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Trans-Atlantic R&E connectivity: Update and outlook on ANA and friends

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JET Meeting – Online – 18 May 2021

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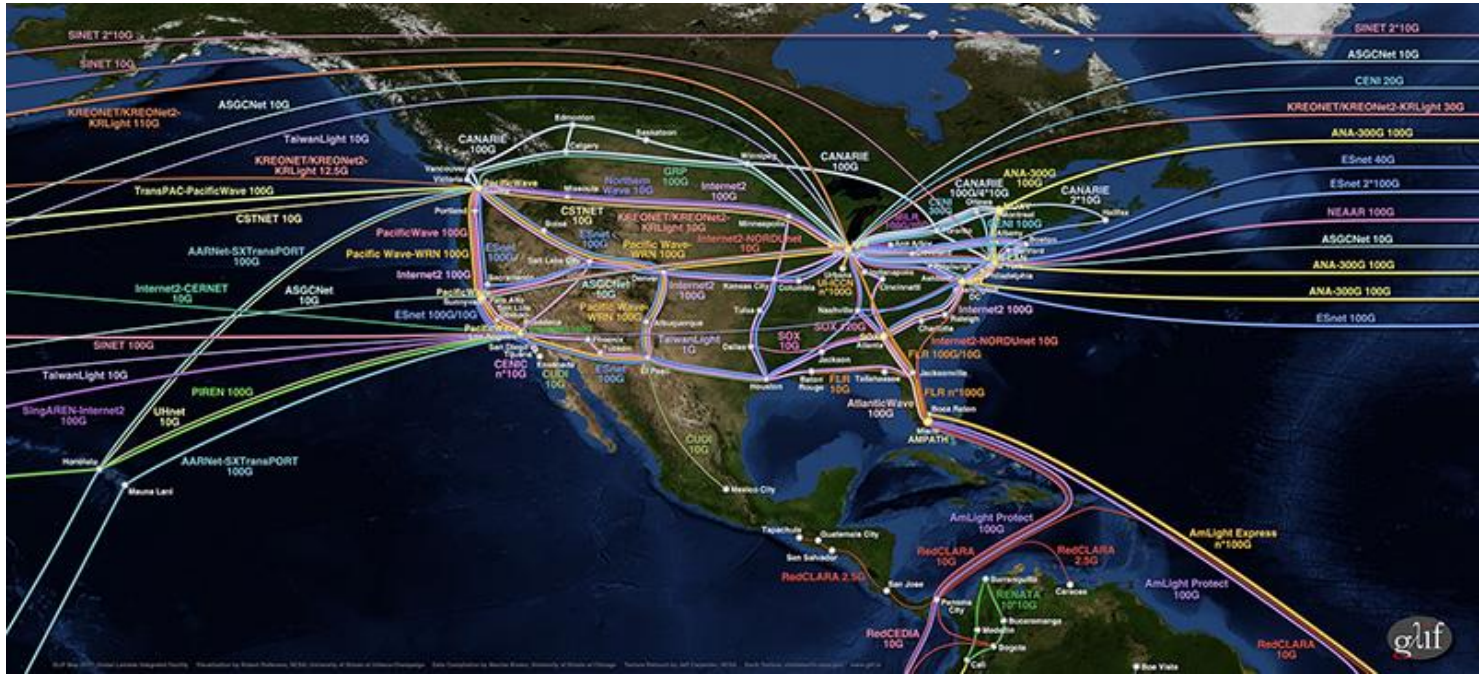
- Q&A

R&E Networking Europe-North Am: Phase 1

- Early days:
  - EARN: 9.6 kbit/s (~1990): IBM protocols
  - SURFnet: multiple 2 Mbit/s (1994): IP
  - NORDUnet: 34 Mbit/s (1995): IP
  - NSF…
  - Ebone…
  - DANTE…
- Every R&E Network for themselves:
  - Spaghetti
  - Not much reciprocity

