NLR Update

Wendy Huntoon

JET Meeting

October 17, 2006

Topics

- Infrastructure Update
- Selected Projects
- SCO6 Status
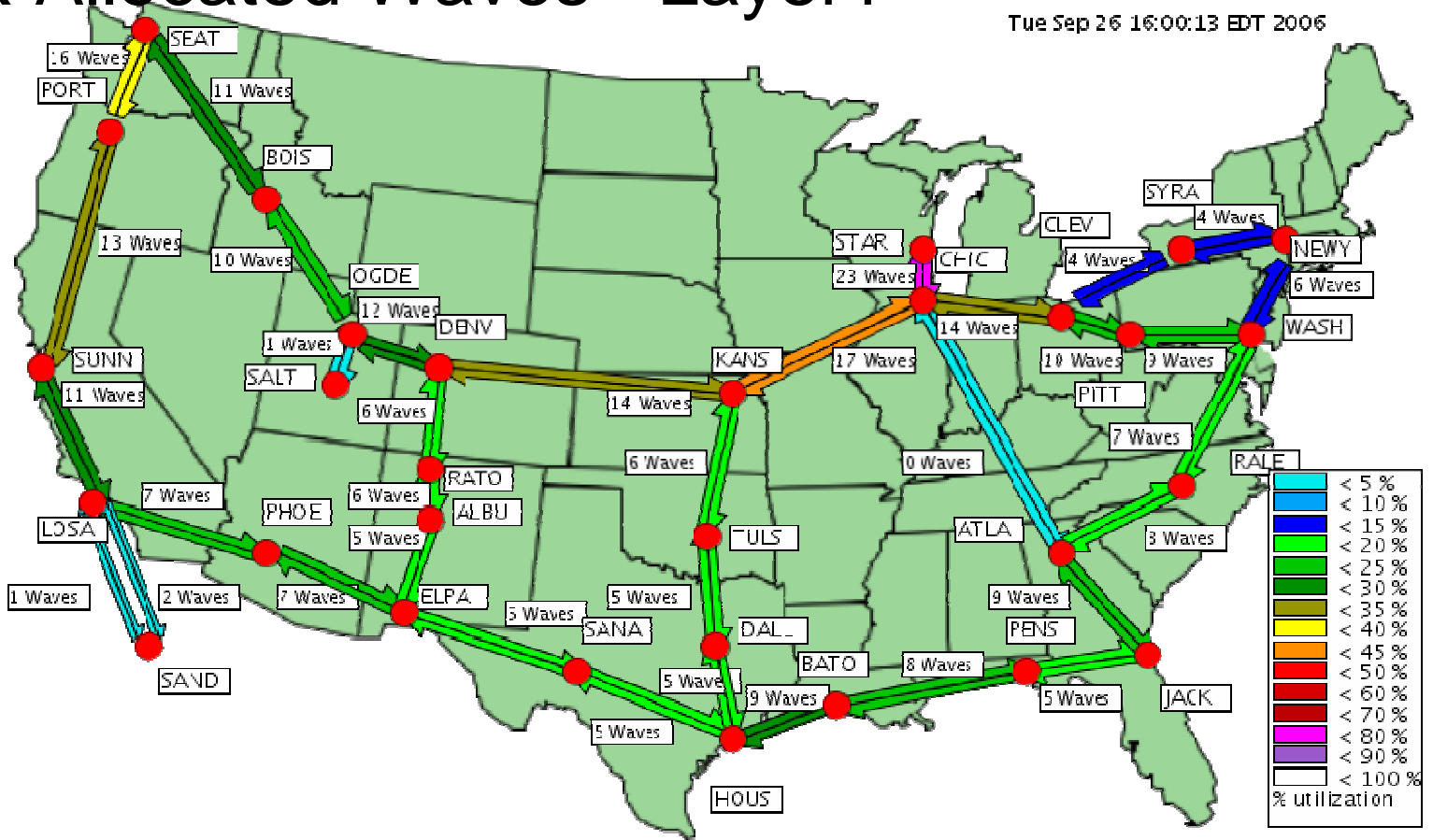
nlr.net

