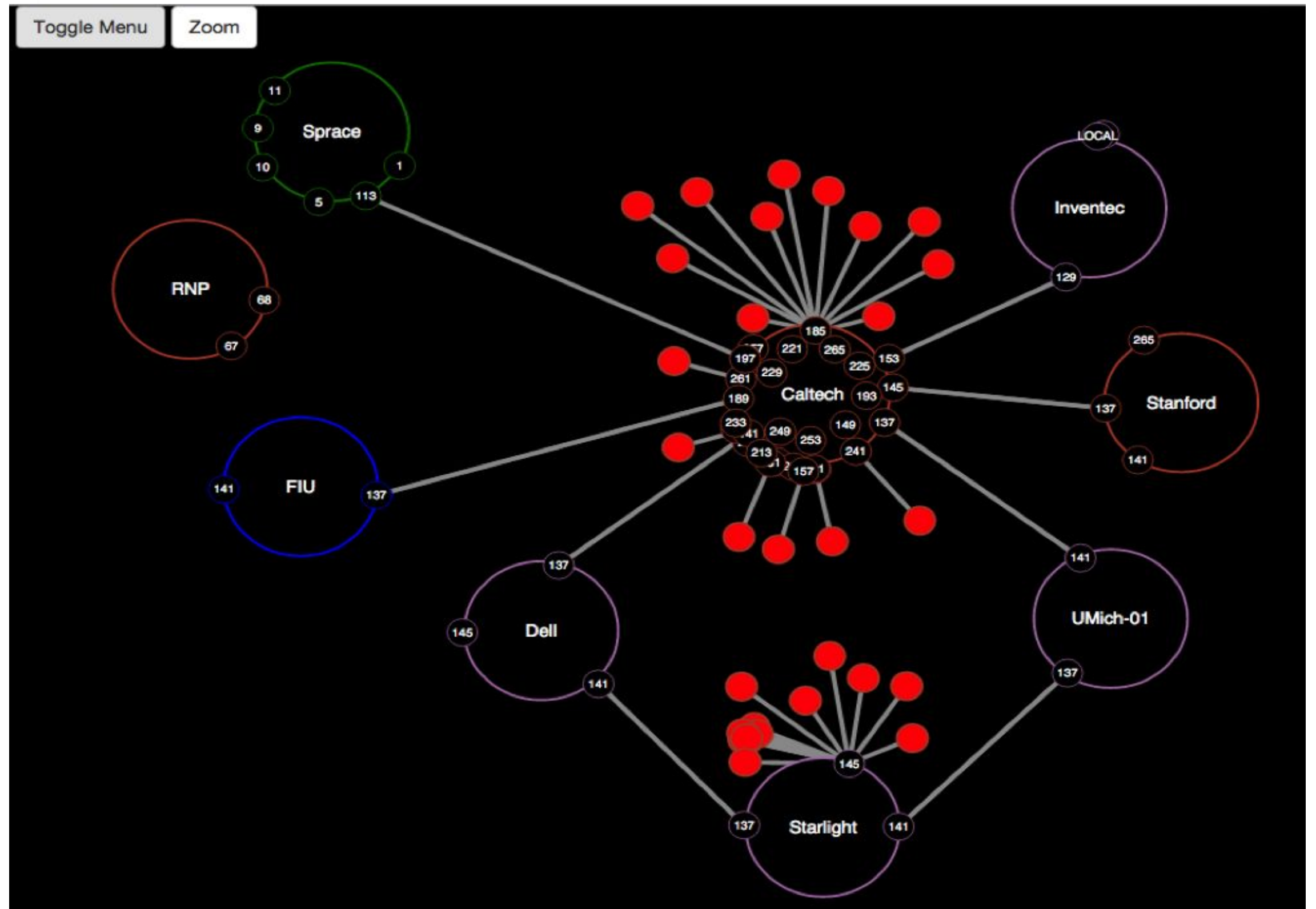




