



The Global Network Architecture: Shifting Gears on Intercontinental Research Networking



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Agenda



global network architecture

1. Introductions
2. The Works of the GNA Technical WG
3. Zooming in on the Architecture
4. Making the GNA Tangible
5. Conclusions and Q & A



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- 5 independent NRENs, tradition for collaboration
- NORDUnet: regional network, international connection
- 25+ year history
- 1 million users
- Annual budget: About 20 Million \$
- NORDUnet incorporated, owned equally by NRENs, funded by NRENs



How this radio astronomer looks back in time

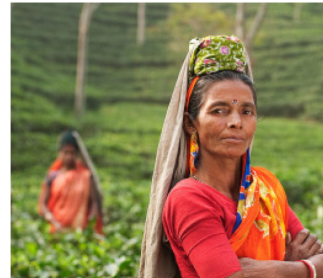
AARNET RADIO ASTRONOMY

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

The first Chilean Virtual Observatory fires up

REDCLARA RADIO ASTRONOMY

The first Chilean Virtual Observatory (ChiVO) (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.



Improving the resilience of Raki's crop

RNP TEIN FOOD SECURITY

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READ MORE »



Leading the way with virtual language and cultural exchanges



Exploring the universe with the world's largest telescope

GEANT RADIO ASTRONOMY

The Square Kilometre 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 »



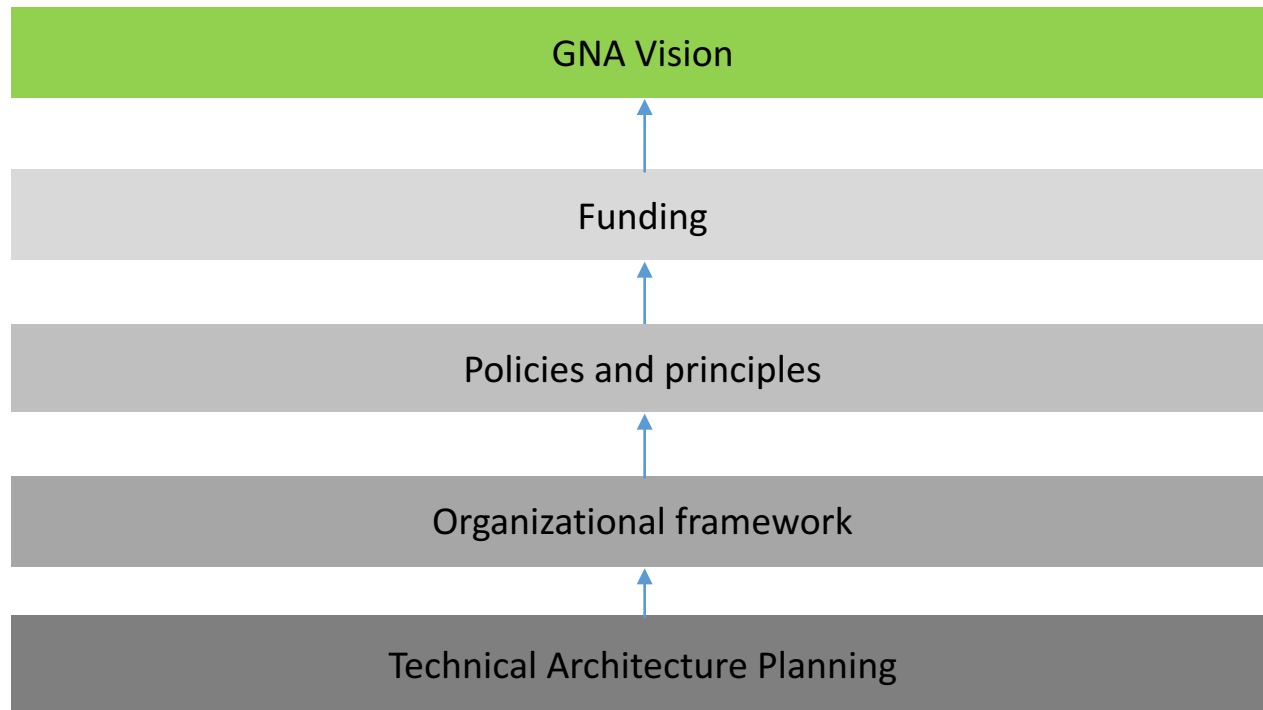
Joining forces to combat dengue fever

SINGAREN HEALTH

1. Dimensions of GNA



global network architecture



The Vision & Mission of GNA global network architecture

The GNA Vision:

