



# SINET 5 LAUNCH

## Global Network Architecture Overview

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# Global Network Architecture Overview

## Agenda

- Congratulations NII & SINET-5!
- Brief Internet2 Overview
- Global Network Architecture: Advancing research and education capabilities for researchers, educators and global collaborations

# CONGRATULATIONS!



## SINET5

Ultra high speed / low latency  
network throughout Japan



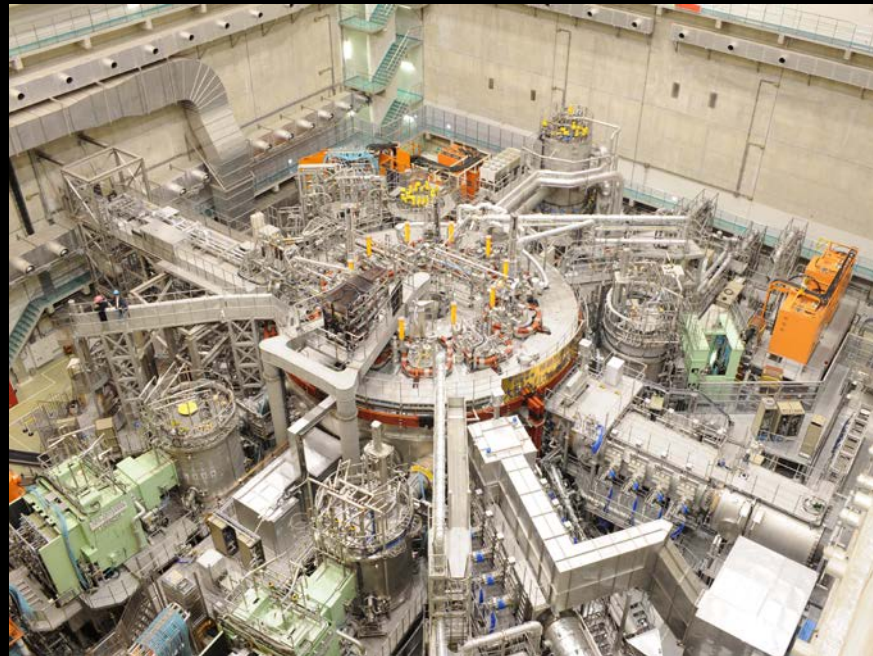
大学共同利用機関法人 情報・システム研究機構

国立情報学研究所

National Institute of Informatics

# CONGRATULATIONS!

- New 100Gbps national backbone provides extraordinary new fabric for national and global collaboration!
- Internet2 deeply values the leadership & collaboration with NII & SINET5 and all of our Japanese colleagues in supporting Global Research!



# About Internet2: An unparalleled human network



- Internet2 brings together thought leaders from member organizations and the broader research and education community
- Our community advances frontiers of network-enabled applications
- Our community accelerates innovation and enables transformation
- We deliver community led services at scale and at production quality



# Internet2 National Backbone





What an NREN wants to be able to say: We can provide advanced IP services and dedicated VLAN circuits research and education partners across the globe with the same reliability and services expected “at home”. We can also extend our research and cloud activities to our researchers anywhere in the world

## Global Services in Support of Research and Education



# Global connectivity, today







# This looks great, right?

- Simply having big pipes between countries perhaps is not enough?
- What matters now is:
  - Can you deliver the SERVICES your researchers and education teams require on a global end to end basis?
  - Is the operation consistent? Do you know who is responsible and what service levels they strive for?
  - Does our local national topology encourage others to see us as great place to interconnect with us and others?
- Recognition that nations must work together towards a consistent set of goals and build a system where these issues are addressed.

