The Florida LambdaRail (FLR)

Florida LambdaRail

Florida's Research and Education Network

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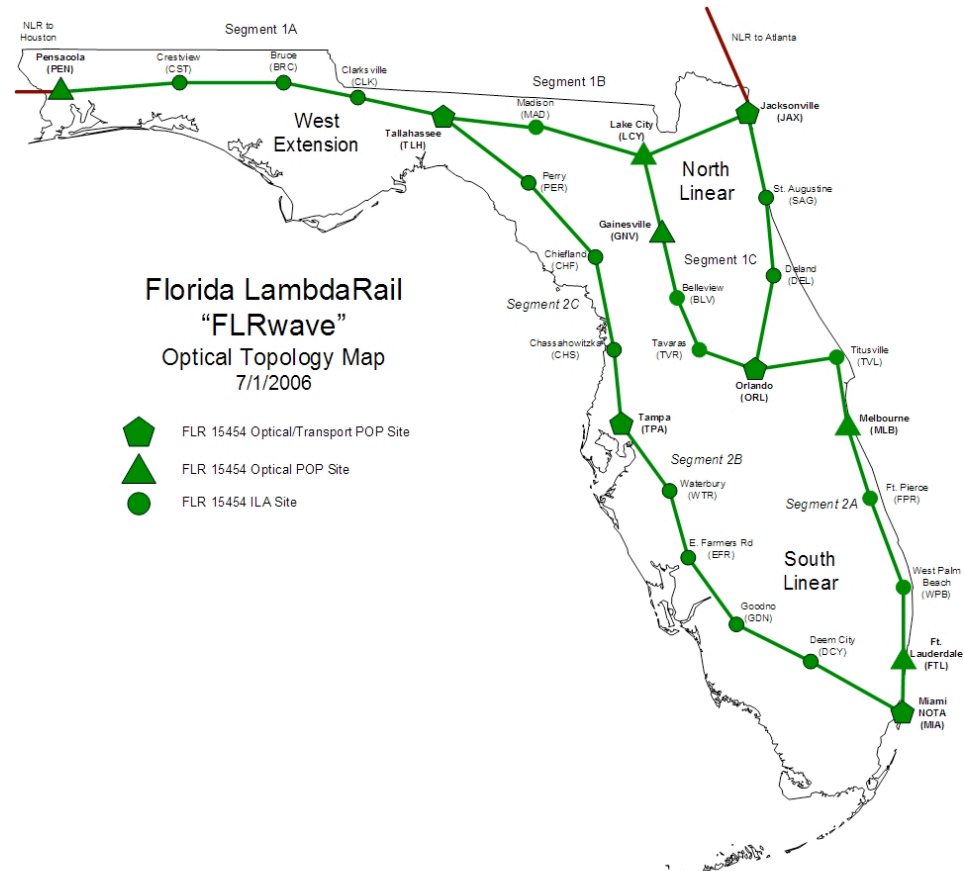**www.flrnet.org**

What is FLR?

- FLR is a high Speed Research and Educational Network.
- FLR is owned and operated by its 10 Equity Members.
  - 7 Public Universities
  - 3 Private Universities
  - +SEGP (Orange County Public Schools, CCLA, Barry University)
- High performance State-wide Optical Network with over 1500 miles of fiber
- High performance and redundant Layer 3 backbone
- Provides connectivity
  - National Research and Education Networks (RENs)
  - Regional Optical Networks (RON)s
  - Peering between Members, TransitRail and settlement-free IX (NOTA/AIX)
  - International Peering (AMPath)
  - ISP Service and low cost IX
  - Dedicated Lambdas or point to point circuits (UltraLight, Atlantic Wave, DR)
  - Layer3 VPNs

FLR
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The FLR Optical Network

- Composed of Two Linear Paths.

- Over 1500 Miles of Fiber

- DWDM Backbone
  – Supporting 32 waves
  – Can grow to 64 waves

- Cisco 15454s

- 10Gig and 1 Gig waves

- 28 sites
  – 5 Optical/Transport
  – 5 Optical PoP
  – 18 ILA

Florida LambdaRail "FLRwave" Optical Topology Map 7/1/2006

FLR 15454 Optical/Transport POP Site
FLR 15454 Optical POP Site
FLR 15454 ILA Site

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Regional Optical Network

Facilities-based Regional Optical Networks

Rev. 0.7.1 7th March 2007

Information may be neither accurate nor up-to-date.
Please send updates to ssw@indiana.edu

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AT INDIANA UNIVERSITY

Advanced Network Management Laboratory
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The FLR Transport Network

- 5 Core Cisco 6509 Routers
    - Sup720 3BXL
    - 10 Gigabit Ethernet Interfaces
    - 1 Gigabit Ethernet Interfaces
- Backbone is MPLS over 10G Ethernet
- Multiple VRFs
- OSPF and BGP routing on the Backbone.
- Redundant Layer 3 design
- BGP routing to members
- Out of Band management to all equipment

