GLOBAL NETWORKS FOR BIG SCIENCE

SIG-NGN- 20 April 2023

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NREN MISSION

LOFAR

CERN

JIVE
Joint Institute for VLBI ERIC

SKA
SQUARE KILOMETRE ARRAY

SKA
SQUARE KILOMETRE ARRAY

ANYONE, ANYWHERE, ANY TIME

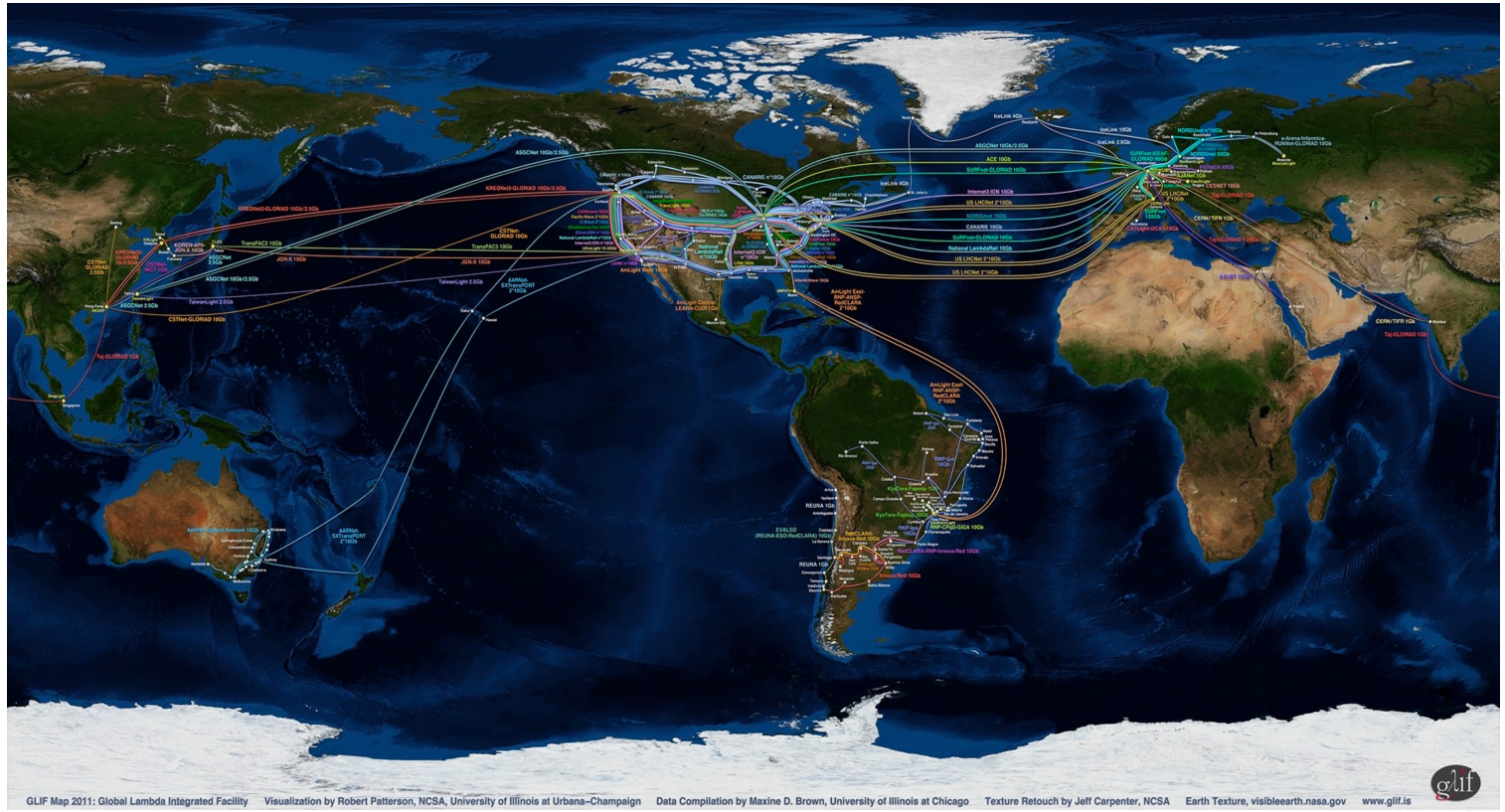
Research is **completely unconstrained** by the physical location of instruments, computational resources, or data

