

# Starlight/ wide area briefing

CCF Dept

May 11, 2004

# Outline

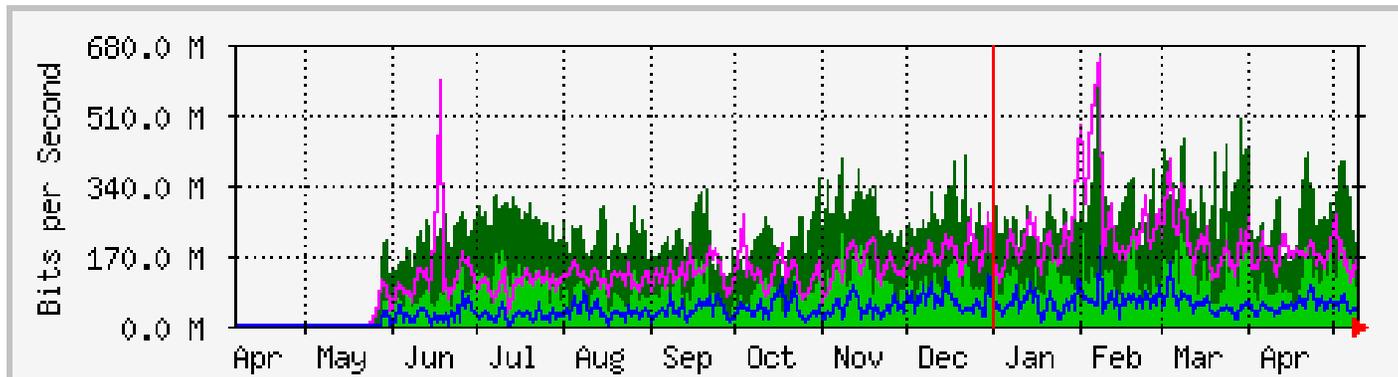
- ESnet:
  - WAN Support Status & Considerations
  - MAN Proposals
- Starlight
  - Status & Issues
  - Exploitation projects.
  - Implication on the FNAL LAN.
- Regional Network Environment.
- Organizing for Exploiting networks.