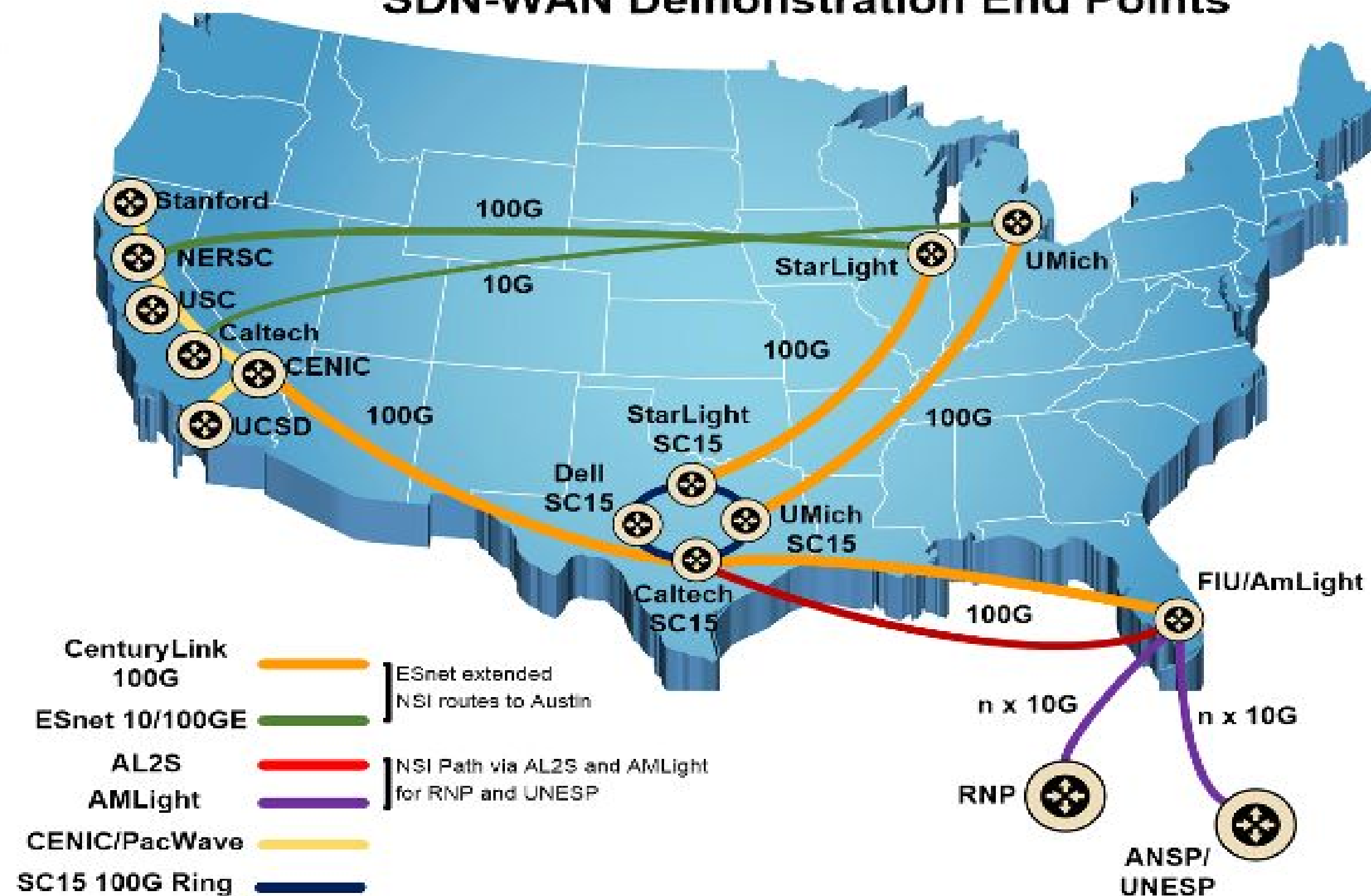
SC14
New Orleans, LA | hpc matters.

