INTERNET2 EXISTS TO...

Facilitate collaborative effort of U.S. higher education institutions to design and provide selected mission-critical services required to advance all aspects of their academic and service missions.

These are services that no single institution could provide on its own and that no one other than the academic community itself will provide in the ways needed.
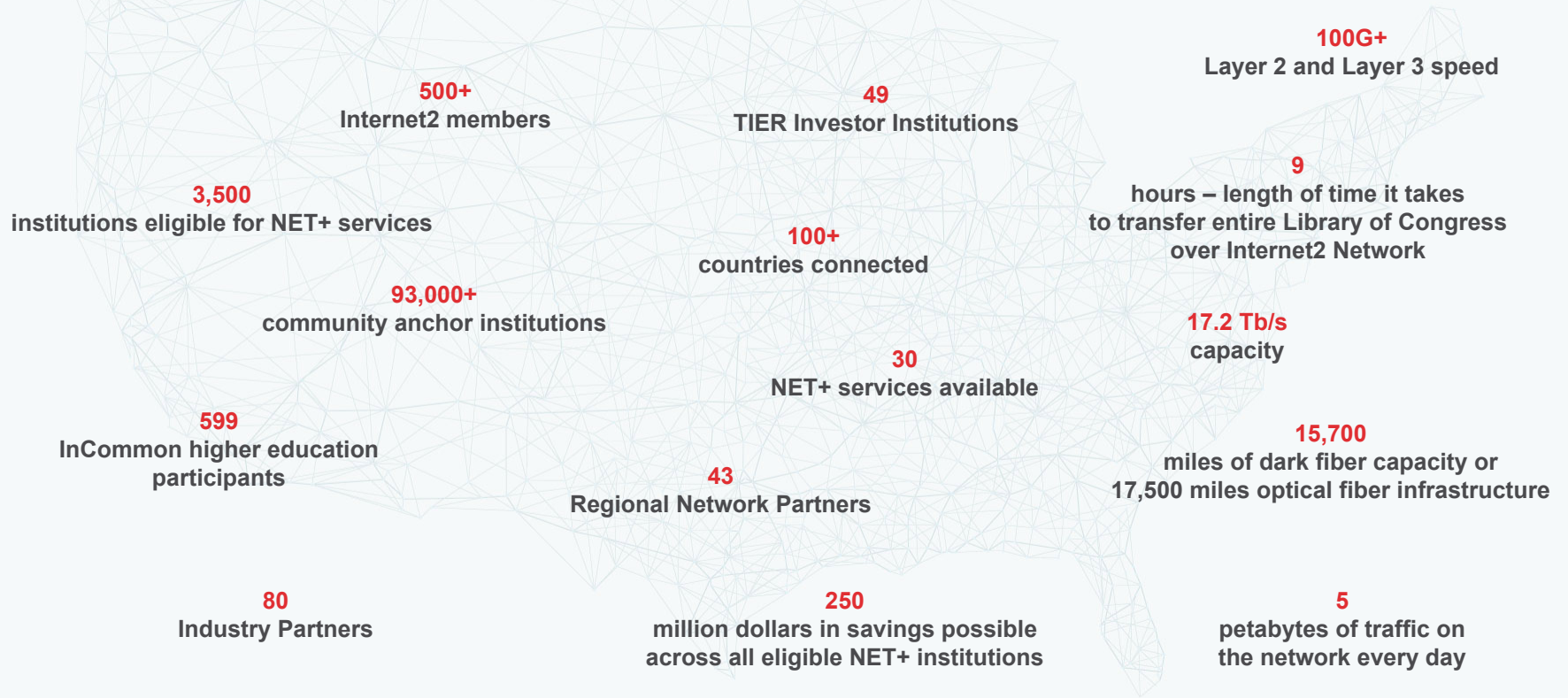
INTERNET2 WORKS BY...

