100G Impact to your campus (directly connected campus)

Thursday, June 6, 2013

WebEx

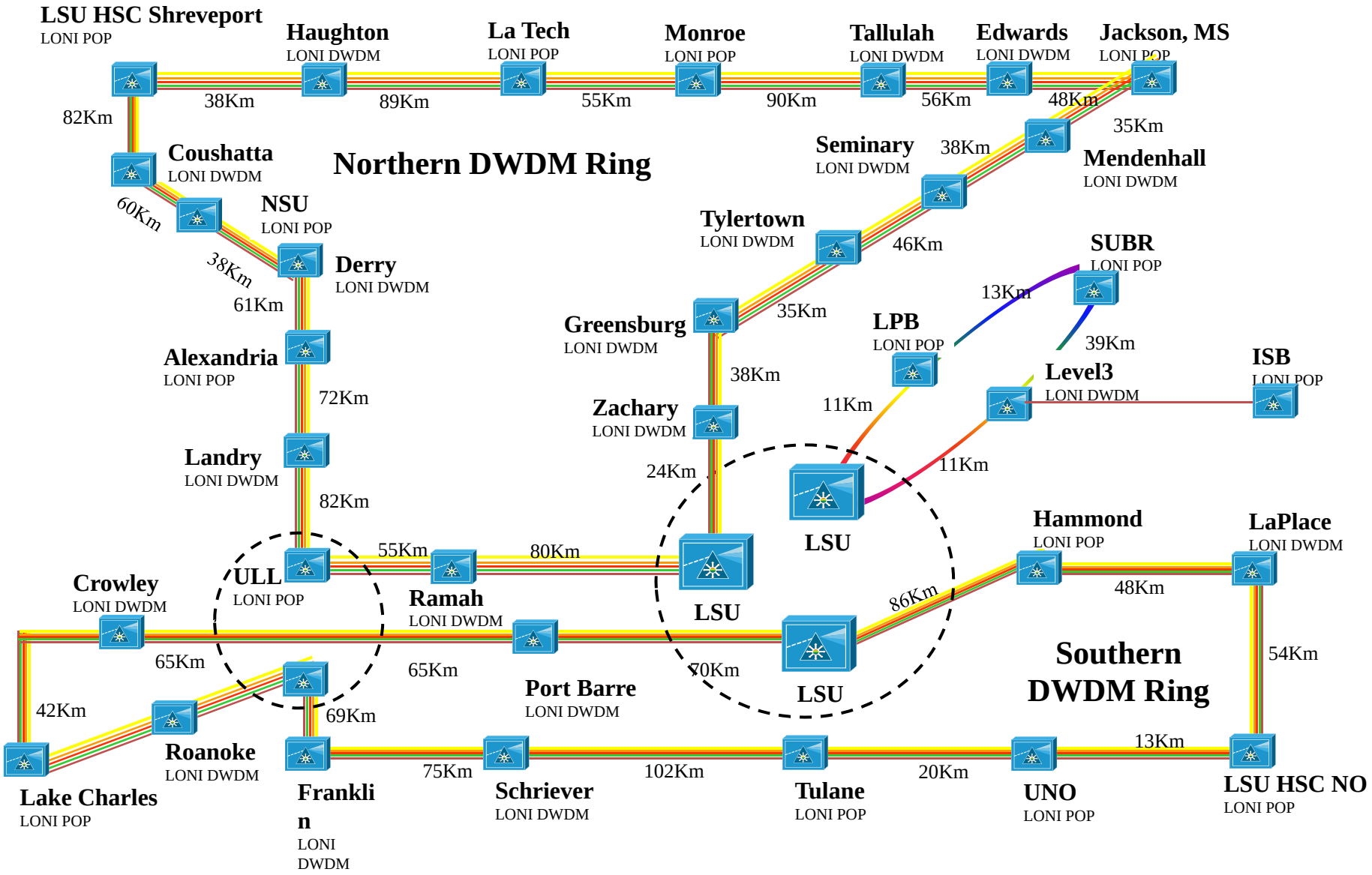
2:00pm – 3:00pm