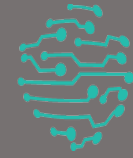
- Globally Connecting Science, Research & Education

The GNA Mission:

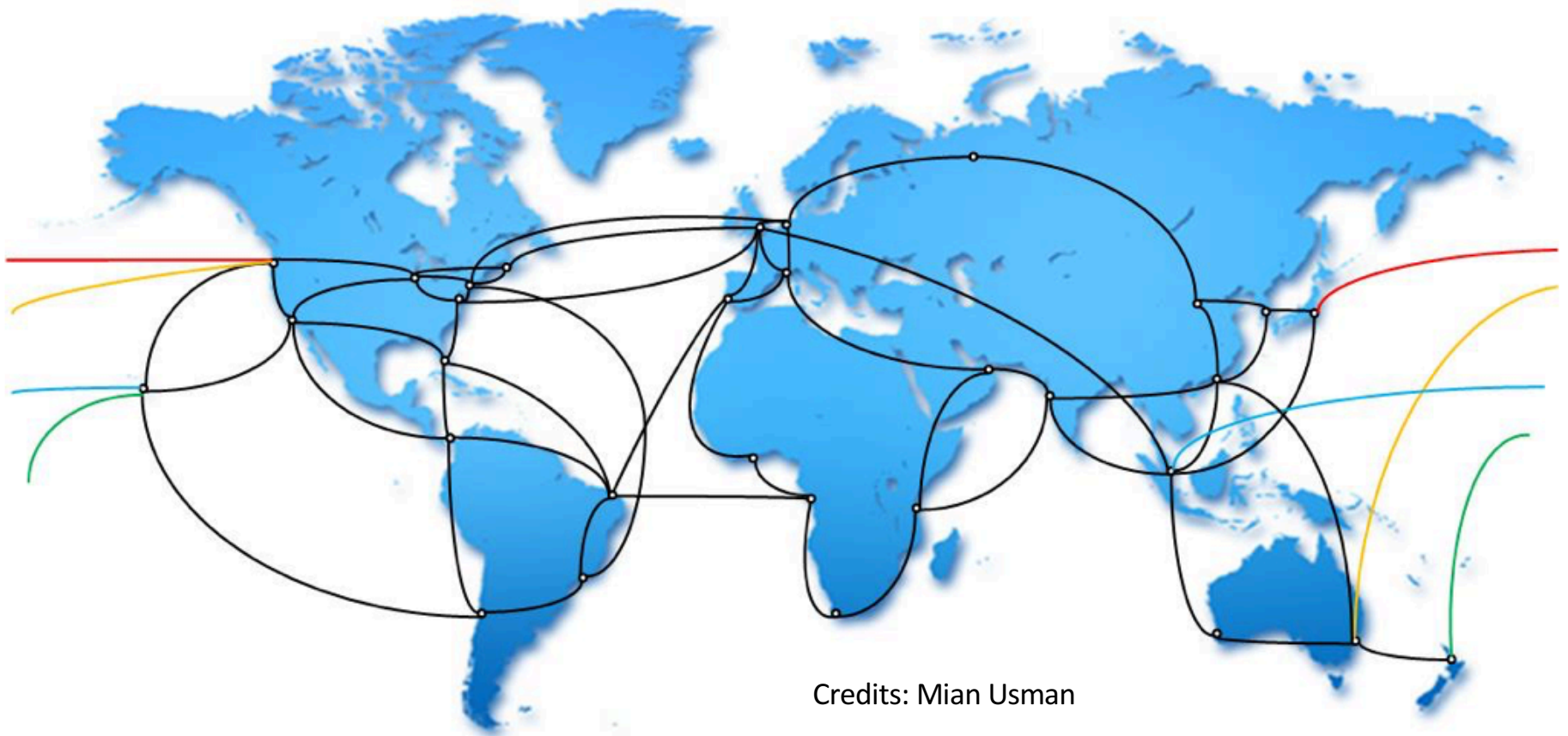
- Creating an inclusive “architecture” to increase collaboration and resource sharing between the global R&E community maximizing utilization of funds
- Developing an aspirational blueprint that R&E Networks can use to align their investments in intercontinental circuits



