



# Internet2 & NET+

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# Internet2 - Overview

- Created and Managed by the University Community (252 member U.S. universities).
- Private network built specifically to support the needs of higher education.
  - Exceptionally fast, high capacity network (100G/sec)
  - Very low latency
    - Enables applications not otherwise capable of operating across the internet.
    - **LOLA (LOW LAtency audio / visual system)**

# Internet2 and GPN Regional Network Maps



## INTERNET2 NETWORK INFRASTRUCTURE TOPOLOGY

OCTOBER 2014



- Advanced Layer 3 Service  
(Research/Education and peering IP)
- Advanced Layer 2 Service  
(SDN Ethernet add/drop)
- Advanced Layer 1 Service  
(Optical wave add/drop)

### INTERNET2 NETWORK BY THE NUMBERS

|        |  |
|--------|--|
| 17     | JUNIPER MX960 ROUTERS SUPPORTING LAYER 3 SERVICE   |
| 34     | BROCADE AND JUNIPER SWITCHES SUPPORTING LAYER 2 SERVICE                                  |
| 62     | CUSTOM COLLOCATION FACILITIES  |
| 250+   | AMPLIFICATION RACKS  |
| 15,717 | MILES OF NEWLY ACQUIRED DARK FIBER   |
| 8.8    | TBPS OF OPTICAL CAPACITY   |
| 100    | GBPS OF HYBRID LAYER 2 AND LAYER 3 CAPACITY  |
| 300+   | CIENA ACTIVEFLEX 6500 NETWORK ELEMENTS   |
| 2,400  | MILES PARTNERED CAPACITY WITH ZAYO COMMUNICATIONS IN SUPPORT OF THE NORTHERN TIER REGION |