BRIDGING THE GAP

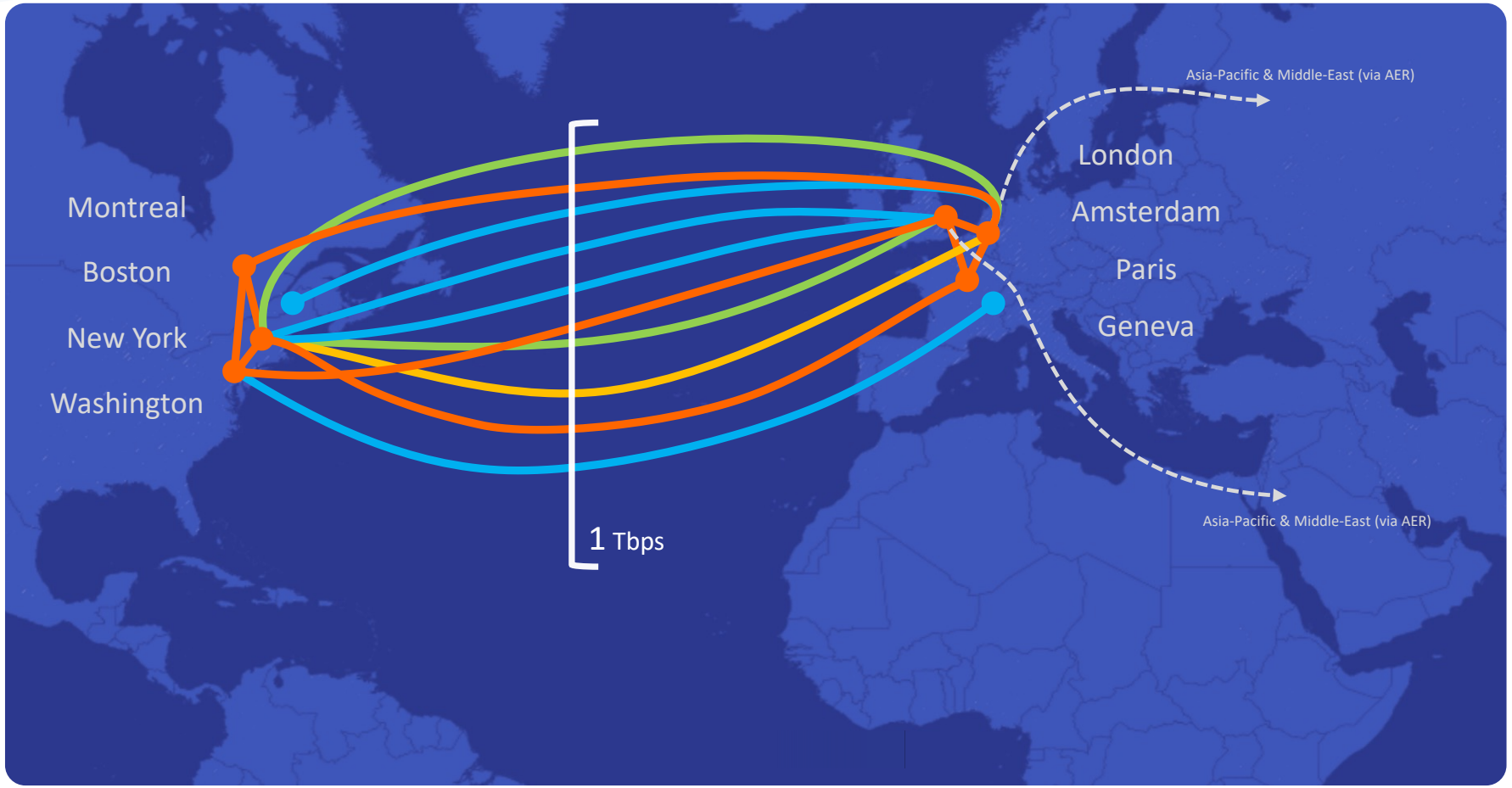
- Research is global
- National research depend on global resources
- Infrastrastructure must be global, integrated, and comprehensive
- To lower barriers, NRENs have joined forces to deliver a truly global infrastructure
- More than the sum of the parts

2011 - OCEANS AS BARRIERS

- GLIF map is impressive, but…
- National networks and continental backbones
- Fragmented inter-continental connectivity
- Inter-continental capacity orders of magnitude lower than terrestial