Engaging mutual-interest collaboration across diverse communities to advance scholarship and accelerate discovery.

higher education

industry

regional networks

international networks

government agencies

research and cultural institutions

INTERNET2 **BY THE NUMBERS**

500+
Internet2 members

49
TIER Investor Institutions

100G+
Layer 2 and Layer 3 speed

3,500
institutions eligible for NET+ services

9
hours – length of time it takes
to transfer entire Library of Congress
over Internet2 Network

100+
countries connected

93,000+
community anchor institutions

17.2 Tb/s
capacity

30
NET+ services available

599
InCommon higher education
participants

15,700
miles of dark fiber capacity or
17,500 miles optical fiber infrastructure

43
Regional Network Partners

80
Industry Partners

250
million dollars in savings possible
across all eligible NET+ institutions

5
petabytes of traffic on
the network every day

INTERNET2

POWERED BY COMMUNITY

INTERNET2

Internet2 delivers a diverse portfolio of solutions that leverages, integrates, and amplifies the strengths of its members though every aspect of the organization.

Internet2 delivers to its **community** through its core components – a secure **national network** that was built to deliver **advanced customized services** that are accessed and secured by the community-developed **trust and identity framework.**

INTERNET2 TOP PRIORITIES

National R&E Network

Designed for abundant bandwidth, zero congestion, capacity for innovation, and peered to regional and global research and education networks reaching over 100 countries.

INTERNET2 TOP PRIORITIES

Integrated Trust and Identity Services

InCommon Federation and TIER (Trust and Identity in Education and Research) to develop a standard identity and access management software suite, using existing open-source products like Shibboleth and Grouper – to enhance interoperability with other campuses and services

SERVICE AND SUPPORTING PROGRAMS

Community Engagement, Collaboration and Convening

Community Collaboration and Engagement program works to assure that Internet2 membership delivers a clear value proposition and results in durable membership commitments and strong engagement across membership constituencies.

SPECIAL PROGRAMS

NET+ Services
Influence commercial cloud service providers to offer configurations and terms of service optimized for higher education.

Innovation Office
Assure that Internet2 is consistently forward-looking as it operates its durable key programs—"know where the puck is going to be"…

US UCAN
Explore meaningful ways to provide benefit from Internet2's network beyond the core membership.

INTERNET2 GLOBAL ECOSYSTEM

Internet2 represents the US Research and Education network platform (both network and trust and identity) and as such, represents our community outside the United States where it is important to our members—in a globally networked ecosystem.
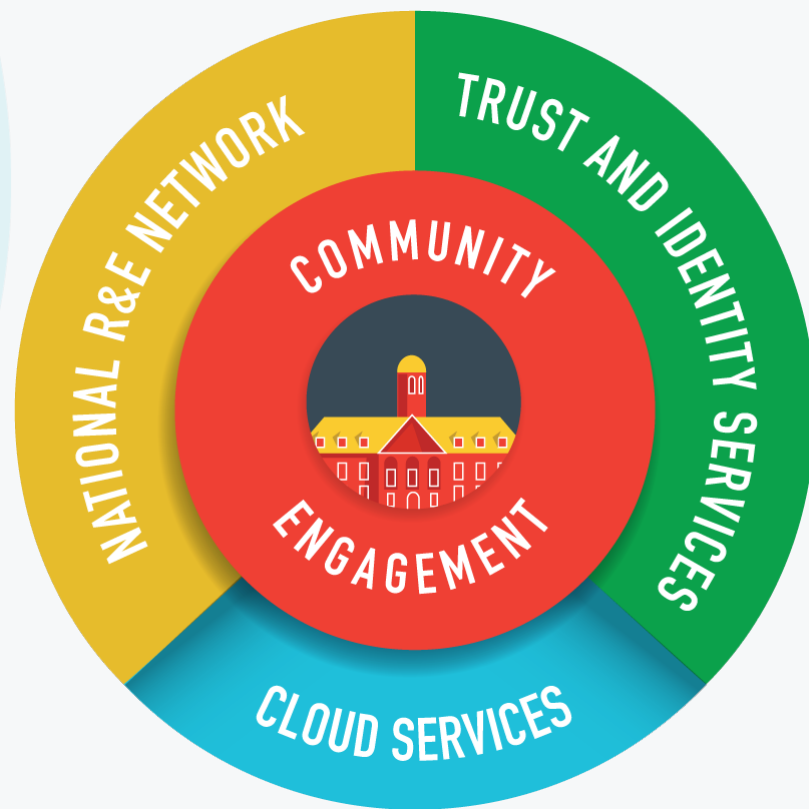
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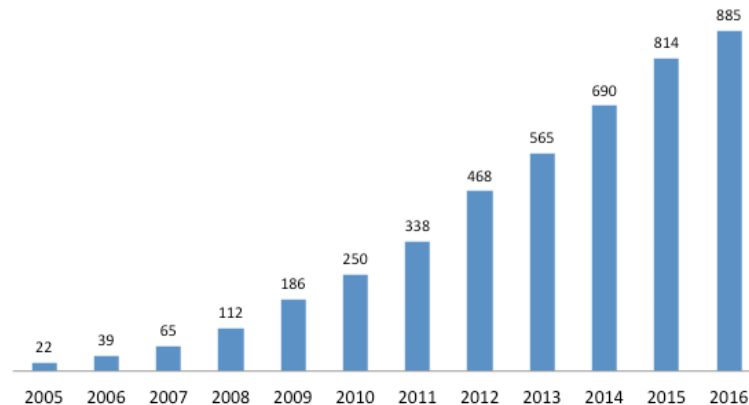
INCOMMON FOUNDATION FOR TRUST & IDENTITY

