LONI 2.0 – Optical, Routers and HPC

Tuesday, October 8, 2013

LONI Management Council

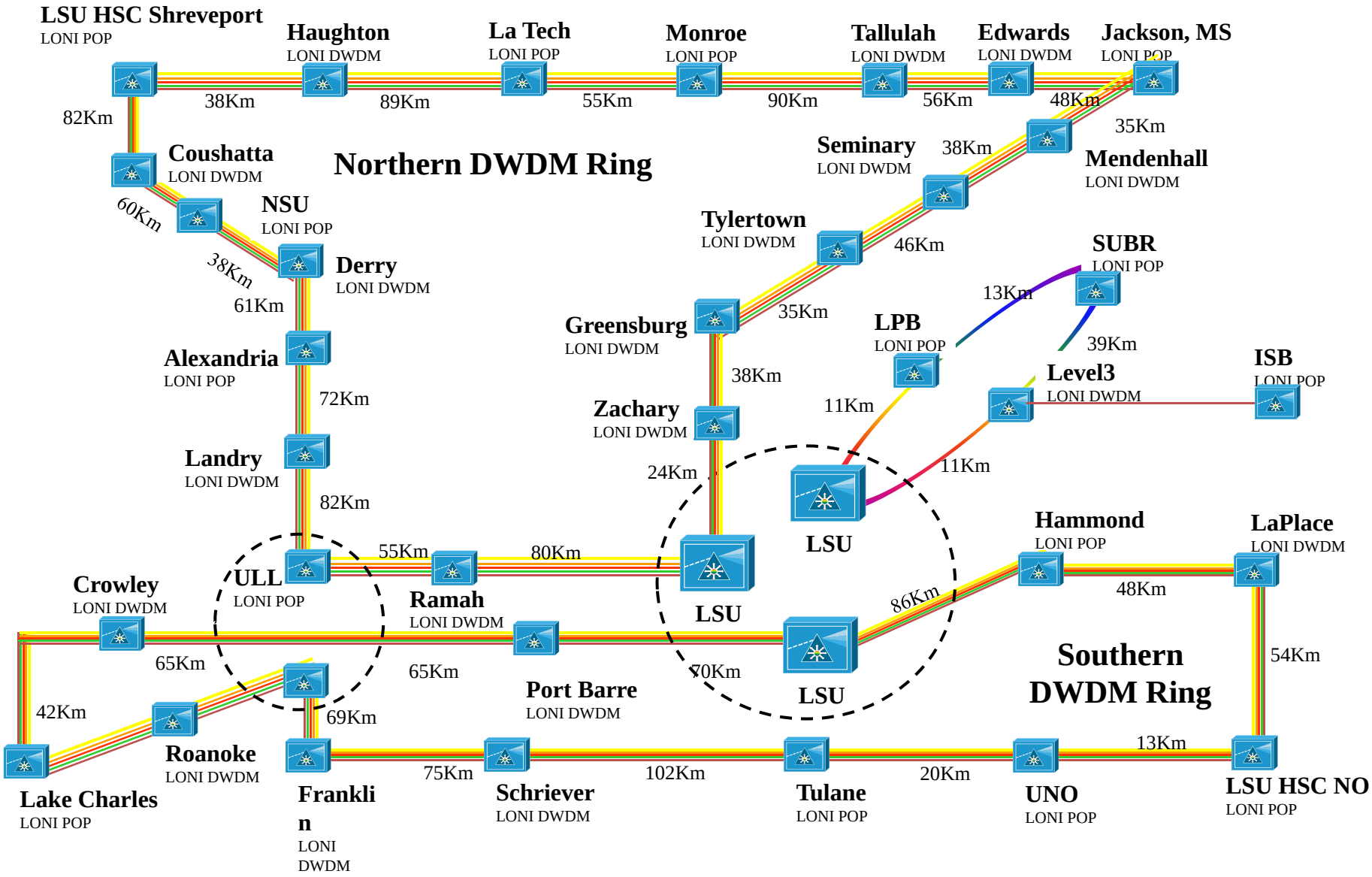
9:55am – 10:15am

Agenda

- Current State
- How did we get here?
- Moving forward
- Participant participation
- Progress
- Services

Current Optical State

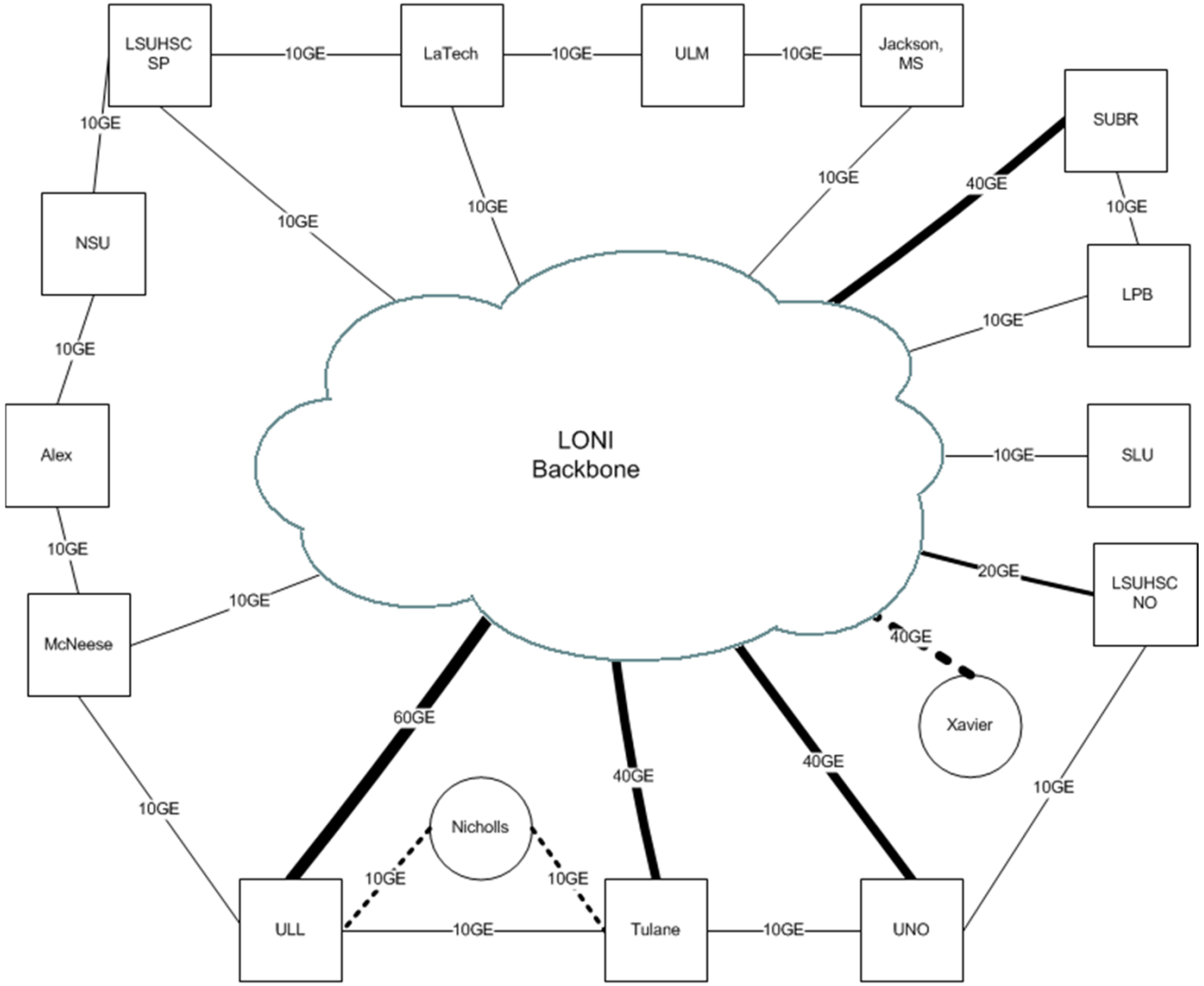
Optical Transport (Layer 0)