Infrastructure Update

NLR Allocated Waves - Layer1

Tue Sep 26 16:00:13 EDT 2006

NEWY->WASH	6 Waves	WASH->RALE	7 Waves	NEWY->SYRA	4 Waves	RALE->ATLA	8 Waves
WASH->PITT	9 Waves	ATLA->JACK	9 Waves	PITT->CLEV	10 Waves	CLEV->CHIC	14 Waves
SYRA->CLEV	4 Waves	CHIC->KANS	17 Waves	KANS->TJLS	6 Waves	TJLS->DALL	5 Waves
DALL->HOUS	5 Waves	KANS->DENV	14 Waves	DENV->OGDE	12 Waves	OGDE->BOIS	10 Waves
BOIS->SEAT	11 Waves	SEAT->PORT	16 Waves	PORT->SUNN	13 Waves	SUNN->LOSA	11 Waves
LOSA->PHOE	7 Waves	PHOE->ELPA	7 Waves	ELPA->ALBU	5 Waves	ALBU->RATO	6 Waves
RATO->DENV	6 Waves	ELPA->SANA	5 Waves	SANA->HOUS	5 Waves	HOUS->BATO	9 Waves
BATO->PENS	8 Waves	PENS->JACK	5 Waves	CHIC->STAR	23 Waves	OGDE->SALT	1 Waves
LOSA->SAND	1 Waves	LOSA->SAND	2 Waves	CHIC->ATLA	0 Waves		
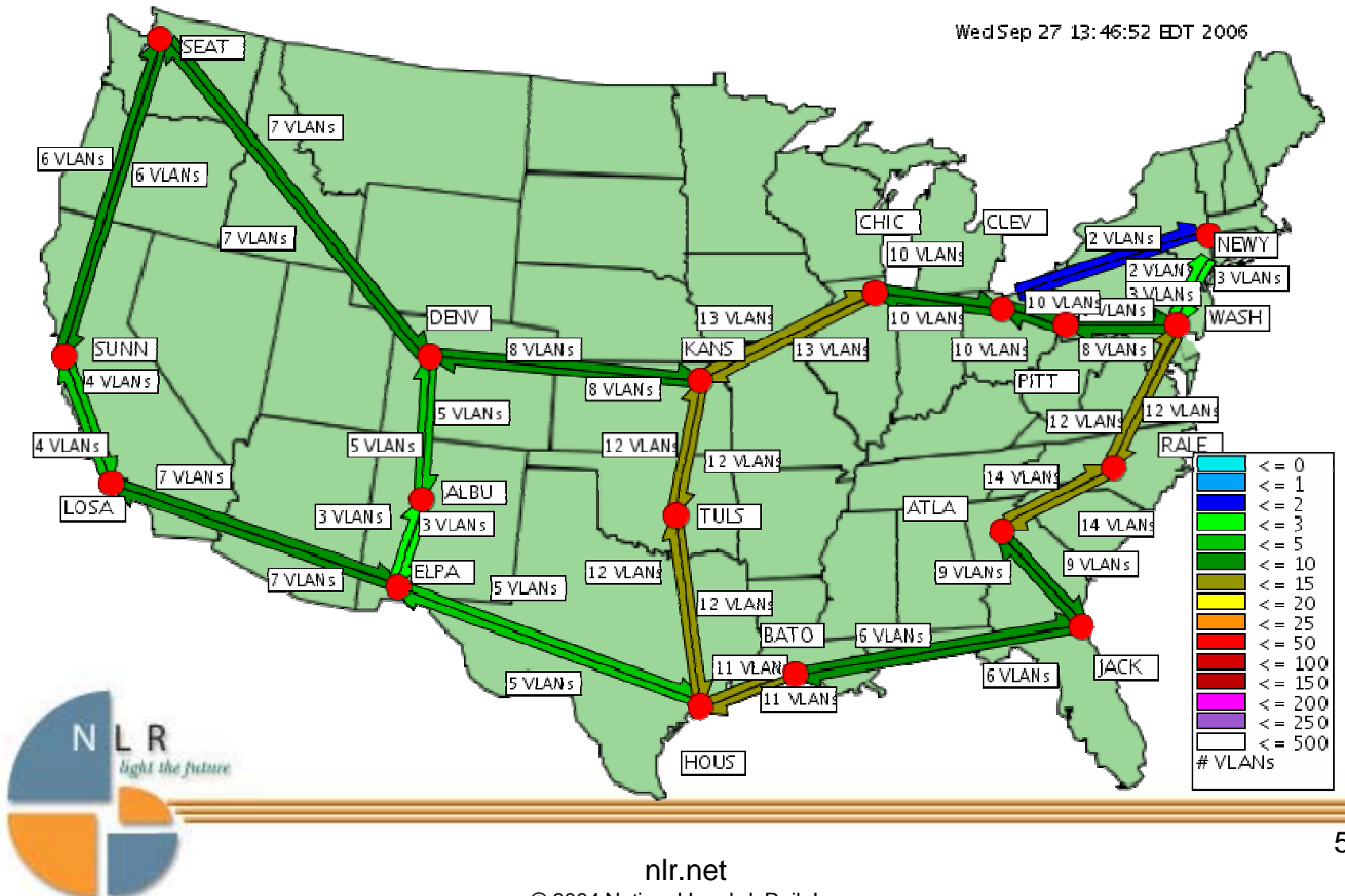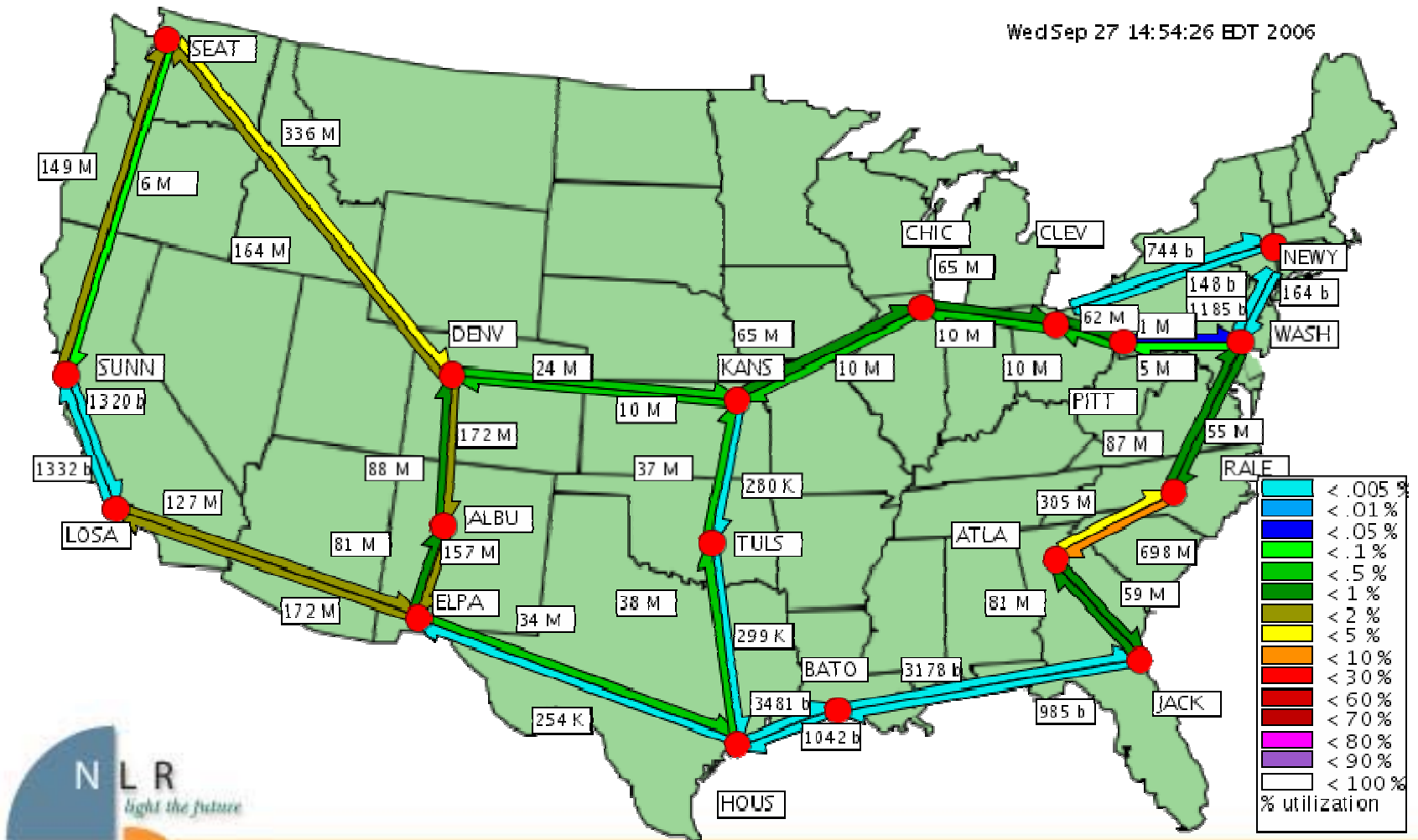
nlr.net