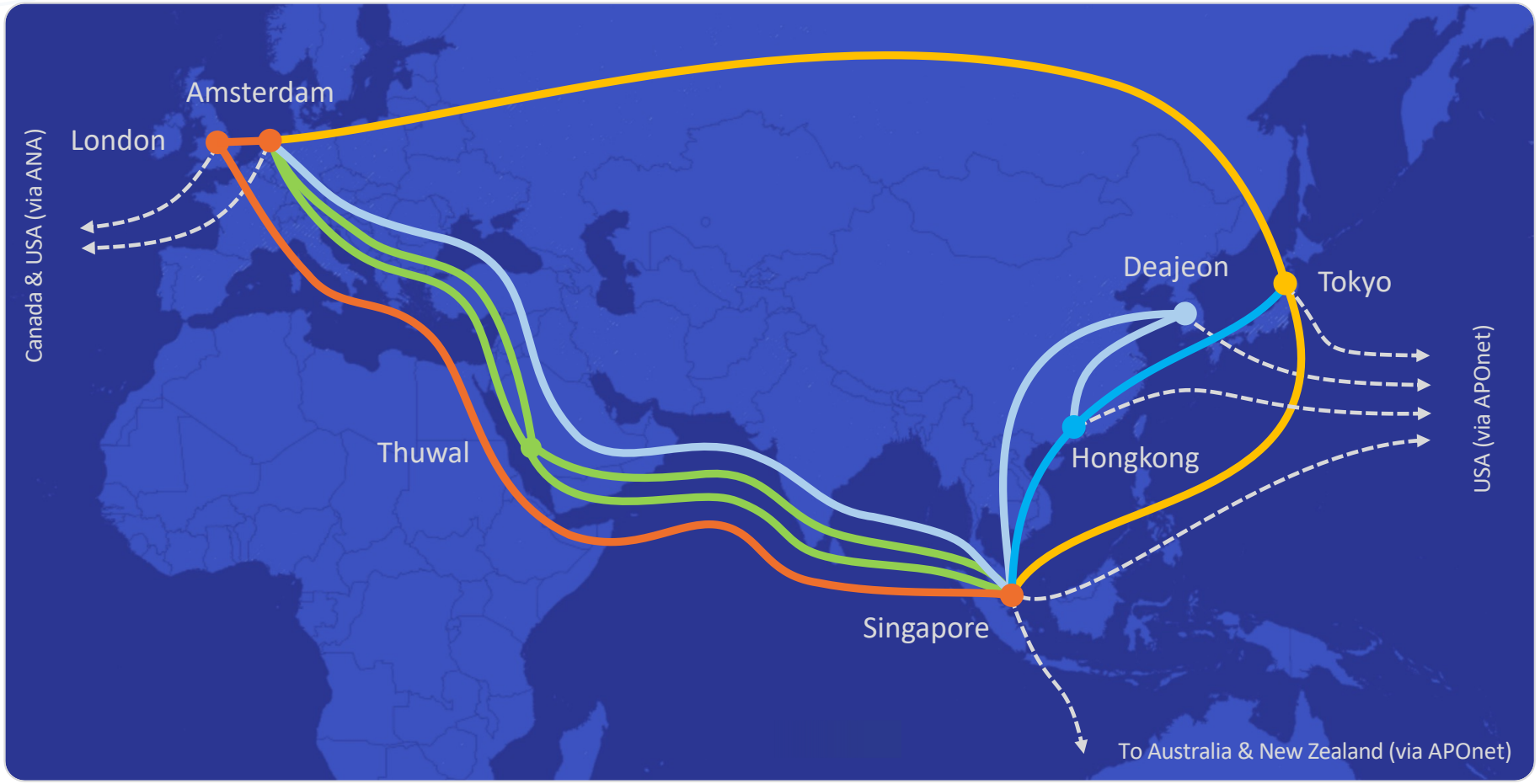


ADVANCED NORTH ATLANTIC (2023)