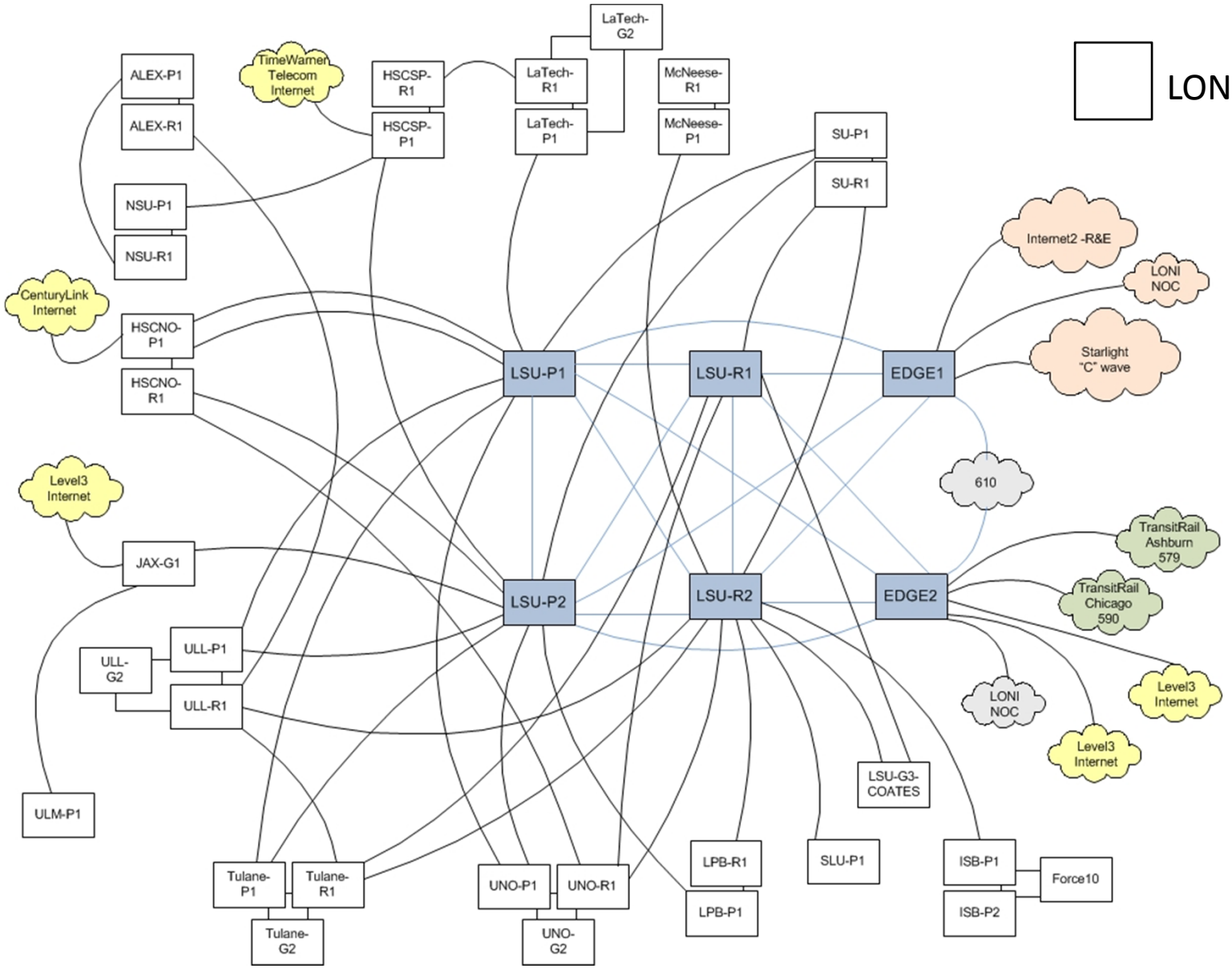
Optical Circuits Layer 1

Campus Device

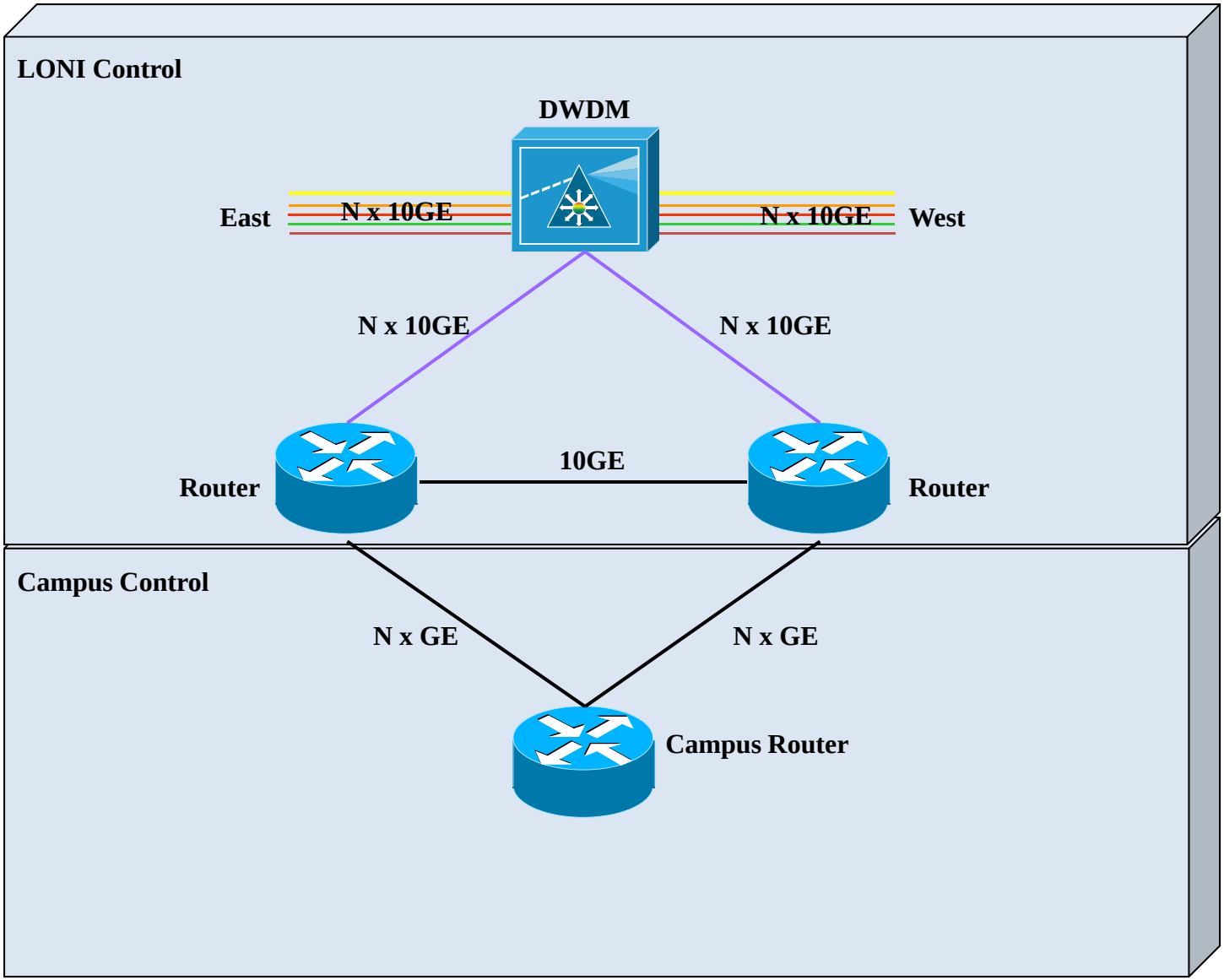
LONI Device



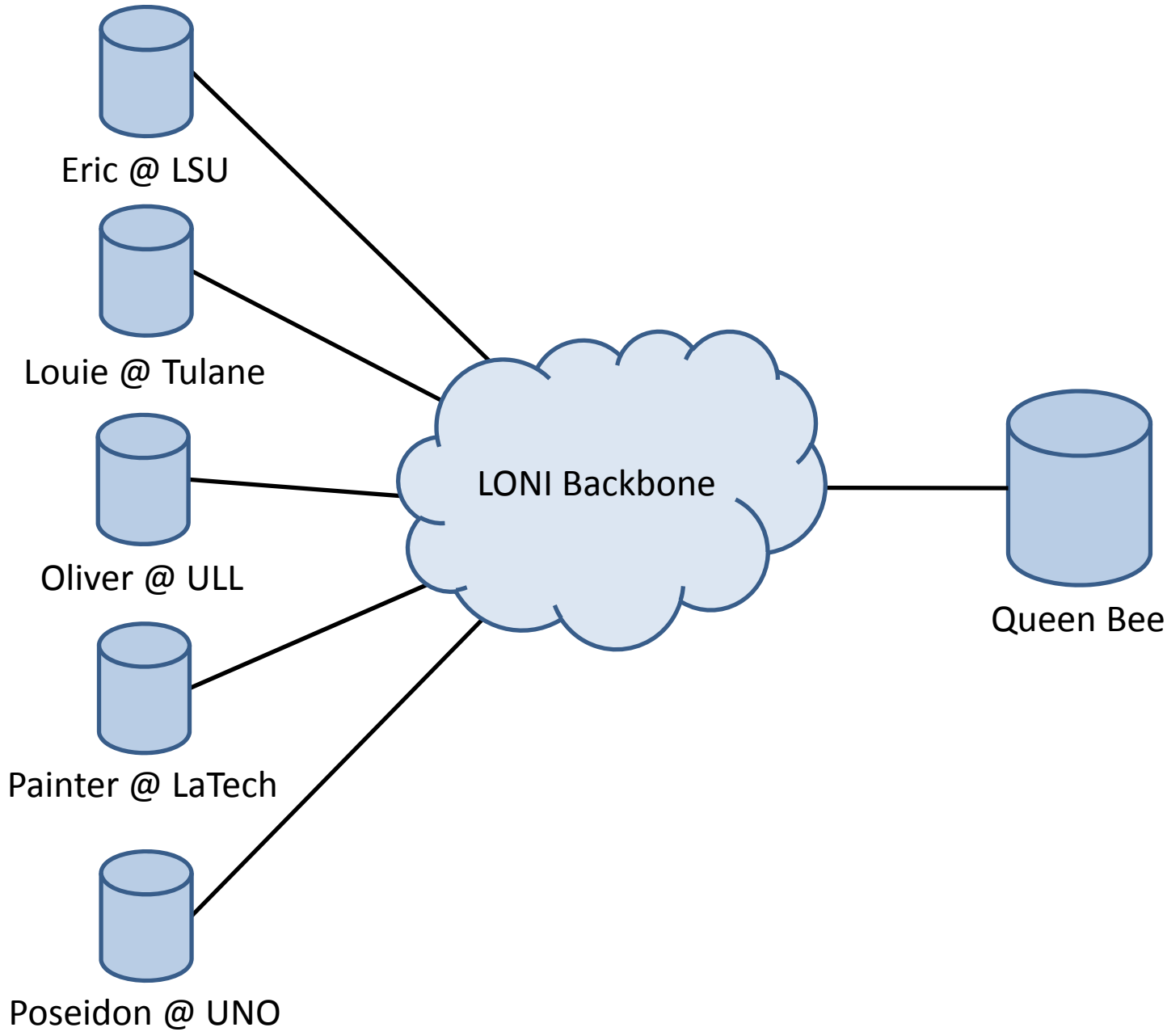
Current Router State (Layer 2 and Layer 3)


LONI Device
LaTech-G2
TimeWarner Telecom Internet
HSCSP-R1
LaTech-R1
McNeese-R1
ALEX-P1
ALEX-R1
HSCSP-P1
LaTech-P1
McNeese-P1
SU-P1
SU-R1
NSU-P1
NSU-R1
Internet2 -R&E
LONI NOC
CenturyLink Internet
HSCNO-P1
HSCNO-R1
LSU-P1
LSU-R1
EDGE1
Starlight "C" wave
