



Global Network Advancement: Today and Tomorrow

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Marco Teixeira (RNP), David Wilde (AARNet)

GNA-G Leadership Team



What is the GNA-G?

Global Lambda Integrated Facility



global network architecture



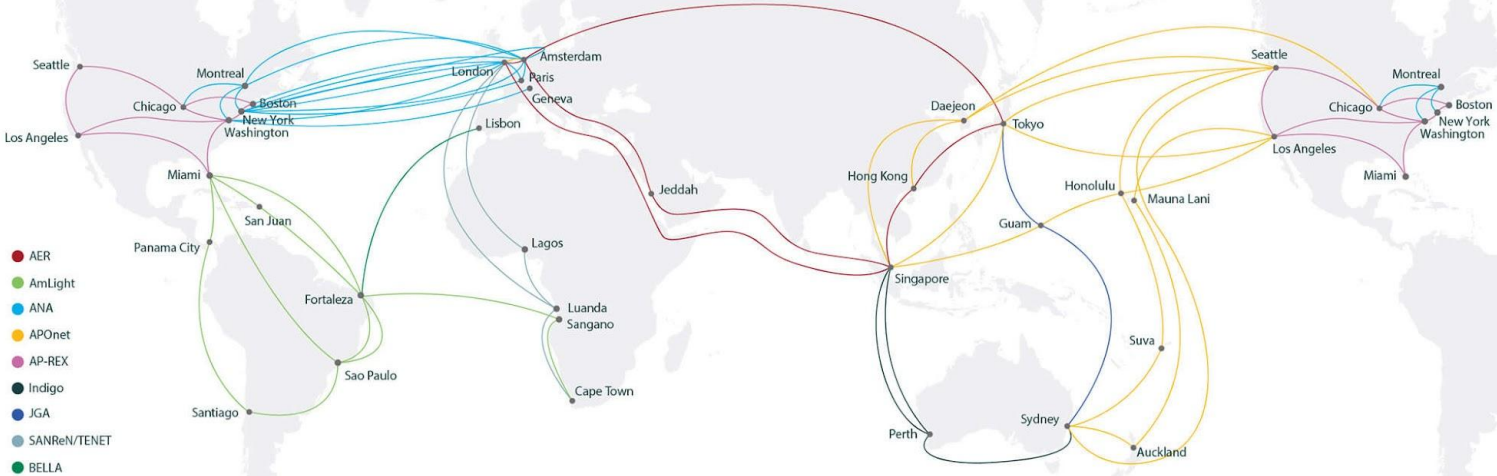
Global Network Advancement Group

Our vision



A unified, collaborative, global advanced network infrastructure

uniquely supporting the needs of research and education.



Our mission



The GNA-G:

- embodies a vision for international collaboration of the global research and education (R&E) networks

The Global R&E network:

- a large and diverse set of networks with differences in speed, accessibility, and capacity

GNA-G's purpose:

- to build on the work of GNA and GLIF to make interconnection of networks more effective for data-intensive research and education

Goals:

- Provide a **forum** which brings together researchers, National Research and Education Networks (NRENs), Global eXchange Point (GXP) operators, regional and other R&E providers;
- **Develop innovative architectures, services, and models** for more effective use of GREN resources;
- Provide **testbed resources** for the demonstration of future capabilities;
- Agree on a blueprint for aligning **equitable spending** on intercontinental bandwidth for greatest value;
- Advance **data movement** capabilities, **end-to-end experience** and **visibility**;
- **Promote awareness** of the capability, reach and connectedness of the Global R&E Network.

Communicate, Contribute, Collaborate



Motivation

- Gather experts worldwide around topics of their interest
- Provide a platform to:
 - **Communicate:** share information, experience, knowledge
 - **Contribute:** establish working groups around immediate opportunities
 - **Collaborate:** establish peer-liaison around common goals and initiatives
- Organise periodic community meetings
- Create knowledge base of (document, code...) repositories

GNA-G: What is it?

