Ciena Update for Fiberco

Ciena Government Solutions, Inc (CGSI)
October, 2008
Outline

Ciena as a Corporate Partner for Internet2 and the R&E community

Ciena Offerings in the Fiberco umbrella

How to engage us
Ciena: An Internet2 Corporate Partner

7 Years of membership and participation in the Internet2 community

History of collaboration within the marketplace on advancement of research networking

Optical switching foundation for Internet2 DCN Services (CoreDirector platform)

Vendor Advisory Community member within the I2 RHCPP initiative

Ciena professional services and systems available through Fiberco
Who is Ciena?
The network specialist

Core competencies:
- Optical transport & switching
- OTN-based carrier Ethernet
- Intelligent control plane
- Programmable hardware
- Dynamic wavelength routing
- Service interworking
- Circuit-to-packet migration
- Advanced service-level management
- Carrier Class Ethernet Systems

Key offerings:
- Optical, data and access networking platforms
- Network and service management systems
- Global network services and professional services

Ciena Government Solutions, Inc (CGSI)
- Cross functional team dedicated to gov’t, research & education
- HQ in Maryland USA
- Customers include:
  - US DoE, ESNet, UltraScience Net
  - Maine, Northwestern, MAGPI, UNM, GPN
  - Internet2 nationwide backbone
  - MIT/NRL BOSSNet
  - CERN / Caltech LHCNet
- Global R&D centers
- Service and support across the Americas, EMEA and Asia

A path to help you optimize the way you operate
- Tools to adapt and deliver with a programmable service-delivery engine
- Collaboration with the community to advance research networking

Vision
Innovation
Partnership

Collaboration with the community to advance research networking
## Ciena research network collaboration initiatives

<table>
<thead>
<tr>
<th>Organization</th>
<th>Initiative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naval Research Labs / MIT</td>
<td>100G development on BOSSNet network</td>
</tr>
<tr>
<td>US Department of Energy Oak Ridge National Labs</td>
<td>Intelligent control plane utilization;</td>
</tr>
<tr>
<td>University of MD; MAX (Mid-Atlantic Crossroads)</td>
<td>Control plane interoperability; integration with DRAGON control plane</td>
</tr>
<tr>
<td>SC08 / SCiNet</td>
<td>Annual participation in demonstration and delivery of optical network connectivity to SC08 (100G aggregate BW)</td>
</tr>
<tr>
<td>Internet2</td>
<td>Control plane and 10G interoperability; Dynamic Circuit Services; Corporate Partner</td>
</tr>
<tr>
<td>CERN / CalTech</td>
<td>Implementation of CoreDirector dynamic lightpath solution for global LHCNet</td>
</tr>
<tr>
<td>US National Science Foundation GENI</td>
<td>Consulting roles on next generation internet testbed program; 3-GENI proposals under definition</td>
</tr>
<tr>
<td>OIF / ITU / IETF</td>
<td>Founding member and president of OIF; Leadership on standards development in OIF/ITU/IETF</td>
</tr>
</tbody>
</table>
Ciena’s architectural vision: FlexSelect Architecture

- A new range of applications
  - Ethernet and wave services
  - Add services and support applications via software

- and a Converged Infrastructure
  - Ethernet for optimized packet transport
  - OTN for multi-protocol transport
  - WDM for capacity scaling
  - Automation for rapid deployment

One Network – Many Services

Multi-service network solutions

- True Carrier Ethernet
- Resilient Access Products
- Regional Optical Network supported with CN4200
- National /Global Research Networks
  - CoreDirector
  - CoreStream

- Virtual Wave Services
- MEF & Conv. Ethernet Services
  - EVPL/EPL
  - E-LAN
  - VLAN tags
  - PBB-TE