Padtec waves





SC15 Caltech-UM-Dell-Starlight SDN-WAN Demonstration End Points

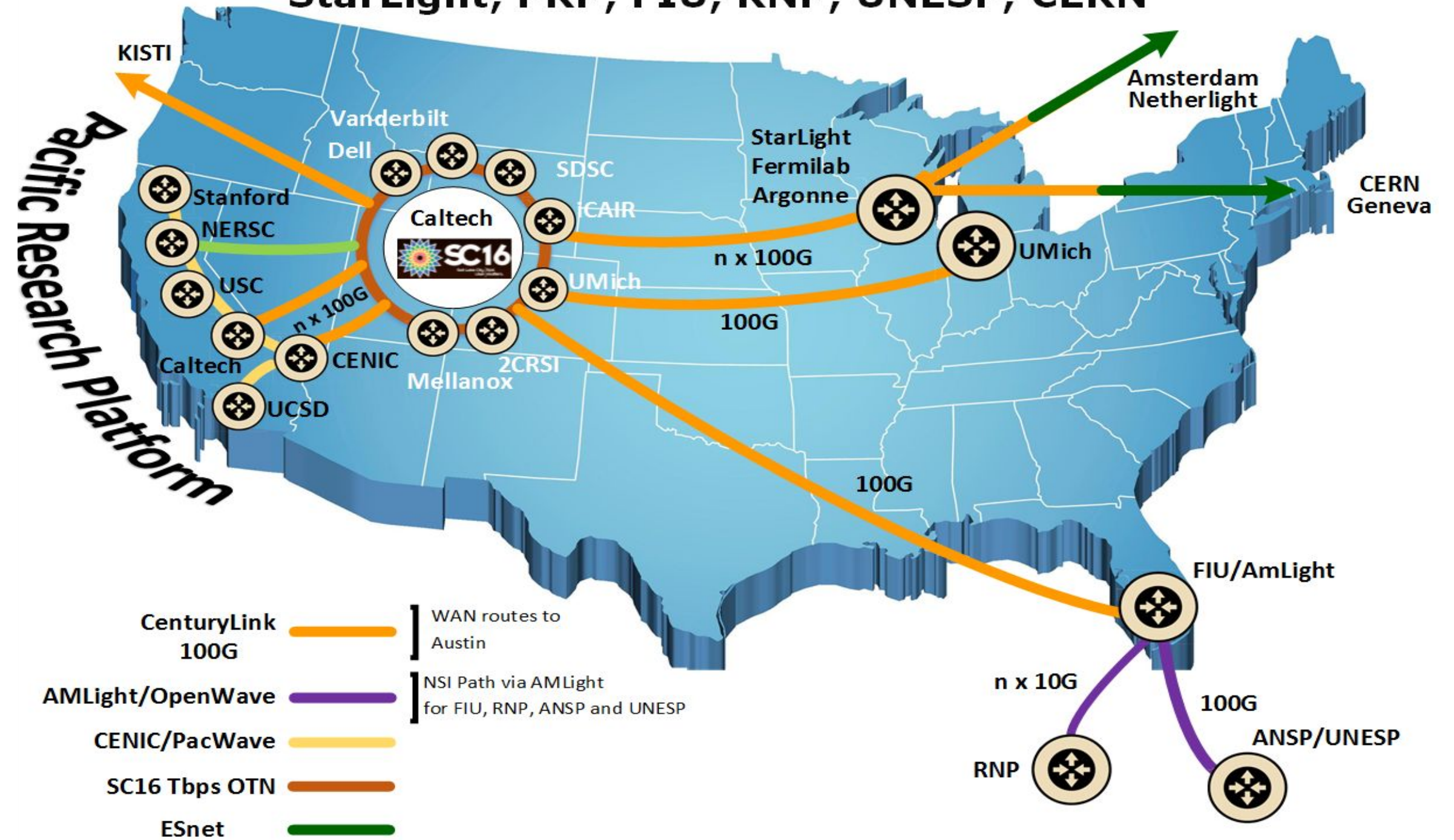


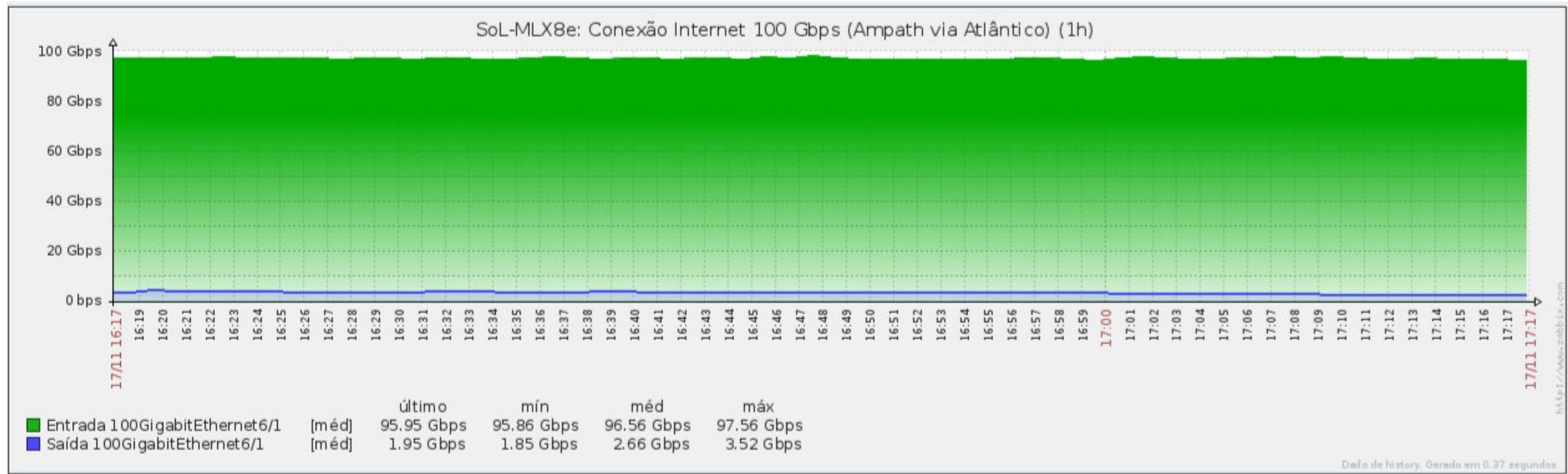


SC16

Salt Lake City, Utah | hpc matters.

SC16 SDN-WAN Demonstration End-Points Caltech, UM, Vanderbilt, UCSD, Dell, 2CRSI, KISTI, StarLight, PRP, FIU, RNP, UNESP, CERN





We reached **100 Gbps** from São Paulo to Salt Lake City

- The Bandwidth Challenge Demo reached ~2 Tbps at the showfloor

What is Kytos ?

- An SDN Platform at early, but heavy stage of development since Jan/2016
 - Event Handler with "*Pub&Sub*" methods and decorators
 - High Level Language API to write Network applications
 - Event Driven
 - Ecosystem with Plug&Play Network Applications repository
 - User friendly with a Nice and Responsive web UI
 - 100% Open Source (MIT License)
 - Always with "*keep it simple*" paradigm in mind
 - Designed to be vendor and protocol agnostic

Definition: *Cyto-: Prefix denoting a cell. 'Cyto-' is derived from the Greek 'kytos', meaning 'hollow, as a cell or container.'*

What can Kytos do?

- Orchestrate OpenFlow (≤ 1.3 spec) switches
- Delegate OF messages to network applications
- Be easily extended to support other protocols and versions
- Help network engineers to debug SDN problems
- Make it simple to create and share Network Applications (NApps):
 - High-level code abstractions for beginners
 - Tool for downloading NApps and sharing your own

Current status

- Release life cycle
 - 2 stable releases / year
 - 3 beta pre-releases + 2 release candidates before stable
 - "*bethania*" release in progress (2017.1 beta2)
- Work in progress
 - > 10K effective lines of code
 - > 500 closed issues
 - > 50 commits / week
 - ~ 6 Full Time Equivalent (FTE)
- 250 Gbps stress test during SC16 (Nov/2016) demo
- Published on Python Package Index (pypi)
- Current packages already accepted into Official Debian Repository
 - *python3-openflow* low level library
 - *kytos-utils*

Kytos distributions (aka "flavors")

- Kytos core + Kytos team NApps = Kytos Controller
- Kytos core + Kytos team, community, your NApps = Your Controller