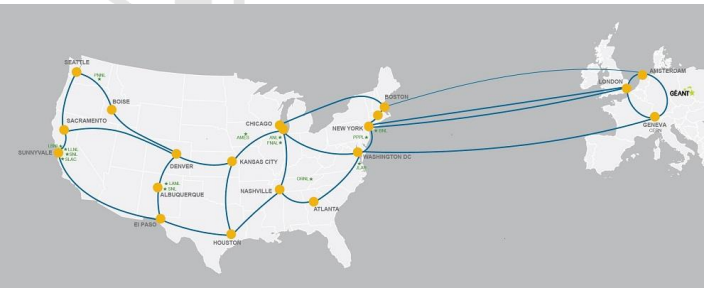
R&E Networking Europe-North Am: Phase 2

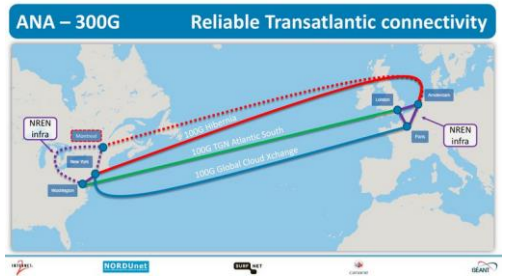
- Global Lambda Integrated Facility (GLIF):
  - September 2001: First closed 2-day workshop (Amsterdam)
  - September 2002: Second closed workshop (Amsterdam)
  - September 2003: First open workshop (Reykjavík), "GLIF"
  - Leading to more coordination when buying bandwidth
  - Plus:
    - WGs
    - Meetings
    - Maps
    - Community

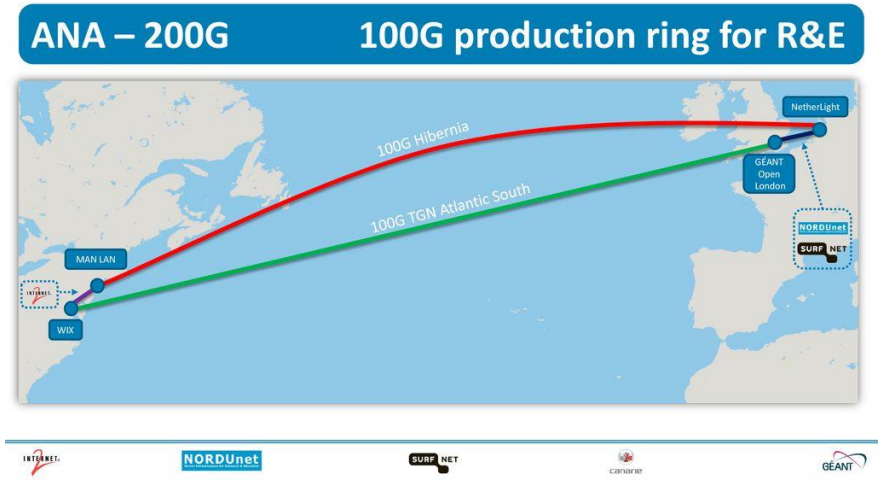


R&E Networking Europe-North Am: Phase 3

- Advanced North Atlantic Collaborating: ANA
  - Challenging the market for 100G (2012)
  - 1st ever intercontinental 100G: New York City – Amsterdam
    - Inaugurated TNC13 in Maastricht, The Netherlands
    - One single 100G, jointly purchased
  - Onwards, jointly buying 100G lamdbas
    - Between Global R&E Exchange Points (GXPs)
    - Federated Operations Model
    - ”Token-based”, back-up arrangements
    - Now at 10x 100 Gbit/s = 1 Tbit/s

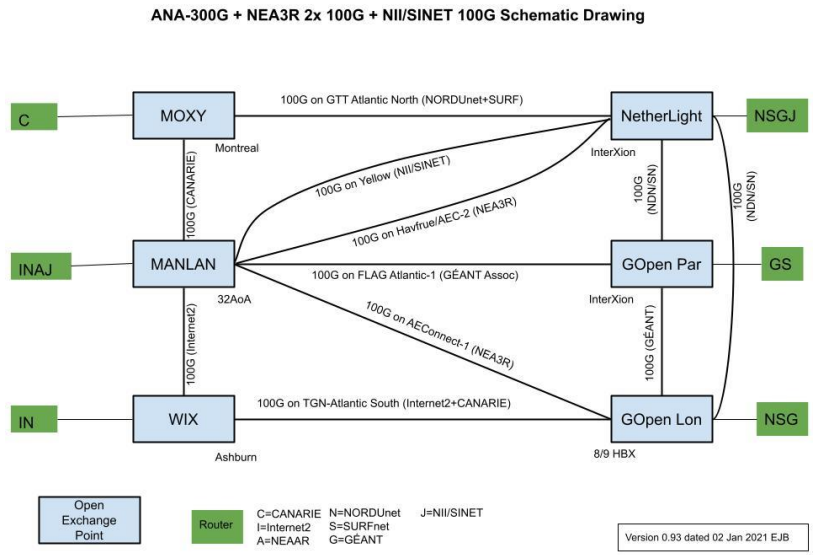






Advanced North Atlantic (ANA) Collaboration

- Europe – North America, now to include Canada
- A deeper dive into the 1 Tbit/s
  - Founding Fathers:
    - North America: Internet2, ESnet, CANARIE
    - Europe: NORDUnet, SURF(net), GÉANT
  - NEA3R Project/NSF
  - SINET/NII
- Key characteristics:
  - MoU
  - GXPs
  - Federated Operations