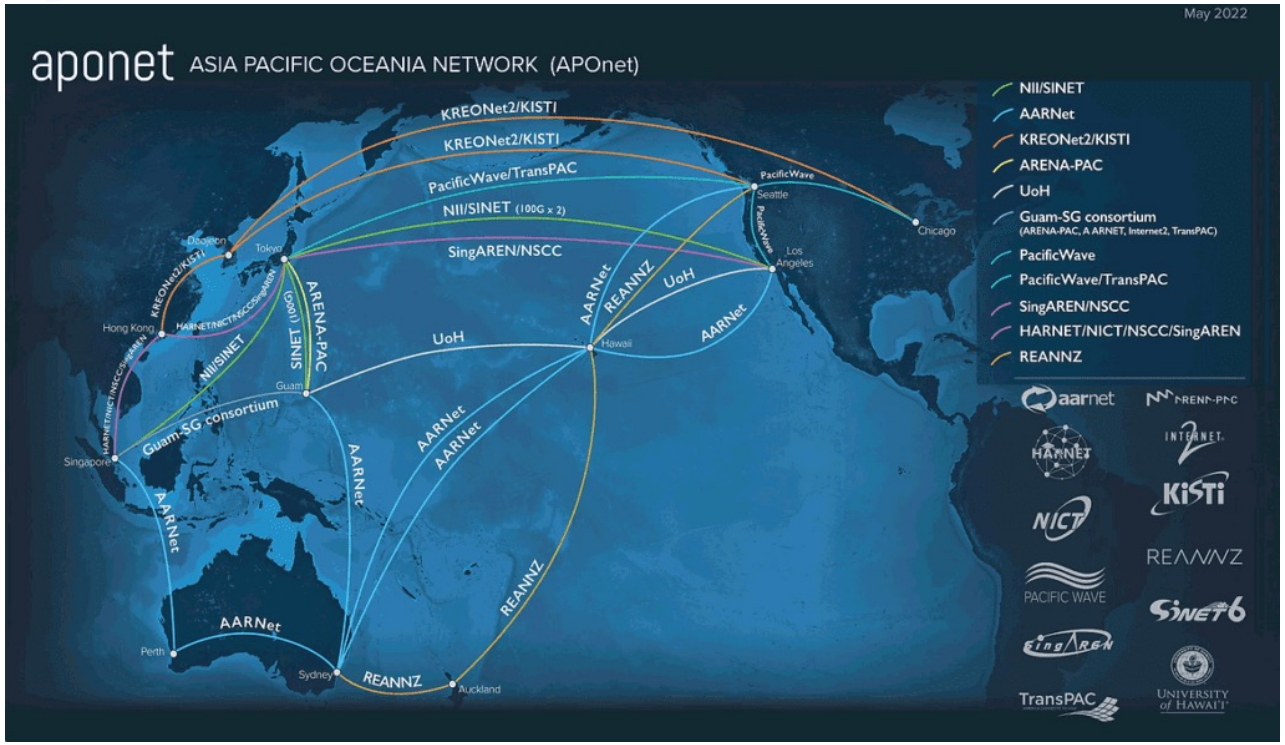
IU
ESnet
NII
GÉANT, SURF, NORDUnet, Internet2 & CANARIE