IN SUPPORT OF  
**U.S. JCAN**

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NETWORK PARTNERS

**CIENA**  
  
**CISCO**

**INDIANA UNIVERSITY**

**INFINERA**

**JUNIPER NETWORKS**

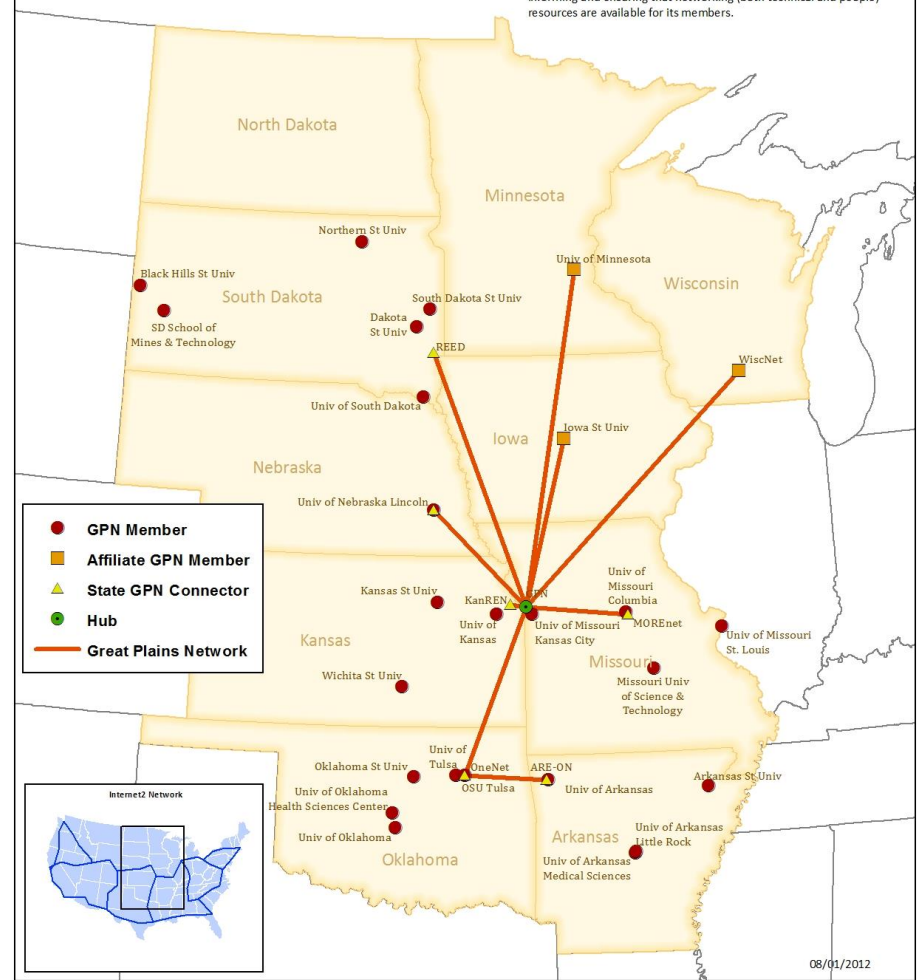
## Great Plains Network



The Great Plains Network is a consortium of universities, located across the Midwestern United States. GPN partners with member universities and state networks to connect them to the National Research & Education infrastructure and to facilitate the use of advanced cyberinfrastructure across the network.

**Vision:** The Great Plains Network is a community of research and education professionals using advanced technologies to enhance the missions of their institutions and the and the region.

**Mission:** GPN advances the efforts of the community by convening, informing and ensuring that networking (both technical and people) resources are available for its members.



08/01/2012

41 Regional and State Education Networks Interconnect with Internet2

# Internet2 and Nebraska

- UNL connects to Internet2 through a 100Gb/sec network connection to Kansas City.
- Internet2 is made available to all Network Nebraska participants.
- No one needs to do anything special to use Internet2 – the network itself makes the decision regarding how best to route network traffic.

# Nebraska Internet2 100G Usage

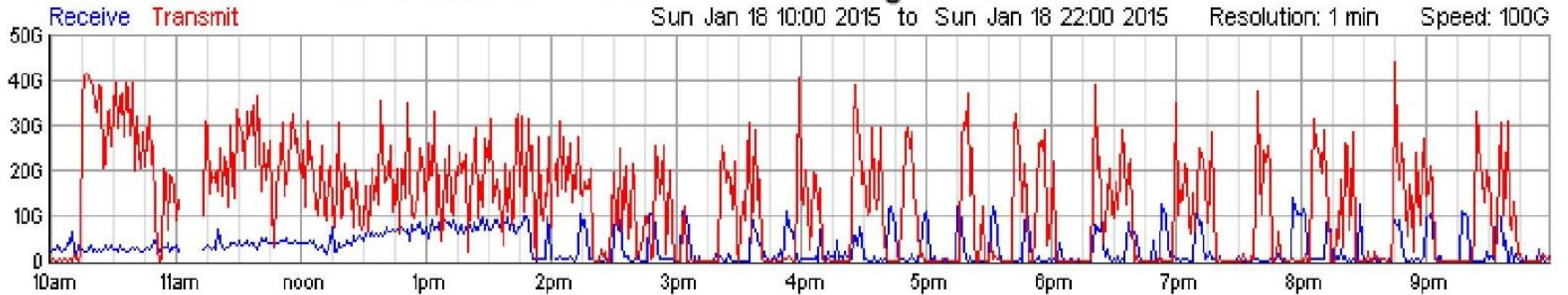
**Statseeker**

Interfaces Reporting Tool Graphs - BitsPerSecond

Fri 13 Feb 2015, 07:16 (America/Chicago)