610
Level3 Internet
JAX-G1
TransitRail Ashburn 579
TransitRail Chicago 590
LSU-P2
LSU-R2
EDGE2
ULL-G2
ULL-P1
ULL-R1
LONI NOC
Level3 Internet
Level3 Internet
LSU-G3-COATES
ULM-P1
Tulane-P1
Tulane-R1
UNO-P1
UNO-R1
LPB-R1
SLU-P1
ISB-P1
Force10
Tulane-G2
UNO-G2
LPB-P1
ISB-P2

Current Building Blocks



Current HPC State


Eric @ LSU
Louie @ Tulane
Oliver @ ULL
Painter @ LaTech
Poseidon @ UNO
LONI Backbone
Queen Bee

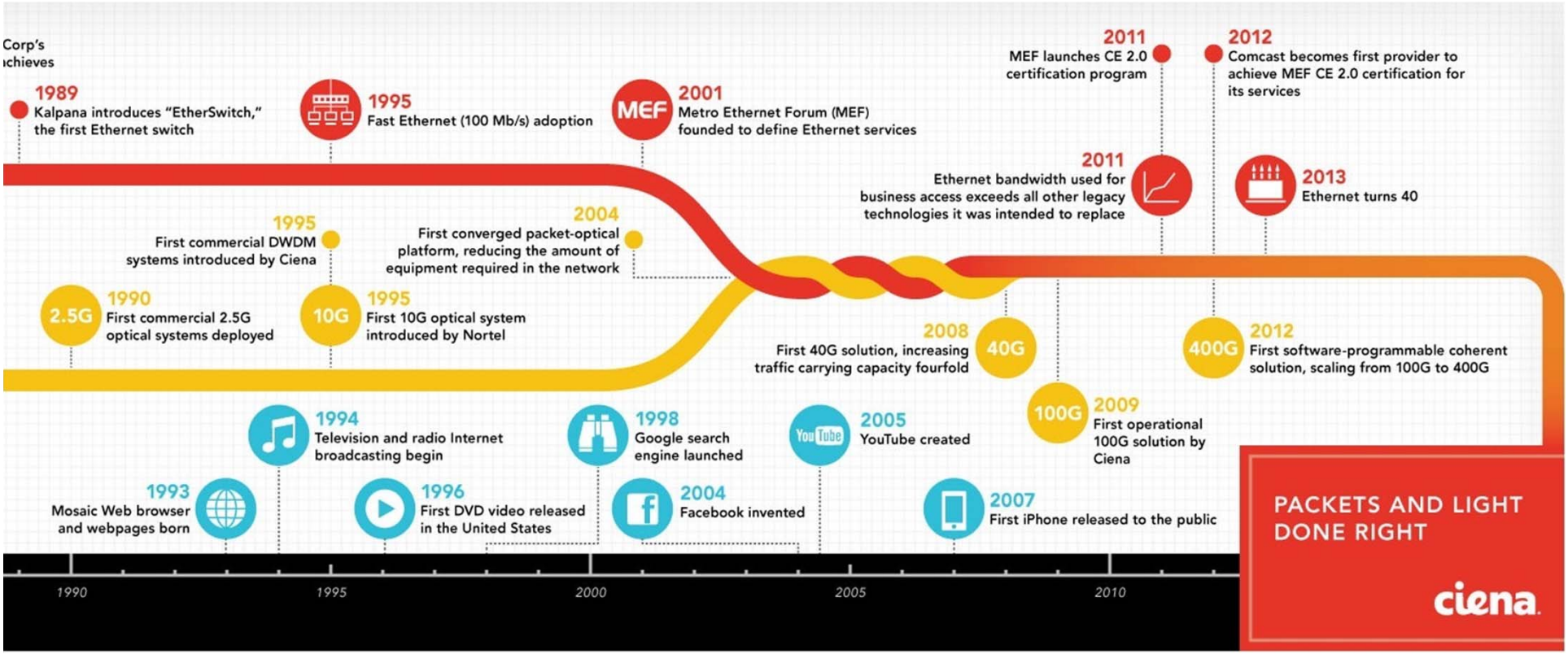
How did we get here?

