LONI
Design and Capabilities

Louisiana Tech

HealthGrid Symposium 2006

March 16th-17th

What is LONI?

One of the Board of Regents recent initiatives supported by the Governor and Higher Education is the establishment of a high-speed fiber optic network connecting our major research institutions to foster expansion in academic and private sector research for the betterment of the citizens of the State.

The Louisiana Optical Network Initiative (LONI) is this high speed computing and networking resource supporting scientific research and the development of new technologies, protocols, and applications to positively impact higher education and economic development in Louisiana. LONI is a statewide asset administered under the authority of the Board of Regents.

What is LONI?

Louisiana Optical Network Initiative

What is LONI?

Great State of Louisiana

Fiber Optics

Collaborative Network

Funded Initiative

Great State of Louisiana

Great State of Louisiana

Fiber Optics

- **Diameter of human hair 45 μm**

- **Diameter of fiber 8-10 μm**

- **Current theatrical transmission limitation is approximately 100 Tb/s**

- **Current best laboratory results are about 10 Tb/s**

- **Current largest DWDM system in the world is approximately 1.6 Tb/s**

- **Phase I for LONI will have an aggregate transport capacity of approximately 870 Gb/s**

Fiber Optics
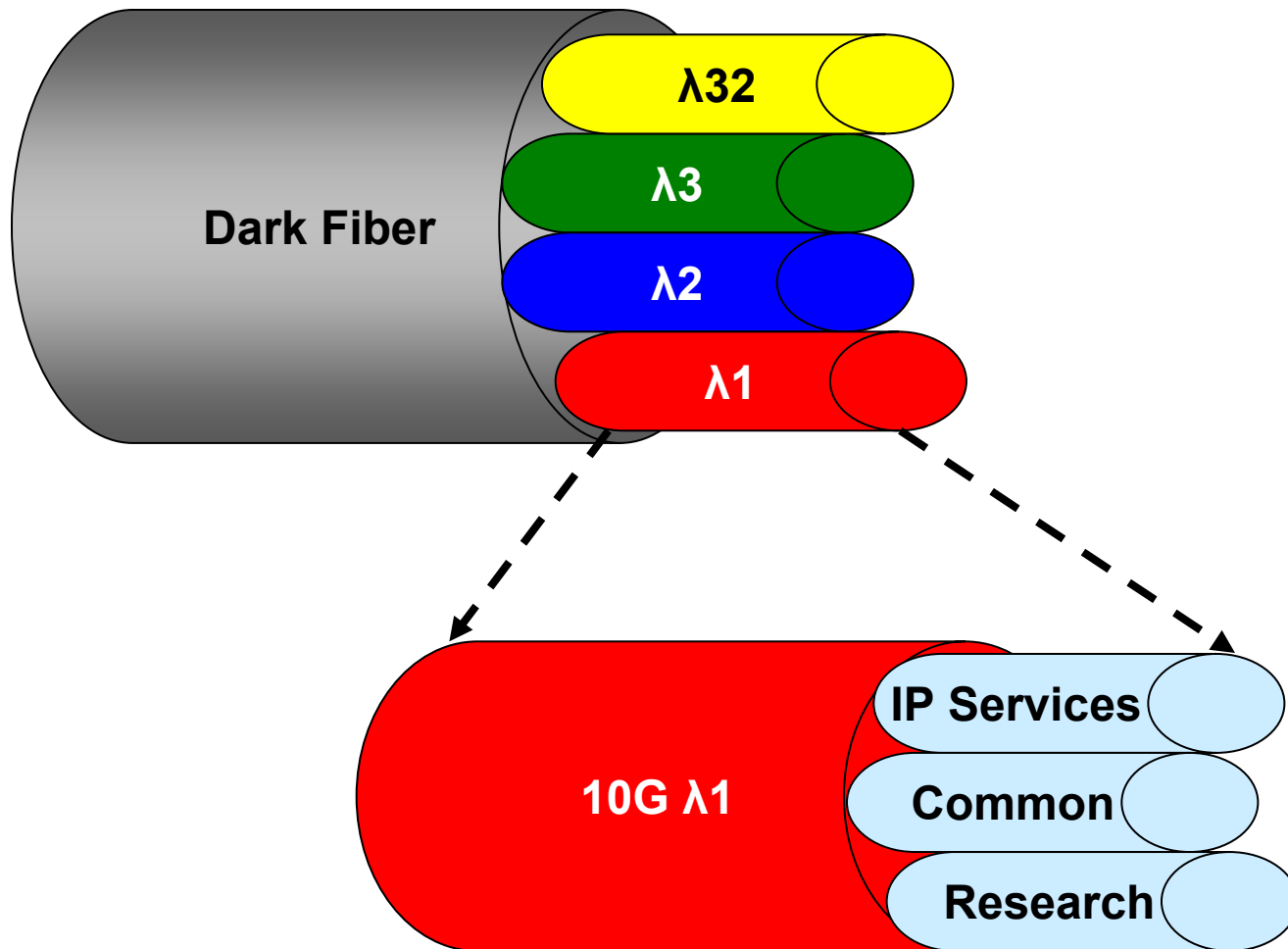
Collaborative **N**etwork

Member Institutions

- **Louisiana Tech University**

- **Louisiana State University Health Science Center – Shreveport**

- **University of Louisiana at Lafayette**

- **Southern University – Baton Rouge**

- **Louisiana State University – Baton Rouge**

- **Louisiana State University Health Science Center – New Orleans**

- **University of New Orleans**

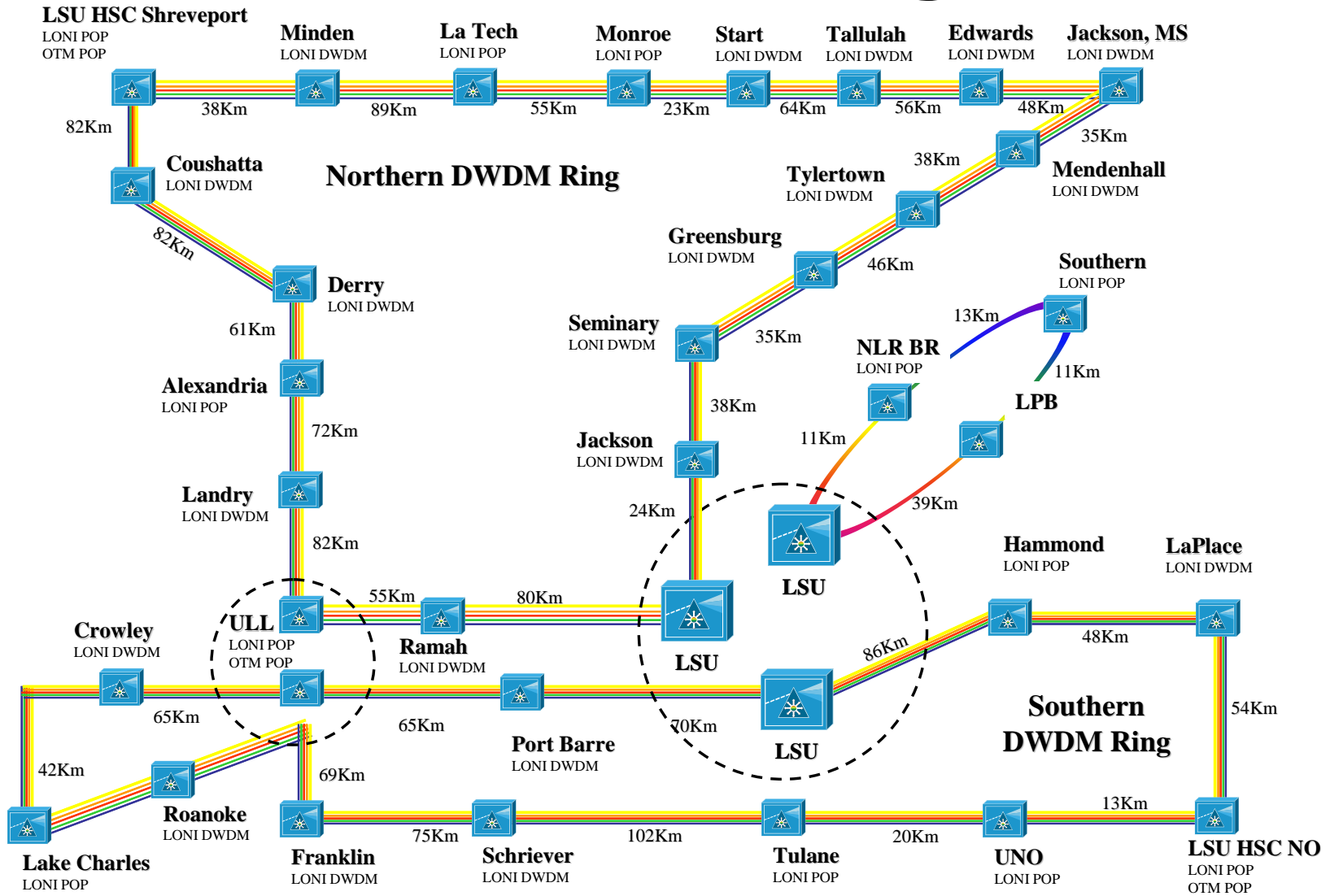- **Tulane University**

Collaborative Network

Collaborative **N**etwork

- **ANY-to-ANY**

- **a.k.a Tele-collaboration**

- **Enables sharing of information, knowledge, and insight**

- **Multiple location sharing work and interacting in real time learning and research**

- **Linking high-powered grid computational resources at each of the 6 Member Institutions**

LONI Design

- **Based on dense wave division multiplexing (DWDM) optical transmission**

- **Phase I capacity of 32 wavelengths per fiber pair**

- **Phase I will have three rings (Southern, Northern, NLR) each with a 32 wavelength capacity expandable to 96**

