Global Network Advancement: Today and Tomorrow

David Wilde
(Chair, GNA-G Leadership Team)
What is the GNA-G?
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 (“GREN”):
- 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, computer & network scientists, 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.
Some questions we seek to answer

Can we clearly articulate the unique value of the GREN?

➢ How is it better than the commercial internet?

➢ How much is appropriate for each participating org to invest in it? What happens if we don’t invest?

➢ How can we assist less well resourced regions?

➢ Conversely, how can we ensure we’re supporting key “big science” projects?
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
GREN: Collaboration on the intercontinental transmission layer

Telemetry
Data Intensive Science
AutoGOLE/SENSE
Telemetry
Routing Anomalies
Smart sensor cables
GREN Risk Review
GXP Architectures & Services
GNA-G participant CEOs/Directors
GNA-G Executive Liaison
GNA Architecture v2.0
GNA-G Leadership Team
Research & Development
Operations
Securing the GREN
Advancing GREN Engineering
Network Automation
NomCom
GNA-G structure
GNA-G
Global Network Advancement Group
GNA: Architecture v2.0
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.
A forum for discussion.
Support for global big science & data intensive projects.
Engagement with international R&E network consortia.

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

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. 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
6. Increase awareness
How can you get involved?

Join the GNA-G “all” mailing list
https://lists.gna-g.net/postorius/lists/all.lists.gna-g.net/

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
Say g’day to the 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)
Thank you

Next Community VCs:
Tue 16 April 8-10pm UTC / Thu 18 April 6-8am UTC

Next in-person meeting:
Mon 10 June 2-5.30pm - TNC24, Rennes France
Additional slides
GNA–G Working Groups

- AutoGOLE/SENSE
- Data Intensive Science
- GREN Map
- Network Automation
- GNA–G Routing WG
- GREN Engineering Advancement
- Securing the GREN
- NomCom

Proposed:
- Subsea cable sensing and smart cables
- GREN vulnerability risk review
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
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, Internet2, ESNet
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
Thank you