January 1, 2010

We watched the market and engaged others

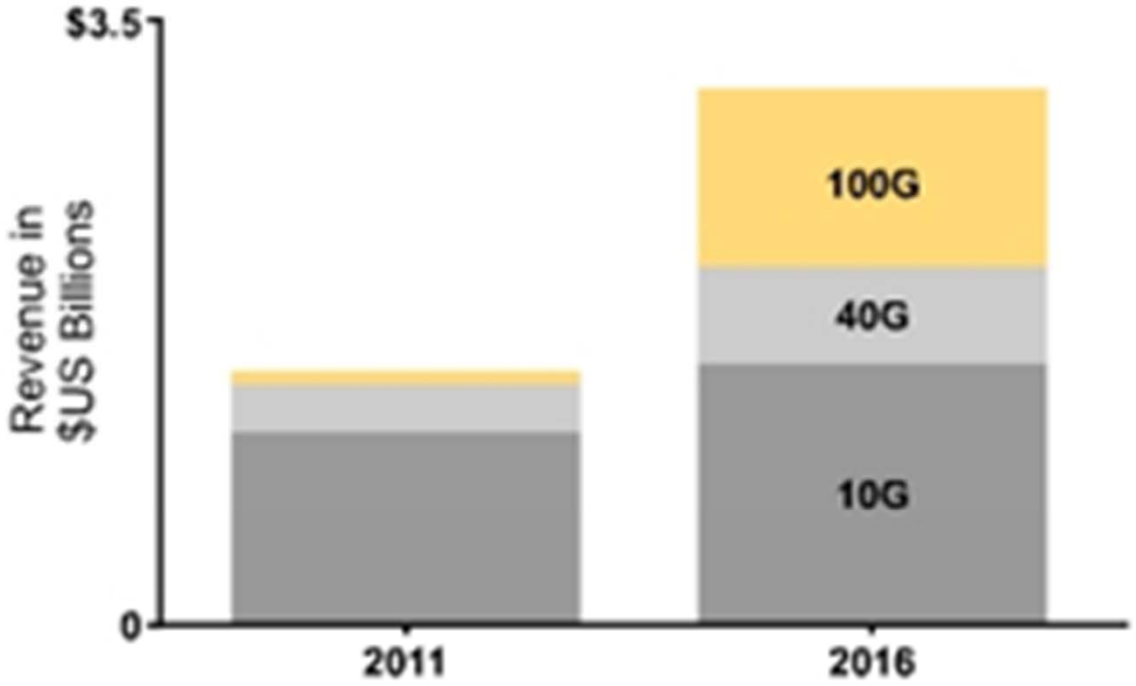
What Happens in an **Internet Minute?**

And **Future Growth** is **Staggering**


Corp's
achieves
1989
Kalpana introduces "EtherSwitch," the first Ethernet switch
1995
Fast Ethernet (100 Mb/s) adoption
MEF
2001
Metro Ethernet Forum (MEF) founded to define Ethernet services
2011
MEF launches CE 2.0 certification program
2012
Comcast becomes first provider to achieve MEF CE 2.0 certification for its services
2011
Ethernet bandwidth used for business access exceeds all other legacy technologies it was intended to replace
2013
Ethernet turns 40
1995
First commercial DWDM systems introduced by Ciena
2004
First converged packet-optical platform, reducing the amount of equipment required in the network
2.5G
1990
First commercial 2.5G optical systems deployed
10G
1995
First 10G optical system introduced by Nortel
2008
First 40G solution, increasing traffic carrying capacity fourfold
40G
400G
2012
First software-programmable coherent solution, scaling from 100G to 400G
100G
2009
First operational 100G solution by Ciena
1994
Television and radio Internet broadcasting begin
1998
Google search engine launched
YouTube
2005
YouTube created
1993
Mosaic Web browser and webpages born
1996
First DVD video released in the United States
2004
Facebook invented
2007
First iPhone released to the public
1990
1995
2000
2005
2010
PACKETS AND LIGHT DONE RIGHT
ciena

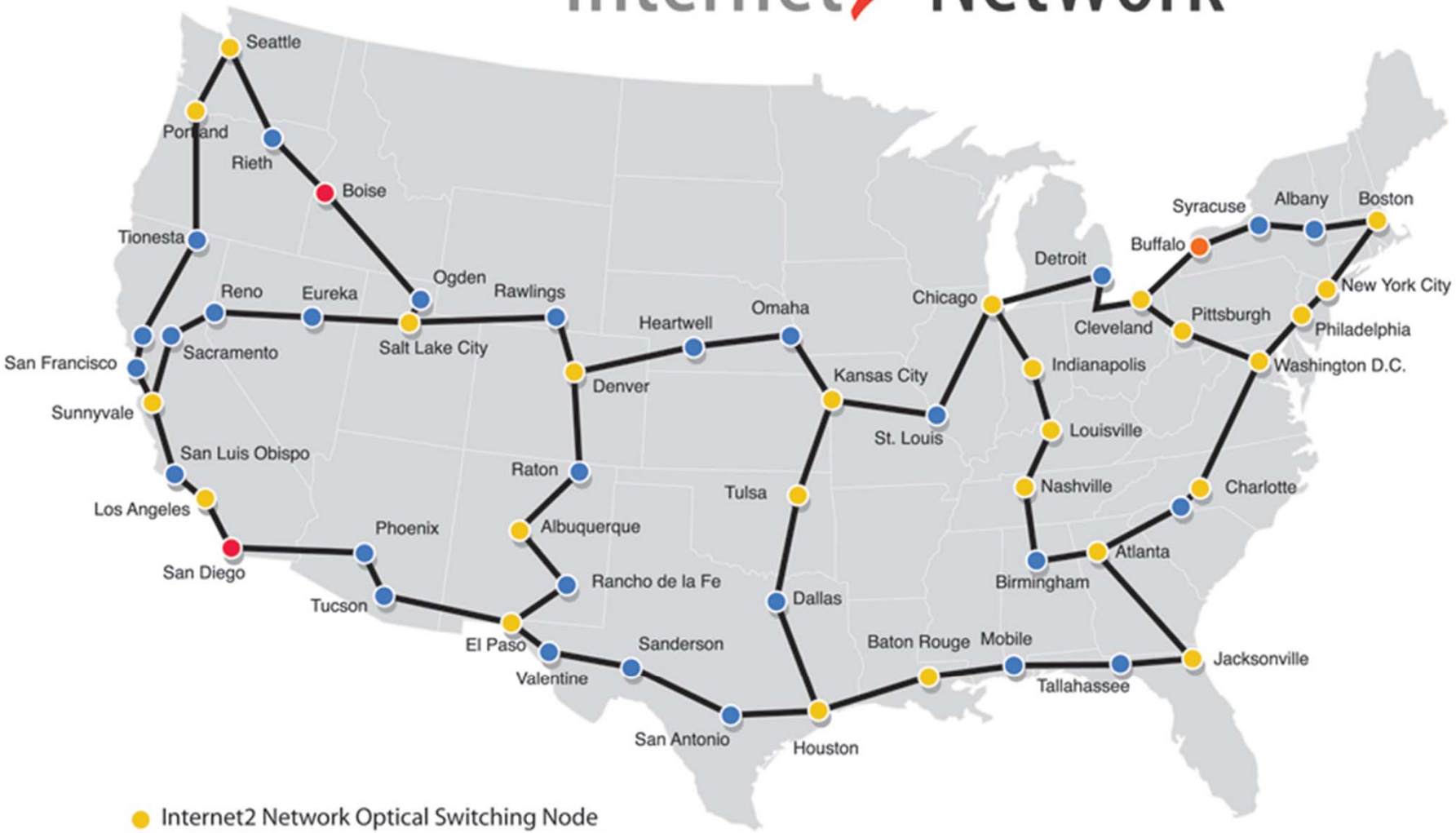
INFONETICS RESEARCH

100G drives the global revenue growth in the optical transceiver and transponder market




40G
100G
Networks Are Coming

Internet2 Network



- Internet2 Network Optical Switching Node
- Level3 Regen Site
- Internet2 Redundant Drop/Add Site
- ESnet Drop/Add Site