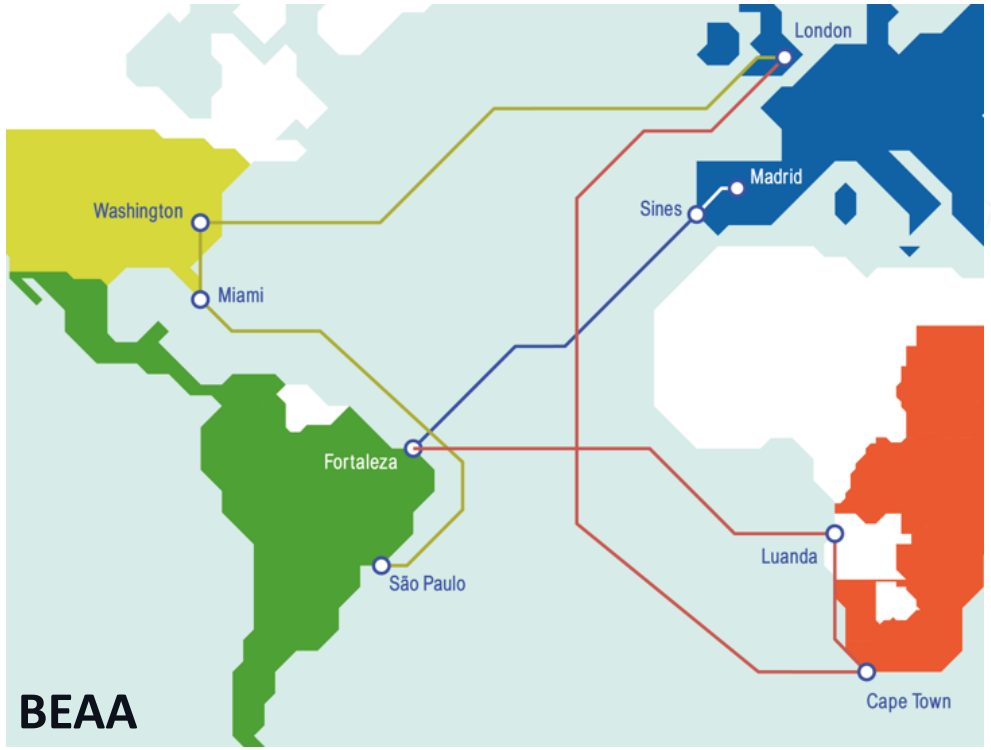
ASIA-PACIFIC EUROPE RING



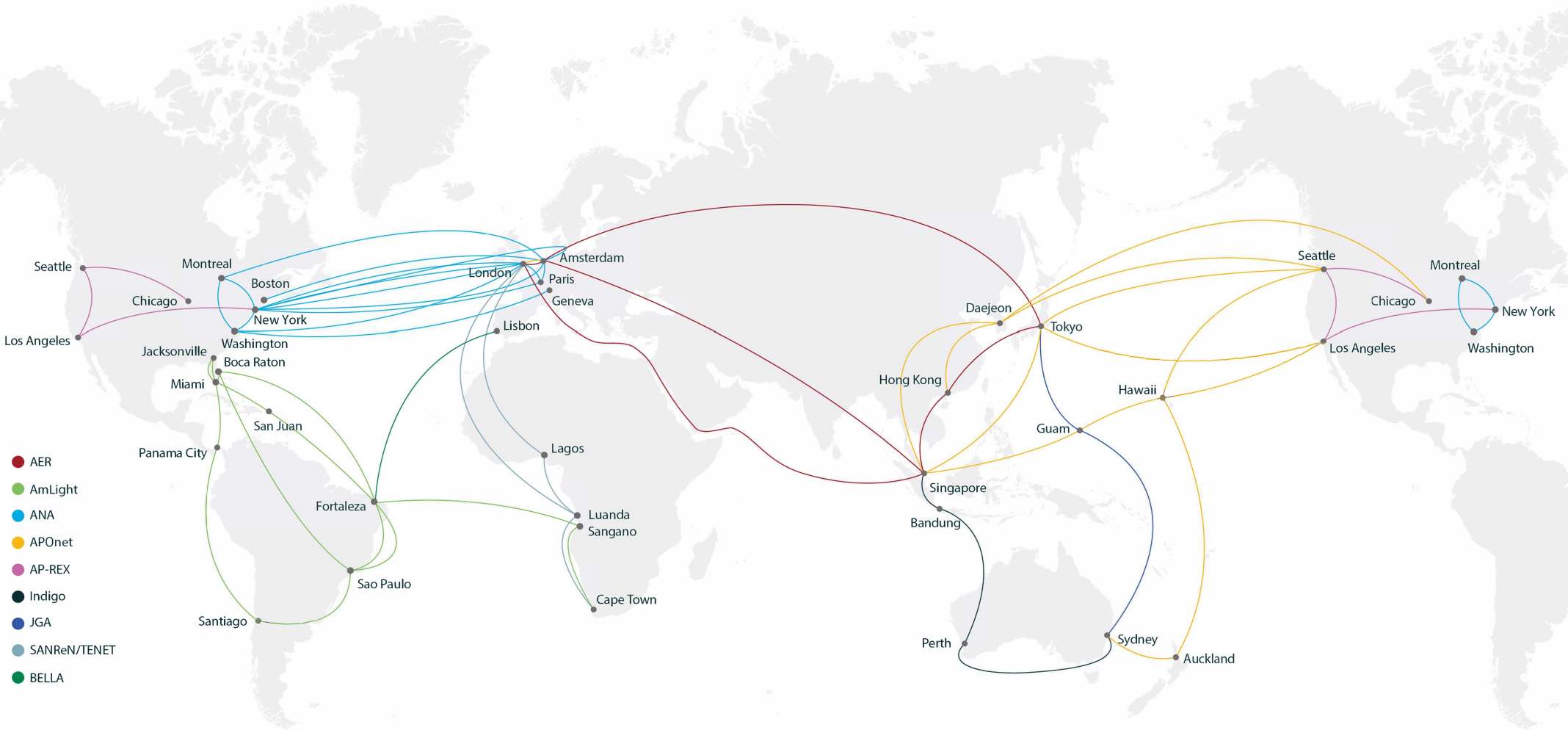
HARNET, NICT & SingAREN
NII
KAUST
KISTI
GEANT, SURF, NORDUnet, AARnet, SingAREN & TEIN*CC