- **Each wavelength operates at 10 Gbps**

- **Phase I will utilize some 1,120 route miles of dark fiber**

LONI Design

LSU HSC Shreveport
LONI POP
OTM POP

Minden
LONI DWDM

La Tech
LONI POP

Monroe
LONI POP

Start
LONI DWDM

Tallulah
LONI DWDM

Edwards
LONI DWDM

Jackson, MS
LONI DWDM

38Km — 89Km — 55Km — 23Km — 64Km — 56Km — 48Km

82Km

35Km

Northern DWDM Ring

Coushatta
LONI DWDM

38Km

Mendenhall
LONI DWDM

Tylertown
LONI DWDM

82Km

Derry
LONI DWDM

Greensburg
LONI DWDM

46Km

Southern
LONI POP

13Km

61Km

Alexandria
LONI POP

Seminary
LONI DWDM

35Km

NLR BR
LONI POP

LPB

11Km

72Km

38Km

Landry
LONI DWDM

Jackson
LONI DWDM

11Km

39Km

82Km

24Km

ULL
LONI POP
OTM POP

55Km — 80Km

LSU

Hammond
LONI POP

LaPlace
LONI DWDM

Ramah
LONI DWDM

LSU

86Km

48Km

Crowley
LONI DWDM

65Km — 65Km

70Km

**Southern
DWDM Ring**

54Km

42Km

69Km

Port Barre
LONI DWDM

LSU

13Km

Roanoke
LONI DWDM

75Km — 102Km — 20Km

Lake Charles
LONI POP

Franklin
LONI DWDM

Schriever
LONI DWDM

Tulane
LONI POP

UNO
LONI POP

LSU HSC NO
LONI POP
OTM POP

LONI Design

LSU HSC @ 20 Gbps

La Tech @ 40 Gbps

SU @ 40 Gbps

ULL @ 60 Gbps

LSU @ 40 Gbps

UNO @ 40 Gbps

LSU HSC @ 20 Gbps
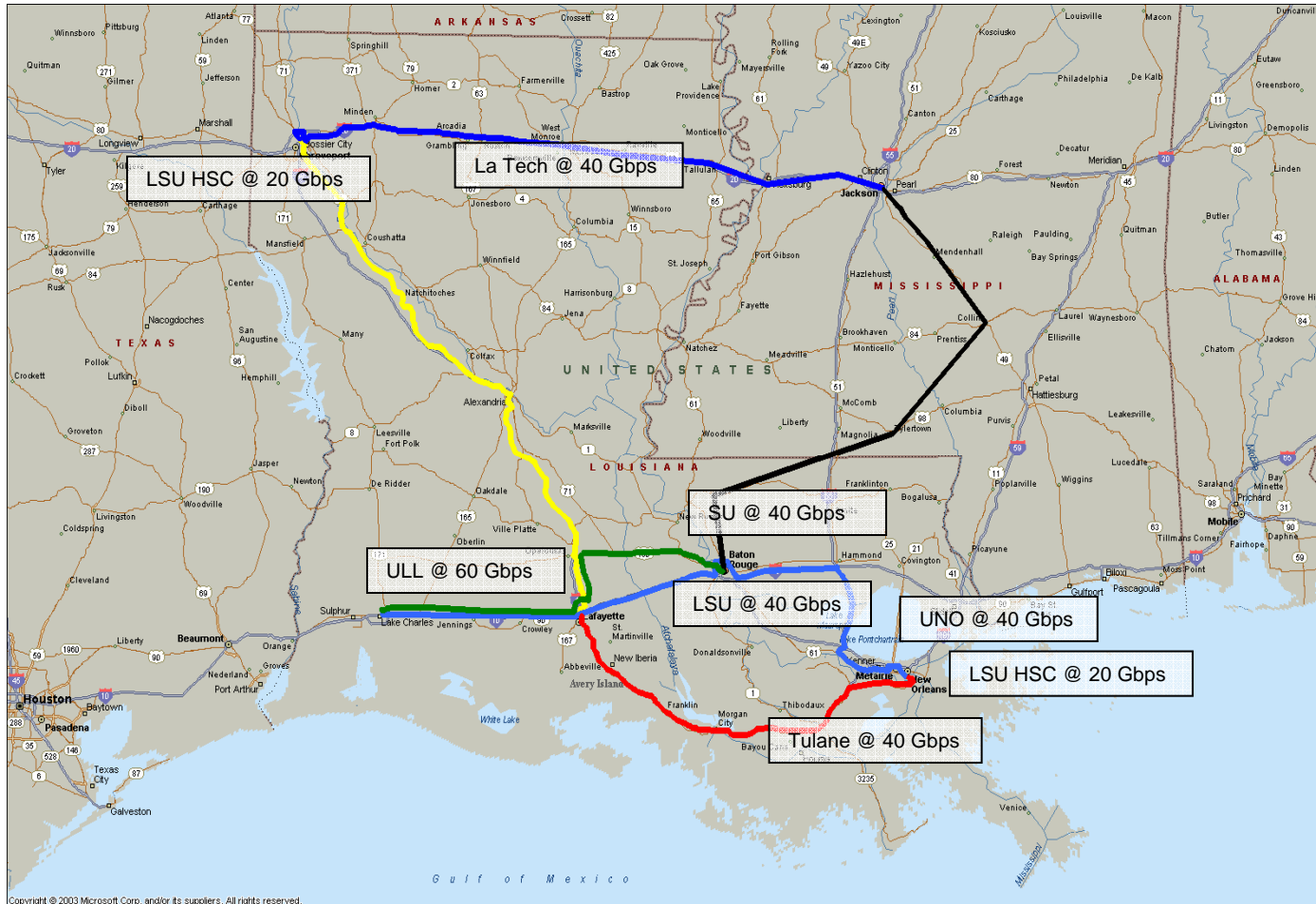
Tulane @ 40 Gbps

LONI Design

La Tech

SU

UNO

LSU

ULL

Tulane

LONI Design

- **Southern Loop**
  - **University of Louisiana at Lafayette with 30 Gbps**

  - **Louisiana State University – Baton Rouge**

