

# COLLABORATING FOR CONNECTIVITY AROUND THE GLOBE

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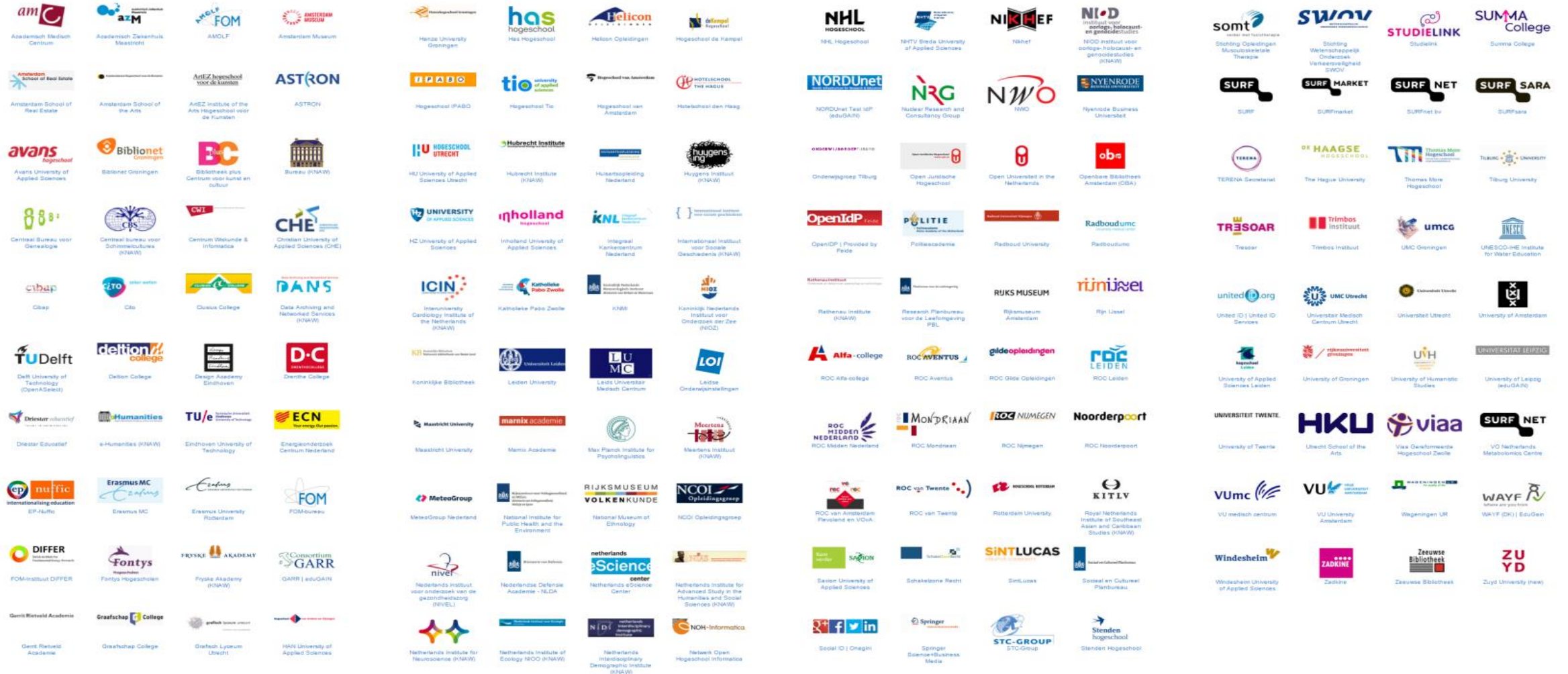