# ESnet Network Support

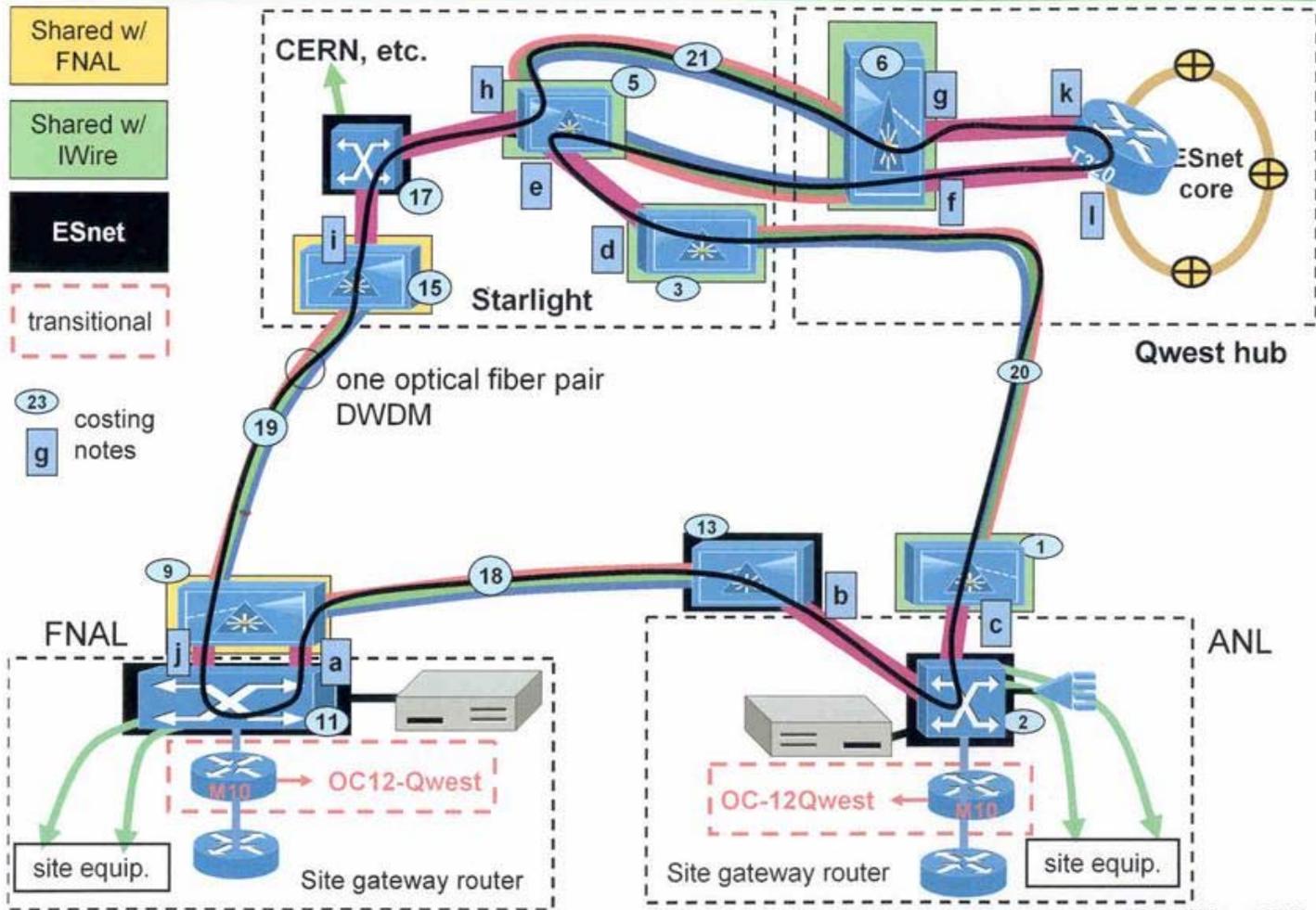
- Responsible for our general IP connectivity:
  - Per 2003 Workshop, ESnet support should include:
    - High impact network service (very large file transfers...)
    - Research network facilities
  - In an ideal world, ESnet would provide everything:
    - But they cannot see completely handling the physical layer.
- ESnet provisioning model is changing:
  - ESnet's budget remains flat/flat through FY'05
    - Tail circuits becoming disproportionate part of ESnet budget
  - ESSC working on more structured upgrade process:
    - Set criteria; demonstrated necessity; co-funding model

# ESnet Network Support (cont)

- New approaches for site connectivity to ESnet:
  - MAN proposals for Chicago & Bay areas
  - Lab initiative with regional consortia approach
- FNAL's current tail circuit status:
  - OC12 (622 Mb/s); upgraded in 12/02
  - Traffic projection: we'll see congestion by end-of-year



# Chicago MAN – logical ring structure – Plan A



CONFIDENTIAL

# ESnet Chicago MAN Proposal

- ESnet sees MAN as joint project with Labs
- Chicago area labs would be responsible for:
  - Providing the physical infrastructure
  - Lighting, managing, & operating the ring
  - furnishing lambdas to ESnet.
- Default thinking for Chicago MAN:
  - FNAL to implement & support FNAL/StarLight fiber link and missing FNAL/ANL fiber segment:
    - Budget for riskiest segment is FNAL responsibility
    - Raises ownership question on fiber between I355 & ANL
  - ANL to implement & support ANL/NBC & NBC/StarLight I-Wire segments