PacketNet Connection Status

Member	PacketNet Routed IP Service - 10G	PacketNet Routed IP Service - 1 GE	v4 mc	v6 uni	v6 mc
Case Western	Pending	Pending			
CENIC	460	In Use	4	21	
CIC	In Use	Pending			
Cornell	4	In Use			
Duke/NC	N/A	65	0		
FLR	Pending	52	49		
LEARN	Pending	4			
LONI	9	Pending			
MATP	17	Pending			
New Mexico	12	In Use	13	20	
Oklahoma	68	In Use			
PNWGP	162	N/A	66	2	
PSC	6	In Use			
SLR	435	In Use			
UCAR	116	In Use			
Total	1285	121	132	43	

Peers - Location, Routes, Services

Peer	Location(Routes)	Services
DREN	STAR(496), PW(265)	v4mc
ESnet	STAR(132), MAN(131)	v4mc, v6
NREN	PW(4)	
USGS	STAR(9)	
StarLightAS	STAR(2619)	v4mc
TransPac	PW(0)	v4mc
CAnet	STAR(812),PW(),MAN()	v4mc
Ultralight	STAR(4)	
TWAREN	STAR(203)	v4mc,v6
Los Nettos	PW(218)	

ESnet CAnet
DREN TWAREN
NREN REANNZ
Transpac LosNettos
Pacific Wave

PNW
Seattle

Ultralight/LHCnet
2 x CAnet
Starlight
USGS
TWAREN CERN
ESnet DREN
StarLight

Surfnet
CAnet
TWAREN
ESnet
ManLan

CIC
Chicago

Case
Cle

New York City

UCAR
Kans

Denver

Sunn

Plt

Cornell

CENIC

UNM
Albu

Oklahoma

Duke/NC

Washington

PSC

MAT

Los Angeles

Elpa

Tuls

SLR
Atlanta

Ral

Ultralight

Jack

Bato
Houston

LONI

FLR

LEARN

ober 2006

Key:

Houston NLR rou
2 3 layer2/3
operatio
coming
exchang
peer net
Tuls layer2 switc

NLR Optical Switching

- Goal - work with other optical switching projects to understand
  - To enhance WaveNet fault tolerance
    - Understand how to use optical switch and spare or shared waves to improve layer1 availability.
  - Demarcation point between backbone (NLR) and RON.
    - Understand the issues associated with sharing management and control between organizations.
  - Shared resource for researchers
    - Support experiments with GMPLS by providing access to the PXC control plane.
      - Collaborate and interoperate with research projects focusing in this area
   » E.g. Enlightened, Cheetah, Dragon

NLR Switch Placement

- Locate NLR Switch in Kansas City
  - Node which connects to 3 segments
    - CHIC - KANS
    - DENV - KANS
    - TULS - KANS
- Support a range of projects
  - Collaboration with Enlightened/LONI
  - Test resilient WaveNet service
  - Collaborate on control plane projects