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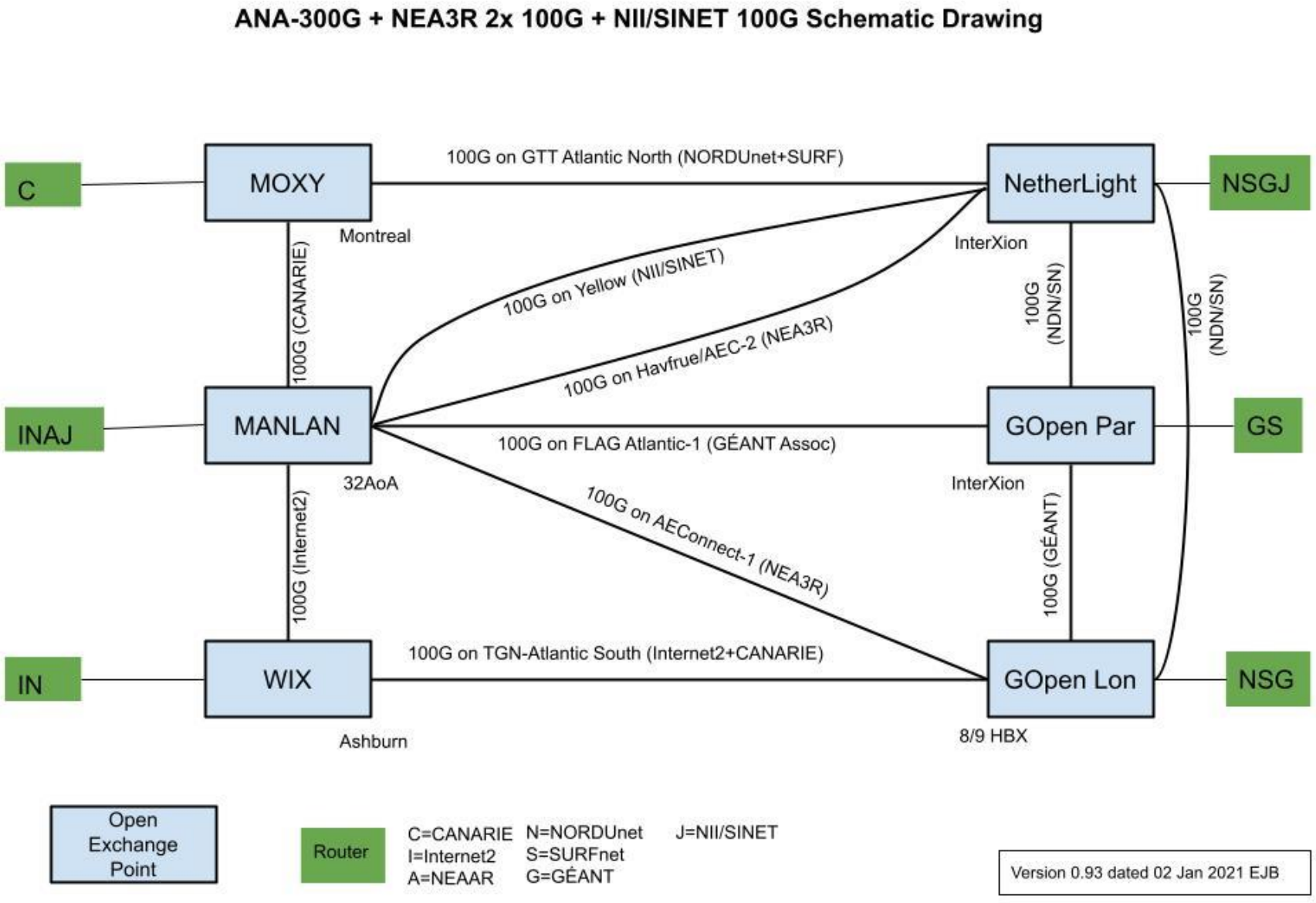
ANA Schematic (excl. Esnet)