# GNA: Network Services

- Deterministic Services:
  - Guaranteed BW Service
  - Guaranteed BW Service with Bursting
- Non-deterministic Services:
  - Best Effort Service
  - Flow and IP Routing Separation
- Other Services:
  - Special Use & Innovation Enablement





# Global R&E Network CEO Forum

## Priority Area

- “Global Network Architecture – A well-defined, inclusive, global architecture for, and a roadmap towards, interconnecting the Research and Education Networks on a global scale, taking into account input from the large science & education projects”





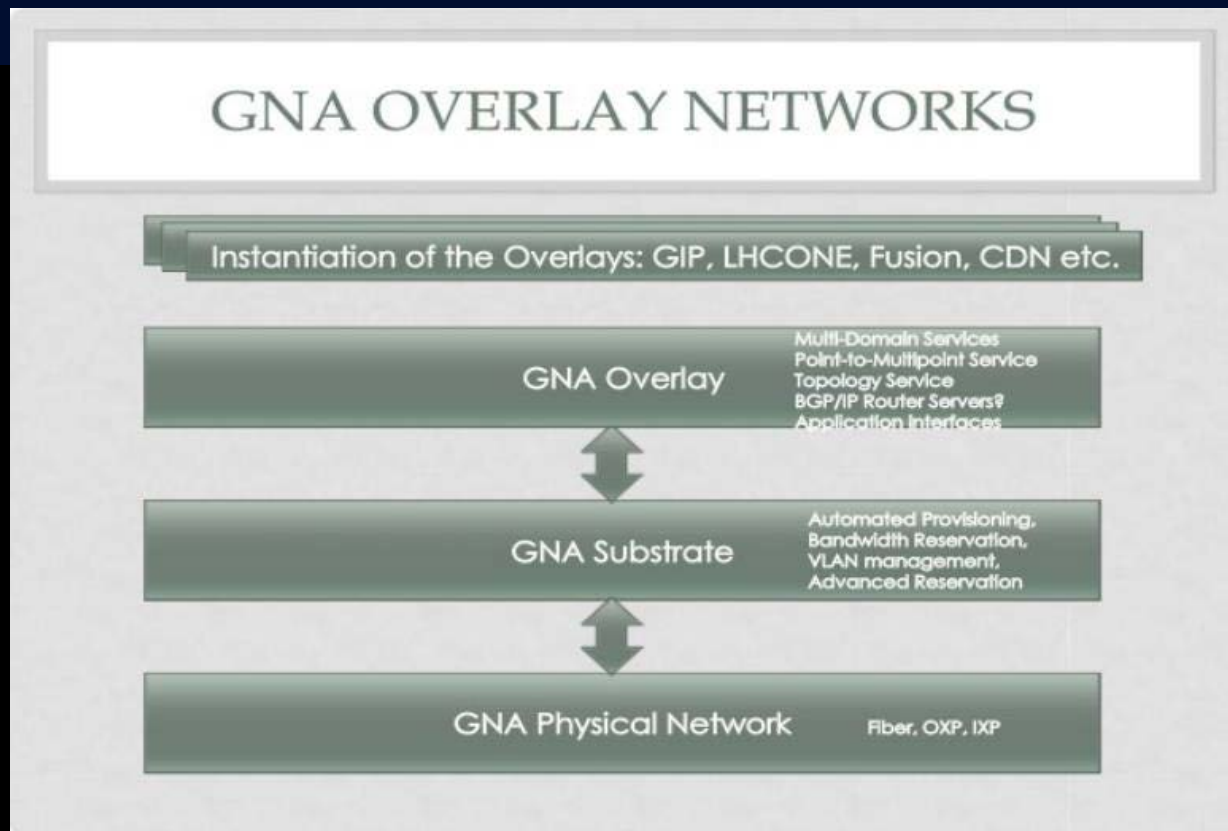
# Global Network Architecture (GNA)

- GNA Technical group:
  - Architecture Model
  - Open Exchange Points & Big Pipes
  - Federated Operations
  - Automation
  - The Commons
- Executive Action Team group: narratives & awareness



# Early GNA Architecture

GNA is a set of guiding principles that individual NREN's can use to build their own networks so that their portions can co-operate in end-to-end services in conjunction with other NREN networks.