## BitsPerSecond - BorderA HundredGigE0/1/0/1 100G to KC

Sun Jan 18 10:00 2015 to Sun Jan 18 22:00 2015 Resolution: 1 min Speed: 100G

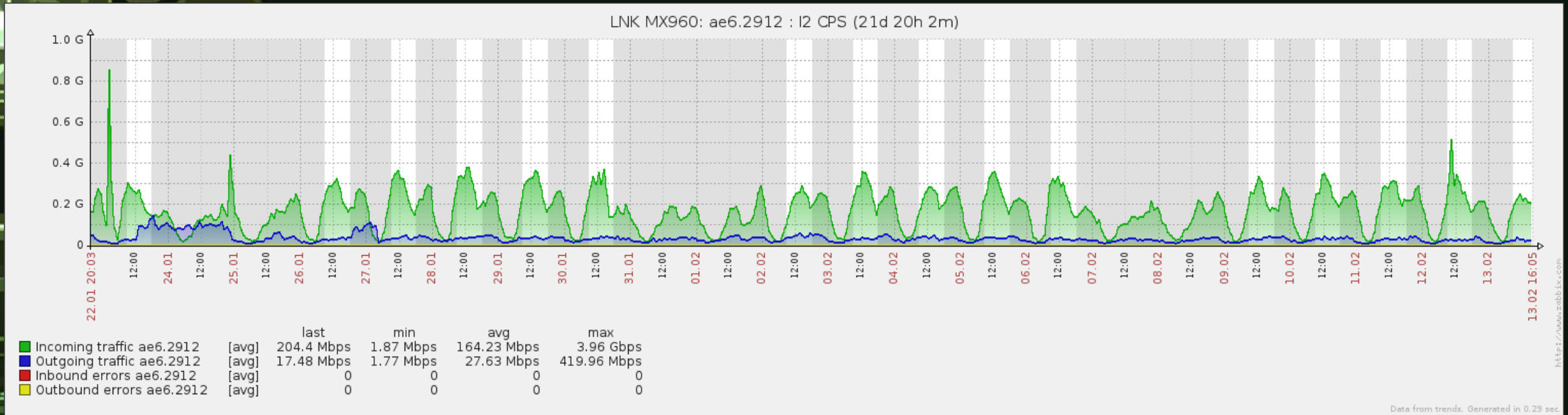


1 records

# Internet2 Commodity Peering Service

- Internet2 has installed direct peering connections to over 80 of the most popular service providers.
  - Google, Microsoft, Yahoo, Netflix, Apple, ....
  - Helps to ensure that bottlenecks that periodically exist within the Internet don't impact education.
  - Reduces latency to the most popular services through a reduction in network hops and less constrained network segments.

# I2 CPS Usage by Network Nebraska



NOTE: The data to create this chart has been compressed and therefore does not represent actual values, but is a good representation of general daily usage from 1/22/15 through 2/13/2015. Actual daily usage is somewhat higher than shown above.

# Internet2 – “NET+” Services

- A means to acquire services that are commonly used within education.
- Not simply a buying consortium!
- Vendors can not request to become part of the NET+ program – Internet2 members themselves must champion a service.
- One contract is developed including the terms and conditions that most education institutions demand.
  - Potentially saves a great deal of procurement and legal staff time.
- Only a limited number of services of the same type will be included in the NET+ program.



# Internet2 – “NET+” Services (cont.)

- Most services are customized in some manner to meet the specific needs of education.
  - Identity Management (In Common)
  - Security
  - Internet2 network access at the server provider.
  - Components not needed by the education community are sometimes removed, reducing purchase and support costs.

# Internet2 – “NET+” Services (cont.)

- “In Common” Identity Management needs to be implemented by the educational institution in order to take advantage of most NET+ services.

# NET+ Service Validation Phases

- Internet2 member(s) sponsor the service.
- Functional Validation
- Security Assessment
- Federated Identity Integration
- Network Integration and Testing
- Completion of a Business and Customer Agreement

The Sponsor and schools participating in the Service Validation process are closely involved in all of the above steps.

# NET+ Cloud Services and Applications

| Name                              | Service Type                               | Phase                |
|-----------------------------------|--|----------------------|
| Aastra/Level 3 SIP Services       | Video, Voice and Collaboration             | General Availability |
| Acquia                            | Infrastructure, Platform, Security         | Service Validation   |
| Alfresco                          | Infrastructure, Platform, Security         | Inquiry              |
| Amazon Web Services               | Infrastructure, Platform, Security         | Early Adopter        |
| AT&T Synaptic Storage and Compute | Infrastructure, Platform, Security         | Service Validation   |
| Azure                             | Infrastructure, Platform, Security         | Early Adopter        |
| Blackboard                        | Software as a Service                      | General Availability |
| Blue Jeans Network                | Video, Voice and Collaboration             | Early Adopter        |
| Box                               | Infrastructure, Platform, Security         | General Availability |
| Canvas                            | Software as a Service                      | General Availability |
| CenturyLink Cloud                 | Infrastructure, Platform, Security         | Evaluation           |
| CloudBearing                      | Software as a Service                      | Service Validation   |
| CrashPlan PROe                    | Infrastructure, Platform, Security         | Early Adopter        |
| Desire2Learn Capture              | Software as a Service                      | Early Adopter        |
| Desire2Learn Learning Environment | Software as a Service                      | Early Adopter        |
| DocuSign                          | Trust and Identity                         | Service Validation   |
| Duo Security                      | Trust and Identity                         | General Availability |
| DuraCloud                         | Infrastructure, Platform, Security         | Early Adopter        |
| E-Content                         | Digital Content for Research and Education | Evaluation           |
| eduroam                           | Trust and Identity                         | Early Adopter        |
| Fischer Ignite-Federation Service | Trust and Identity                         | Evaluation           |
| Fuze                              | Video, Voice and Collaboration             | Early Adopter        |
| Globus                            | Infrastructure, Platform, Security         | Service Validation   |
| GreenButton                       | Infrastructure, Platform, Security         | Inquiry              |
| ICE Health Systems                | Software as a Service                      | Early Adopter        |
| InCommon Certificate Service      | Trust and Identity                         | General Availability |
| Kaltura                           | Video, Voice and Collaboration             | Service Validation   |
| KeyNexus                          | Infrastructure, Platform, Security         | Evaluation           |