**SURF**

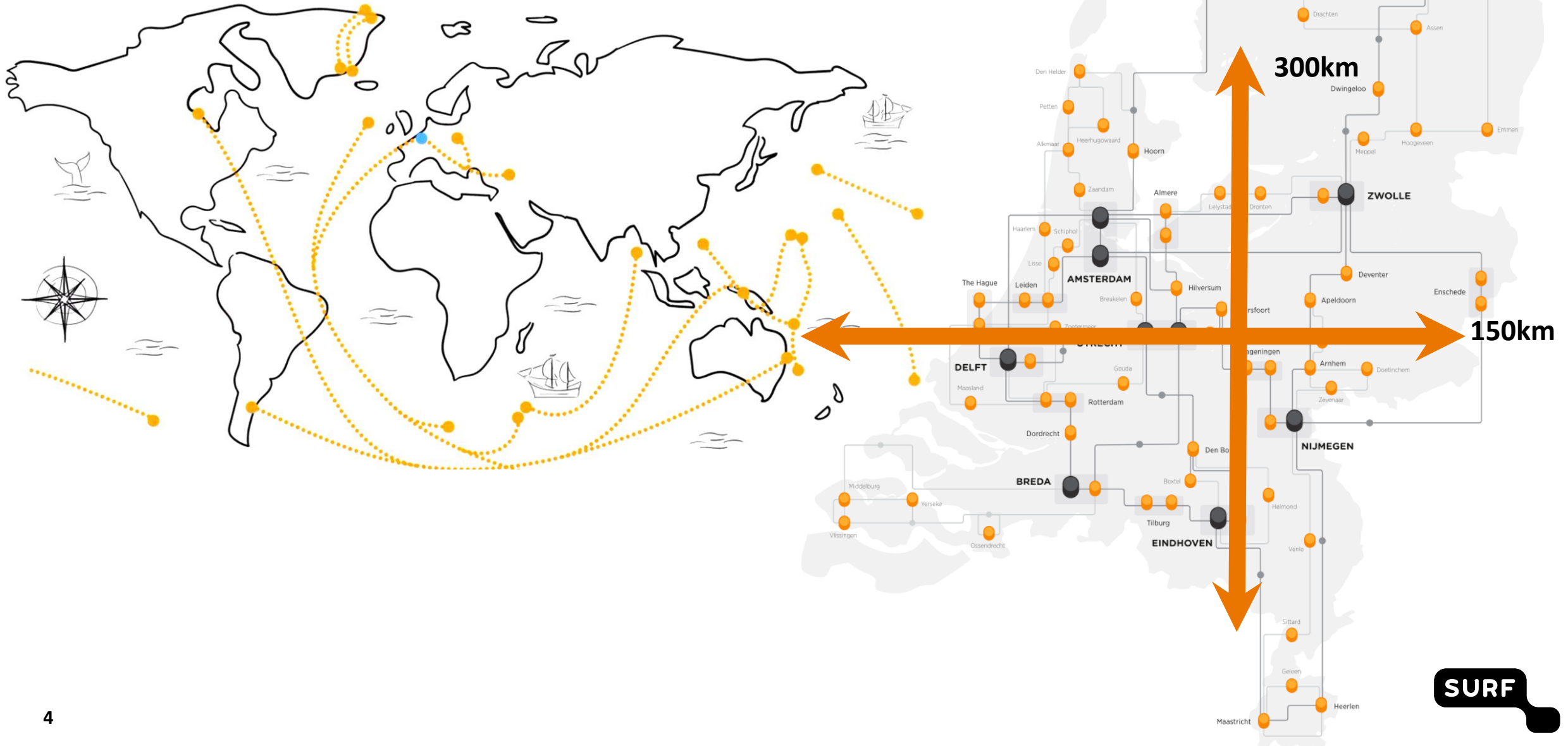
# An introduction to SURF



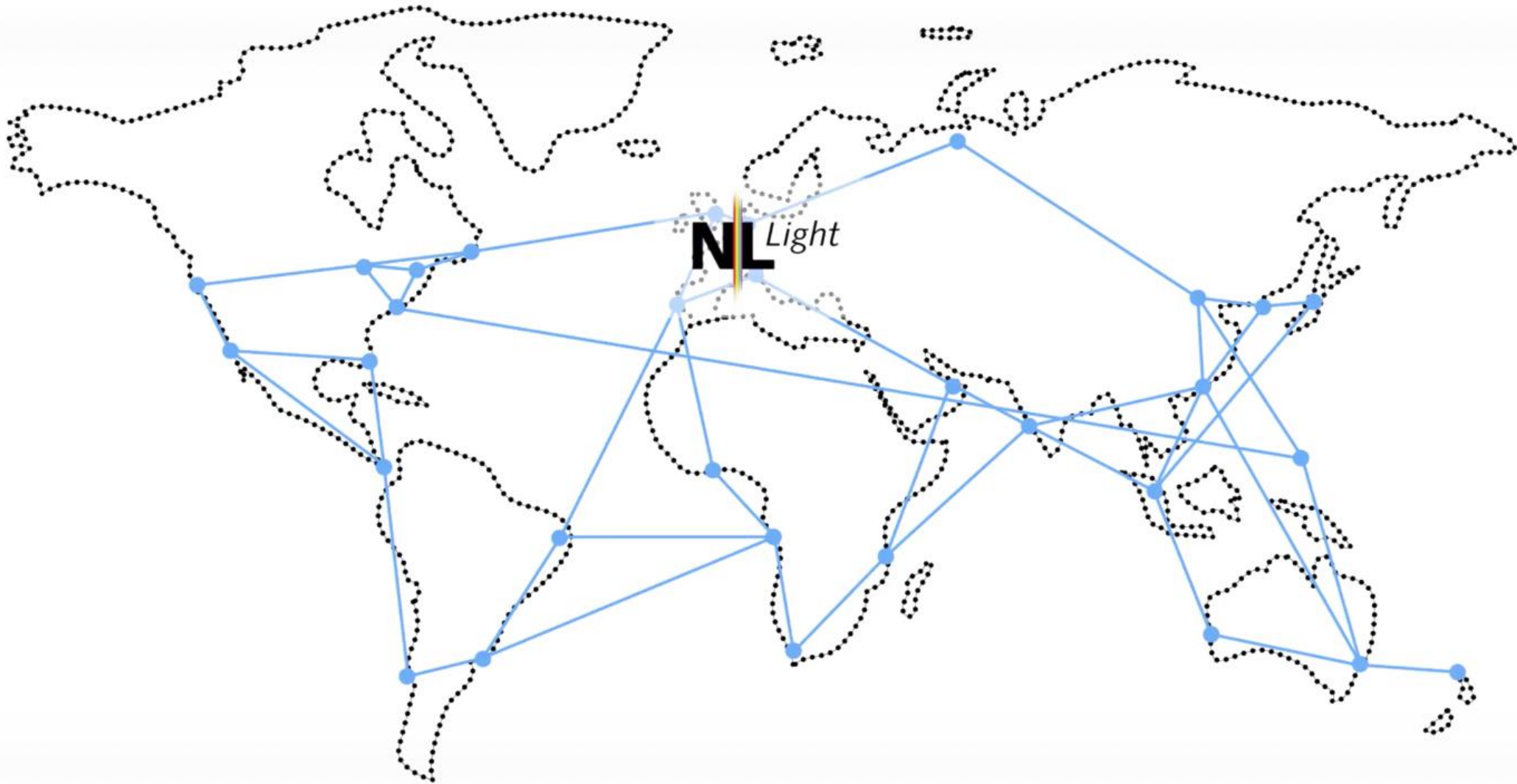
# 180 connected institutes



# The SURF network



# The need for a Global Network Architecture (GNA) to build the Global Research and Education Network (GREN)





## Resources & Downloads

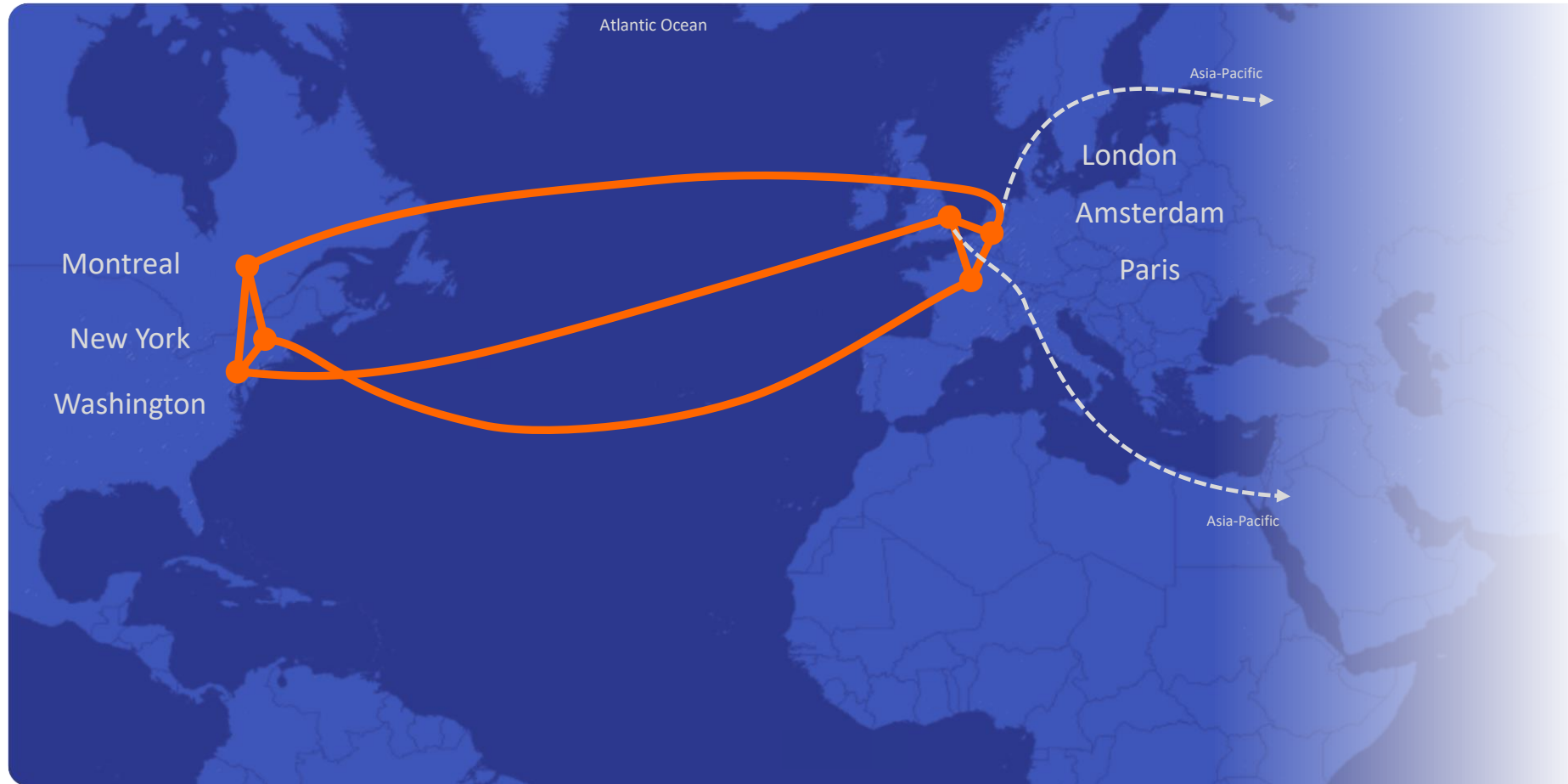
### GNA Reference Documents v1.0 – January 2017

The GNA Technical Working Group produced six documents