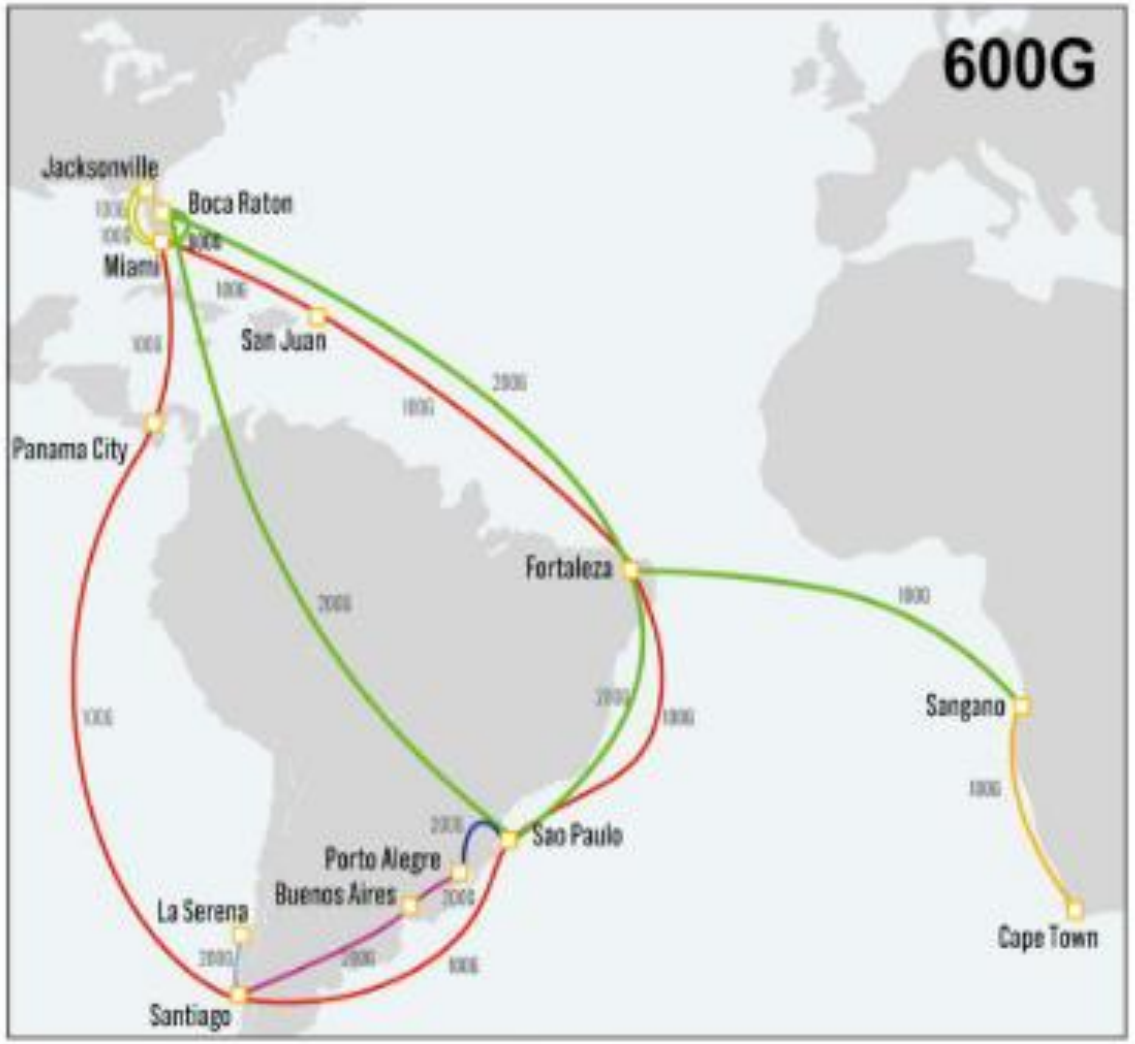


Other Things Trans-Atlantic

- Meshing the GREN continues:
  - BELLA-S

Other Things Trans-Atlantic

- Meshing the GREN continues:
  - AmLight-ExP



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