# ESnet Chicago Upgrade

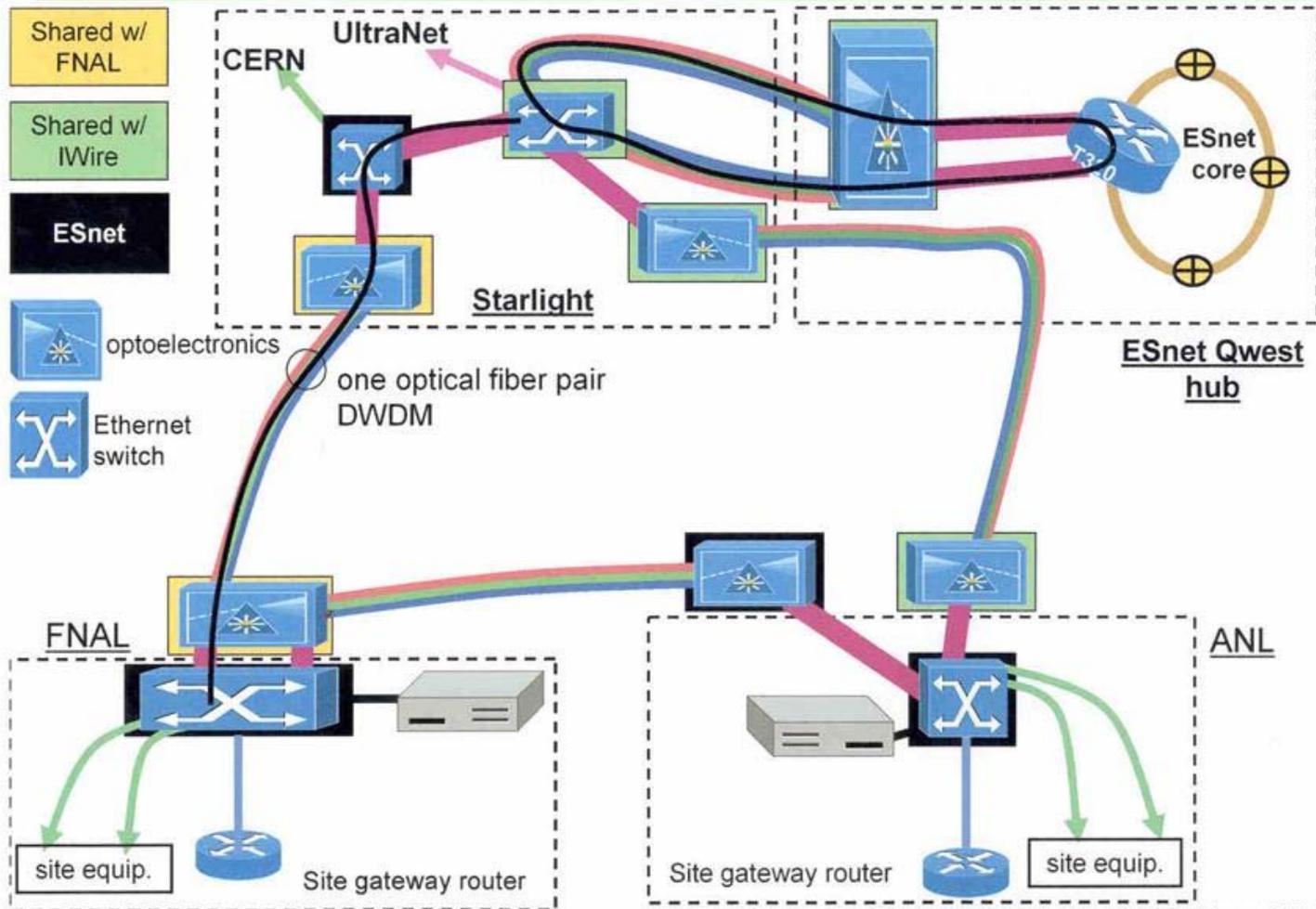
- ESnet promising 10GE ring upgrade between NBC bldg. and Starlight:
  - Even if Chicago MAN is not funded
  - Would enable greater use of FNAL StarLight fiber in conjunction with ESnet

# ESnet Chicago MAN Options

- ESnet has drafted three options for initial FNAL Chicago MAN implementation:
  - Plan A: Fully redundant MAN ring
  - Plan B: Stripped down logical ring to FNAL, without FNAL/ANL redundant fiber
    - OC12 kept around for backup, but possibly for only 6 months
  - Plan C: Partial implementation of Plan A:
    - Includes FNAL/ANL fiber
    - But not with all required opto-electronics for a redundant ring



# Chicago MAN – Plan C ring structure



# How does FNAL fit?

- MAN
  - is a proposal, fate TBD.
  - Our alternative to the MAN is to be like BNL, JLAB, and fit well into our regional R&E networks.
- OC48 tail circuit upgrade request should proceed:
  - MAN/cooperation with R&E are just being developed
  - SLAC's ESnet link being upgraded to OC48.
  - No FNAL OC48 may prejudice Chicago MAN payback calculations