that together are the **Global Network Architecture Reference v1.0**. These documents were published in January 2017:

- [GNA Reference Architecture v1.0](#)
- [GNA Exchange Point Specifications v1.0](#)
- [GNA Multi-Layer Transport Services v1.0](#)
- [GNA Operations v1.0](#)
- [GNA Technical Notes v1.0](#)
- [GNA Glossary v1.0](#)

# Europe to North-America

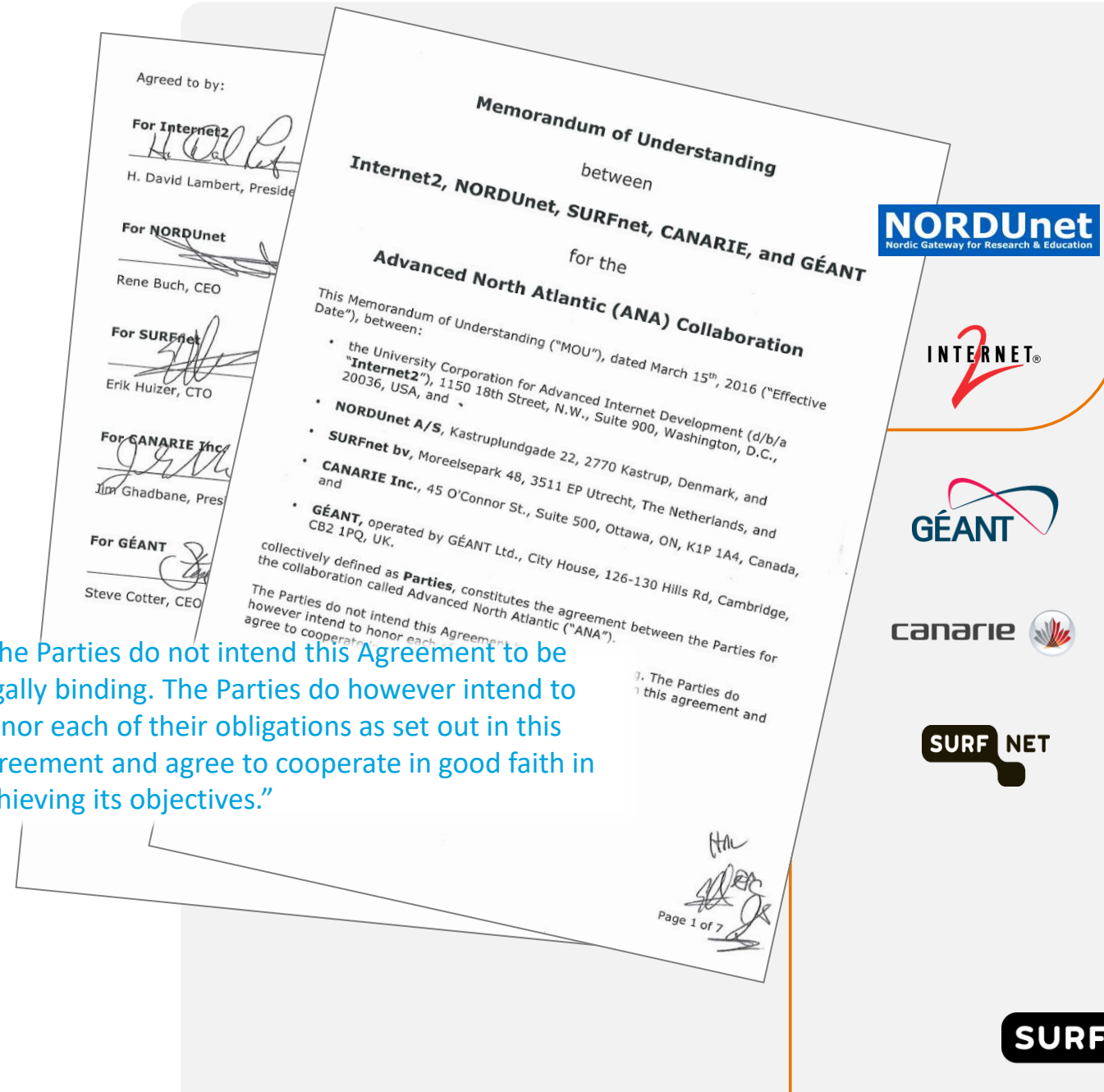
# The pathfinder: Advanced North Atlantic (ANA-300G)