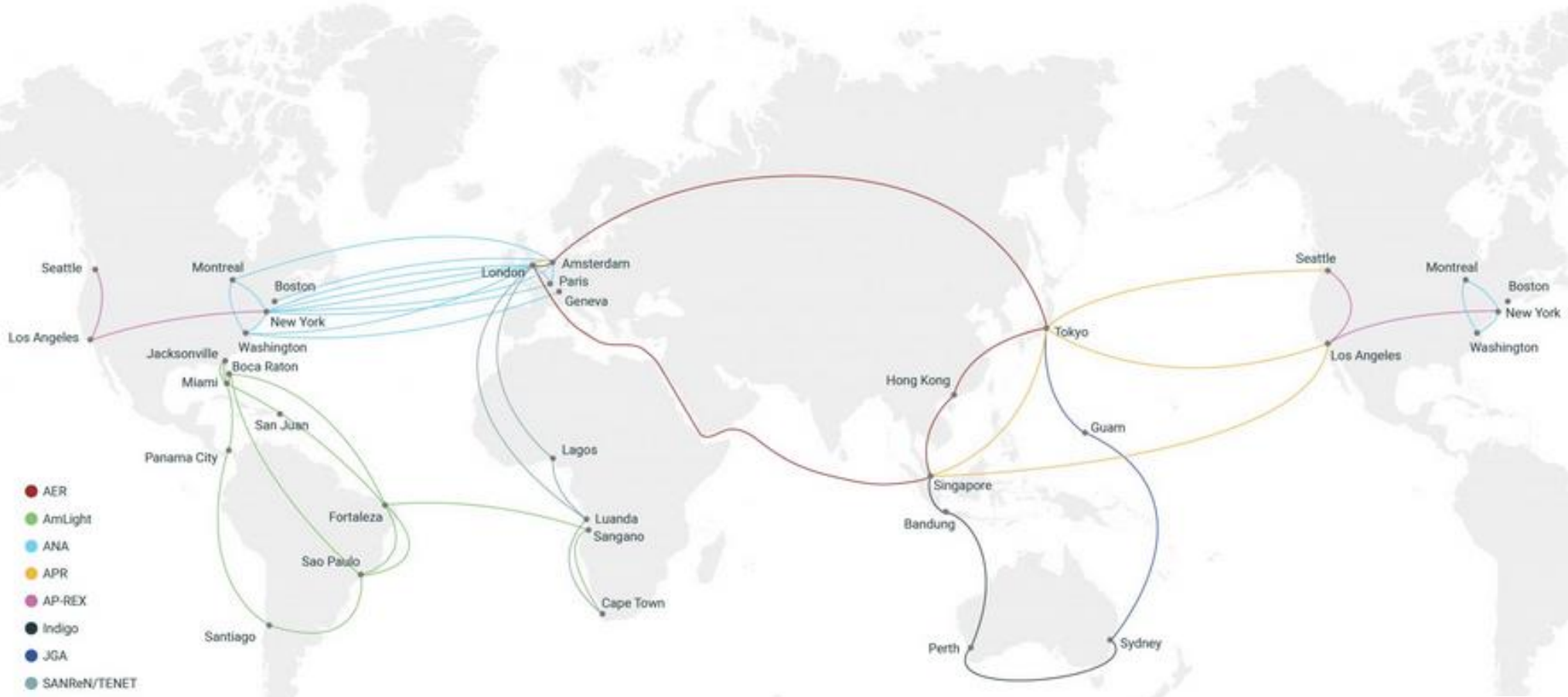
The Global R&E Interconnect (100G+)



GNA-G
Global Network Advancement Group

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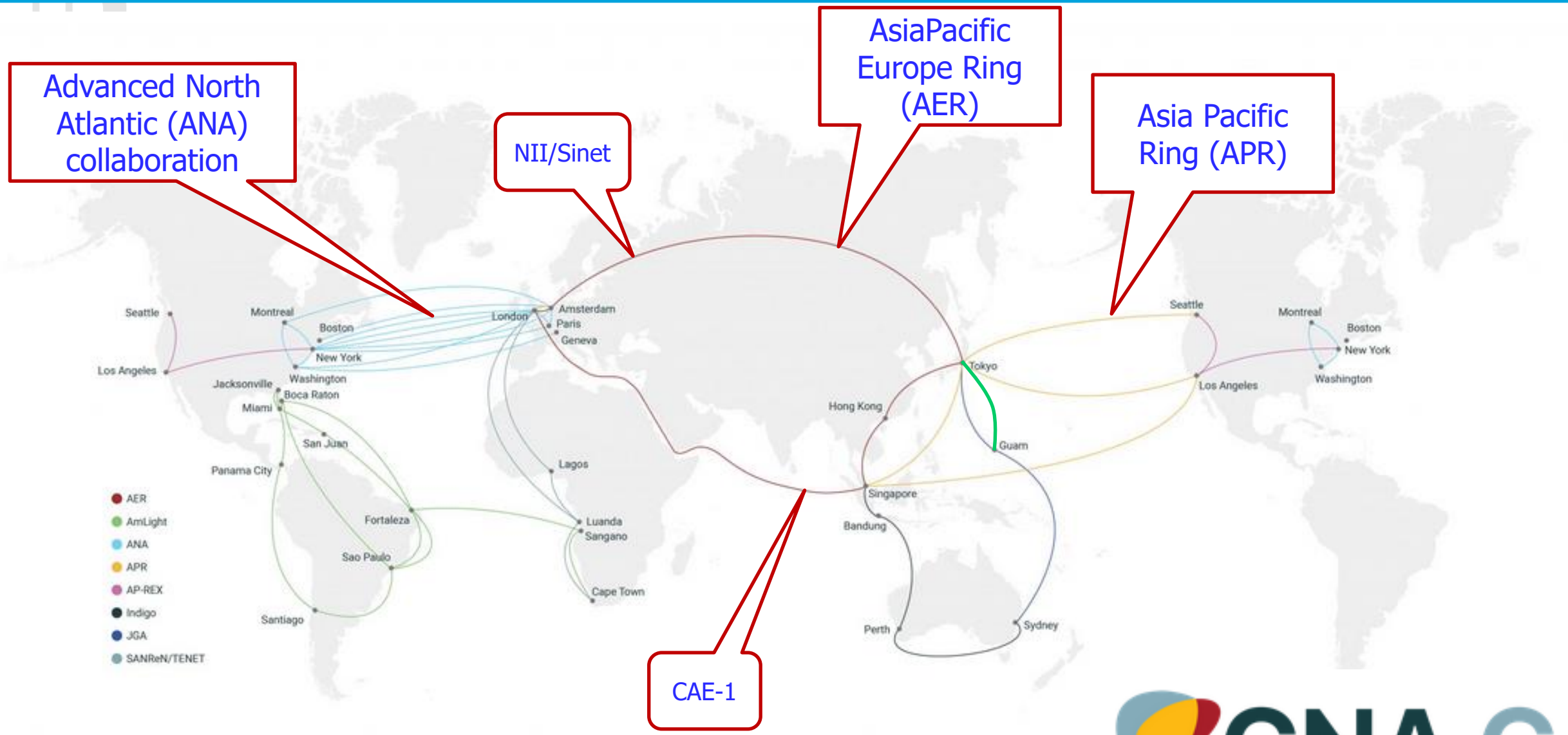
The Global R&E Interconnect (100G+)