OARNET

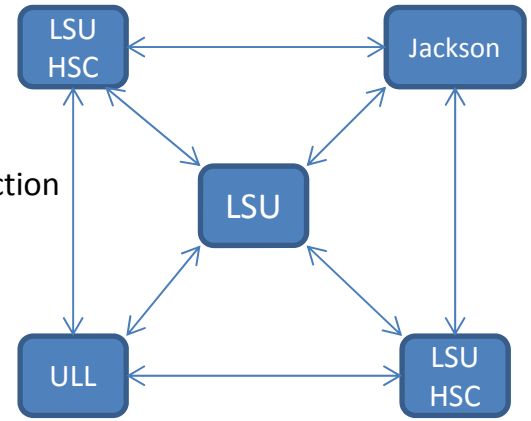

Internet2
Toledo
Cleveland
Youngstown
Akron
Wooster
Columbus
Dayton
Athens
Cincinnati
Portsmouth
Internet2
Legend
100Gbps Link
100Gbps Site

Research Proposals and Activity

- July 1, 2011
  LONI Fiber to Nicholls State University
- May 31, 2012
  NSF CC-NIE Proposal with Tulane
- May 31, 2012
  NSF CC-NIE Proposal with SUBR
- May 31, 2012
  NSF CC-NIE Proposal with LSU
- September 8, 2012
  NSF CC-NIE Award with LSU
- March 13, 2013
  NSF EPSCoR C2 RII Rebudget
- April 1, 2013
  NSF CC-NIE Proposal with LSU
- April 1, 2013
  NSF CC-NIE Proposal with Tulane
- April 1, 2013
  NSF CC-NIE Proposal with SUBR

July 18-19, 2011
2011 LONI Technical Forum

- Fewer routers focused at external peerings
- More optical nodes
- Push MPLS down to optical nodes
- Provide managed CPE device that is MPLS configurable on every connection
- Move from optical rings to optical mesh
- Upgrade router backbone to 40GE
- Every connection supporting IPv6
- Network management via IPv6

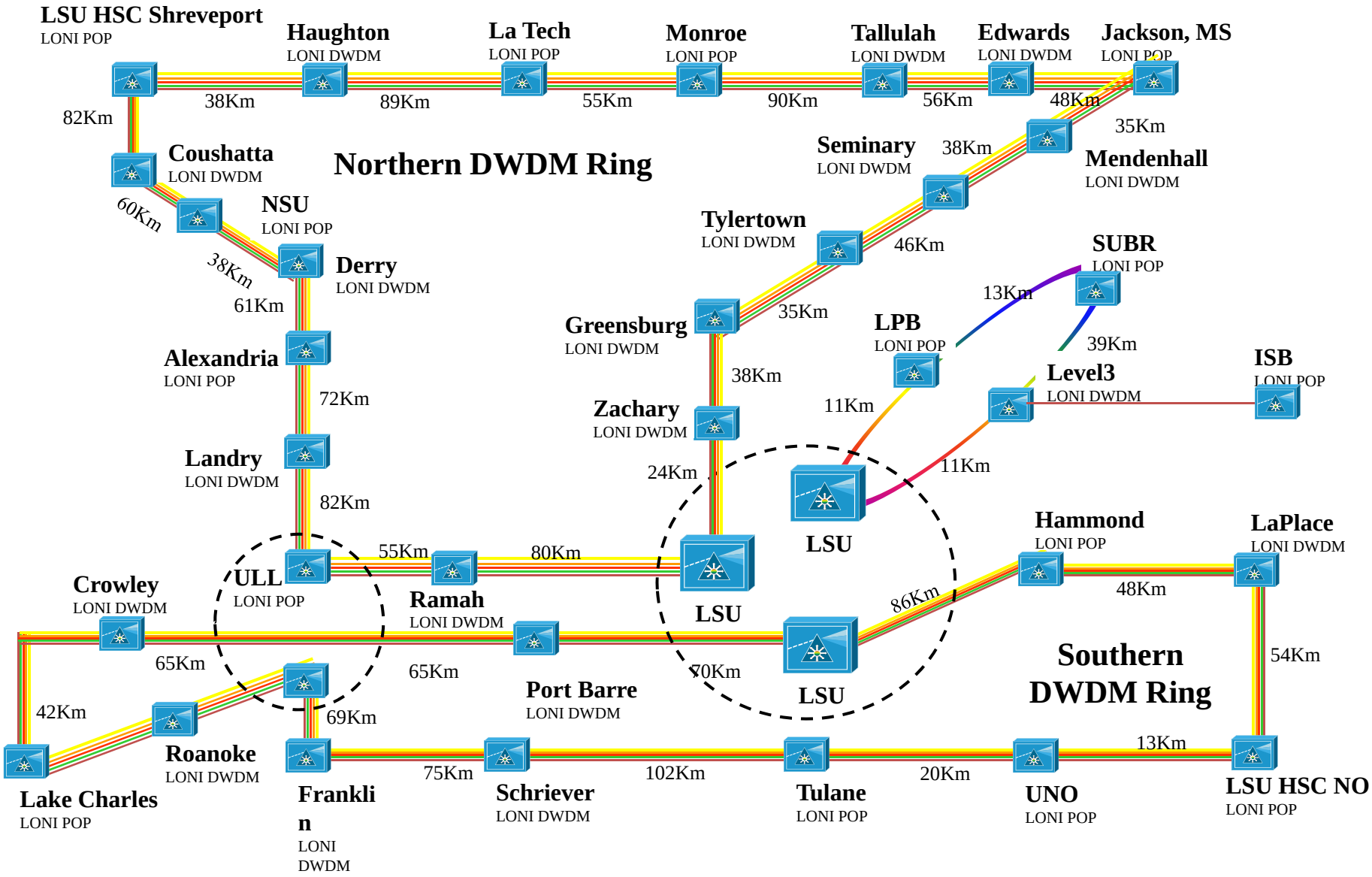


Moving Forward

Network Architecture

LONI 2.0 – Optical
(Layer 0 and Layer 1)