Florida LambdaRail "FLRnet" Layer 2 Topology Map

FLR Layer 2/3 Pop Site

FLR Member

FLR Transport Network Backbone (MPLS over 10G Ethernet)

FLR Member 10G Connection

FLR Member 1G Connection

**Note:** Connections which are dashed are pending installation

The FLR Network Operations Center

- 24x7 staffed operations center

- The NOC provides
  – Network Management
  – Monitoring
  – Testing Services
  – Problem/Request ticket Dispatching

- Engineering

- Sparing
  – Spare most equipment for rapid deployment during outages.
  – Maintain set of OADMs and transponders that are channels not in use on the network for disaster recovery.
  – All equipment is under Cisco Smartnet maintenance.

- The network design allows the NOC to be re-locatable in case of a disaster recovery scenario.

FLR Services

- Layer2 VPN for point to point connectivity

- Dedicated Waves for point to point circuits

- Layer 3 VPNs

- ISP Service

- FLRnet Peering Service
  - Between Members
  - International Exchange Points (Ampath)
  - Other RONs (such as SoX and LONI)
  - Internet Exchange Points
  - Peering Fabrics (Awave)
  - Transit Rail

- Connectivity to National RENs
  - National LambdaRail
  - Internet2

- Connectivity to DR storage facilities

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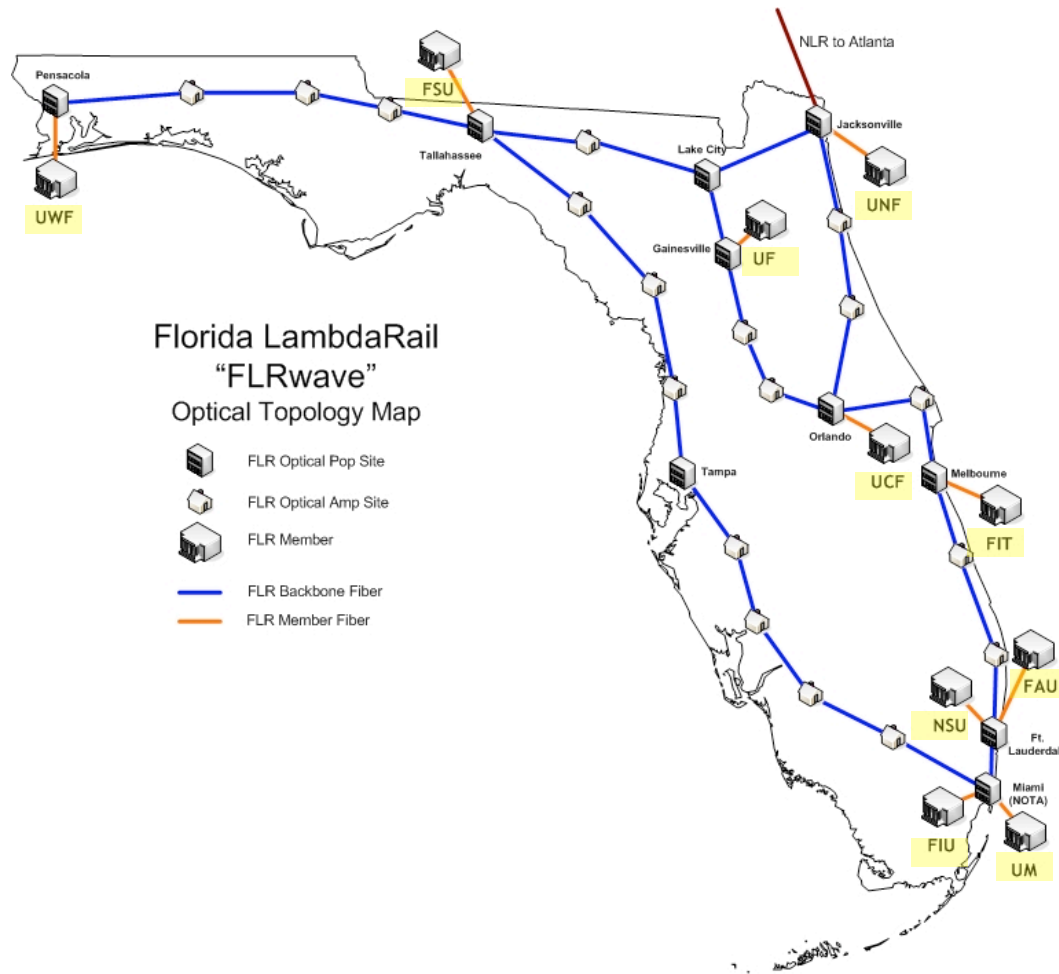
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Florida LambdaRail
"FLRwave"
Optical Topology Map

UF Campus

University of Florida
HPC Research Network
Network Layout Diagram
V1.5 - 1/27/2007