An Artist's Impression



global network architecture



Credits: Mian Usman



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- Network engineers from R&E Network organizations around world (Europe, Australia, North & South America, Asia, and Africa), working on:
 - Architecture documents
 - Network Services Definitions
 - Information Architecture Framework
 - White Papers (The Commons, Global Virtualization Architecture)
- Creation of publicly reviewed framework documents
- Web site (background and documents)

http://gna-re.net/



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MEMBERS LOGIN

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HOME ABOUT OUR PLAN **RESOURCES** MEETINGS GET INVOLVED

White paper:
Global R&ENetwork Architecture Program

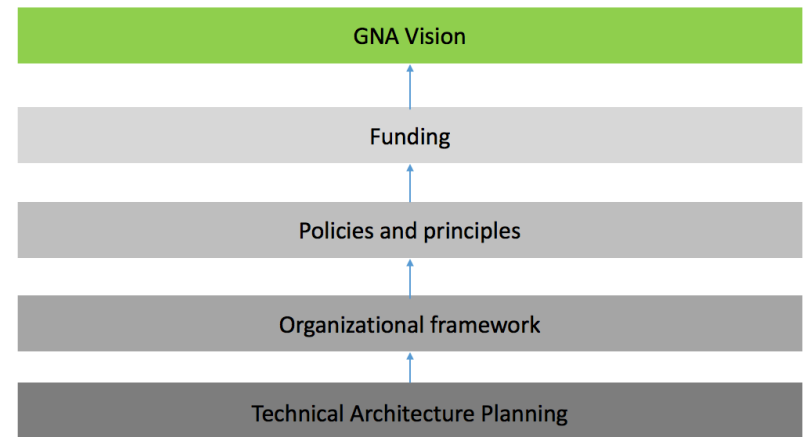
FIND OUT MORE

Developing a blueprint for global
R&E network architecture

The background features a blurred image of network cables plugged into a switch or patch panel. Below this, there is a faint world map with teal lines connecting various geographical locations, symbolizing a global network.

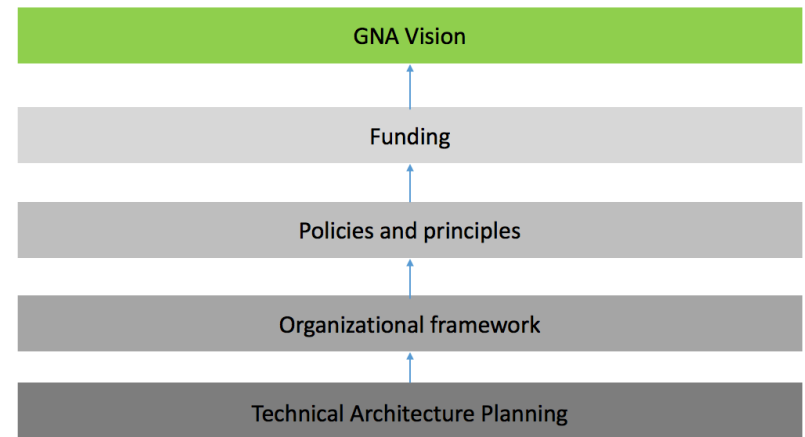
Six Architecture Documents global network architecture

- Reference Architecture
- Exchange Points
- Network Services
- Operations
- AUPs
- Privacy