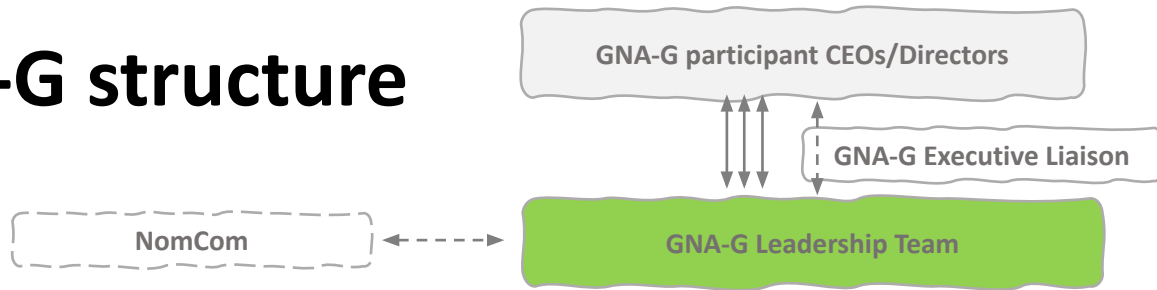


A forum for discussion
between operators,
researchers and key users
of the GREN

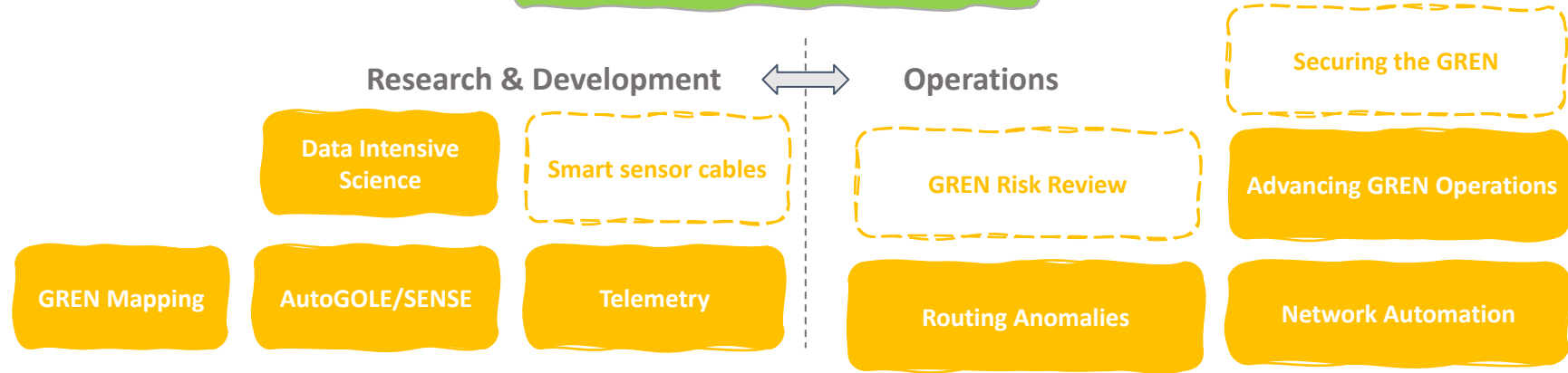
Action-oriented
Working-Groups

A global network
providing a testbed for
innovation

GNA-G structure



GNA Architecture v2.0



GXP Architectures & Services

GREN: Collaboration on the intercontinental transmission layer

Link consortia

- AER
- APR
- ANA
- AmLight
- ...

GNA-G - strategic pillars



A forum for discussion
Support for global big science & data intensive projects.
Engagement with international R&E network consortia

GNA-G - strategic pillars



GREN operations

- Global network architecture & services
- Coordinated operations
- Automation, orchestration
- Monitoring, reporting, GREN map
- Secure GREN; MANRS

A forum for discussion

**Support for global big science & data intensive projects.
Engagement with international R&E network consortia**

GNA-G - strategic pillars

GREN innovations

- Global test facility
 - *eg SC demos; P4 testbed*
- Innovative network services
- Data movement

GREN operations

- Global network architecture & services
- Coordinated operations
- Automation, orchestration
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A forum for discussion

**Support for global big science & data intensive projects.
Engagement with international R&E network consortia**

Strategic objectives



“To advance the Global R&E Network”

1. Provide a forum to bring together network operators, exchange-point operators & researchers
2. Improve operational maturity of the GREN globally
3. Deliver innovative capabilities, services and testbeds to maximise usage of the network
4. Provide focused support for big science projects & data intensive research
5. *Increase security maturity (planned)*
6. *Increase awareness of GNA-G (planned)*

How can you get involved?

Join a working-group

<https://www.gna-g.net/working-groups/>

Contribute your thoughts & ideas at the next meeting/VC:

<https://www.gna-g.net/meeting/>

Reach out to the Leadership Team

Web: <https://www.gna-g.net/contact-us/>

Email: leadershipteam@lists.gna-g.net

The GNA-G Leadership Team



Ⓞ **David Wilde, Chair**

AARNet (Australia)



Ⓞ **Harvey Newman**

Caltech (USA)



Ⓞ **Buseung Cho**

KISTI (South Korea)



Ⓞ **Ivana Golub**

PSNC (Croatia/Poland)



Ⓞ **Marco Teixeira**

RedCLARA (Latin America)



Ⓞ **Alex Moura**

KAUST (Saudi Arabia)

Next GNA-G meeting



Securing the GREN:

Tue, 27 June 2022: 8pm - 10pm UTC

More info:

<https://www.gna-g.net/attend-a-meeting/gna-g-community-vcs-q2-2023/>



Thank you



Additional slides

GNA-G Working Groups

- AutoGOLE/SENSE
- Data Intensive Science
- GREN Connecting Offshore Students - closed in Feb 2023
- GREN Map
- Network Automation
- GNA-G Routing WG
- GREN Engineering Advancement - **NEW** from Feb 2023
- NomCom