NLR Proposed Optical Switch Topology

nlr.net
© 2004 National LambdaRail, Inc
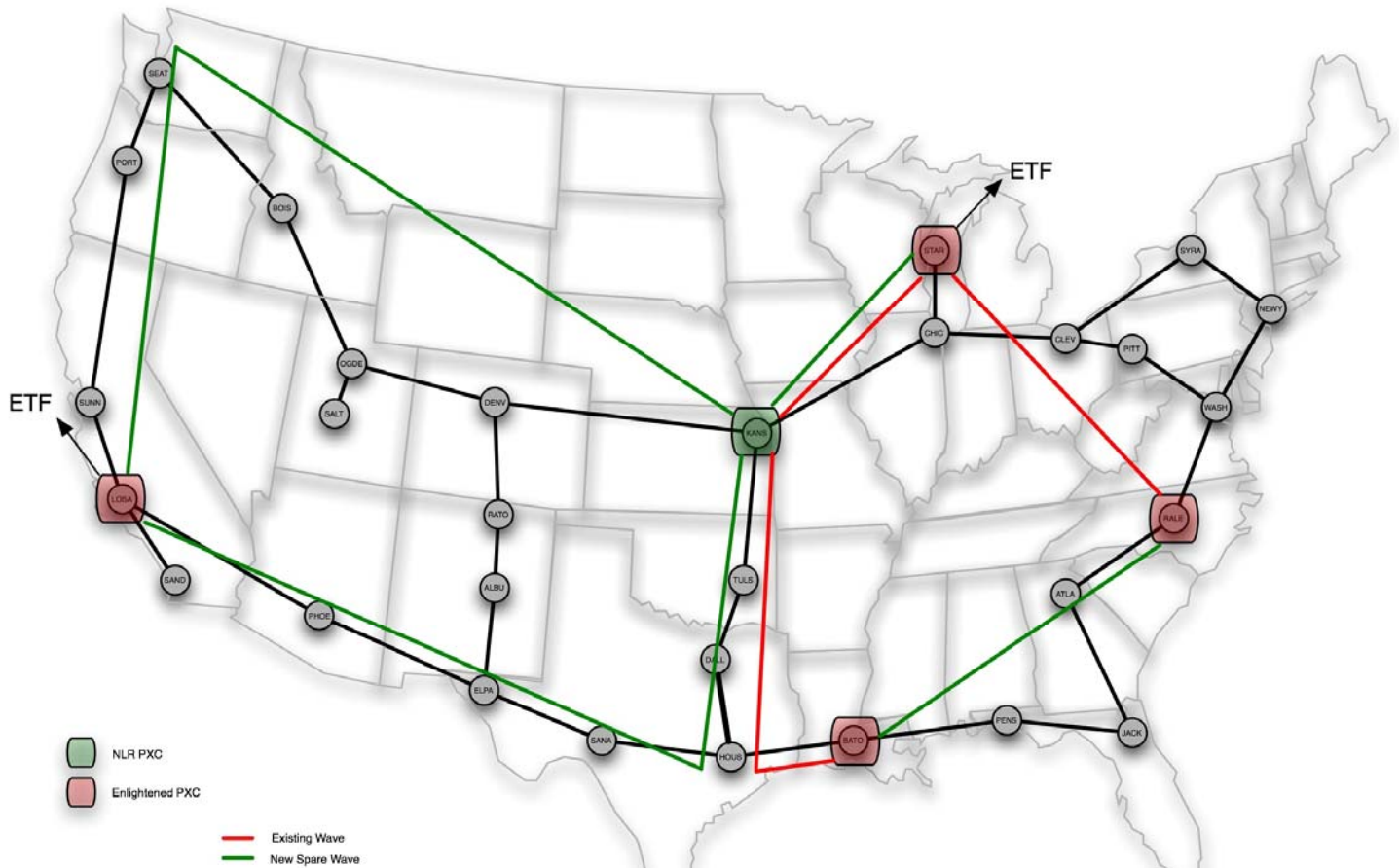
NLR Measurement Infrastructure

What will NLR provide:

NLR managed equipment that will be used to collect data from the FrameNet and PacketNet devices and make that data available to interested researchers

Space, power, and other ancillary equipment to allow network researchers to place dedicated research instruments in the NLR infrastructure

Equipment shared amongst network researchers, well inter-connected with NLR facilities, to act as a platform on which research experiments may be executed

A set of Network Test Points that Layer2/3 service center engineers can use to measure performance characteristics (e.g. IPerf, NetPerf) at the various NLR nodes.

N L R
light the future

13

NMI Infrastructure - Phase 1

- PacketNet Nodes
  - Four Servers
    - Data Collection PC, 2 Shared Research Platforms, 10GigE Test Point PC
  - Sites:
    - Atlanta, Houston in support of SC06
    - Seattle or Chicago - still TBD
- 2 FrameNet Nodes:
  - Single server
    - 1 Gigabit Ethernet test point - directly attached to 6509
  - Sites:
    - Baton Rouge, Jacksonville in support of SC06