Agenda

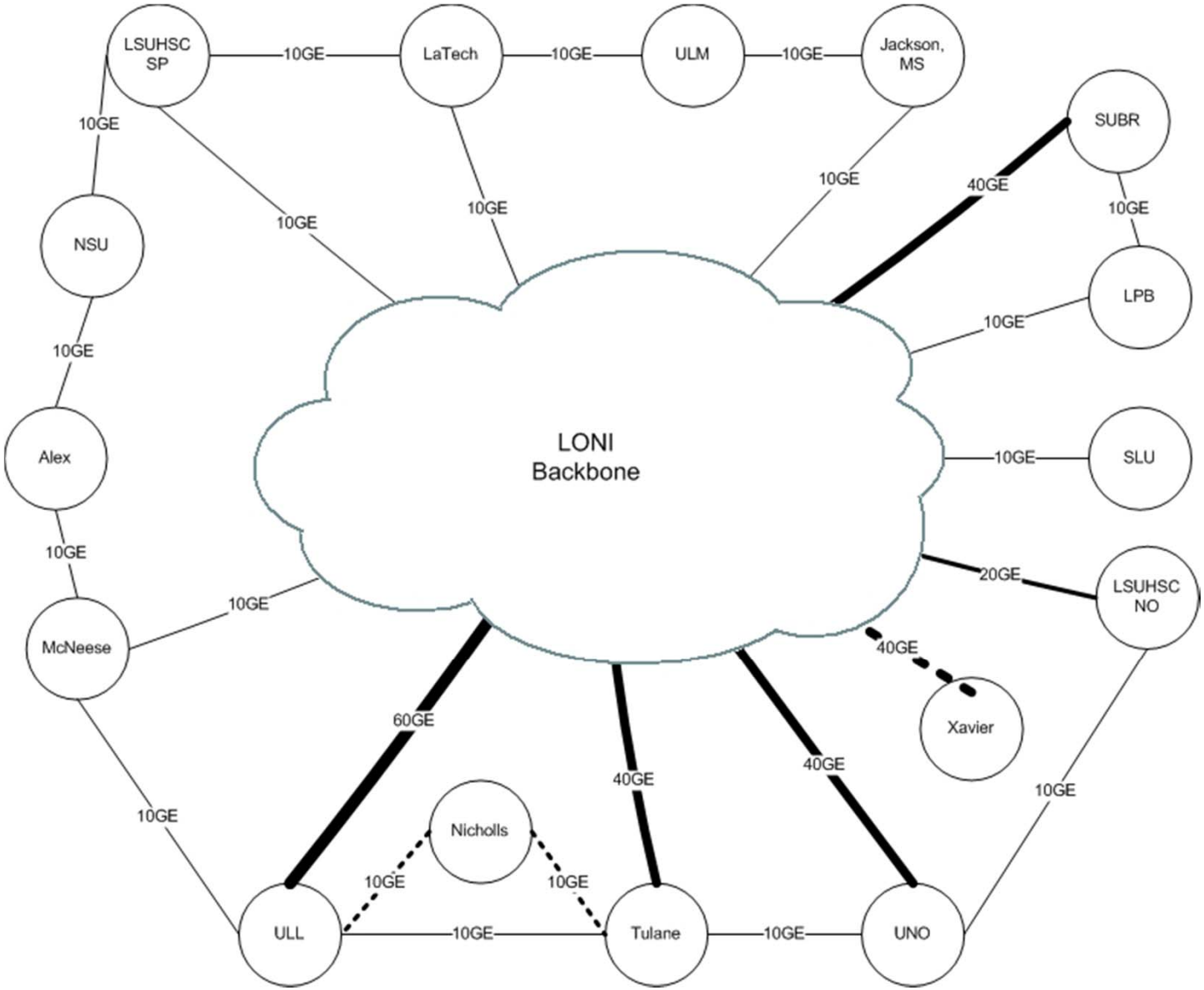
- Current State
- How did we get here?
- Moving forward
- Campus participation