Proposed in Feb 2023:

- Subsea cable sensing and smart cables
- Securing the Global R&E Network

AutoGOLE/SENSE

- AutoGOLE = **Automated Global Lambda Integrated Facility (GLIF) Open Lightpath Exchanges**
- SENSE = **Software-defined Network for End-to-end Networked Science**
- **Intelligent network services for Science Workflows**
- **Collaboration of open exchange points and R&E networks to deliver services end-to-end in a fully automated way using Network Service Interface Connection Service (NSI-CS)**

Objectives:

- **Delivering automated network (de)provisioning on the trans-Atlantic ANA fibre system**
- **Researching and Implementing of SENSE within the AutoGOLE networks, exchanges and end points**
- **Building a persistent infrastructure for science on top of dedicated connectivity, NSI and SENSE**

WG Chairs: ESnet, KISTI, RNP, SURF

Data Intensive Science

- Collaboration between science and network communities on addressing the growing demand for network—integrated workflows, cross-institution data management, automation, resource management, etc.

Objectives:

- Share, deploy, develop tools and services, provide a forum to support science programs across network and science communities
- Looks for new tools and services, new modes of R&E network operations
- Moving towards (globally) federated infrastructures including networking, compute and storage

WG Chairs: Caltech, ESnet, AmLight/FIU

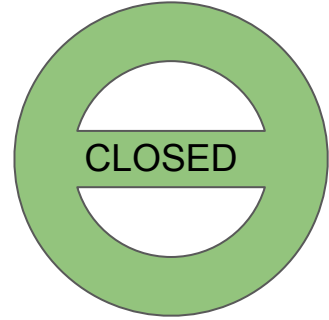
GREN Connecting Offshore Students

- GREN = Global Research and Education Network
- Investigate whether a collaborative international effort can deliver improvements in performance and/or lower costs for network connectivity to support teaching, learning and research for international users.

Objectives:

- Review delivery of services
- Investigate feasibility
- Identify performance improvements of capacity for connectivity and peering

WG Chairs: AARNet, Jisc, CANARIE



GREN Map

- Guiding the development of a unified system for visualizing the high-level connectivity of and participation in the community of R&E networks around the globe
- Achieving a dynamic visualization, without maintenance activities
- A joint development of a reference data model used also for other visualizations

Objectives:

- Provide dynamic visualization of the GREN that is perpetually up-to-date without requiring parallel data collection and maintenance activities

WG Chairs: CANARIE, GÉANT

Network Automation

- Develop a catalogue of tools to drive automation in network configuration, security auditing, change control activities and intra-domain automation activities
- Facilitate collaboration on common tools and practices

Objectives:

- Create a standardised glossary of network automation tools
- Create and maintain a catalogue of network automation tools
- Set up network automation training
- Identify a common set of network automation activities each NREN could re-use
- Identify common APIs that NRENs use
- Identify and agree on a common API set for communicating between NRENs

WG Chairs: AARNet, SURF

GNA-G Routing WG

- Optimal data routing, good performance, determined/expected data paths in single and multi-domain networks
- Engages network owners and NRENs to discuss and address ineffective routes and act proactively across community to systematically create policies to prevent ineffective routes

Objectives:

- **Engineering** – promoting and supporting advanced tools to identify and resolve routing issues
- **Collaboration** between network owners and operators to resolve network issues
- **Policy** – collaboration with higher-level networking operators to detail their routing policies and be able to check if the traffic follows the policy

WG Chairs: Indiana University, AARNet

GREN Engineering Advancement WG

- The aim of this workgroup pioneer, try, test, experiment with solutions to better/more efficiently/redundantly run services over links part of the GNA-G.

Objectives:

- **To enhance operation** on systems between production networks.
- Effective and efficient **multi-domain** service orchestration.
- Disseminate gather knowledge and work results.

WG Chairs: SURF

Securing the Global R&E Network

- The aim of this group is to **increase the security maturity of the R&E network operators.**

Objectives:

- **Develop a** basic recipe or **set of recommended security practices**, similar to the approach taken by MANRS, which all R&E networks can implement in order to increase their security maturity.
- **Develop a simple measurement and reporting mechanism** including a standardised risk matrix and quarterly GREN security scorecard, so that each network who implements these security improvements can demonstrate that they have measurably improved.
- Facilitate and track the **implementation of these recommendations across the GREN**, providing assistance where possible.
- Identify associated **security-related groups** and set up ongoing **communication** and coordination.

Proposed WG Chairs: GÉANT, AARNet

NomCom

- **NomCom = The Nominations Committee**
- **Differs from other working groups**
- **Gathers in November of every odd calendar year to nominate candidates to serve on the leadership team**
- **Consists of volunteers from the GNA-G community**

Objectives:

- **Elect members of the GNA-G Leadership team**



Global Network Advancement Group

Thank you