NLR Measurement Infrastructure

- Data Collection Server
  - Two servers located at IU
  - Netflow archive server
  - 4 TB usable RAID-50 array
  - Data repository server
  - Present one logical data repository from which network researchers can retrieve data
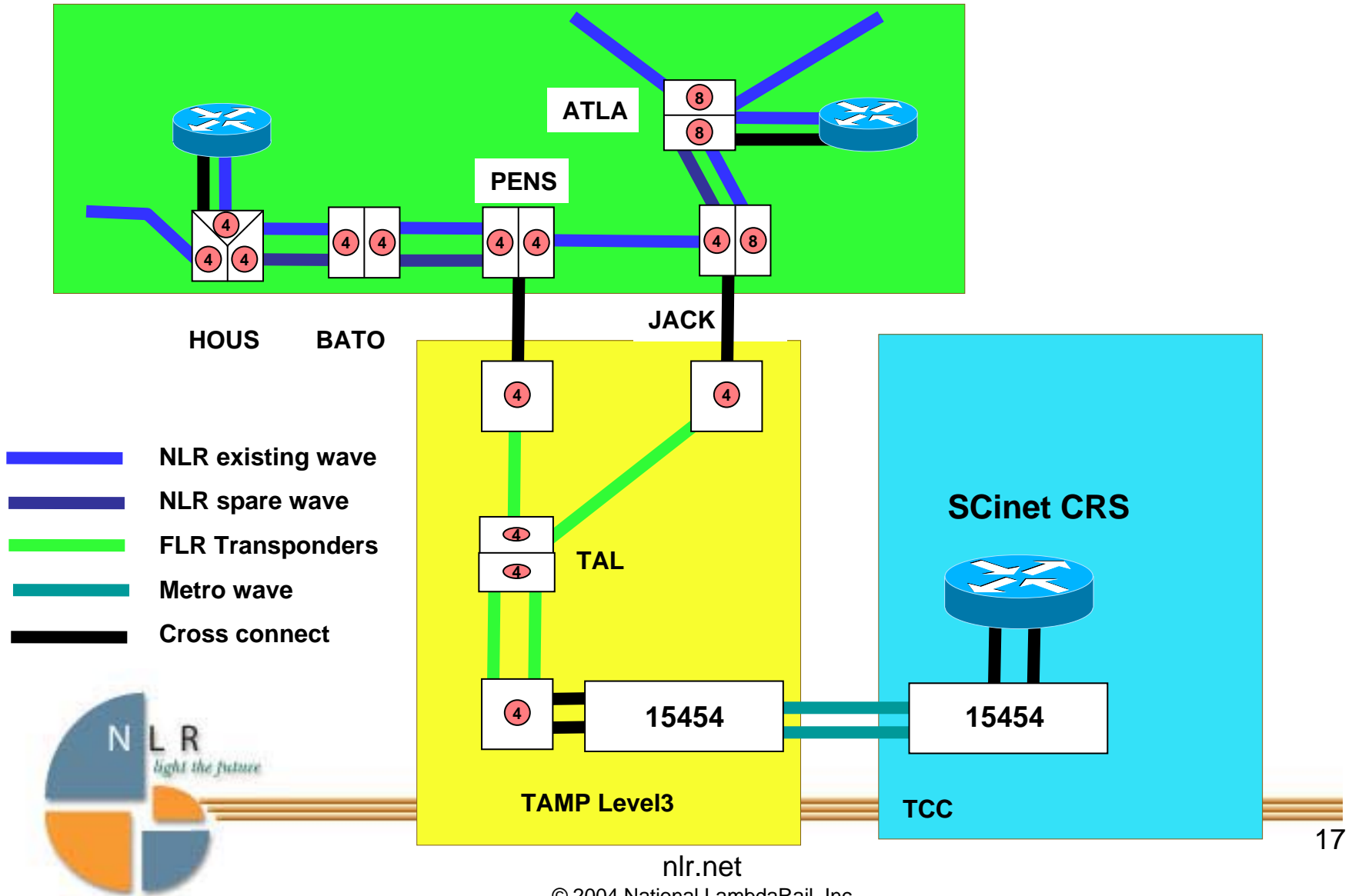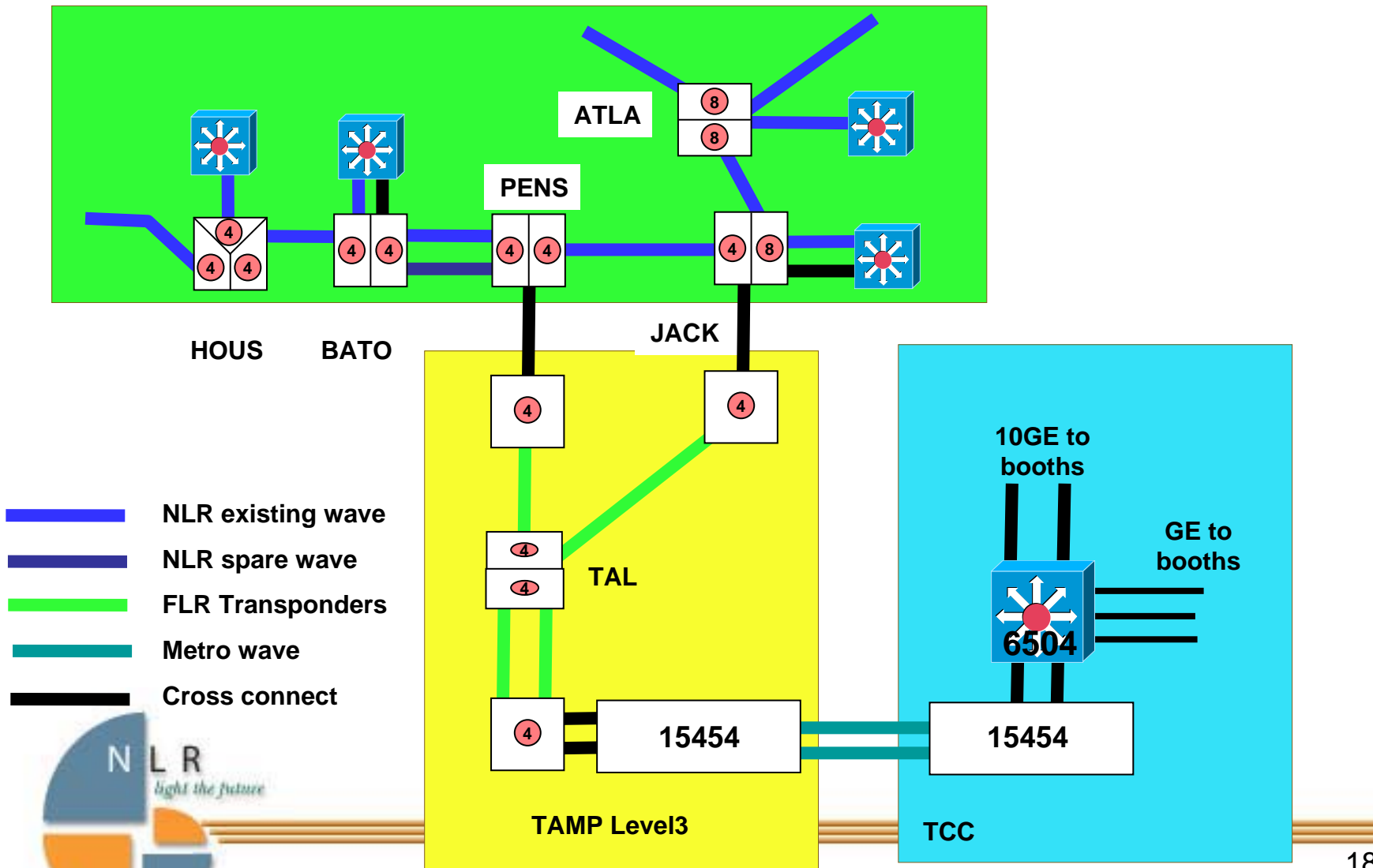
N L R
light the future

SC06 Plans

NLR
light the future

SC06 NLR PacketNet Architecture

nlr.net
© 2004 National LambdaRail, Inc

17

SC06 NLR FrameNet Architecture

ATLA

PENS

HOUS   BATO

JACK

NLR existing wave

NLR spare wave

FLR Transponders

Metro wave

Cross connect

TAL

TAMP Level3

TCC

10GE to booths

GE to booths

6504

15454

15454

nlr.net

SC06 Service Requests

- PacketNet
  - National Center for Data Mining: 10Gig (BWC)
  - Virginia Tech: 1 GigE
  - RENCI: 2 GigE's
  - PSC: 10 GE
  - Purdue: (BWC)
  - Indiana: (BWC)
  - APAN:
  - NASA: 3 GigE's
  - CANARIE
  - Research Channel

- FrameNet
  - Research Channel -1 10Gig
  - LSU: 2 10 GigE's
  - EVL: 1 10 GigE's
  - CalTech: 2 10GigE's
  - University of Tokyo
- WaveNet
  - AWave

N L R
light the future