- Network Transport Service
- Monitoring & Measurements & Trouble Tickets
- Encryption
- Security





- End of Calendar Year 2016:
 - Six Architecture Documents stable
 - Four Services Documents stable
 - White Paper on Commons stable



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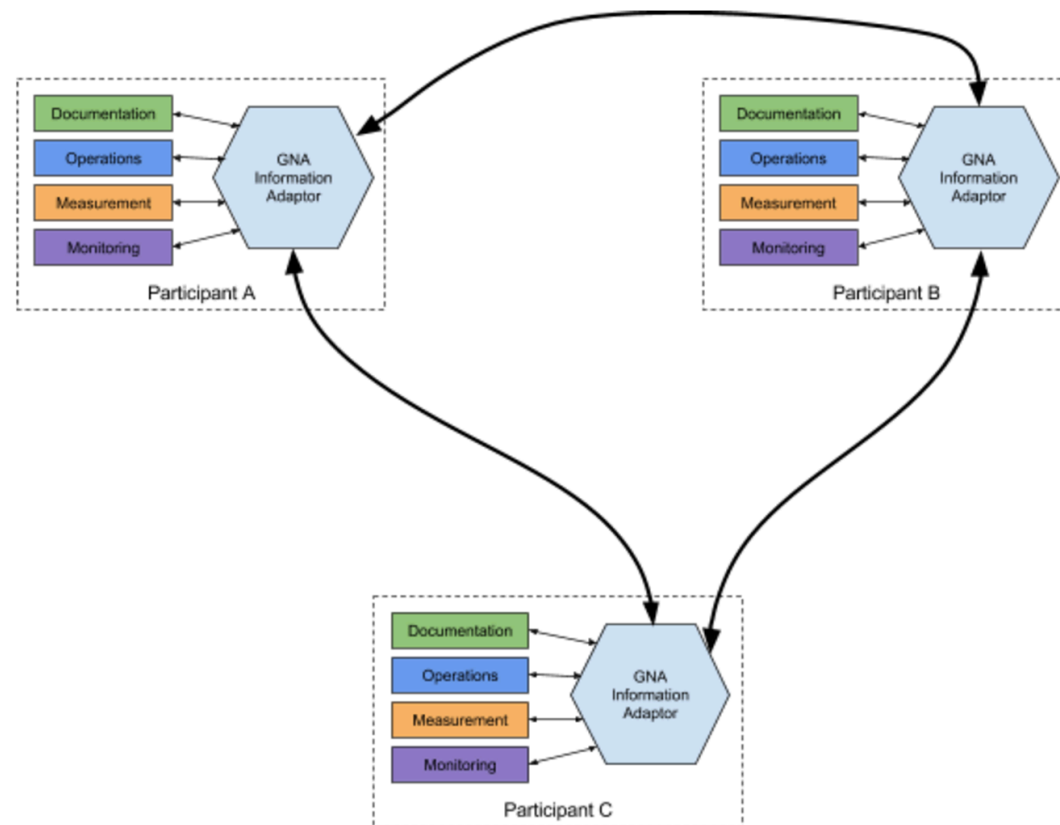
- No rocket science, but coordination on:
 - Technology
 - Topology
 - Bandwidth acquisition
 - Key components:
 - Exchange Points
 - Fat pipes
 - Networks serving R&E organizations
- Service Aspects:
 - The Commons
 - Deterministic Services
 - Virtualization



- Idea derived from the concept of Common Land in medieval English Law
- In the GNA this is about Shared Capacity:
 - Fairly
 - Efficiently
- Making explicit a fundamental feature of NREN collaboration and the development of the Internet
- Continuing work on the existing white paper
- If we all contribute a little to the Commons we all benefit



- “Towards an Information Architecture for the GNA” v0.6
- Currently a draft architecture document
- Planned to be tested in real life