Kytos Controller



Your Controller

Using Kytos - Try first

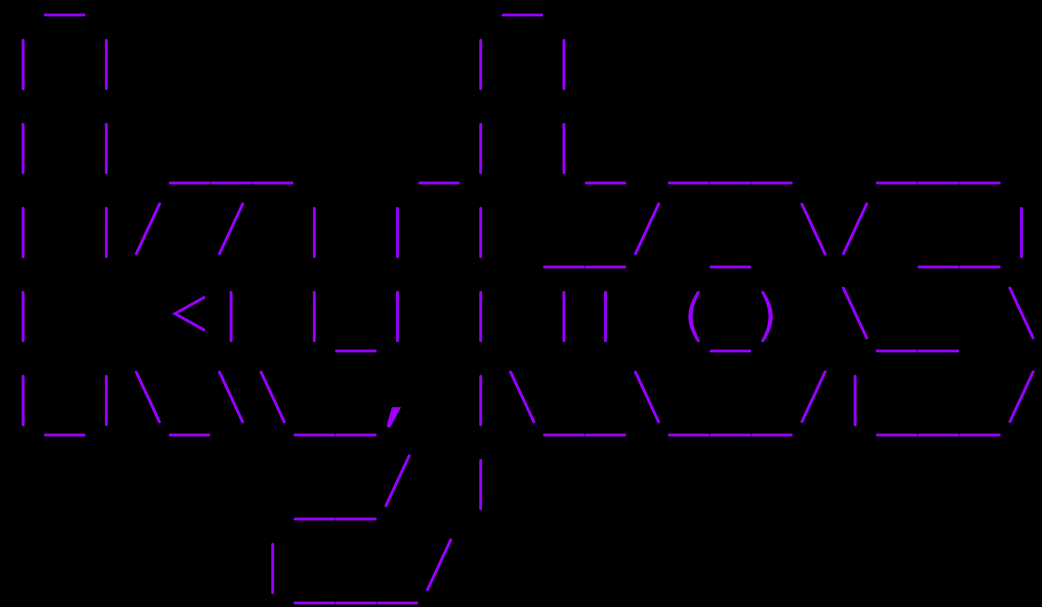
```
$ docker run --privileged -it kytos/tryfirst
```


Using Kytos - Installing

```
$ sudo pip3.6 install kytos
```


Using Kytos - Starting

```
# kytosd -f
```



```
Welcome to Kytos SDN Platform!
```

```
We are doing a huge effort to make sure that this console  
will work fine. But for now is still experimental.
```