© Ciena Confidential and Proprietary
Ciena Global Network Services

Deployment Services
→ Turnkey
→ Turn-up & Test

Maintenance Services
→ Basic Hardware
→ Basic Software
→ Basic Plus Standard = (24 x 7 x 365 Tech Support)
→ Basic Plus - Bronze = (next business day replacement and engineer dispatch)
→ Basic Plus - Silver = (4 hour replacement and engineer dispatch)
→ Basic Plus - Gold = (2 hour replacement and engineer dispatch)

Multi-vendor Services
→ Deployment Services
→ Network Operability Testing & Verification
→ Logistics Management
→ Engineer Dispatch
→ Consulting Services

Network Analysis, Planning & Design
→ Network Assessment & Design

Operations & Network Management
→ Network Management Services
→ Assigned Tech Support Engineer
→ Assigned NOC Tech Support Engineer
→ Operations Assessment

Project Management Services
→ Assigned Project Manager
→ Program Management Activities
→ Staging Activities
→ Site Preparation Activities
→ Installation Activities

Network Optimization & Tuning
→ In-Service Hardware Upgrade
→ Software Verification & New Feature Testing
→ Software Upgrade, Documentation & Support
→ Preventive Maintenance Audit
How to engage Ciena via Fiberco

Same process as in dark fiber procurement:
Contact Fiberco at fiberco@internet2.edu.

May bundle your fiber and wave inquiry with request for quote on professional services and network systems.

Ciena works cooperatively with most of the national and regional telecom carriers.
Ciena’s Approach to Optical Networking
The CN 4200 Family

The FlexSelect Architecture

User Premises – Metro/Regional Area – Regional and National

Integrated connectivity

OTN and Ethernet throughout architecture enable service & transport optimization

FlexSelect Building Blocks

FlexiPort

Programmability brings unprecedented flexibility

Programmable client ports
- ESCON (200Mb/s)
- GbE (1250Mb/s)
- FC (2125Mb/s)
- STM-1 (155Mb/s)

OTN

G.709 OTN brings highest efficiency and performance assurance

Bandwidth Optimization

Bandwidth optimization via compression and dynamic bandwidth assignment

Automation

Universal management with automation and protocol layer visibility

Carrier Grade Ethernet

Integrated Ethernet Switching saves in L2 switching cost, mgmt and maintenance

© Ciena Confidential and Proprietary
True Carrier Ethernet solution set

An end to end Ethernet architecture that delivers resilient, carrier class Ethernet service at a low cost

→ Traffic engineering for deterministic bandwidth
→ Performance monitoring, fault sectionalization, trace capabilities, and statistics collection
→ Control plane for automated end to end provisioning and resiliency.
→ Over 100 customers to date.
CoreDirector
Multiservice optical switch

*Enabling dynamic Ethernet lightpaths and traffic grooming for research networks*

**Description**

A hybrid SONET/SDH/Data/OTN multiservice switch

Supports DCS, ADM/MSPP and SON/SDH, OTN and Ethernet switch applications

Supports control plane driven, intelligent networking

Layer 1 & Layer 2 switching for multi-protocol switching applications

- TDM switching/grooming at STS-1/VC-3 granularity for SONET/SDH
- Ethernet switching: VLAN tags and MEF 10 Ethernet traffic management

Interfaces: 155/622M, 2.5G & 10G SONET/SDH, GbE, 10GbE & STM-1e

- GbE and 10GbE support GFP, VCAT & LCAS for efficient packet transport over SONET/SDH

Integrated ITU DWDM optics

**Benefits**

Routes & switches optical and Ethernet capacity

Layer 1 and Layer 2 switching

TDM Channelized (down to STS-1)

Highly Intelligent

- Field-proven automated control plane
- Discovers network topology and state
- Manages capacity end-to-end
- Automated end-to-end provisioning

Built in Reliability

- Redundant, carrier class architecture
- Separation of control, data, and timing planes
- Network survivability through linear, ring, and mesh protection mechanisms
- Up to 6-9’s availability in live production networks

Integrated Management with Service Level Management capabilities

- The typical stuff: Map, alarm display, config mgmt, equip views, Plus:
  - Modeling & planning capabilities
Ciena R&E base and collaboration partners