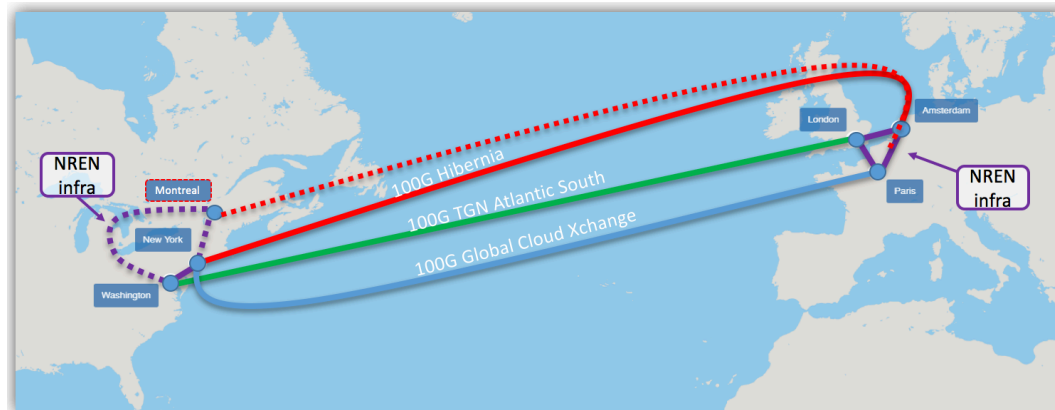


Federated Operations



global network architecture

- Interworking NOCs
- NOCs of the Exchange Points front and center to the operations
- Example:
 - NORDUnet link in ANA



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Opportunities for Exchange Points



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- Cape Town Exchange Point:
 - Implementation underway
 - And London – Cape Town bandwidth
- Montreal Exchange Point:
 - And Onwards to Chicago (StarLight) and the North American West Coast
- NOX-HEL, the Exchange Point in Helsinki
 - A possible gateway to the East
- Guam Exchange Point:
 - AARNet, Internet2, Asian NRENs, and others working together, including plans for additional 100G lambdas