Credit: Inder Monga (ESnet)



# Major Components & Key Functions

(if each investor follows this, all benefit)

## Exchange Points

- Non Blocking
- Open AUP
- Well Instrumented
- Ports & Speeds Required
- Supports Information Sharing
- Supports Link-Owner Policies
- Clear Privacy Policy
- Supports Cloud Services
- Supports Innovation Projects

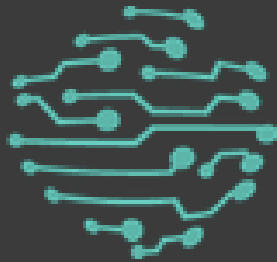
## Links

- Engineered for Resiliency
- Engineered for Diversity
- Capacity Reserved for Link Investor Interests
- Capacity Reserved for General Purpose R&E Use (The Commons)
- Coordinate availability with other link owners

## Operators

- 7x24x365 NOC Services
- Multilingual
- Proficient Engineering Support
- Participate in GNA Planning
- Communicate Roadmaps for their services

# GNA website



global network architecture

<http://gna-re.net/>

# Pathfinding Project

- ANA-200G
  - Governance
  - Cost sharing
  - Technical
  - Federated Operations
- Lessons Learned & Observations:
  - Plan for federated operations in a complex environment
  - Act locally and in –small- collaborations to move quickly





# ANA-200G: As of 2015

## ANA-200G: 100G Production Ring across North Atlantic for R&E


### Open Exchange Points & Links




- MAN LAN
- WIX
- NetherLight
- GEANT Open London
- Internet2
- TGN-Atlantic South
- NORDUnet/SURFnet
- Hibernia Atlantic

ANA-100G Production Network: A 100 Gbit/s production quality ring across the North Atlantic for Research and Education. Collaborators: Internet2, NORDUnet, CANARIE and SURFnet.




# In the Field Stories Global Blog

 In the field  
WITH RESEARCH & EDUCATION NETWORKS




ALL STORIES CATEGORIES R&E NETWORKS REGIONS SORT BY DATE



How this radio astronomer looks back in time

APRNET RADIO ASTRONOMY

Steven Tingey is passionate about designing and building radio telescopes in outback Western Australia and using them to look at the first stars and galaxies.




Improving the resilience of Raki's crop

RNP TEIN FOOD SECURITY

Asinire pore abores scid ultra volupscae. Et leoculus aut mos et velleso necore veritatem conet se odagario. Nam achsepsum et pro quo esantem rote facepud sarrata rivi cas ut facillut accul volorum re nargue arum in ipidi repellorum eum et ut dolat experiatu scupitid id quae poverit rlenatet pra quo volupet vid et...

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Exploring the universe with the world's largest telescope

GEANT RADIO ASTRONOMY

The Square Kilometer Array (SKA) project is an international effort to build the world's largest radio telescope, with a square kilometre (one million square metres) of collecting area. The scale of the SKA represents a huge leap forward in engineering, telescope design and research & development towards building and delivering a unique instrument.


READ MORE »




The first Chilean Virtual Observatory fires up

REDOLARA RADIO ASTRONOMY

The first Chilean Virtual Observatory (ChVO) (launched April 2015) is an astro-informatic platform for the administration and analysis of massive data coming from the observatories built across the country. Its implementation will provide advanced computing tools and research algorithms to the Chilean astronomical community. "This project is a major contribution for Chilean astronomers because besides being an excellent tool for exploring the huge quantity of astronomical data that will be generated in our country in the coming years, it opens new opportunities of interdisciplinary research." - Diego Mardones, an astronomer at Universidad de Chile.



Leading the way with virtual language and cultural exchanges



Joining forces to combat dengue fever

DINGAREN HEALTH

<http://www.inthefieldstories.net/>



*With well coordinated global network architecture, each national research and education network can enable its researchers for greater discovery, enable its educators to deliver reliable global services, and continue to enable the R&E community for greater innovation.*

# CONGRATULATIONS AGAIN!



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**SINET 5 Launch Event and GNA Discussion**