InCommon ®

→ **599+** Academic Participants

→ **250+** Sponsored Partners

→ **3200+** Registered Service Providers

10+ million individuals served by federated IdM

InCommon Participants Year-to-Year

Year	Participants
2005	22
2006	39
2007	65
2008	112
2009	186
2010	250
2011	338
2012	468
2013	565
2014	690
2015	814
2016	885

INTERNET2®

POWERED BY COMMUNITY

TIER: TRUST & IDENTITY IN EDUCATION & RESEARCH

InCommon®   COmanage™   Grouper™   Shibboleth®

THE STANDARD

THE STANDARD FOR OVER 700 HIGHER EDUCATION INSTITUTIONS AND COUNTING!

Secure, streamlined sharing of protected resources

Effective management of user identities and access

Delivery of an integrated portfolio of community-developed solutions

POWERED BY COMMUNITY

WHAT IS TIER ALL ABOUT? THE ENVIRONMENTAL CONTEXT

Many pieces are in place

- InCommon Federation
- Shibboleth for SSO authentication
- Grouper for authorization

Many pieces are evolving

- COmanage for managing collaborative tools
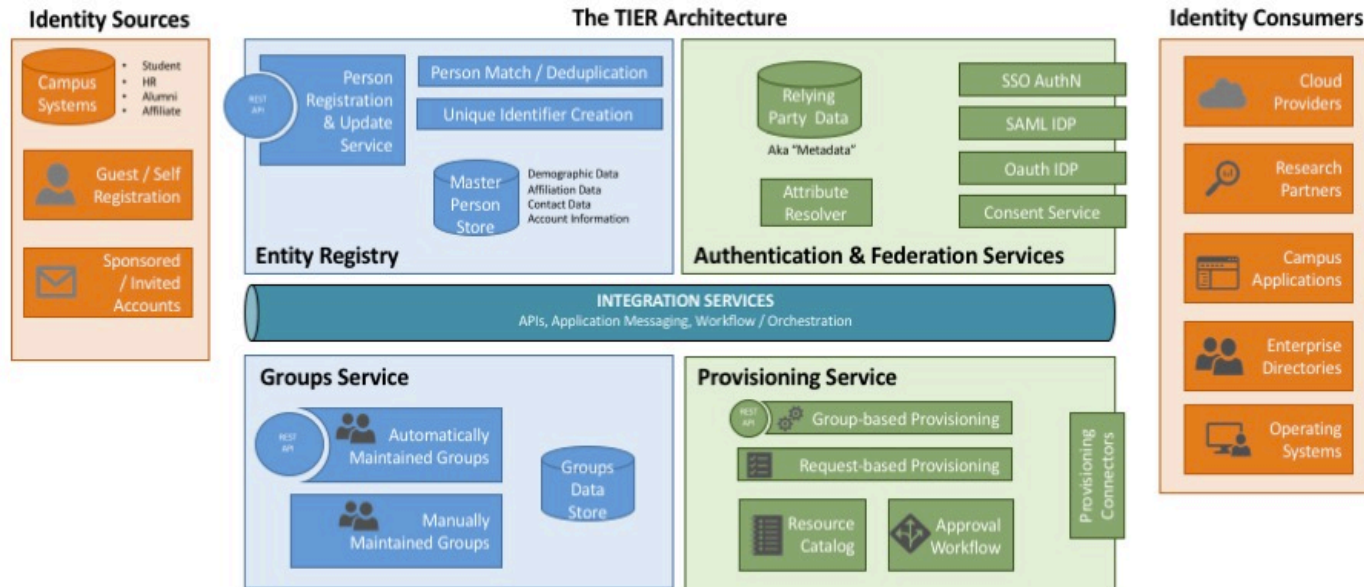- Scalable Consent for managing attributes at Internet scale

But the pieces…

are not consistently organized,

are not easy to configure, install, and maintain because they are fundamentally interoperable,

and have no ongoing support or development mechanisms

POWERED BY COMMUNITY

TIER REFERENCE ARCHITECTURE

INTERNET2 TOP PRIORITIES

National R&E Network
Designed for abundant bandwidth, zero congestion, capacity for innovation, and peered to global research and education networks reaching over 100 countries.

INTERNET 2®

R&E Community Investment in National-footprint Network Services (RECINNS)

POWERED BY COMMUNITY