# Starlight Light Up – Status

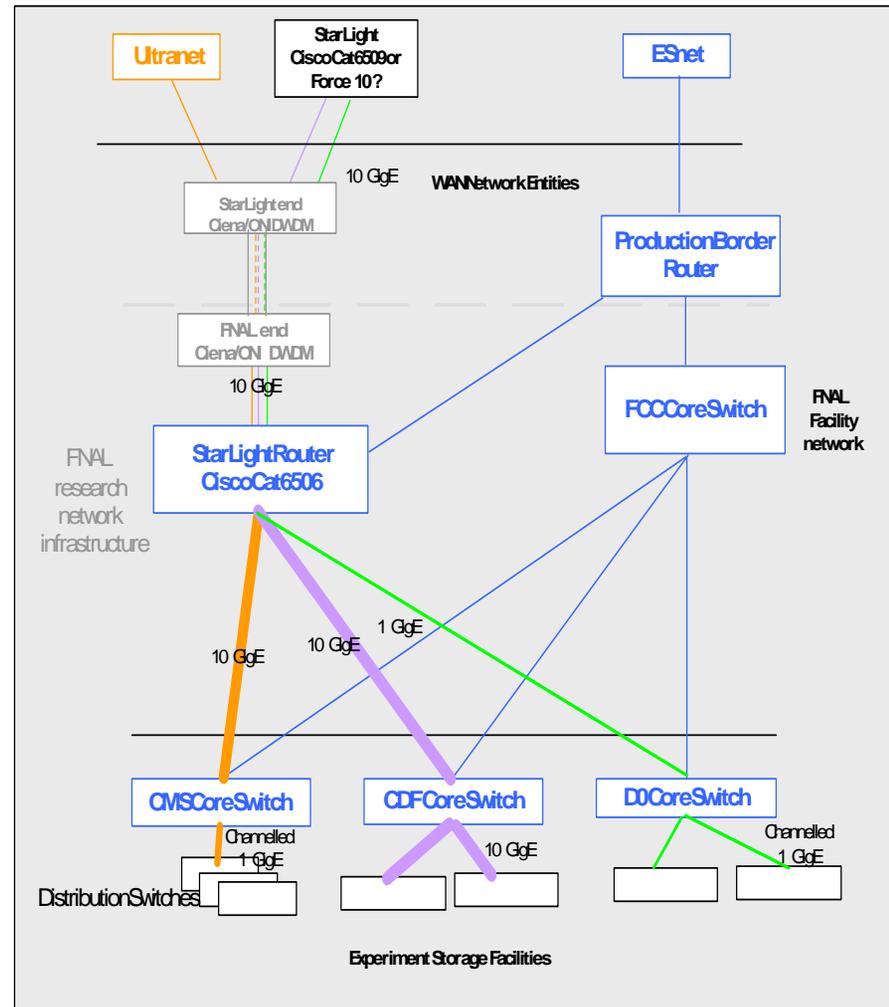
- Completion of fiber construction & testing due by end of next week:
  - FNAL-contracted characterization studies planned for end of this month
  - Preliminary OTDR measurements (Ontario St...) well within expected values
- Network equipment status:
  - DWDM equipment (\$240k) is in Division:
    - Includes one 10Gb/s channel & one OC48 channel (2 x 1Gb/s)
  - Special 1 Gb/s GBICs are in procurement
    - To be used to establish initial 1Gb/s link

# Starlight on/off ramps– Status (cont)

- Network equipment status (cont):
  - Req for FNAL StarLight link router still in Dept:
    - Buggy equipment budget for Dept leaves no \$\$\$
    - But we have a router that can be “borrowed” temporarily
- Changing direction on an FNAL switch at Starlight
  - Initially planned to just connect to “StarLight” switch
    - Potential partners (Ultraneet & UKLight) didn’t have similar plans
    - We would need to procure a 10GE blade for StarLight switch
  - Locating our own switch at StarLight would facilitate direct peering with partners

# Starlight – local LAN issues

- Each work group will need a 10GE connection into the local Starlight Router.
  - Local Infrastructure upgrades will also be necessary.
- Starlight alternate path routing bypasses border router.
  - Will require alternate forwarding and ACL configuration.