GNA-G
Global Network Advancement Group

Europe-North Am: Next Step = Phase 4

- Recap:
  - Phase 1: NRENs buy individually, short term leases
  - Phase 2: NRENs coordinate what to buy, short term
  - Phase 3: NRENs jointly buy, coordindated, longer term
- Phase 4:
  - NRENs becoming an anchor tenant on submarine cable
- Is this brand new?

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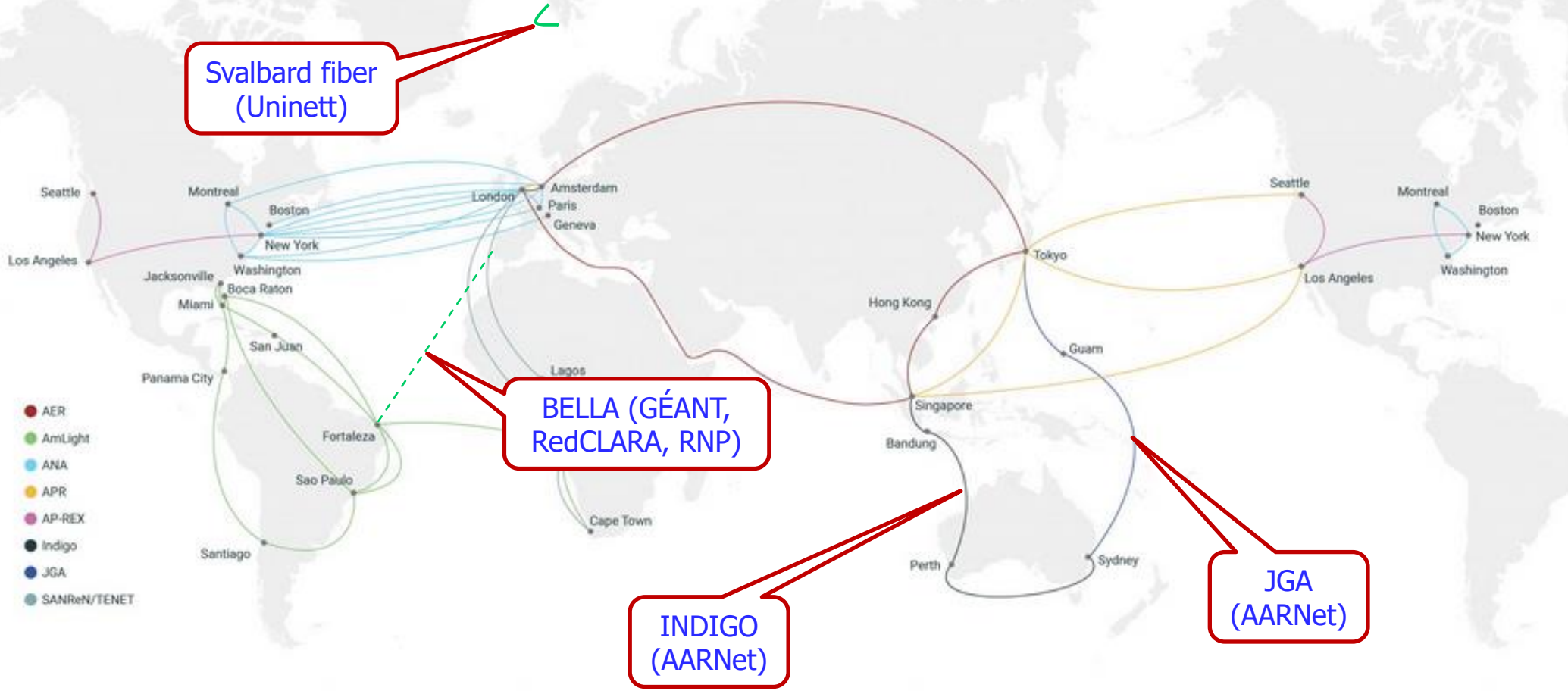
NREN owned submarine cables shares