# ANA-300G – Memorandum of Understanding (MoU)

## Scope of the Collaboration

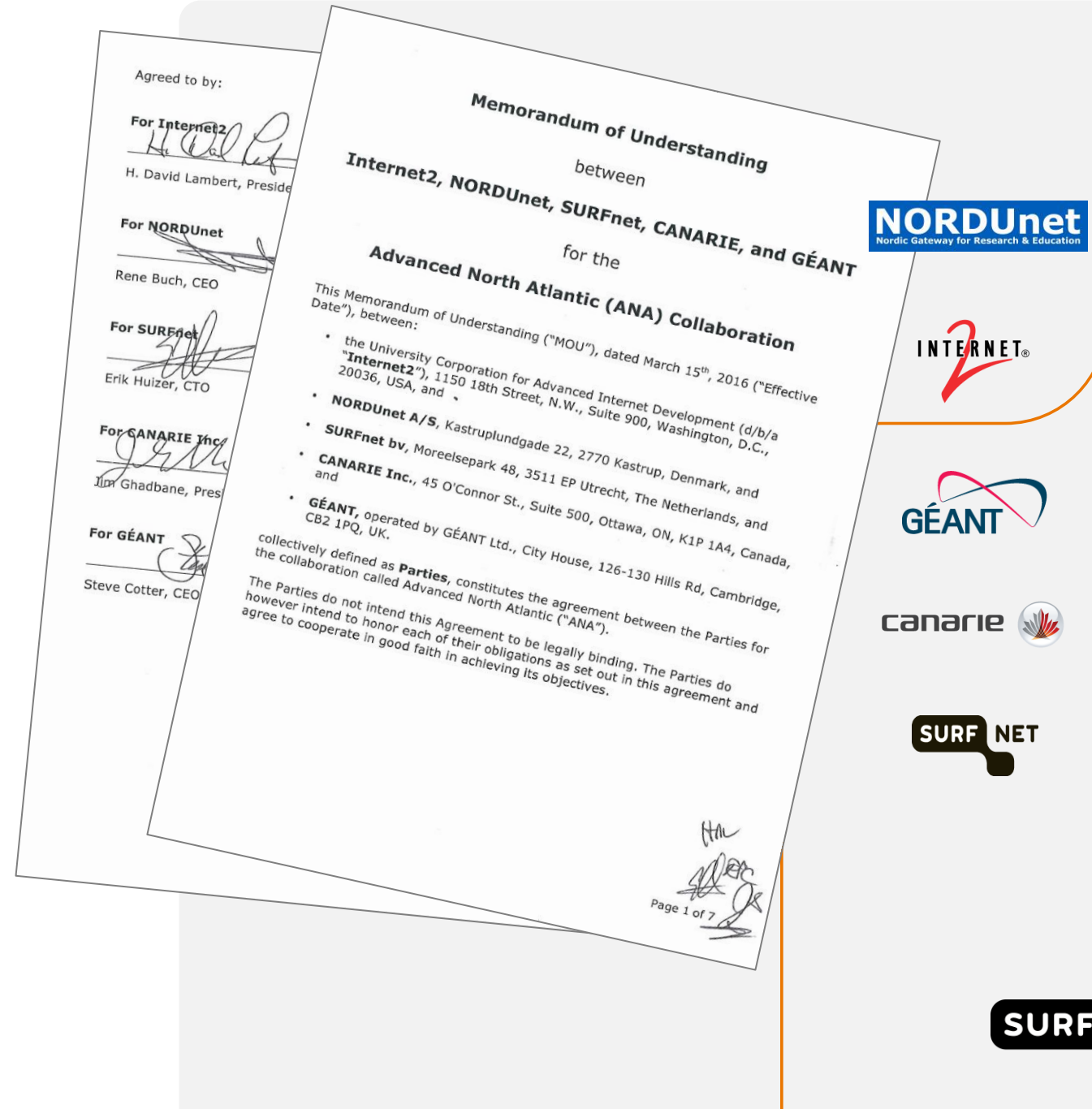
1. Network Interconnection  
Through Global Exchange Points, the parties will jointly operate 100 Gbit/s interconnects between their networks
2. Joint Network Research
3. Joint Application Development
4. Cooperation
5. Back-up Traffic  
With other parties to improve resilience



# ANA-300G – Memorandum of Understanding of Understanding

## We agreed

- Governance
- AUP
- The duration of the collaboration
- Procedures for leaving the collaboration
- Procedures for enlarging the collaboration
- Procedures for External Communications
- How to handle Confidential Information
- How to share the cost



# Collaboration with ESnet, NII & NEAAR in an other MoU

## Scope of the collaboration

### 1. Network Interconnection

Through Open Exchange Points, the Parties will jointly operate 100 Gbit/s interconnects between their networks