# Current WG LAN status

- CMS –
  - Uplink - 10 GE interface (install next week)
  - Distribution - Channeling multiple GE links from distribution switches
- CDF
  - Uplink - 10 GE interface available
  - Distribution - 10GE infrastructure in place
- D0
  - Uplink - Requires 10GE interface
  - Distribution – no 10GE infrastructure in place

# Starlight – Exploitation Projects

- Run II projects
  - CDF (UKLight, Toronto have come calling)
  - D0 (NikHef has known interest)
  - 2 meetings with SAM.
- CMS
  - Is treated in the UF CMS WBS
    - One element is the CMS edge computing <-> FNAL data movement project.
  - Interest the CMS R&D community (Caltech et. Al.)
- CD/Institutional
  - UltraNet and the main DOE network R&D program.
  - Open Science Grid
  - Bursty nature of facility expansion
  - Everyone else, e.g. Vanderbilt

# FNAL's Regional Network Environment

- Were it not for the ESnet MAN
  - Involvement Expected by ESNET
- Existing relationships:
  - MREN (operational)
  - Starlight/NU
- Other extant entities:
  - iWire, MREN – don't seem to be “entities”
  - IMBCA – “not for profit association ... presently each member owns and operates it's own electric utility....”
  - TRECC, NIU
- Comparison to other lab's environments

# California R&E Network Env.

- CENIC:
  - A not-for-profit corporation who's mission to facilitate & coordinate the development, deployment, & operation for State of California higher education R & D network activities
- CALREN2:
  - a multi-tiered advanced network-services fabric
    - No SLA but professional org of known quality.
    - CENIC asks for incremental costs
- Basis for the CA MAN

# BNL R&E Network Env.

- Collaborate with NYSERnet
- Private not for profit corporation
- “has delivered next-generation Internet services to New York State's research & education community for over 18 years. “

# Illinois Network R&E Env.

- No organizations analogous to CENIC.
  - But starlight is next door, and “everything”
- I-Wire is most prominent:
  - A dark fiber communications infrastructure interconnecting major research facilities in Illinois
    - Except FNAL...
  - A physical infrastructure project only
    - Not an operating network entity
    - Not able to receive funds and deliver services

# Need for Regional Networks

- In the absence of the MAN, we would fit into the ESnet “collaborate with regional R&E networks” model.
- Absent an incorporated regional R&E organization, the evident direction would be a collection of arrangements with interested parties.
- Our leverage is the starlight fiber.

# Some Issues.

- The framework in which we would make agreements has to be determined and developed.
- Decide if there are sufficient resources to consider sharing.
  - 33 lambdas
- Find partners.