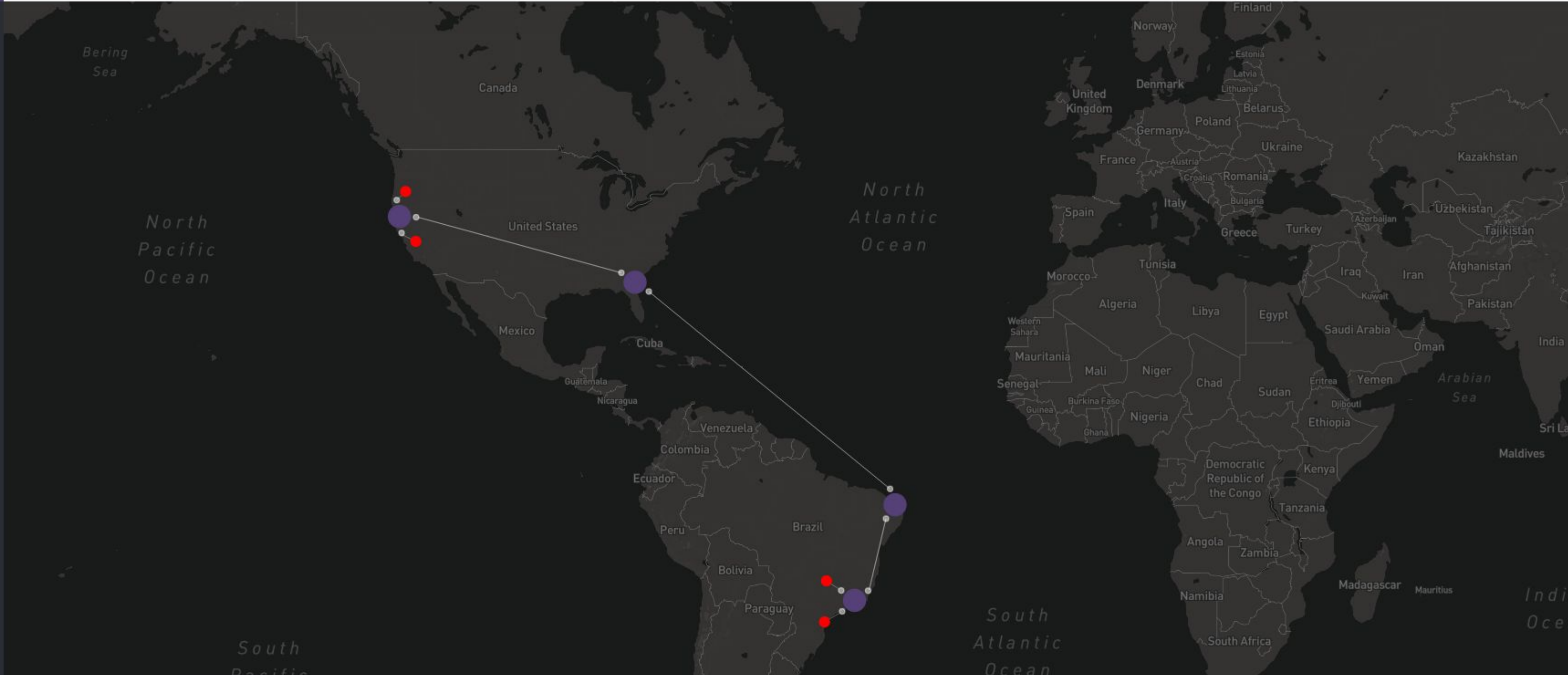
```
Kytos website.: https://kytos.io/  
Documentation.: https://docs.kytos.io/  
OF Address....: tcp://0.0.0.0:6633  
WEB UI.....: http://0.0.0.0:8181/  
kytos $>
```




Topology

Hosts

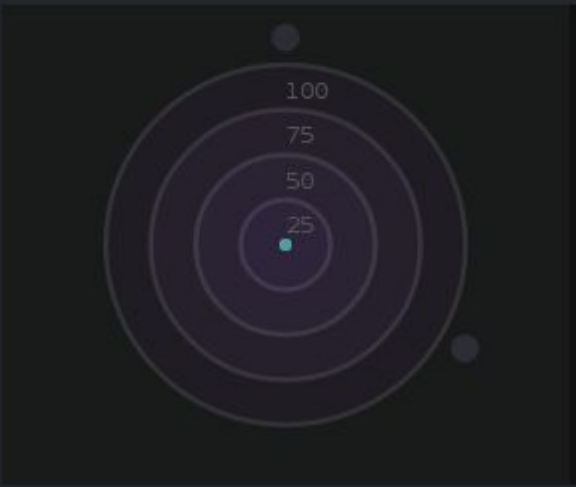
> Terminal



> Terminal Context **Switches** Logs Notifications Settings



00:00:00:00:00:00:00:01
 DPID
 00:00:00:00:00:00:00:01
 CONNECTION
 127.0.0.1:52776
 OFF VERSION
 0x01
 HARDWARE SOFTWARE
 MANUFACTURER
 SERIAL



00:00:00:00:00:00:00:02
 DPID
 00:00:00:00:00:00:00:02
 CONNECTION
 127.0.0.1:52778
 OFF VERSION
 0x01
 HARDWARE SOFTWARE
 MANUFACTURER
 SERIAL



00:00:00:00:00:00:00:03
 DPID
 00:00:00:00:00:00:00:03
 CONNECTION
 127.0.0.1:52780
 OFF VERSION
 0x01
 HARDWARE SOFTWARE
 MANUFACTURER
 SERIAL

- Kytos API
- Kytos Websocket WS

Kytos is a **beta software**.
 For more information,
 please visit kytos.io

Using Kytos - NApps Management

- NApps are simple Python modules in a .napp package
- NApps have a unique identifier: **[protocol][repo]/author/napp[:tag]**
- Examples:
 - huawei/l2ls
 - kytos/of_core:latest
 - https://napps.kytos.io/repo/kytos/of_core

Welcome to Napp repository

Before coding your app, check if someone else has already solved your problem.