Making the GNA Tangible

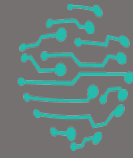


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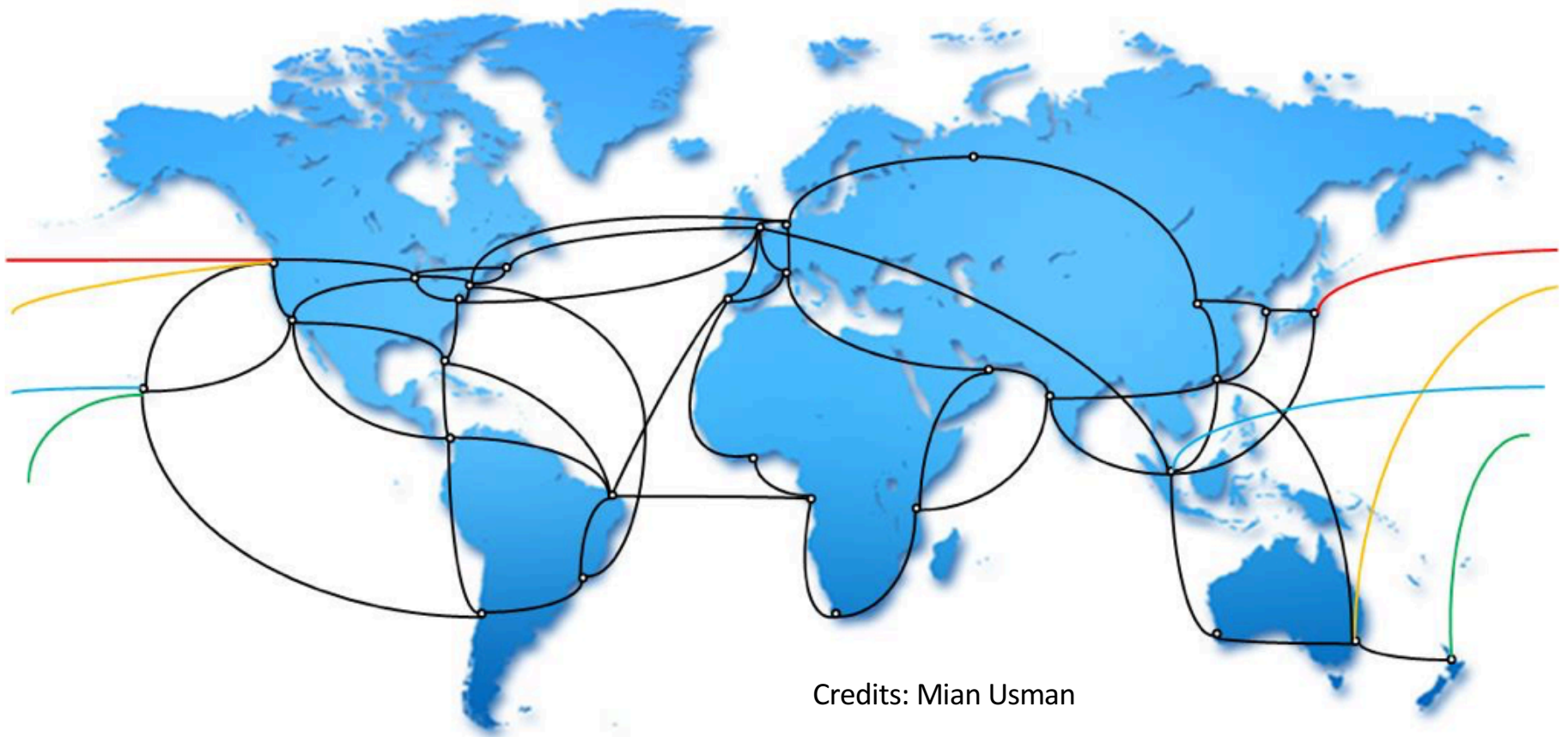
- ANA-300G is running production for 1.5 years+
- Expansion to the east, west and south deemed low hanging fruit
- Aim: Creation of infrastructure based on GNA principles and architecture, version 1.0, with “Round 1” ambitiously set for Q1 2017



An Artist's Impression



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Credits: Mian Usman

GNA Animation (local)

GNA Animation (online)



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Conclusions (and Q & A)

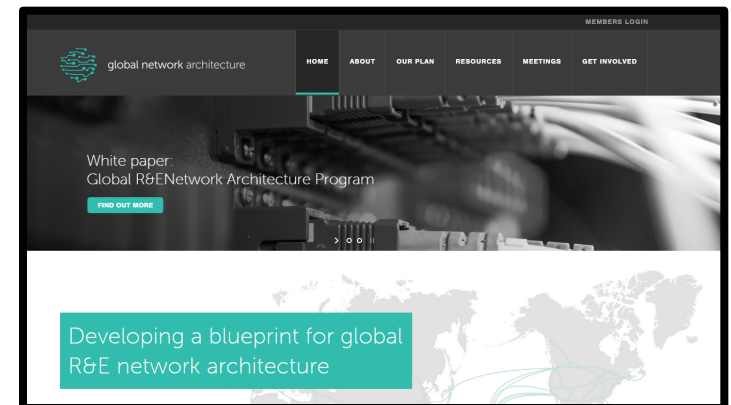


global network architecture

- The GNA work is progressing
- Excellent to see progress on Exchange Points in Africa
- Africa's further input is welcome!
- Towards a more coordinated, inclusive and ambitious global interconnect for Research & Education

GNA Website:

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



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



global network architecture

The screenshot shows the website's navigation menu with 'RESOURCES' circled in red. Below the menu is a banner for a white paper on R&E network architecture, and a section about developing a blueprint for global R&E network architecture over a world map.

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HOME ABOUT OUR PLAN **RESOURCES** MEETINGS GET INVOLVED

White paper:
Global R&E Network Architecture Program

FIND OUT MORE

Developing a blueprint for global
R&E network architecture



Thank you! Questions?

Please contact the presenter for more information:

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bos@nordu.net



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