  - **Louisiana State University Health Science Center – New Orleans with 20 Gbps**

  - **University of New Orleans with 40 Gbps**

  - **Tulane University with 40 Gbps**

LONI Design

- **Northern Loop**
  - **Louisiana Tech University with 40 Gbps**

  - **Louisiana State University Health Science Center – Shreveport with 20 Gbps**

  - **University of Louisiana at Lafayette with 30 Gbps**

  - **Louisiana State University – Baton Rouge**

LONI Design

- **<u>NLR Loop</u>**
  - **NLR Node – Baton Rouge with 40 Gbps**

  - **Southern University – Baton Rouge with 40 Gbps**

  - **Louisiana State University – Baton Rouge with 40 Gbps**

LONI Design

- **Phase I Services**
  - **Dedicated wavelengths between Members for common traffic**

  - **Dedicated wavelengths between Members for research traffic**

  - **IP connectivity to each Member**

  - **IP connectivity to NLR**

  - **Secondary IP connectivity to Internet**

  - **Secondary IP connectivity to Internet2**

LONI Network Capacity

- **Phase I for LONI will have an aggregate transport capacity of approximately 870 Gb/s** (it would take about 3 minutes to transport every book in the Library of Congress that is equivalent to about 28936 DVDs)

- **Florida Lamdba Rail will have an initial aggregate transport capacity of approximately 90 Gb/s**

- **I-Wire (Illinois) has a aggregate transport capacity of approximately 82.5 Gbps**

- **Third Frontier Network (Ohio) has an initial aggregate transport capacity of approximately 5 Gbps**