Current State

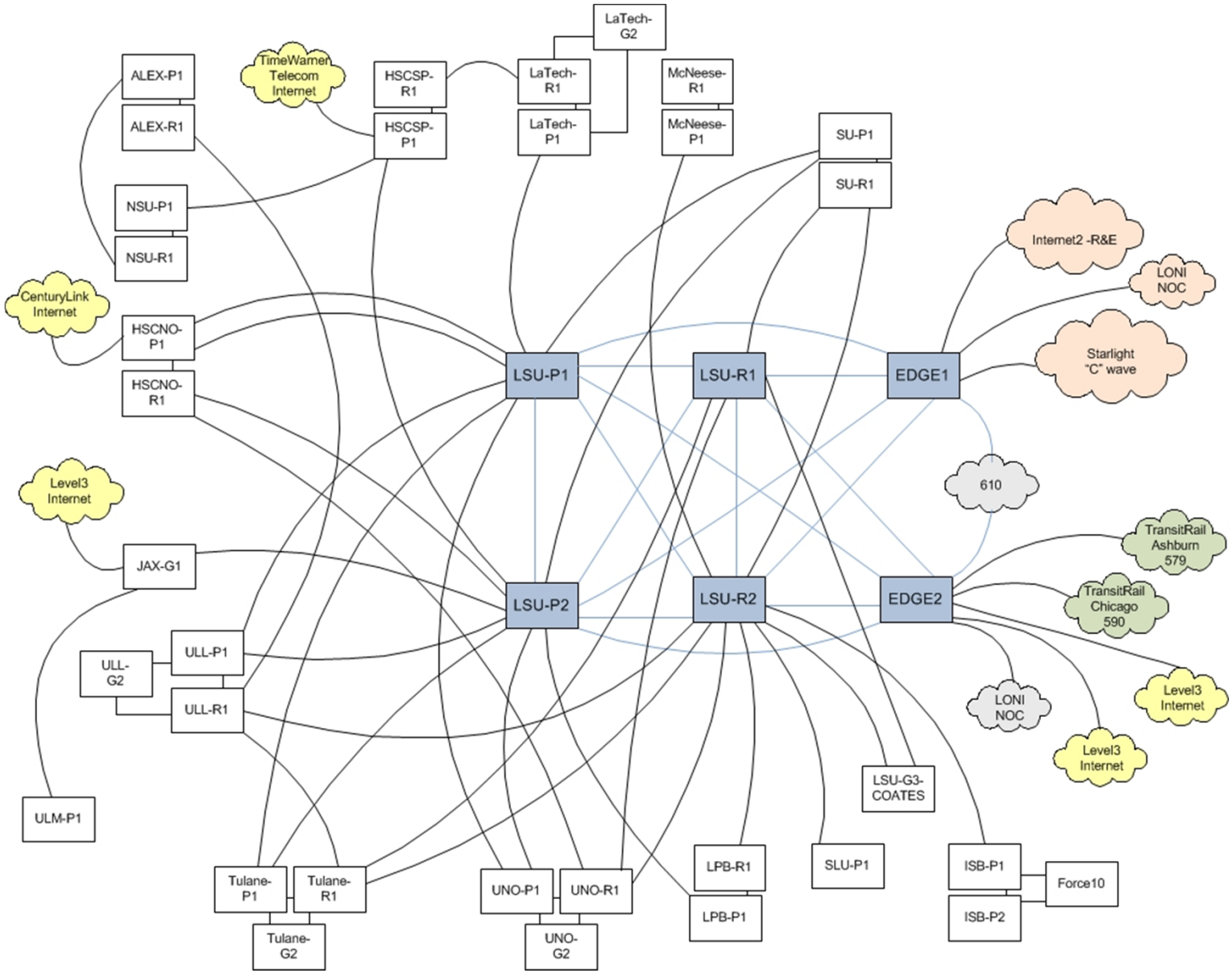
Optical Transport



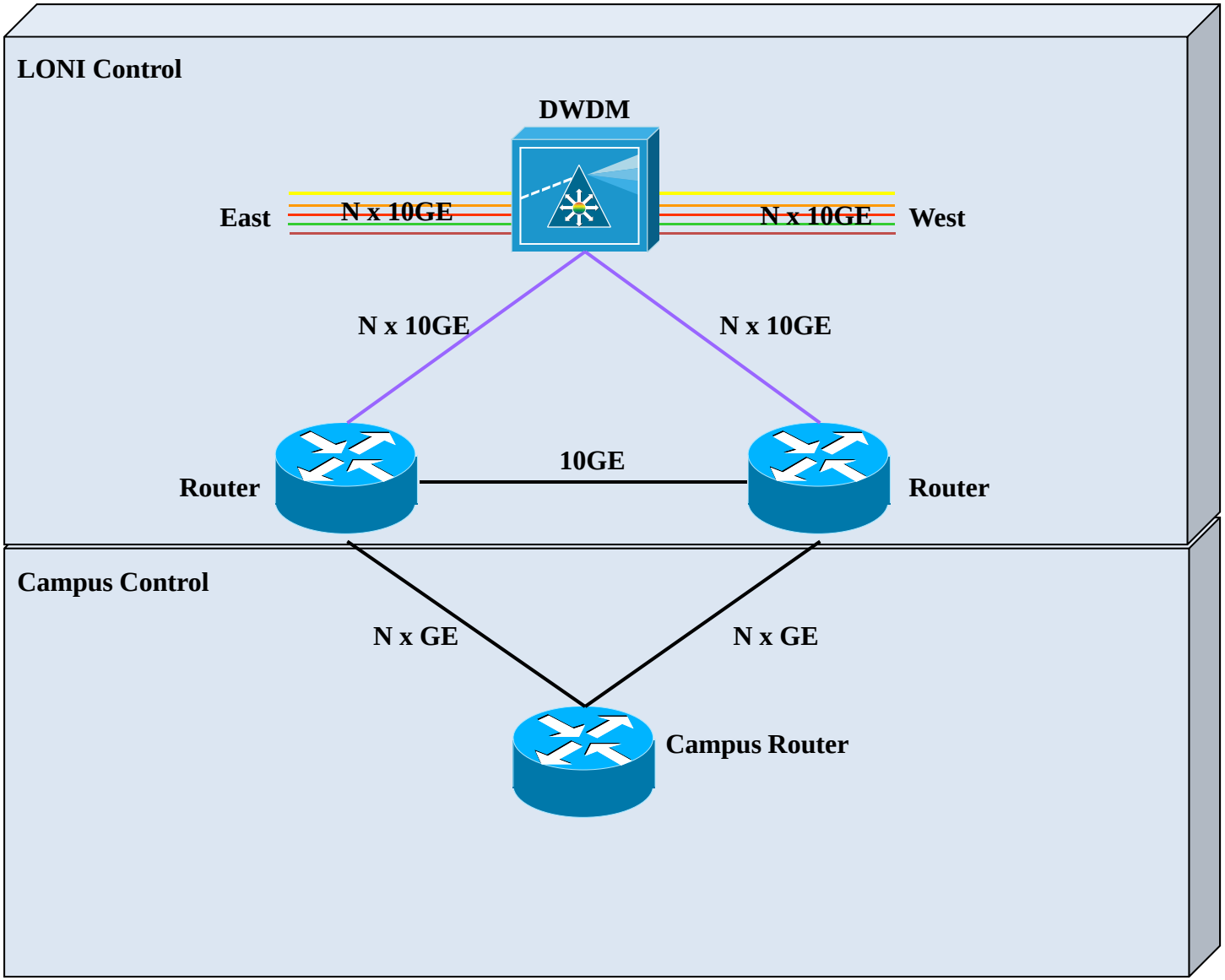
Optical Circuits



Routers


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