COLLABORATIVE GLOBAL NETWORKS



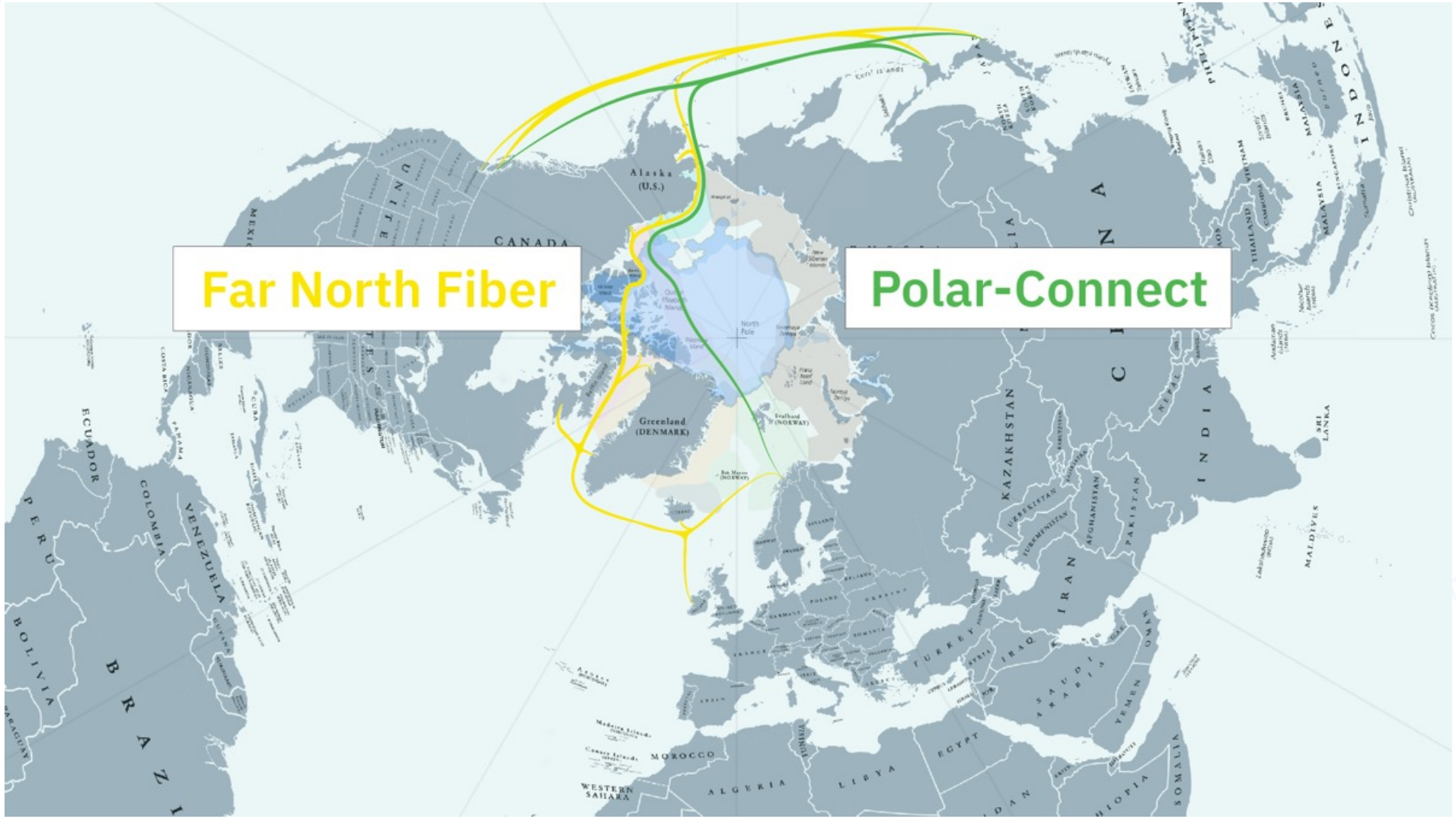


THE GREN – BRINING THE PARTS TOGETHER



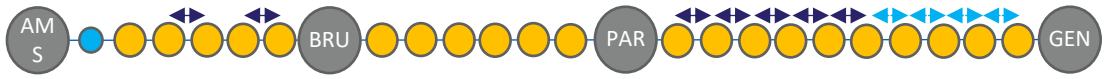
GEOGRAPHY AS A BARRIER

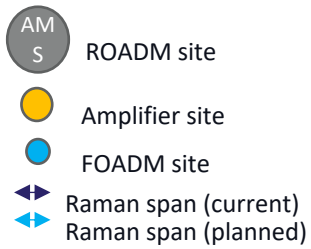
PUSH FOR NEW ROUTES

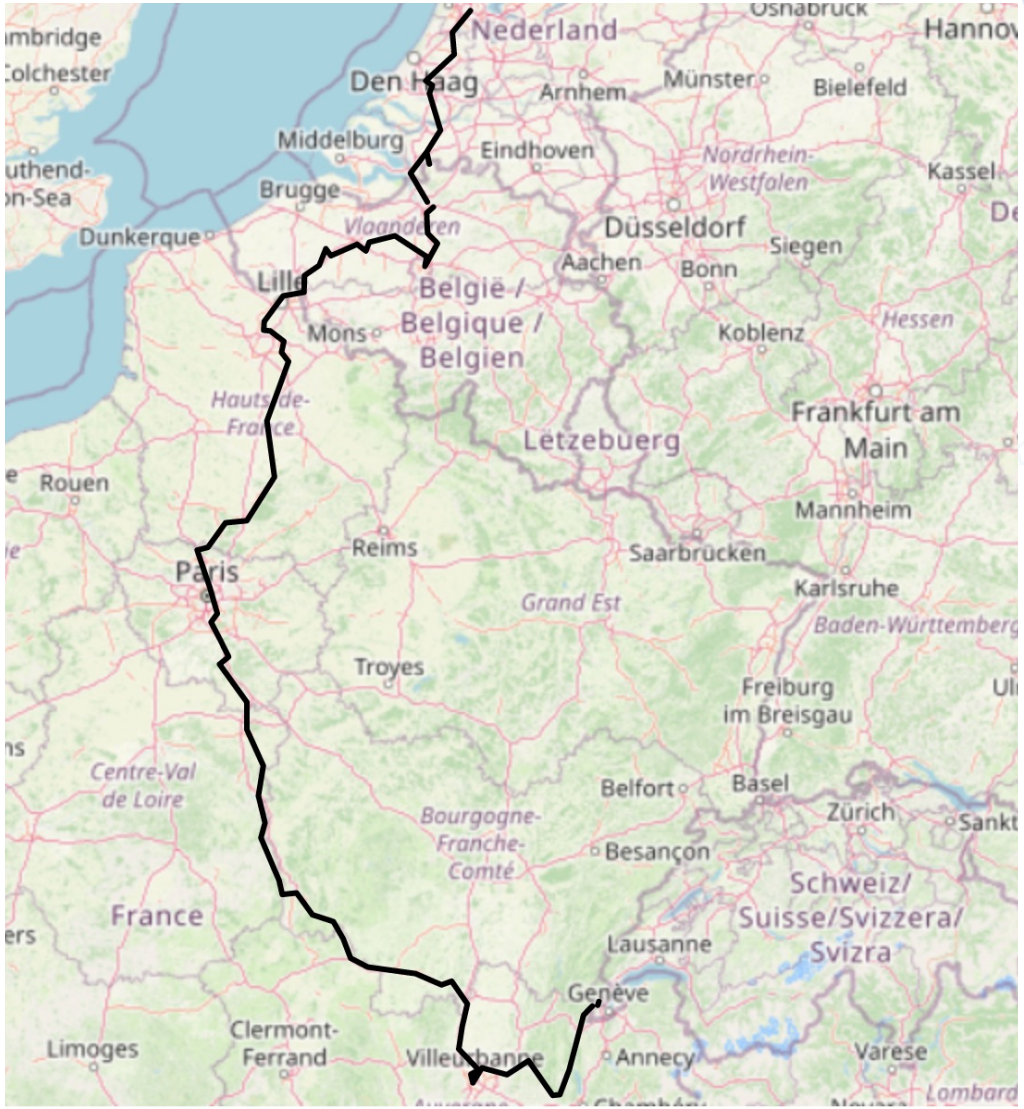


PUSH THE LIMITS BY WORKING WITH INDUSTRY

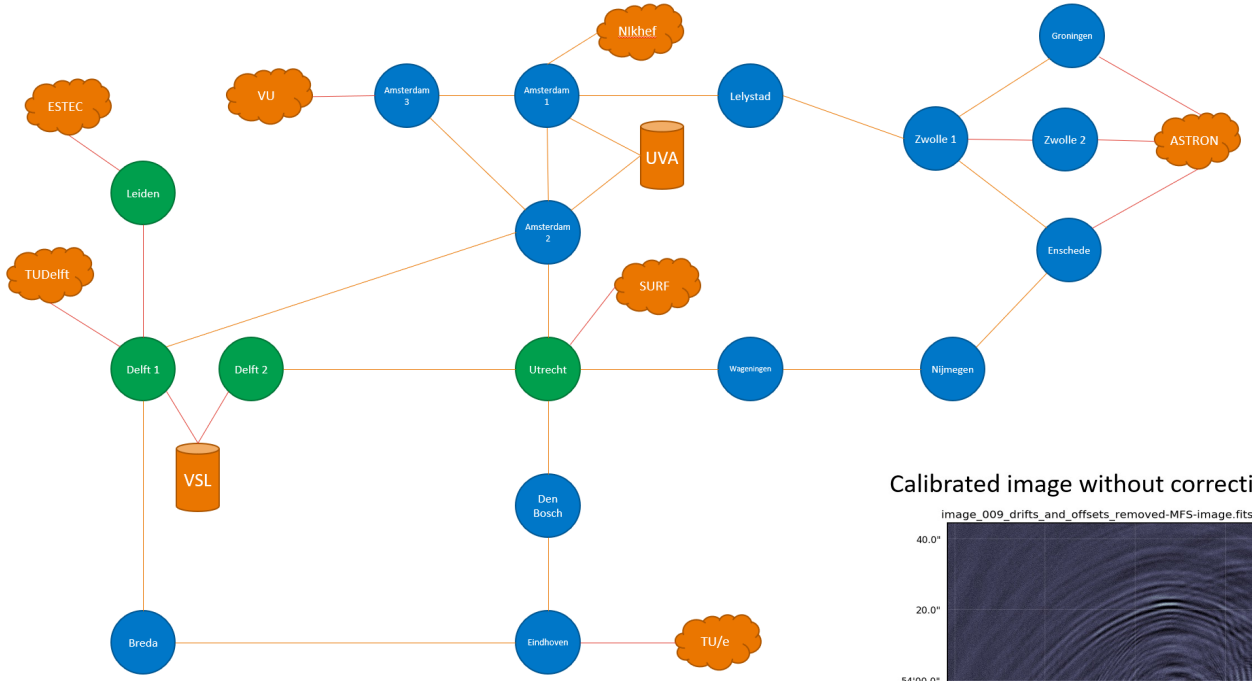
Preparing for 800G and beyond