### 2. Capacity sharing

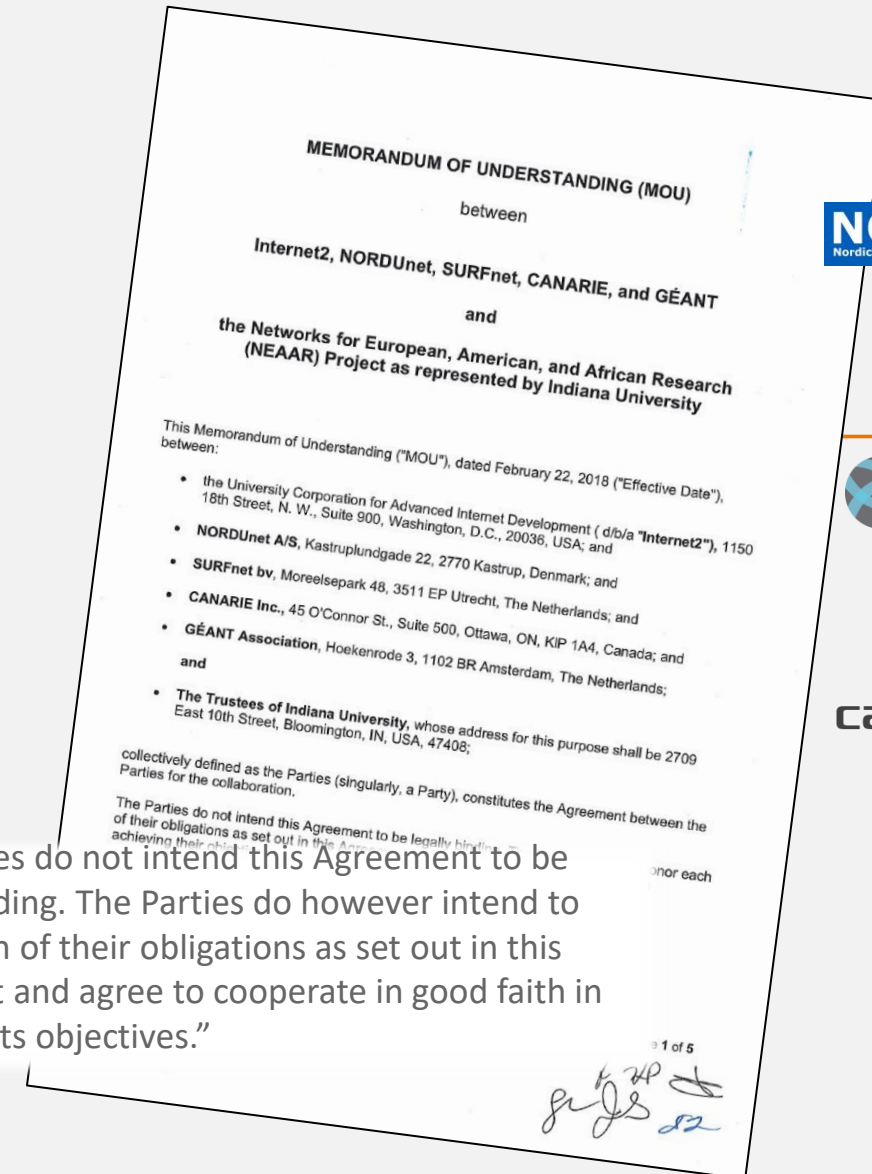
Agreement to cooperate on capacity sharing where appropriate

### 3. Back-up traffic

Agreement to mutually back each other up in the event of outages

#### Again:

“The Parties do not intend this Agreement to be legally binding. The Parties do however intend to honor each of their obligations as set out in this agreement and agree to cooperate in good faith in achieving its objectives.”



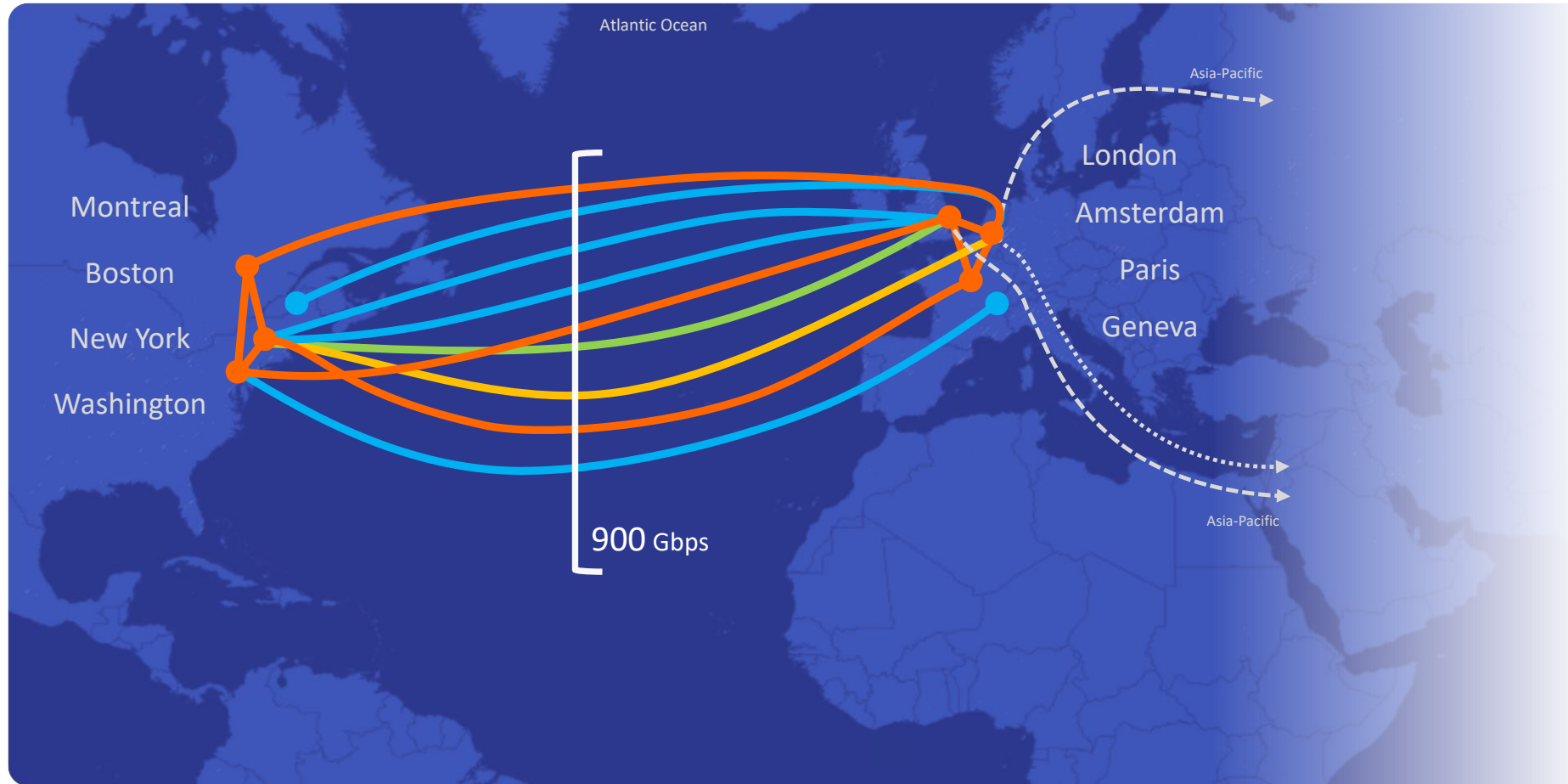
# The pathfinder expands: ANA-300G growing to 900G