LPB-R1
SLU-P1
ISB-P1
Force10
Tulane-P1
Tulane-R1
UNO-P1
UNO-R1
LPB-P1
ISB-P2
Tulane-G2
UNO-G2

Building Blocks



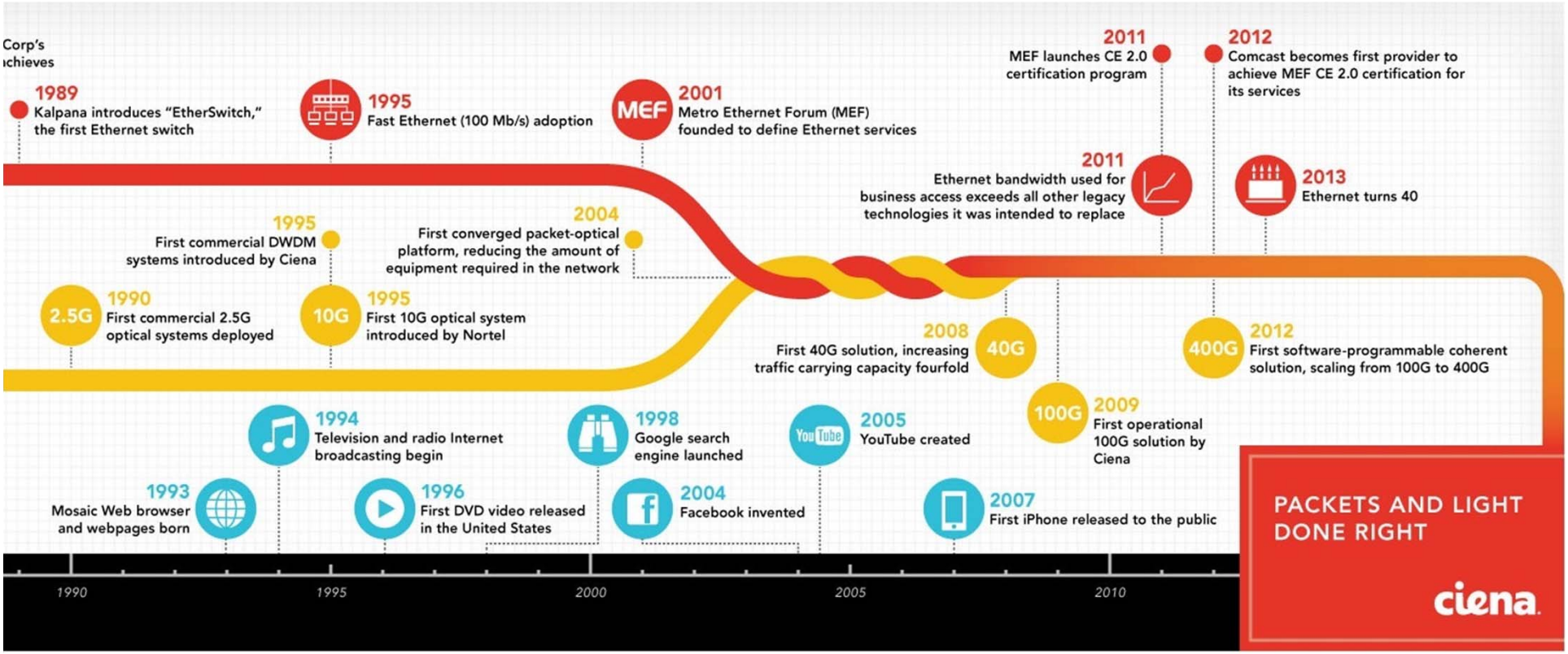
How did we get here?