| Name   | Service Type                               | Phase                |
|--|--|----------------------|
| LabArchives  | Software as a Service                      | Early Adopter        |
| LastPass   | Trust and Identity                         | Evaluation           |
| Mediacore  | Video, Voice and Collaboration             | Early Adopter        |
| Merit Cloud Storage  | Infrastructure, Platform, Security         | General Availability |
| Merit VirtualDataCenters   | Infrastructure, Platform, Security         | General Availability |
| Merit WebConnect   | Software as a Service                      | Sunset               |
| MeritList Manager  | Software as a Service                      | General Availability |
| MeritMail Collaboration Suite  | Software as a Service                      | General Availability |
| Microsoft Large-Data Management and Cyberinfrastructure for Research | Infrastructure, Platform, Security         | Research Incubator   |
| nCrypted Cloud   | Infrastructure, Platform, Security         | Service Validation   |
| NCSU/IBM Virtual Computing Lab                                       | Infrastructure, Platform, Security         | Service Validation   |
| Netskope   | Infrastructure, Platform, Security         | Evaluation           |
| Office 365 Education   | Software as a Service                      | Early Adopter        |
| Philo  | Video, Voice and Collaboration             | Service Validation   |
| Rackspace  | Infrastructure, Platform, Security         | Service Validation   |
| rSmart Cloud Enterprise for Quali Coeus                              | Digital Content for Research and Education | General Availability |
| rSmart OneCampus   | Software as a Service                      | Early Adopter        |
| SeeVogh  | Video, Voice and Collaboration             | Early Adopter        |
| SkySync  | Infrastructure, Platform, Security         | Service Validation   |
| Splunk   | Software as a Service                      | General Availability |
| Toopher  | Trust and Identity                         | Evaluation           |
| Verizon Terremark  | Infrastructure, Platform, Security         | Service Validation   |
| Video Exchange   | Video, Voice and Collaboration             | General Availability |
| Vidyo  | Video, Voice and Collaboration             | Early Adopter        |
| VMWare vCloud Hybrid Service   | Infrastructure, Platform, Security         | Service Validation   |

# NET+ - What does it take to participate?

- An entity must be identified that has the responsibility of providing NET+ services to non Internet2 members
  - Network Nebraska? GPN?
- The specific service provider of interest must be willing to provide the service to your type of institution (not all services are available to K-12, for example).
- Have sufficient network capacity to Network Nebraska (for access to Internet2) to support the desired application.
- Meet the technical requirements of the service.
  - In Common?

# References

- [www.internet2.edu](http://www.internet2.edu)
- [www.internet2.edu/products-services/advanced-networking/](http://www.internet2.edu/products-services/advanced-networking/)
- [www.internet2.edu/vision-initiatives/initiatives/internet2-netplus/](http://www.internet2.edu/vision-initiatives/initiatives/internet2-netplus/)
- [www.internet2.edu/vision-initiatives/initiatives/internet2-netplus/internet2-net-frequently-asked-questions/](http://www.internet2.edu/vision-initiatives/initiatives/internet2-netplus/internet2-net-frequently-asked-questions/)
- [www.greatplains.net](http://www.greatplains.net)
- LOLA (from minute 33 through 65):  
[events.internet2.edu/2012/fall-mm/agenda.cfm?go=session&id=10002623&event=1149](http://events.internet2.edu/2012/fall-mm/agenda.cfm?go=session&id=10002623&event=1149)