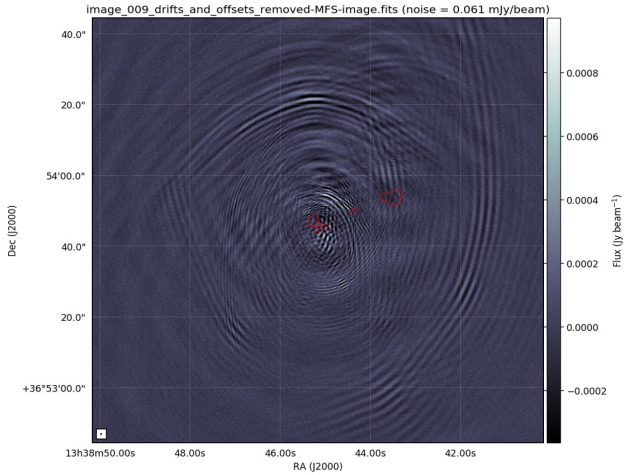




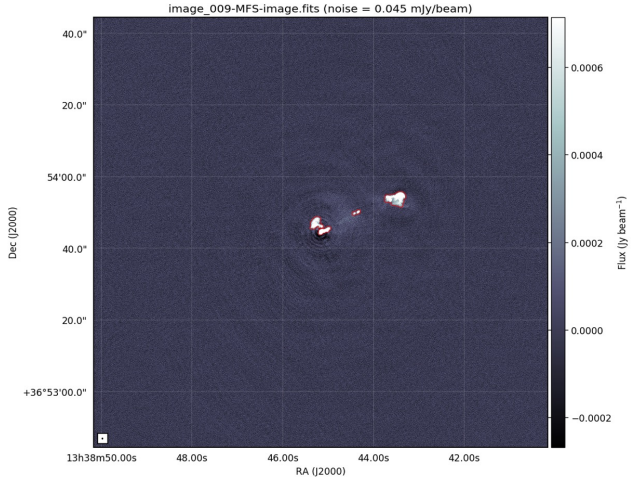
TIME & FREQUENCY TRANSFER



Calibrated image without correction for clock/ionosphere



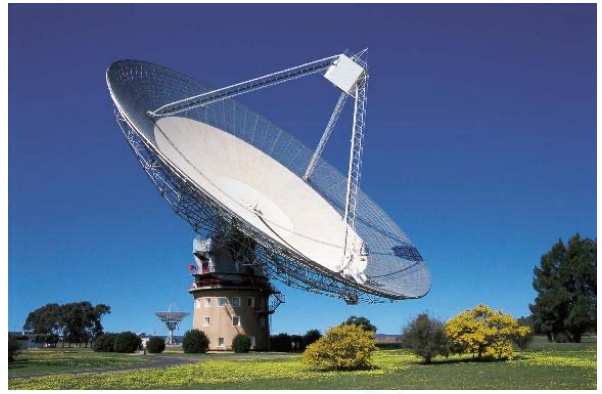
Calibrated image including correction for the clock offset and clock drifts



OUR MISSION: LOWERING BARRIERS

- The role of NRENs
  - Network where it's needed, when it's needed

- For that we jointly:
  - Organize ourselves to act quickly and appropriately
  - Orchestrate network resources into a global facility for research
    - It's not just transport
    - Data Centre and Compute Facilities
  - Outlook, planning, testing -> Being ahead
  - Lower technology and capacity barriers for research



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Driving innovation together

NORDUnet
Nordic Gateway for Research & Education

SURF