January 1, 2010

We watched the market and engaged others

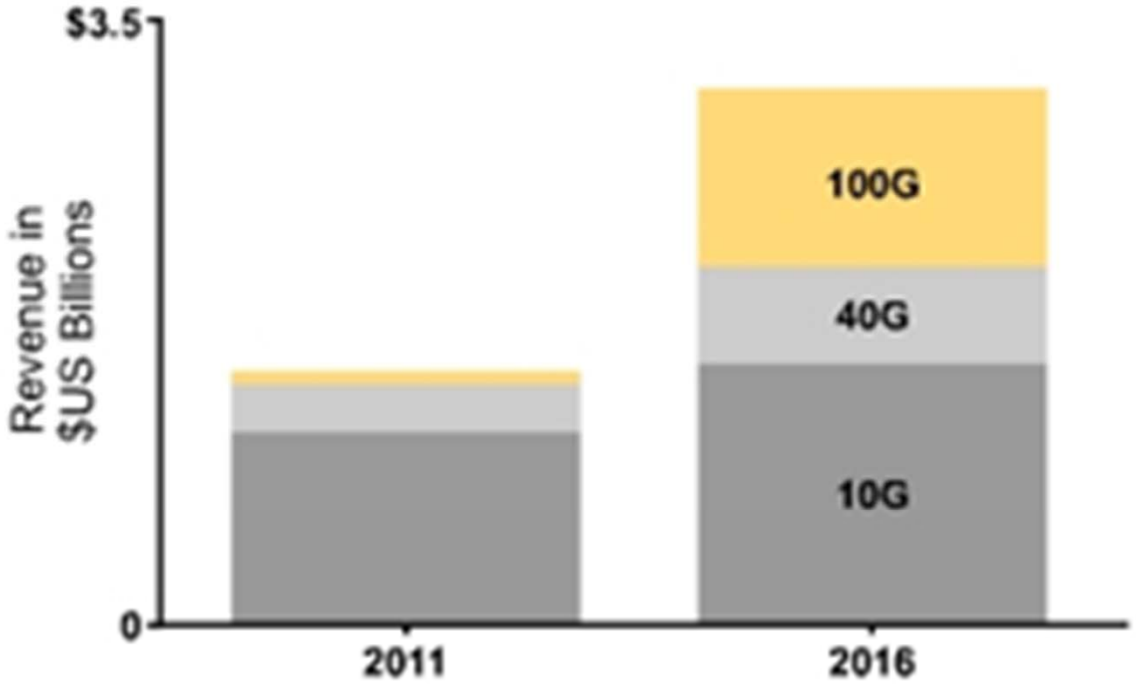
What Happens in an **Internet Minute?**

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

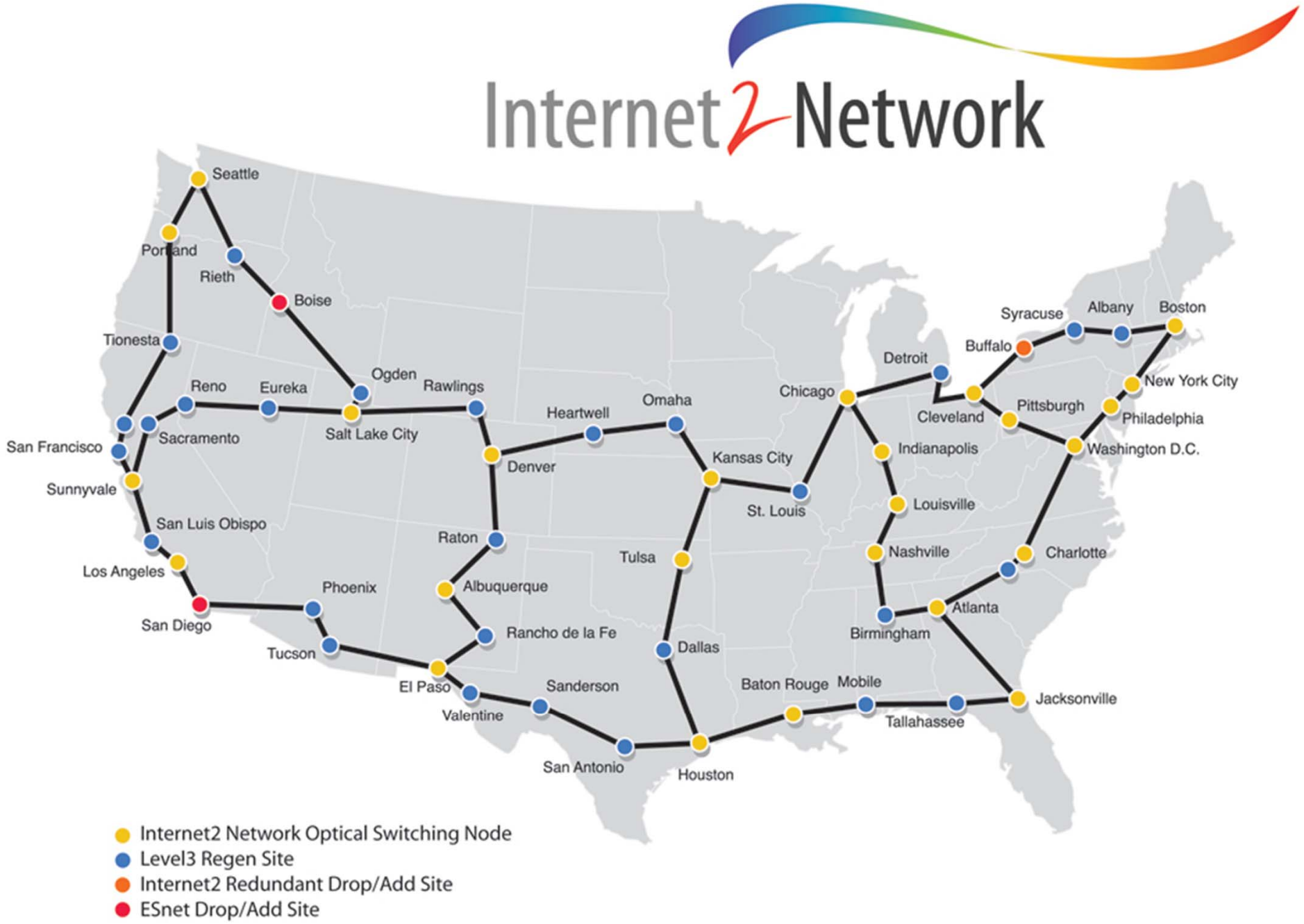
INFONETICS RESEARCH

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



© Infonetics Research, *10G/40G/100G Optical Transceivers Biannual Market Size and Forecasts*, Nov. 2012


40G
100G
Networks Are Coming


Internet2 Network
Seattle
Portland
Rieth
Boise
Tionesta
Ogden
Reno
Eureka
Rawlings
Sacramento
Salt Lake City
San Francisco
Sunnyvale
San Luis Obispo
Los Angeles
San Diego
Phoenix
Tucson
Raton
Albuquerque
Rancho de la Fe
El Paso
Sanderson
Valentine
Heartwell
Omaha
Denver
Kansas City
Tulsa
Dallas
San Antonio
Houston
St. Louis
Chicago
Detroit
Buffalo
Syracuse
Albany
Boston
Cleveland
Pittsburgh
New York City
Philadelphia
Washington D.C.
Indianapolis
Louisville
Nashville
Charlotte
Atlanta
Birmingham
Baton Rouge
Mobile
Tallahassee
Jacksonville
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