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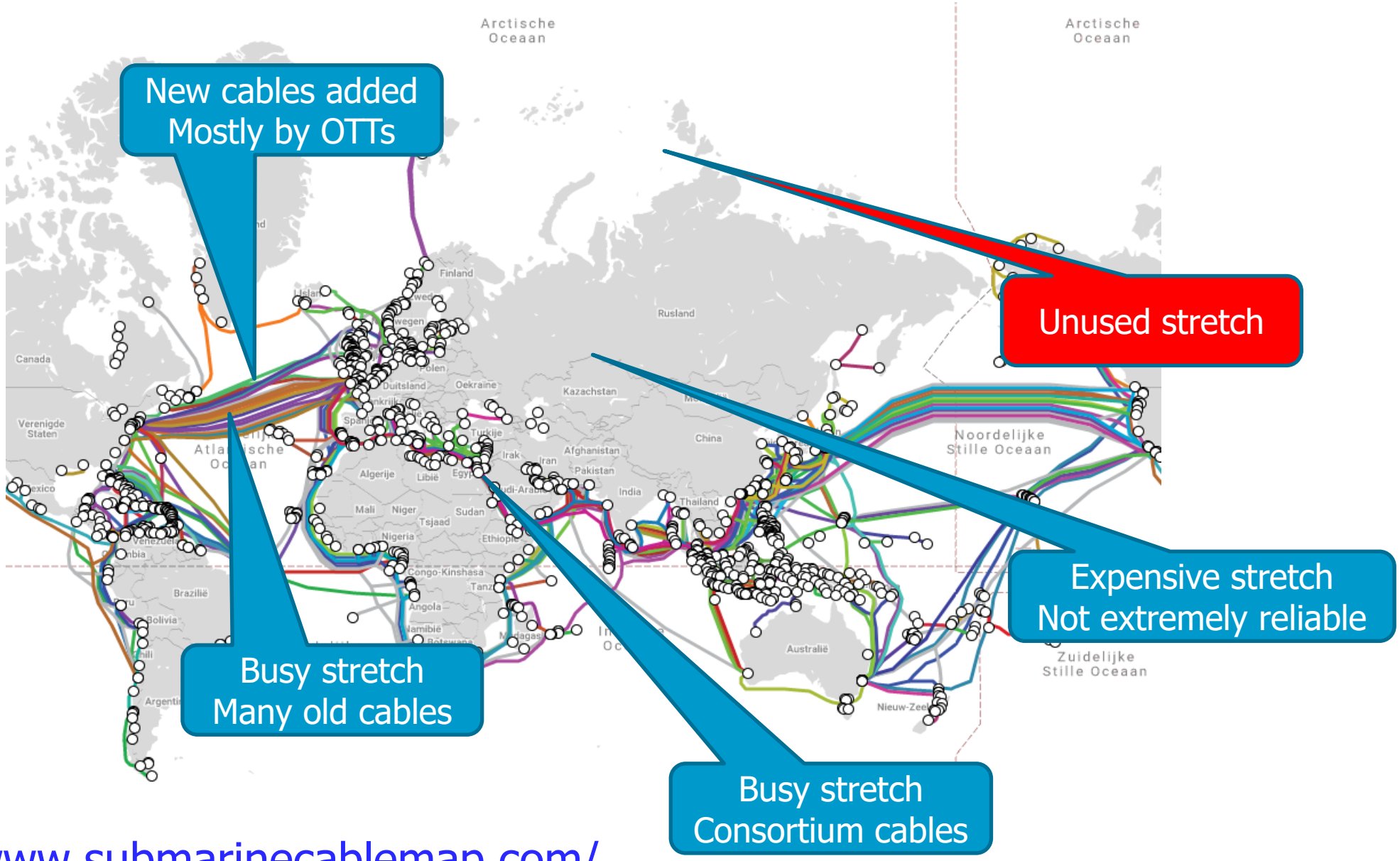
TeleGeography's Submarine Cable Map



URL: https://www.submarinecablemap.com/

Arctic Connect Submarine Cable system

- A plan for new submarine cable system between Europe and Asia, and possibly North America: **ACSC**
- Led by Cinia from Finland