INTERNET2 NETWORK INFRASTRUCTURE TOPOLOGY

COMMUNITY INPUT TO RECINNS EFFORT

Requirements gathering to date:

- Community wide Call for Papers issued in September 2016
- Face to Face Workshop of top papers in January 2017
- Working Groups established in two areas:
  - Academic Enterprise
  - Research Support

- In parallel, Regional principals met in January and prepared a paper for the Board outlining requirements of regionals going forward.

COMMUNITY INPUT TO RECINNS EFFORT

Next steps:

- Refine community input on requirements

- Target expanded input from comunity members from whom we have not heard

- Develop technical working groups
  - High level design
  - Define and manage experiments and pilots

INTERNET2 DDOS MITIGATION SERVICE

- Internet2 will provide a cloud-based volumetric Distributed Denial of Service (DDoS) Mitigation Service procured from a commercial service provider.

- Subscribers to the service will be able to direct attack traffic to the DDoS Mitigation Service provider, and carry the clean traffic back to them via a vlan on their existing Internet2 connection.

- The subscriber will have committed rate of 1G of clean return traffic AND be able to burst into 10G of 'clean pipe" service to which the community has subscribed.

POWERED BY COMMUNITY

INTERNET2 DDOS MITIGATION SERVICE

- Working with our technical community Internet2
  - Developed requirements for a cloud-based DDoS service
  - Iissued an RFP and solicited responses from six providers.
  - Reviewed responses and negotiated with 3 providers.

- We then convened a group of regional representatives to review the proposed business models.