# Building NIUnet to Include our Partners in the Northwest Region of Illinois

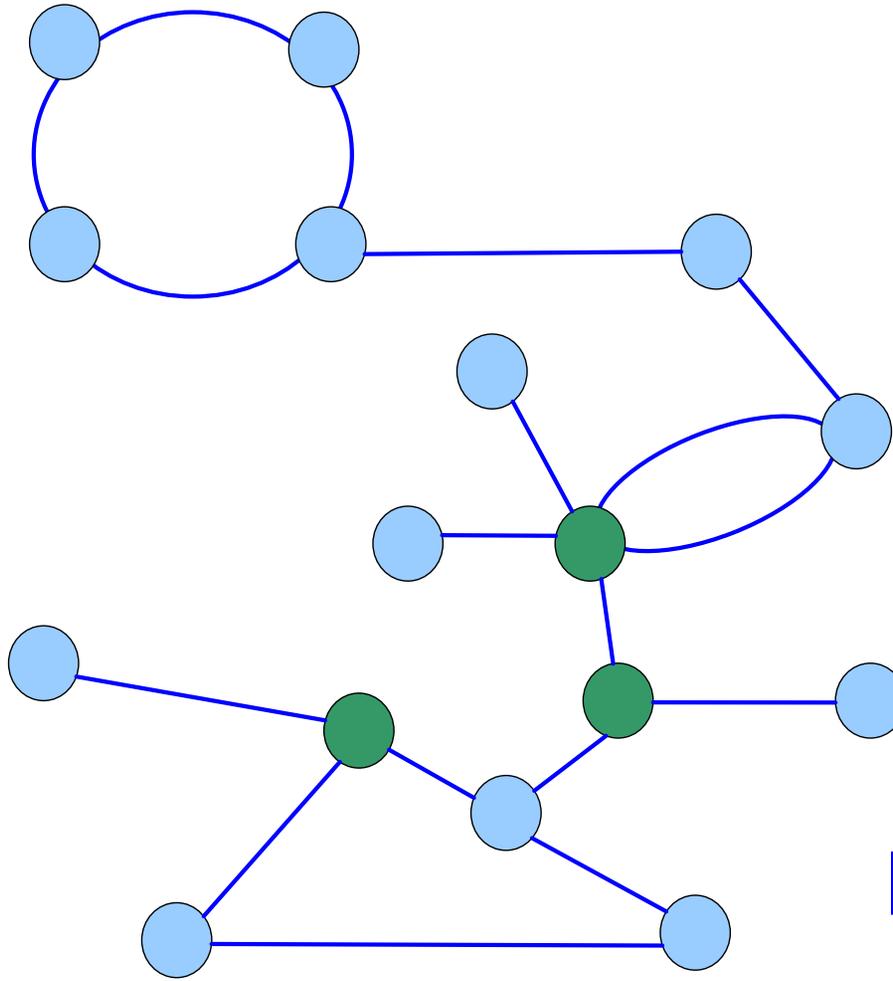
A Three to Five Year Plan in Support of:

NIU as the Premier Regional Public University, Through  
Technology Partnerships

# I-88 to Mitchell Road to Fermilab Lateral

## Three Tasks to Complete This Lateral

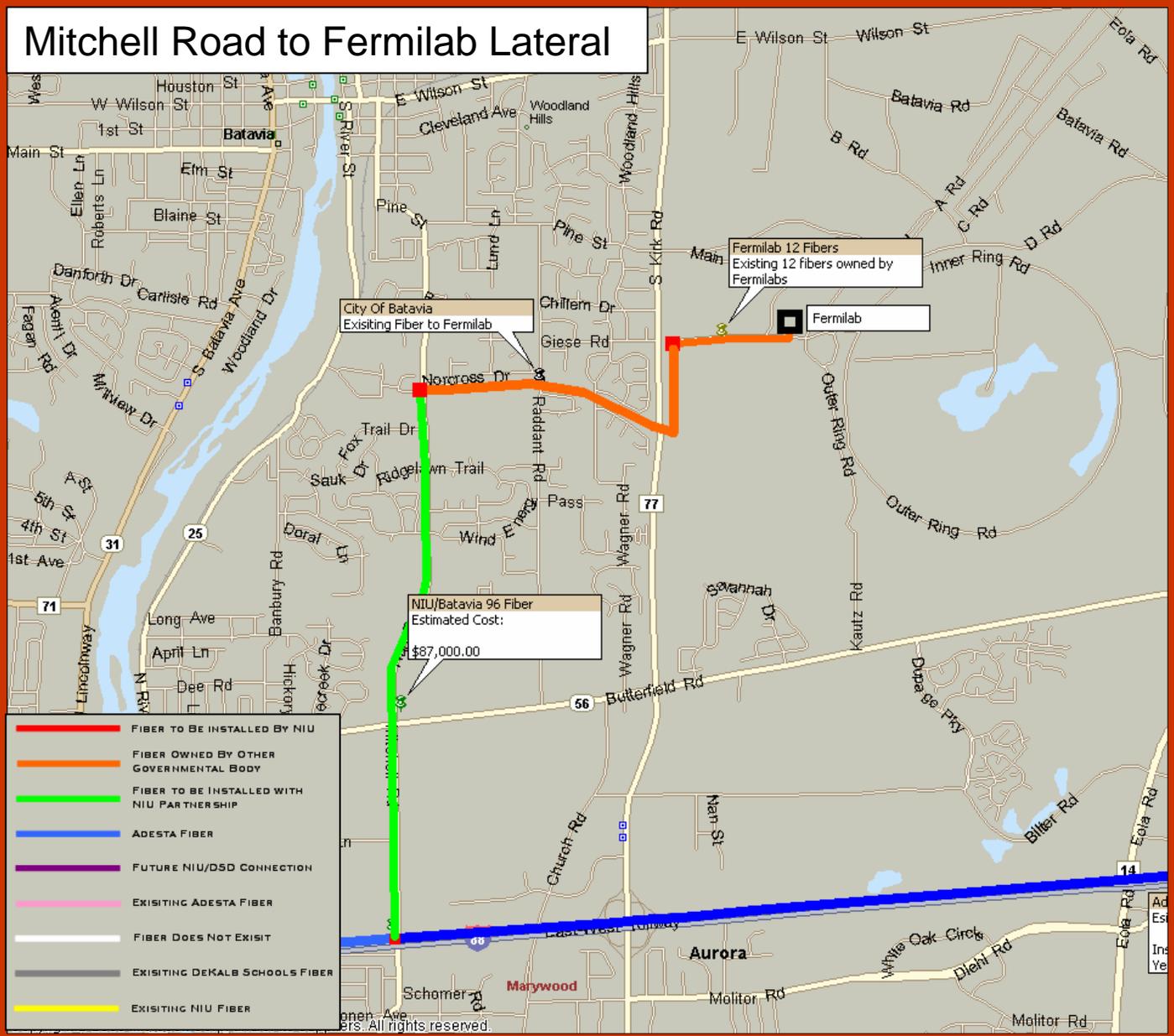
- Establish an NIU and city of Batavia partnership to share the cost of the lateral installation
- Define an agreement with the city of Batavia to maintain the fibers and use pre-existing fiber along the Prairie Park Path to Fermilab.
- Define an agreement to obtain I-WIRE connectivity through Fermilab