Estonia, June 2019



# The pathfinder expands: ANA-300G growing to 900G



- IU NEAAR
- ESnet
- NII/Sinet
- GEANT, SURFnet, NORDUnet, Internet2 & CANARIE



# ANA - Working Groups

- **Operations Working Group**
  - Operational Processes
  - Statistics
- **Engineering Working Group**
  - Peering VLAN & route server on GXP's
  - Automating service provisioning across ANA
- **Cost Sharing and Legal Working Group**
  - Memorandum of Understanding
  - True-up for distributing the costs
- **ANA Next Generation Working Group**

# Europe to Asia

# Connecting Asia to Europe (CAE-1)

- **One Procurement Process, following EU procurement rules**
  - With six parties jointly desiring to buy connectivity between Asia and Europe
  - 11 time zones
  - 6 jurisdictions
  - 6+ Languages (Korean, Singaporean, Danish, Dutch, English, Australian)
  - With nine parties on the selling side
- **Roles**
  - GÉANT fronting the procurement
  - AARNet, as a licensed carrier, being the contacting party towards provider
  - NORDUnet as project coordinator
  - All participating

# Connecting Asia to Europe (CAE-1)



ASGC

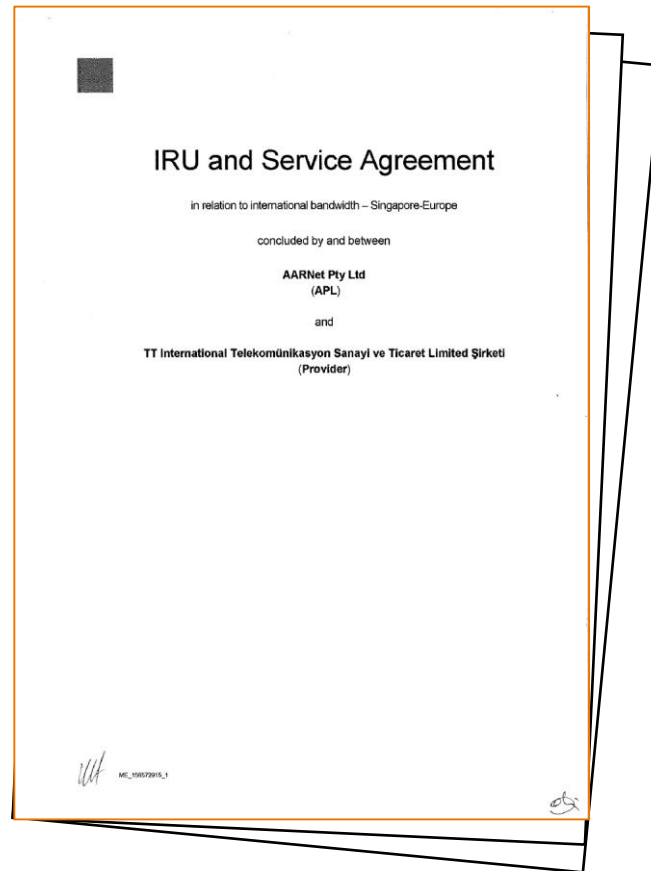
SingAREN & JGN

NII/Sinet

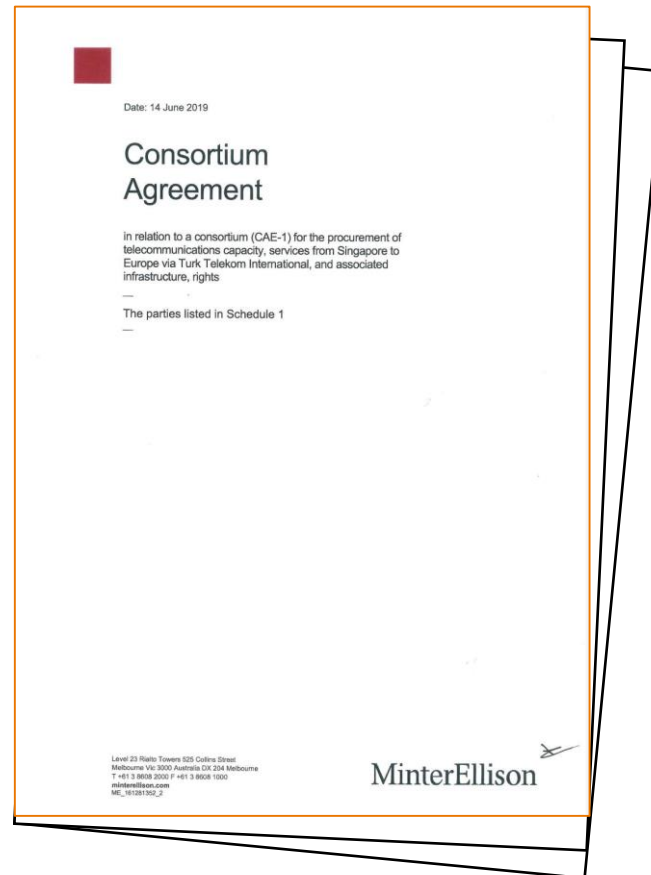
GEANT, SURFnet, NORDUnet, AARNET, SingAREN & TEIN\*CC (CAE-1)



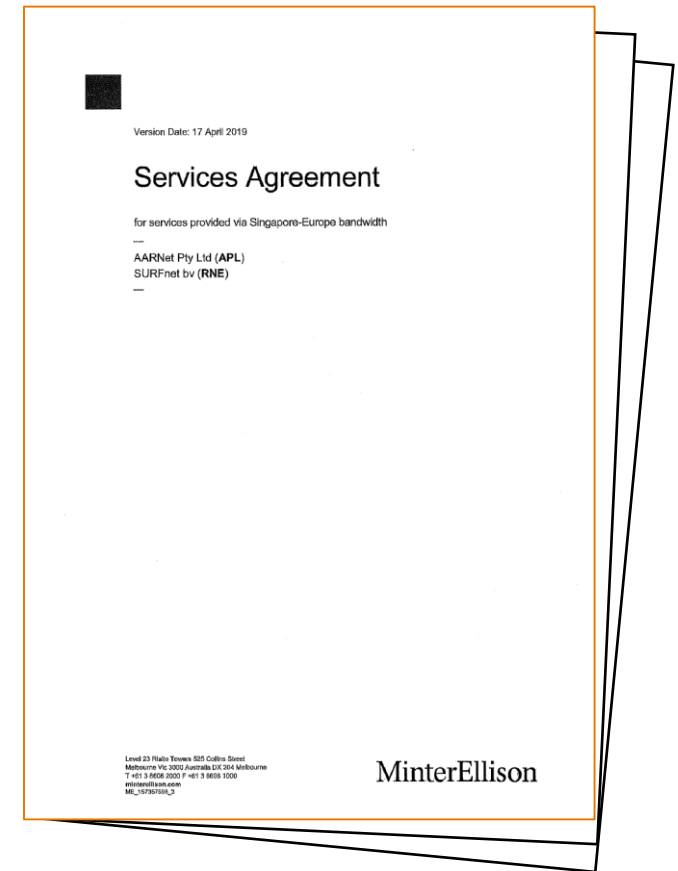
# Connecting Asia to Europe (CAE-1)