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

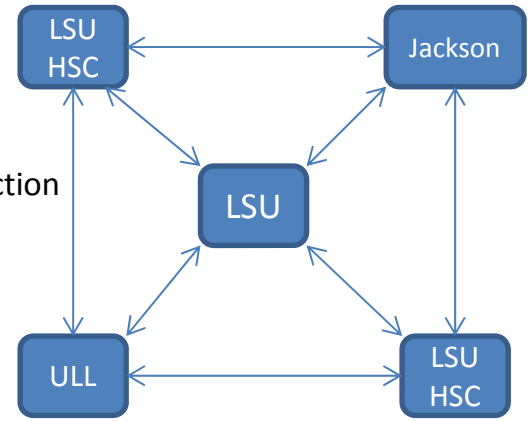
April 1, 2013
NSF CC-NIE Proposal with Tulane

April 1, 2013
NSF CC-NIE Proposal with SUBR

Moving Forward

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



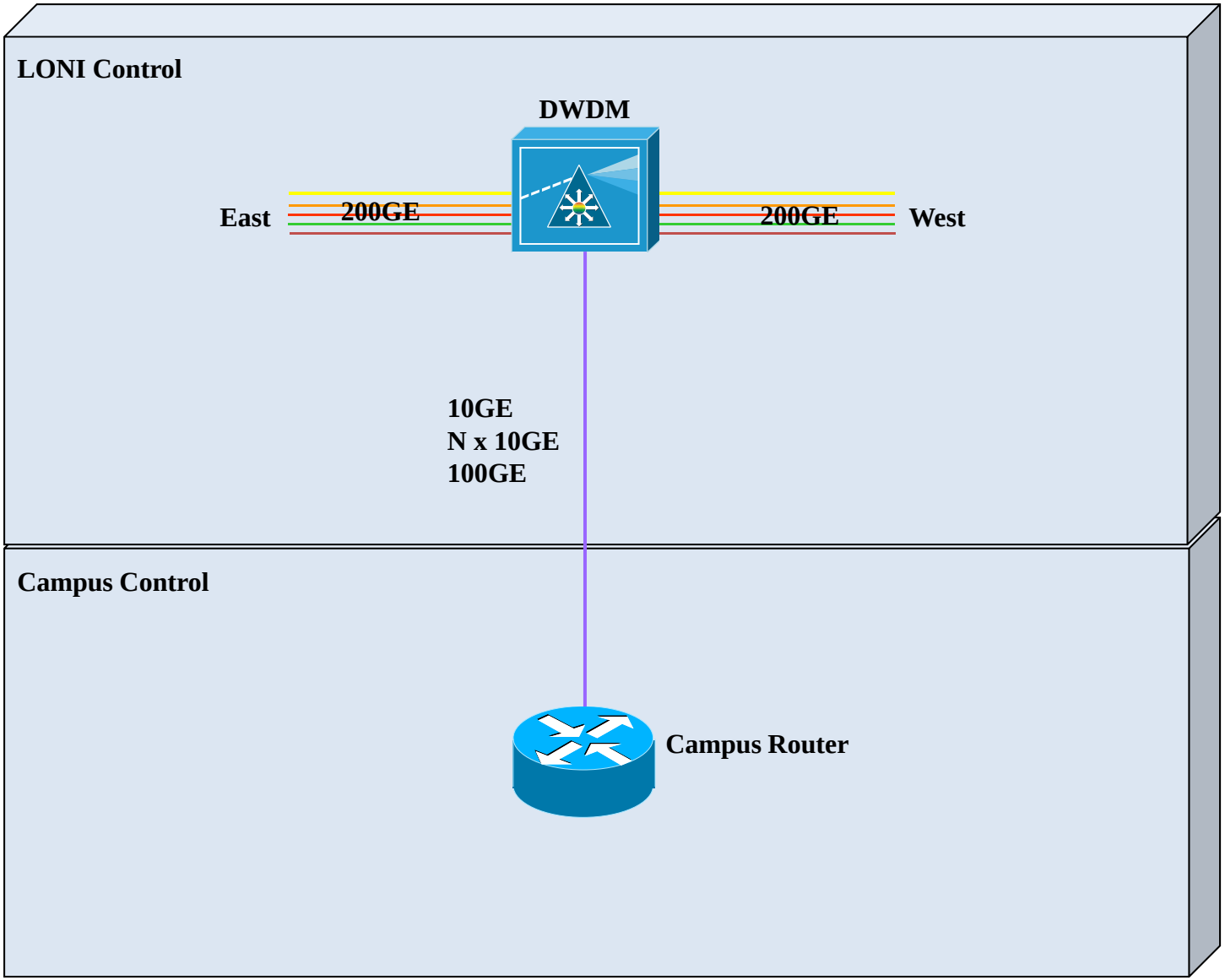
Fewer Routers

5 core routers

Push MPLS down to optical nodes