Featured Napps

[View all](#)

kytos/web_topology_layout

★★★★☆

Manage endpoints related to the web interface settings and layout.

kytos/of_ipv6drop

★★★★☆

Install flows to DROP IPv6 packets on all switches.

kytos/of_stats

★★★★☆

Provide statistics of openflow switches.

kytos/of_flow_manager

★★★★☆

NApp that manages switches flows.

 Trending Now

 Most Recents

Trending now

kytos/web_topology_layout

★★★★★ (1880 reviews)

topology web interface layout

Manage endpoints related to the web interface settings and layout.

300 

10 

kytos/of_ipv6drop

★★★★★ (1880 reviews)

openflow ipv6

Install flows to DROP IPv6 packets on all switches.

300 

10 

Using Kytos - NApps Management

```
$ kytos napps search 121s
```

| Status | NApp ID | Description |
|--------|-------------------|-----------------------------|
| [--] | jab1982/121s | My L2LS implementation |
| [--] | kytos/of_121s | A L2 learning switch ap... |
| [--] | kytos/of_121sloop | A L2 learning switch app... |

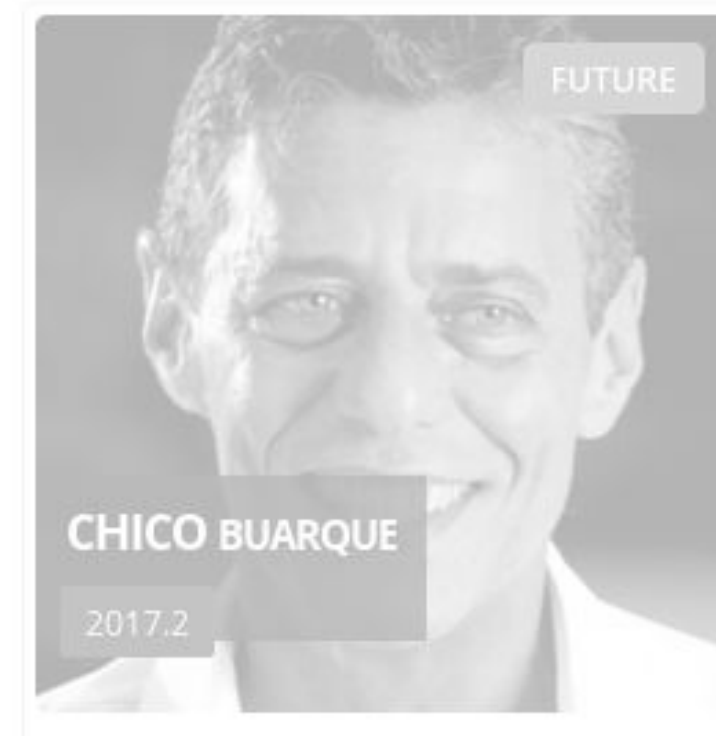
```
Status: (i)nstalled, (e)nabled
```


Using Kytos - NApps Management

```
$ sudo kytos napps install huawei/121s
```

Kytos Releases Cycle

- 2 stable releases / year
 - Kytos summit (1 week)
 - beta1, beta2, beta3 (6 weeks each)
 - Release Candidate (3 weeks)
 - Official Stable Release



Contributing / Become a member

- Main website
 - <https://kytos.io>
- Source Code
 - <https://github.com/kytos>
- Documentation
 - <https://docs.kytos.io>
 - <https://tutorials.kytos.io>
- Mailing list:
 - <https://lists.kytos.io>
- IRC:
 - #kytos @ freenode

Contributing / Become a member

- <https://kytos.io/membership/>
 - Individual Contributor
 - Committers
 - Affiliates
 - Sponsors (Silver, Gold, Platinum)

Kytos Partners



3 partners doing tests
and contributing with
bug reports and code

Kytos Sponsors



Huawei is supporting
us since Jan/2016



kytos

An Open Source SDN Platform - Questions ?

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