INTERNET2 DDOS MITIGATION SERVICE

Provides coverage for commodity traffic and R&E traffic
  IPv4 and IPv6
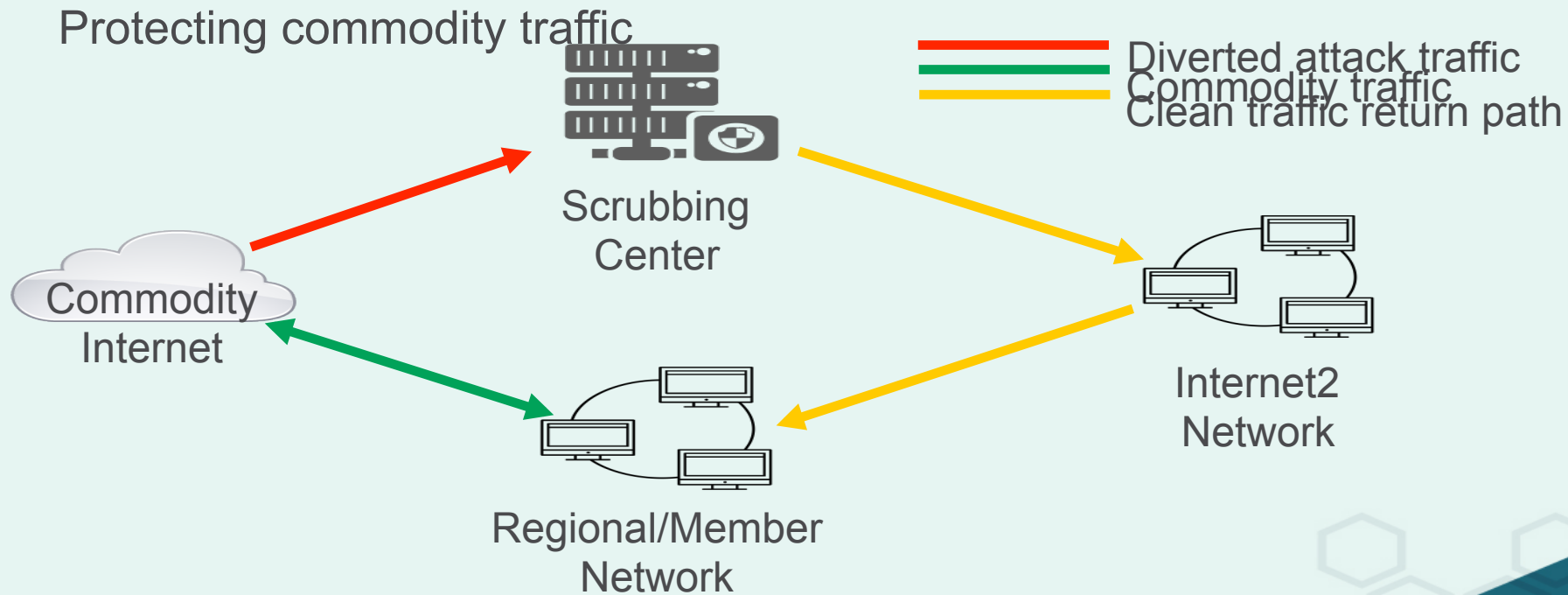 Coverage of unlimited assets/IP addresses

Traffic is returned via a vlan provisioned during service onboarding.

Scrubbing is signaled via eBGP peering with provider, or phone call to provider Security Operations Center (SOC)

Provider will announce /24 (IPv4) subnet globally to draw traffic to the scrubbing center and return to connector/campus

Internet2 DDoS Mitigation Service

Protecting commodity traffic

Scrubbing Center

Commodity Internet

Diverted attack traffic
Commodity traffic
Clean traffic return path

Internet2 Network

Regional/Member Network

INTERNET2

INTERNET2 DDOS MITIGATION SERVICE

- Plan to have connections to Internet2 in Sunnyvale & Chicago

- Each Subscriber will have access to Security Operations Center (SOC) portal and reporting capabilities

- Each Subscriber will have a vlan configured to their edge router(s)

INTERNET2 DDOS MITIGATION SERVICE

- Can provide service to 12 subscribers for an amount not to exceed $8,000 per month.

- 13-20 subscribers could reduce the fee even lower

- Each subscriber will have access to Security Operations Center (SOC) portal and reporting capabilities

  - Option for subscribers to allow Tenants beneath them to have access to the SOC and a direct VLAN for an additional monthly fee.

THANK YOU!

George K. Loftus
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