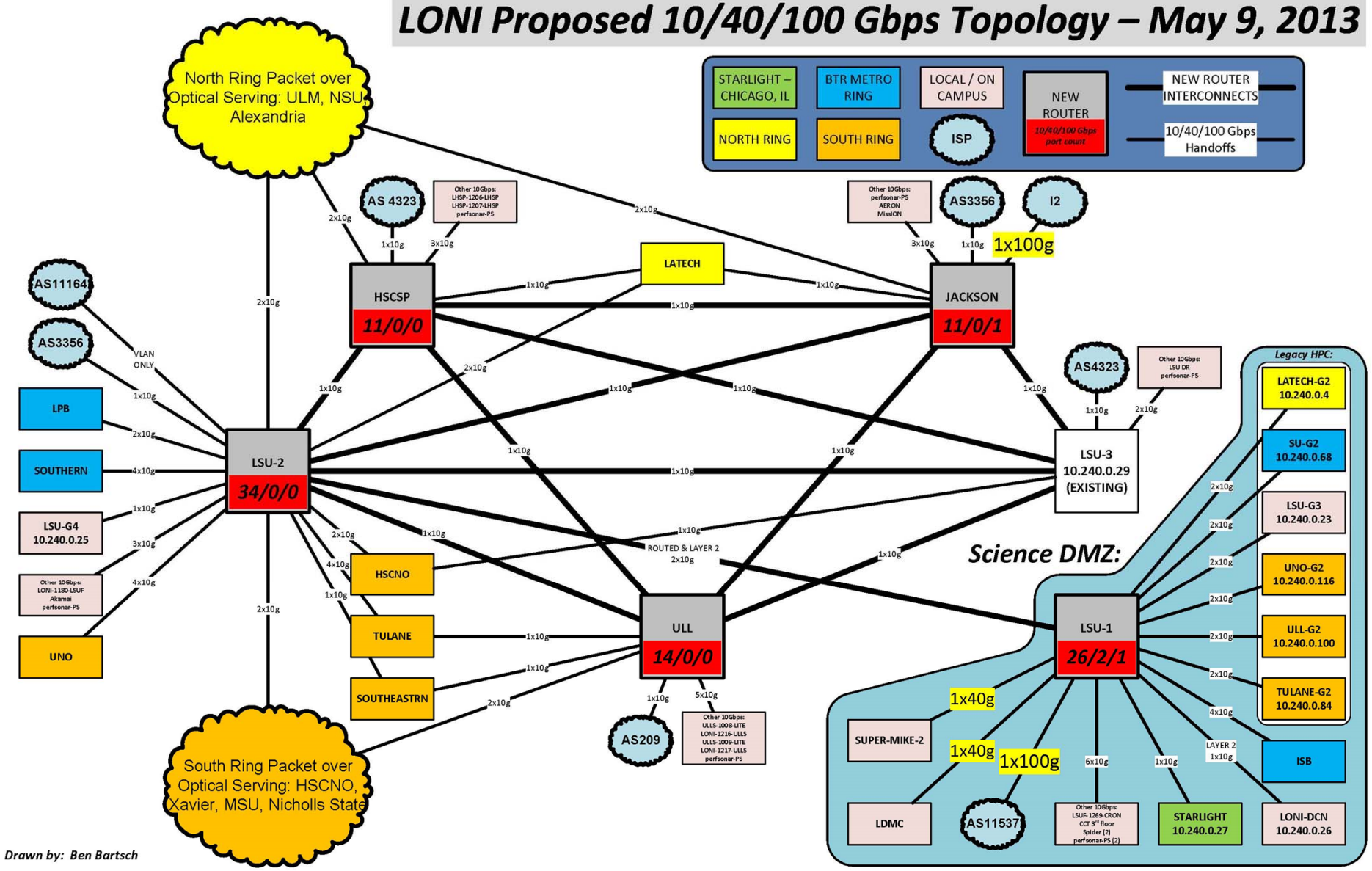
select optical platform with native Ethernet capability

Building Blocks



Only 10Gbps and higher offered to directly connected campus

LONI Proposed 10/40/100 Gbps Topology – May 9, 2013



Campus Participation

Investment

10Gbps

N x 10Gbps

100Gbps

???

Q & A

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