NIU  
Rockford  
Education  
Center



## Mitchell Road to Fermilab Lateral



- FIBER TO BE INSTALLED BY NIU
- FIBER OWNED BY OTHER GOVERNMENTAL BODY
- FIBER TO BE INSTALLED WITH NIU PARTNERSHIP
- ADESTA FIBER
- FUTURE NIU/DSD CONNECTION
- EXISTING ADESTA FIBER
- FIBER DOES NOT EXIST
- EXISTING DEKALB SCHOOLS FIBER
- EXISTING NIU FIBER

ers. All rights reserved.

# Fermilab Partnership

- Fermilab requires agreement to use their fiber and ½ rack for equipment
- Fermilab will provide power, battery, and space for NIU equipment
- Fermilab will allow NIU a through connection to the 710 Northwestern University POP
  - Recent contracts have been signed by Fermilab to install a COMED fiber from their facility to 710 Northwestern University POP
  - NIU has been added to the Fermilab/COMED contract as a user of this fiber
  - Shared costs of Fermilab partnership
    - Expected to cost no more than other co-location arrangements at 710 site plus yearly maintenance for the fiber
    - NIU's presence at Fermilab allows the NIUnet infrastructure to be connected to ANL in partnership with Fermilab. This will allow Fermilab and ANL to access ESnet and allow NIU to access the TeraGrid. This mutually-beneficial collaboration will help each partner realize their goals and reduce the cost for everyone.

# Organizing for Exploiting Networks

- Experiments programs
  - CDF: Rick Snider involved in UK, Toronto projects
  - CMS: Fallon Group working on CMS fast transport
  - D0: SAM involvement
- CD/Institutional
  - WAWG: Technical work group with wide area scope
    - Meets regularly on Friday mornings
    - Distribution list [wawg@fnal.gov](mailto:wawg@fnal.gov)

# Organizing for exploiting Networks

## (cont)

- CD/Institutional (cont):
  - Sustaining regional relationships:
    - Trying to work with I-Wire
    - Participation in MREN activities
    - Developing working relationship with NU/ICair StarLight staff
    - External contacts mailing list.
      - [adt-notes@fnal.gov](mailto:adt-notes@fnal.gov)
      - NIU

# Lambda Station Proposal

- Technical merit:
  - Realistic integration of storage systems and advanced WANs
  - Would provide alternate path selection mechanism for high impact data movements
- Relies on evolution of nominal baseline of some experiments:
  - Not radical modification of their systems
- Now talking to SAM

# Budget.

Paper slide presented.