Agreement with the Service provider  
(AARNet with provider)



How the consortium is organized  
(all parties)



Back to back agreement  
(AARNet with each party)

# Lessons for the future

- NRENs differ
- More that unites us than divides
- Come together in a structured manner from the beginning
- Agreements are for the long term. Circumstances and people change over time
- Use standard legal framework
- Trust but verify!
- Big money agreements don't rest on a handshake

# CAE-1 expanded too: Asia-pacific Europe Ring (AER)

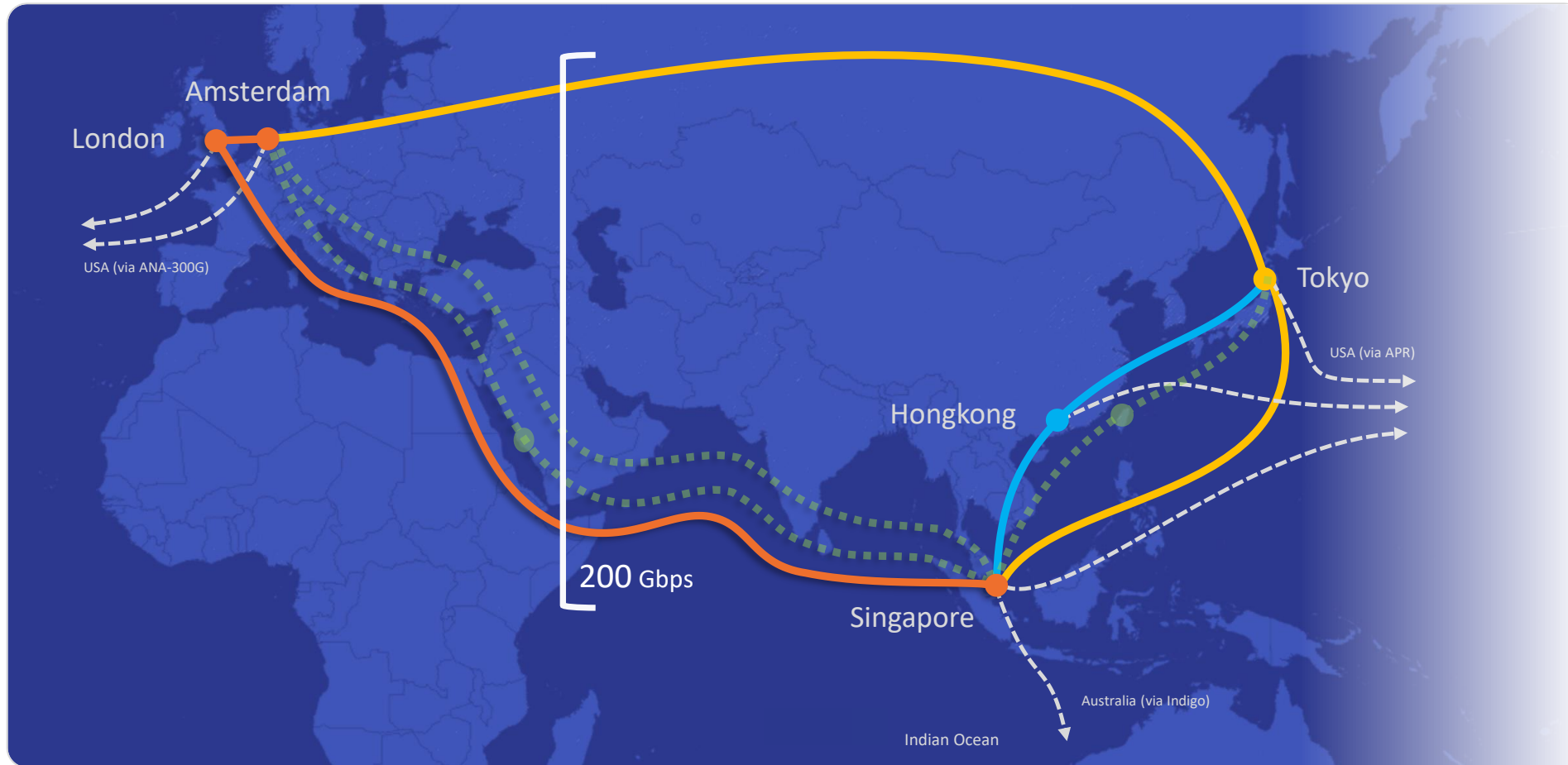
- 8 Party MoU
- Parties back-up each other in case of failure
- Resilient ring – Tokyo - Hong Kong – Singapore - London – Amsterdam
- No exchange of funds