- Cinia Alliance, with partners from Norway, Finland, Russia, and Japan

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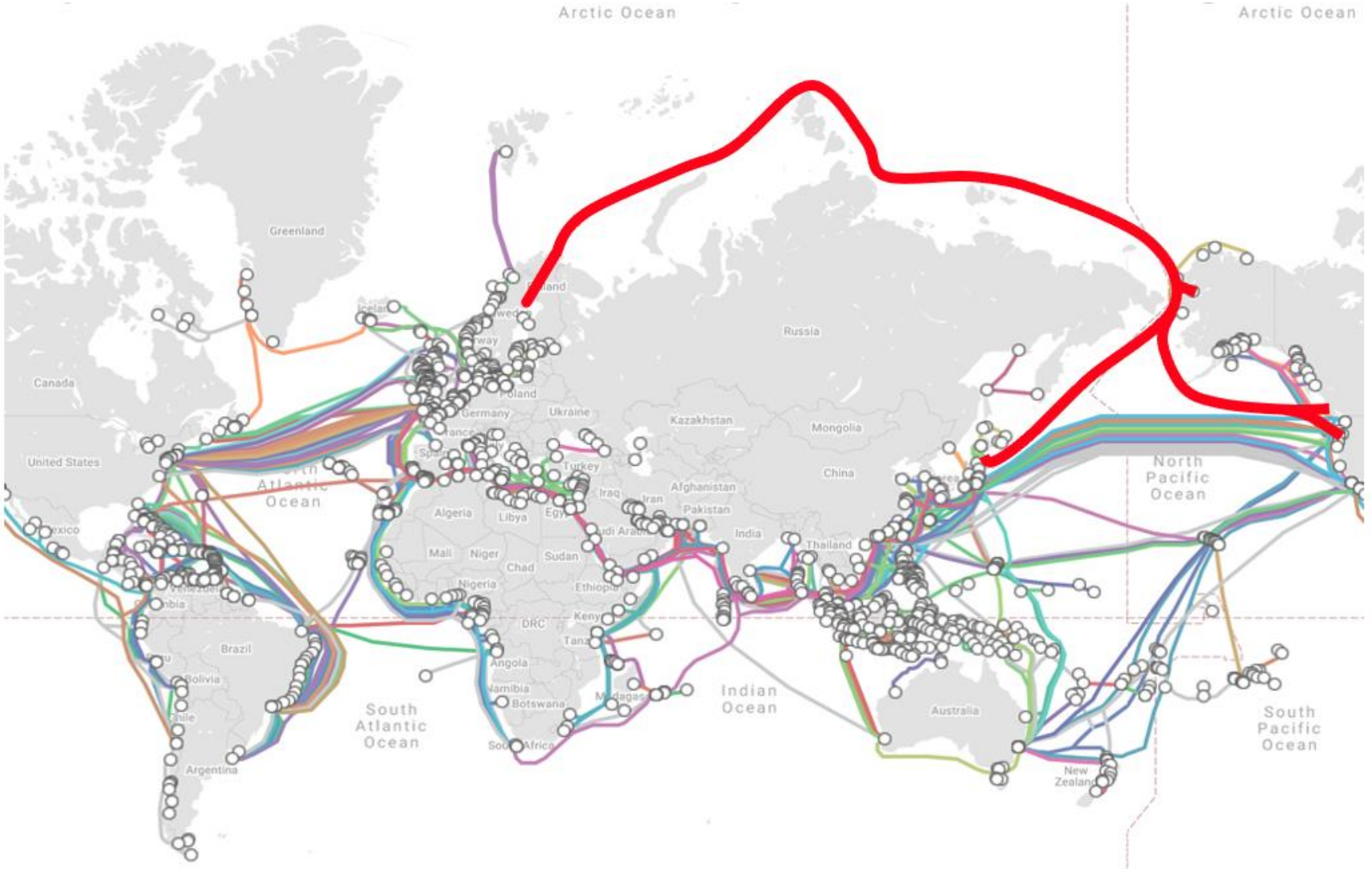
Plan: ACSC – A Unique Route



Arctic Connect Submarine Cable system plotted on TeleGeography's Submarine Cable Map

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Plan: Arctic Connect – A Short Route

Arctic Connect Subsea Cable System on AuthaGraph
Image kindly provided by Prof. Hajime Narukawa (Keio University),
more information at: http://www.authagraph.com/top/?lang=en

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Arctic Connect R&E Position Paper

URL: https://www.nordu.net/content/arctic-connect-re-position-paper

European Data Gateway Platforms Strategy

- Ministerial Declaration (19 March 2021):
  - Signed by all EU Member States + Norway + Iceland
  - Led by Portuguese EU Presidency
  - "Europe to reinforce internet connectivity with global partners": subsea cable systems

Four Platforms to secure Europe's connectivity:

- The EU-Atlantic Data Gateway Platform
- The EU-Mediterranean Data Gateway Platform
- The EU-North Sea & Arctic Data Gateway Platform
- The EU-Baltic-to-Black Sea Data Gateway Platform

Thank You! Questions?

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