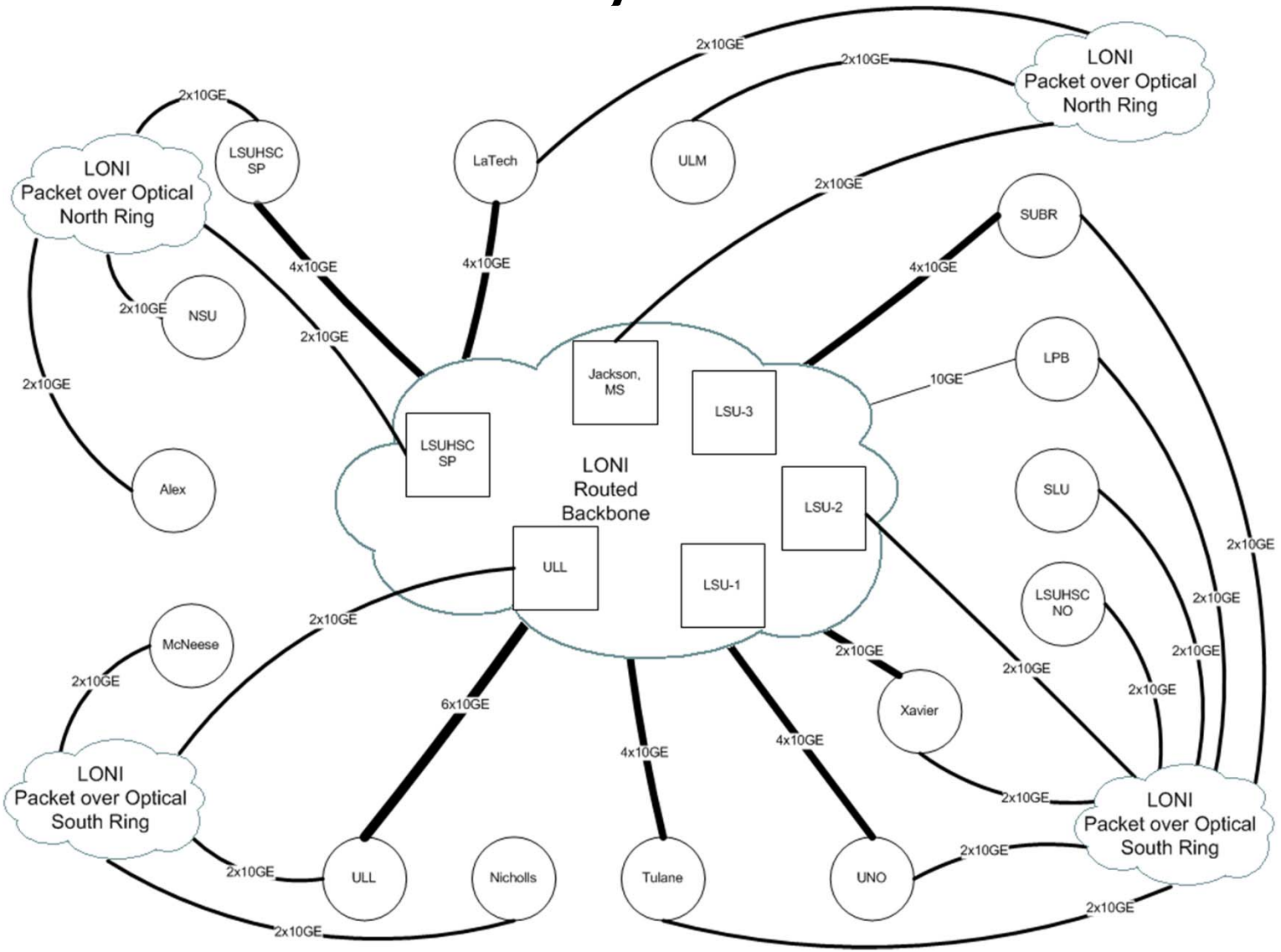
Optical Transport (Layer 0) –NO CHANGE



Optical Circuits
Layer 1

Campus Device

LONI Device



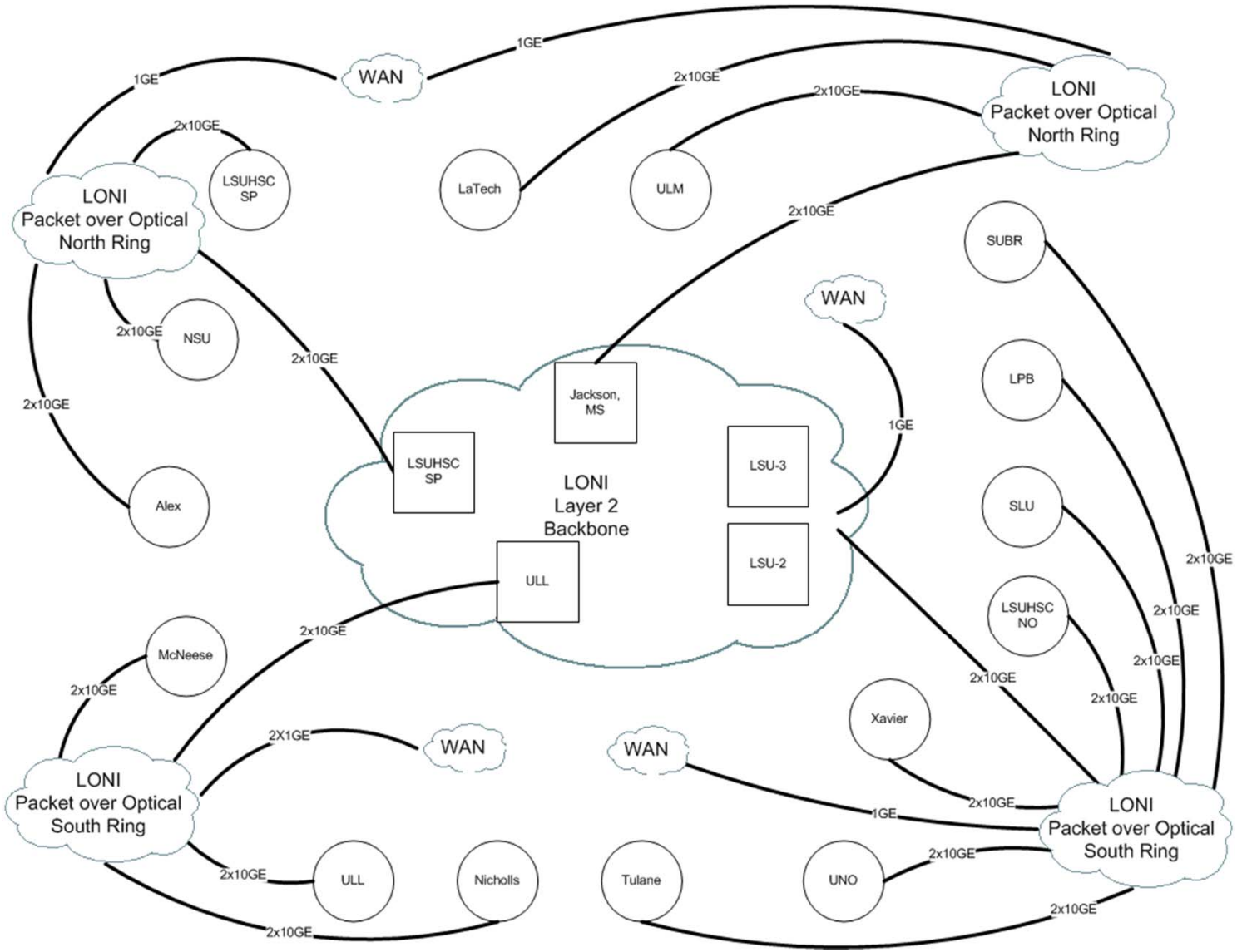
Push MPLS down to optical nodes

select optical platform with native Ethernet capability

MPLS/Ethernet Layer 2

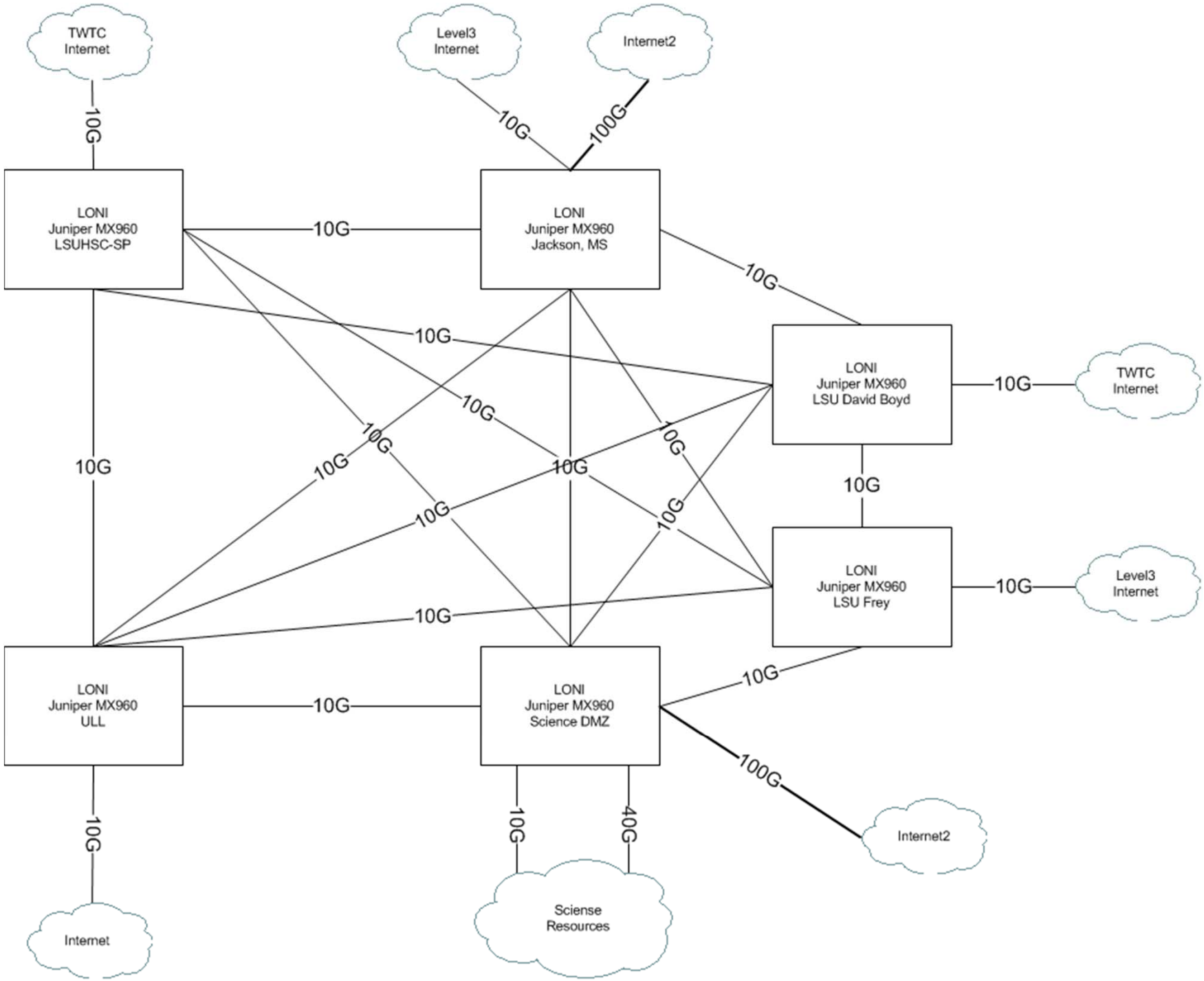
Campus Device

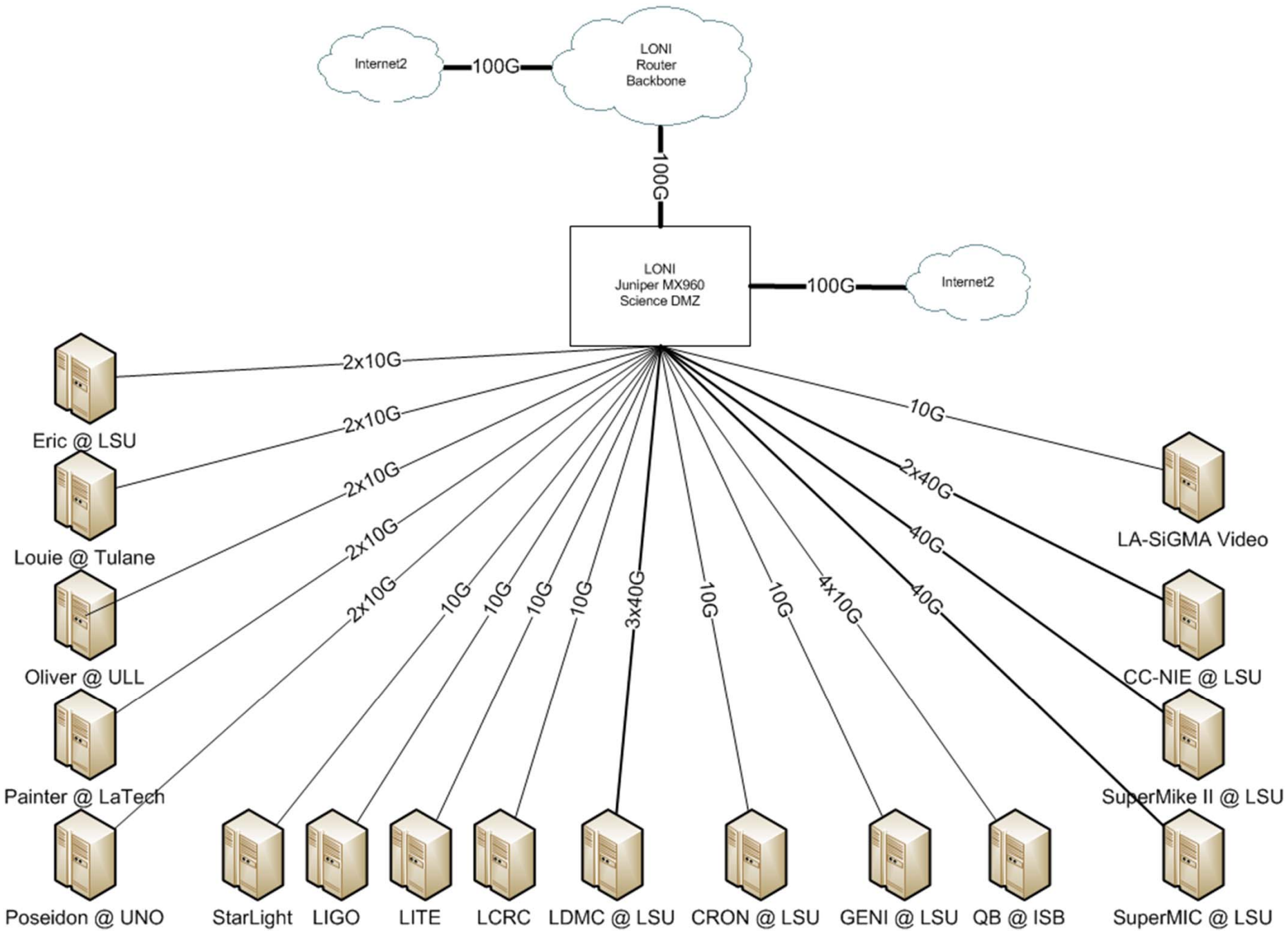
LONI Device

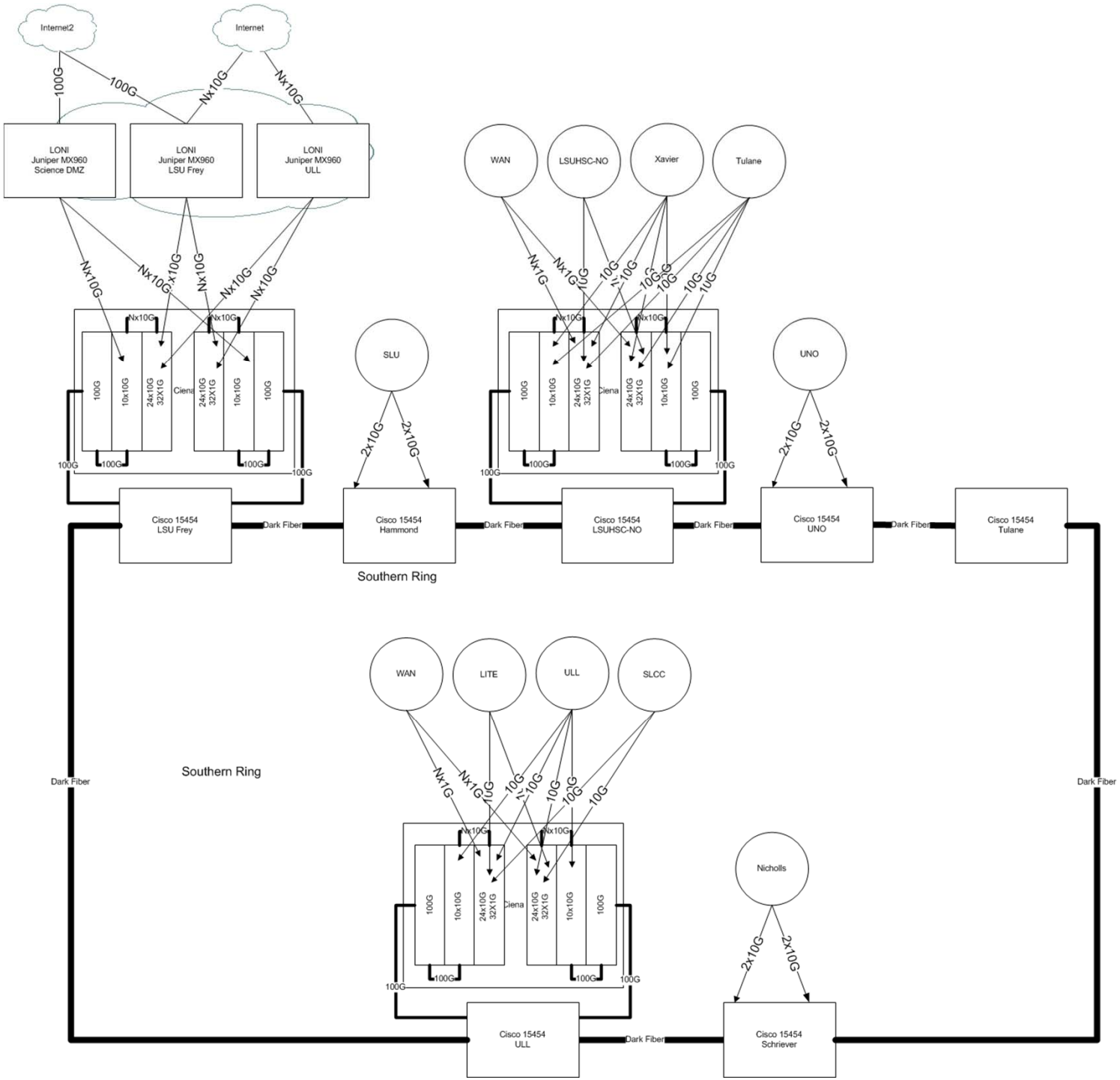


Fewer Routers

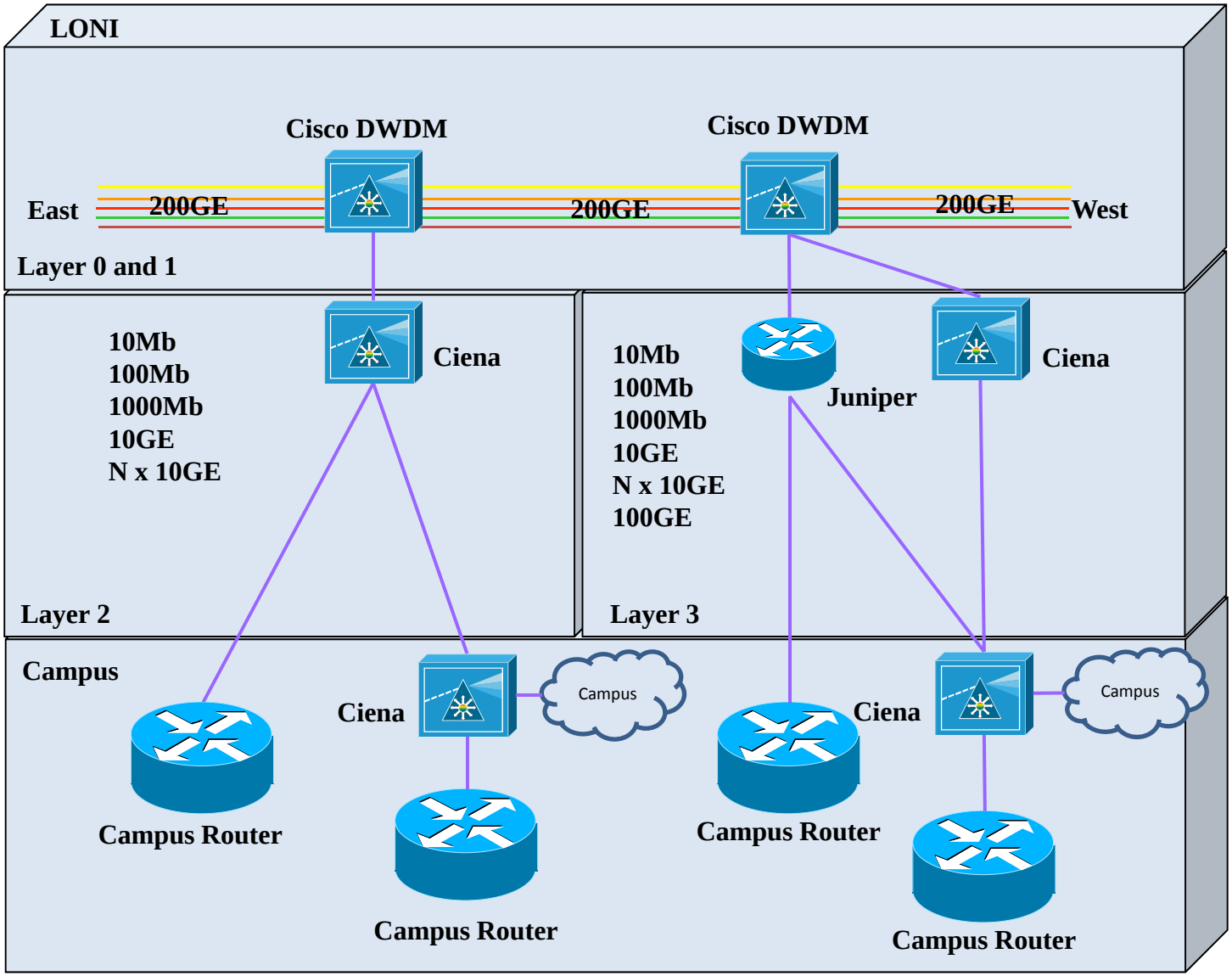
6 core routers


TWTC
Internet
Level3
Internet
Internet2
10G
10G
100G
LONI
Juniper MX960
LSUHSC-SP
LONI
Juniper MX960
Jackson, MS
LONI
Juniper MX960
LSU David Boyd
TWTC
Internet
LONI
Juniper MX960
LSU Frey
Level3
Internet
LONI
Juniper MX960
ULL
LONI
Juniper MX960
Science DMZ
Internet2
Internet
Sciense
Resources
40G


Internet2
100G
LONI
Router
Backbone
100G
LONI
Juniper MX960
Science DMZ
100G
Internet2