Malaysia, August 2019



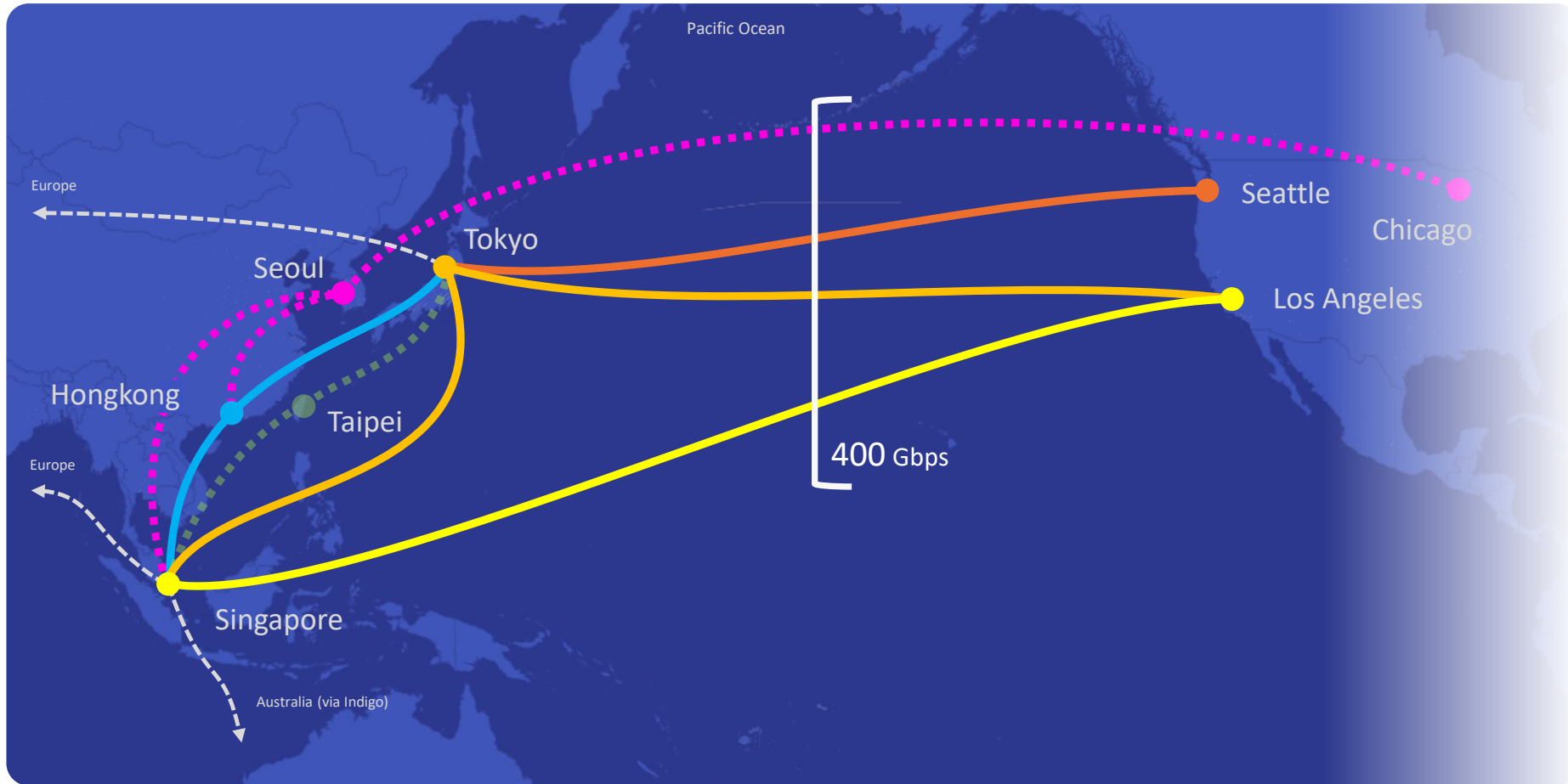
# Asia-pacific Europe Ring (AER)



- SingAREN & JGN
- NII/Sinet
- GEANT, SURFnet, NORDUnet, AARnet, SingAREN & TEIN\*CC (CAE-1)

# Other initiatives around the world

# Other activities: Asia-Pacific Ring (APR)



● SingAREN & JGN  
● KOREN/KISTI

● PacWave/TransPAC  
● NII/Sinet  
● SingAREN & Internet2



# Other activities: Australia



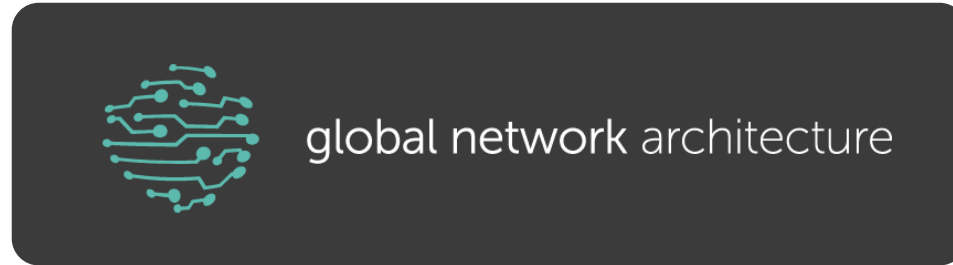
- AARnet
- SingAREN & JGN
- KOREN/KISTI

# Other activities: Africa & Latin America



- Bella
- SANren, TENET
- SACS
- AmLight Project

# Do you want to join?



**GNA-G**  
GLOBAL NETWORK ADVANCEMENT  
GROUP

December 9 @ - December 12  
*TechEx 2019, New Orleans, LA United States*

February 1, 2020 - March 31, 2020  
*APAN49, Kathmandu, Nepal*

March 29, 2020 - April 1, 2020  
*Internet2 Global Summit 2020, Indianapolis, IN United States*

September 14, 2020 - September 18, 2020  
*NORDUnet Conference 2020, Reykjavík, Iceland*

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**Driving innovation together**



By joining forces, the R&E Networks are bigger players in relevant markets — such as the intercontinental connectivity market — than before. Hence, the R&E Networks can be much more ambitious and create a more far reaching result, yielding a sustainable high-performance global interconnect for research and education. By joining forces, the R&E Networks now have the potential to bring the Global R&E Network (GREN) within reach.

Over the last 5 year we've seen impressive results by R&E networks joining forces by implementing new capacity following the Global Network Architecture (GNA) guidelines. For example: The Advanced North Atlantic collaboration of 8 parties now jointly run a high capacity system across the Atlantic Ocean. There is also the Asia Pacific Ring that supports the R&E community with a similar system between Asia and North America. All intercontinental systems are built and shared along the principles of the GNA.

That collaborating under the flag of the GNA is a successful concept is proven by the trend that more collaborations keep coming up, covering more intercontinental capacity. Earlier this year 8 parties launched the AER system to interconnect Europe and Asia by several NRENs in both continents.

This presentation will explain the principles of the Global Network Architecture, show some of the achievements and will give the participants of UC2019 an update on the future plans that that will lead to a truly global R&E network.

# Driving innovation together

The SURF logo consists of the word "SURF" in a bold, white, sans-serif font, centered within a white rounded rectangular shape that has a small circular tail extending downwards and to the right.