LONI Grid Capacity

p575 - LSU Configurations

Attributes/Features
▸ 2U, 24" X 46 " Deep, Full Drawer
▸ FC5793 Rack w/Dual 350V Bulk Power
▸ Squadrons H based 350V Power Subsystem
▸ 14 SQ-IH Nodes
▸ 1 Federation Switch Drawers/Rack
▸ Squadrons L4 based Logic Topology
▸ LPAR Partitions: 10/Node

Core Electronics
▸ Power5 SMP
▸ 8W 1.9 GHz GR -Trimaran DCM (9s3)
▸ 288 MB ECC L3 Cache (Trimaran)
▸ 4 SMI-II Memory Bridges / DCM
▸ 8 DIMM (16 GB) / DCM DDR I
▸ Enterprise IO Hub w/FC7210
▸ Winnipeg RIO-G / PCI-X Bridge
▸ EADS-X PCI-X / PCI-X Bridge w/FC7210

Integrated Features
▸ 4X 10/100/1000 Ethernet (Goliad)
▸ Gemstone Dual Port Ultra 3 LVD SCSI Controller
▸ Virtual SES

Storage Bays
▸ 2 DASD Hot Swap (146.8 GB@15K RPM)
▸ 2 Buses of 1 DASD

Standard Expansion Slots
▸ 2 Dual GX+ Bus Adapter Slots

Featured Expansion Slots w/FC 7210
▸ 4 fullsize PCI-X 133 MHz, 64b, Blindswap Slots
▸ 2 External RIO-G ports on Base Planer

I/O Expansion
▸ 0,1/2,1 Bonnie&Clyde-XG IO Drawer Capably

Supported Gx Adapters
▸ Federation Adapter

Node
❑ 2U rack chassis
❑ 24" X 46 " Deep, Full Drawer

POWER5 IH System

14 Node + 1 Switches/ Rack
112 Processors / Rack
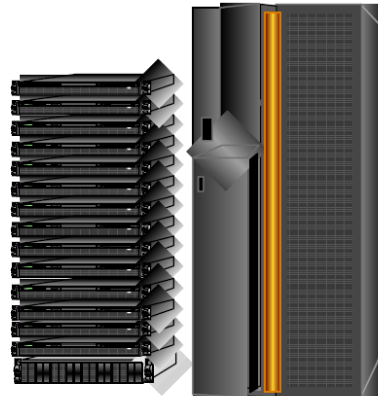
Software Support
▸ AIX 5.2I / AIX 5.3A
▸ Linux
  – Suse SLES9, Redhat RHEL 3 U4

Linux Cluster 12/10/04
▸ SLES 9, RHEL AS 3
▸ CSM 1.3.5: 64 CEC's / 128 LPAR's
▸ LoadLeveler 3.2
▸ ESSL 4.2 / PESSL 3.1.1 Myrinet
▸ GPFS 2.3 GigEthernet

AIX Clusters 12/10/04
▸ AIX 5L v5.2 (5.3 as Drive to)
▸ CSM 1.3.5: 64 CEC's / 128 LPAR's
▸ GPFS 2.3 ,   LoadLeveler 3.2
▸ PE 4.1,   ESSL 4.2/PESSL 3.1.1

AIX HPS Cluster Support (04/'05)
▸ CSM 1.3.6
▸ 4GB FED 24 " Switch
▸ 2-Link Sulu Adapter

▸ ### RAS
▸ Blackwidow FSP
▸ Run time processor de-allocation
▸ ECC / Chipkill memory
▸ PCI-X bus parity & PCI-X bus slot error
  recovery
▸ Hot Swap DASD
▸ Blindswap PCI-X adapters
▸ Memory DIMM FRU
▸ Service Focal Point

Certifications
▸ FCC Class "A"
▸ Environmental Class B Extended
▸ Acoustics Class 1B

LONI Status 3/2006

- **All Long-haul Dark Fiber Routes have been either awarded or waiting for service release**

- **Most of the Local Loop Dark Fiber Routes has been awarded**

- **Completed network equipment installation at La Tech, LSU, HSC Shreveport, SU, Tulane and UNO.**

- **Installed Grid Cluster at La Tech**

- **Installed Grid Cluster at Tulane**

LONI Next Steps

- **Install Grid Clusters at SU, ULL and UNO**

- **Order and install network equipment for the redundant dark fiber routes**

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www.loni.org

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Questions