2x10G
2x10G
2x10G
2x10G
2x10G
10G
10G
10G
10G
3x40G
10G
10G
4x10G
10G
2x40G
40G
40G
Eric @ LSU
Louie @ Tulane
Oliver @ ULL
Painter @ LaTech
Poseidon @ UNO
StarLight
LIGO
LITE
LCRC
LDMC @ LSU
CRON @ LSU
GENI @ LSU
QB @ ISB
LA-SiGMA Video
CC-NIE @ LSU
SuperMike II @ LSU
SuperMIC @ LSU


Internet2
Internet
100G
100G
Nx10G
Nx10G
LONI
Juniper MX960
Science DMZ
LONI
Juniper MX960
LSU Frey
LONI
Juniper MX960
ULL
WAN
LSUHSC-NO
Xavier
Tulane
Nx1G
10G
2x10G
Nx10G
100G
10x10G
24x10G
32X1G
Ciena
SLU
UNO
2x10G
Cisco 15454
LSU Frey
Dark Fiber
Cisco 15454
Hammond
Cisco 15454
LSUHSC-NO
Cisco 15454
UNO
Cisco 15454
Tulane
Southern Ring
WAN
LITE
ULL
SLCC
Nicholls
Cisco 15454
ULL
Cisco 15454
Schriever
Dark Fiber
Southern Ring

Building Blocks



Participant Participation

- Investment
- Discussion and Feedback
- Backbone connected
  - N x 10Gbps
  - 100Gbps
- WAN connected
  - 10/100/1000Mbps

Progress

- Community Technical Calls on 6/6/13, 7/11/13, 8/23/13, 10/18/13
- Ciena 100G to NOLA received and working on implementation services scope from Ciena
- Consolidating our existing routers in preparation for trade-in
- Budgeting 100G to ULL and implementation services from Ciena
- Budgeting Juniper router purchase
- Completed LCTCS Statewide WAN Redesign
- LONI Fiber to Nicholls to be completed very soon
- LONI Fiber to Tulane awaiting Tulane inside work
- LONI Fiber to DOTD in New Orleans complete
- LONI Fiber to DOTD in Baton Rouge approximately 8 weeks away
- Regents signed MSA with Internet2 for 100G and Net+ cloud services

Services

- WAN Management
- Equipment Rental
- Cloud Videoconferencing
  - HD Room Systems
  - HD Desktop
  - Federated Identity
- Cloud services from Internet2
- Cloud services from Venyu
- Cloud services from AT&T

Q & A

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