

SA NREN Connectivity

Enabling International Collaboration

SAACC Meeting

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Outline

- International Connectivity
- International R&E Exchange Points
- International Interconnects to R&E Networks
- Africa Continental Interconnects
- National Connectivity
- Connectivity to Local Astronomy Sites
- Astronomy International Collaborations

International Connectivity

- International Gateway Nodes
- Submarine Cable Systems
 - SACS 100G
 - WACS 60G (100G)
 - SAT3 20G
 - EASSy 20G
 - SEACOM 60G (100G)

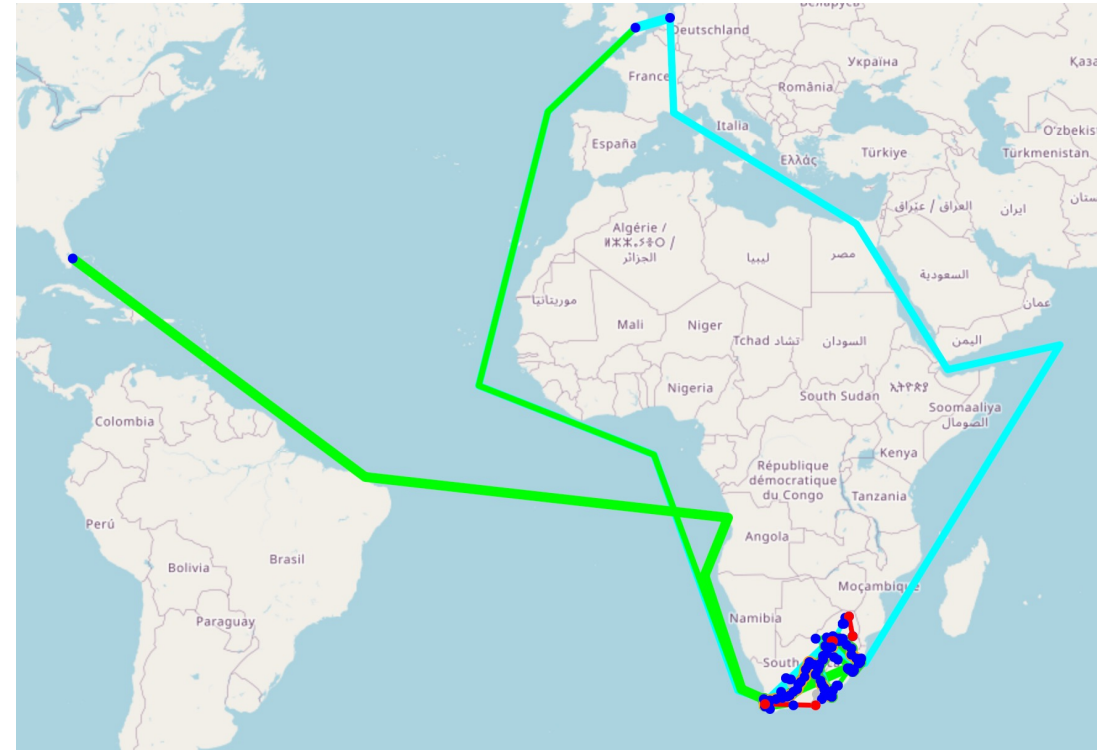


Image: linkmon.sanren.ac.za/nrenmap/

International R&E Exchange Points

ZAOXI

Cape Town



Miami



London



Amsterdam

International Interconnects to R&E Networks - AMPATH

- ANSP
- CANARIE
- CSTNET
- Internet2
- RedClara
- AARNet (planned)



Africa Continental Interconnects

- UbuntuNet Alliance
 - Cape Town
 - Mtunzini
 - Johannesburg (planned)
- WACREN
 - Cape Town (planned)

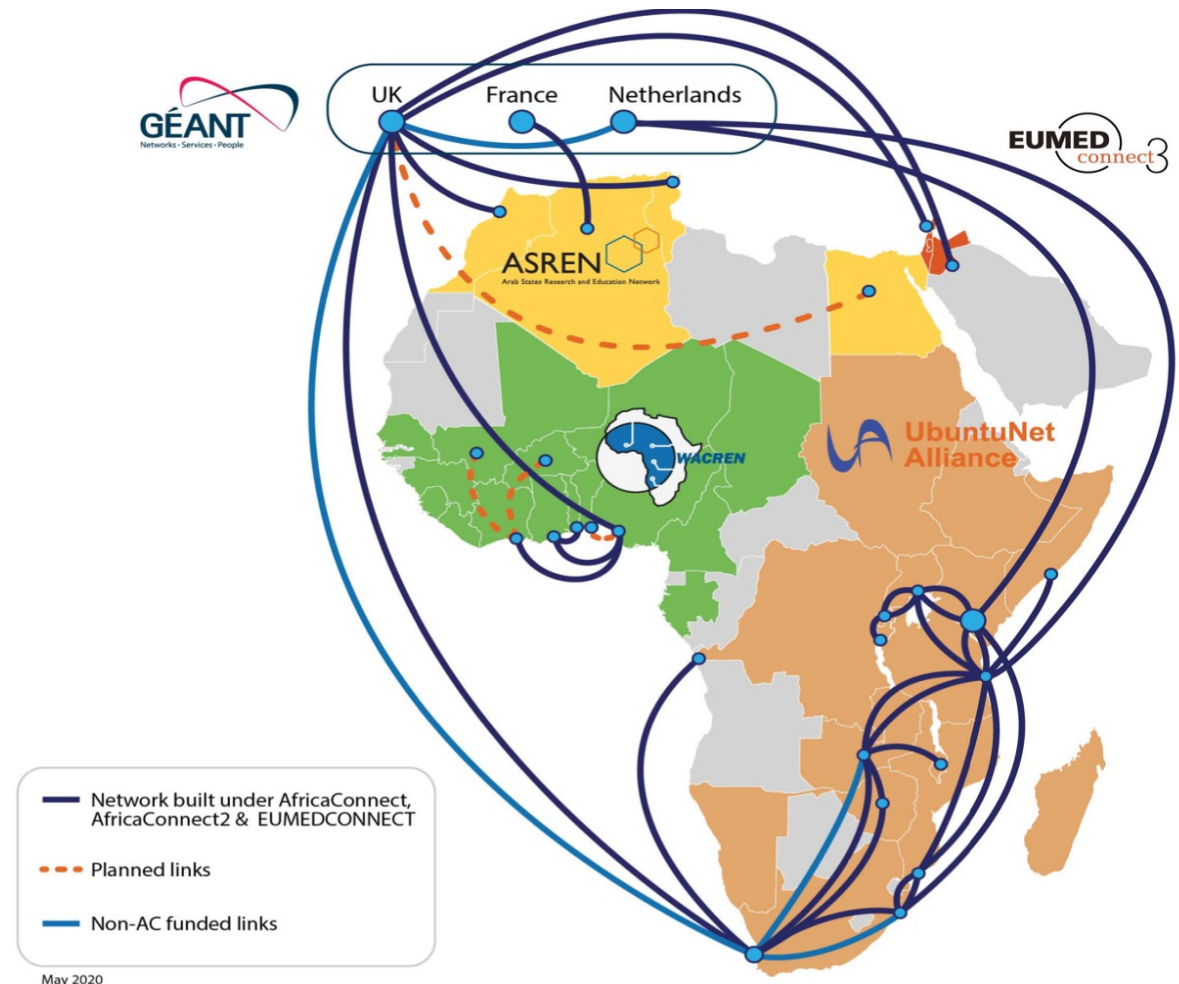
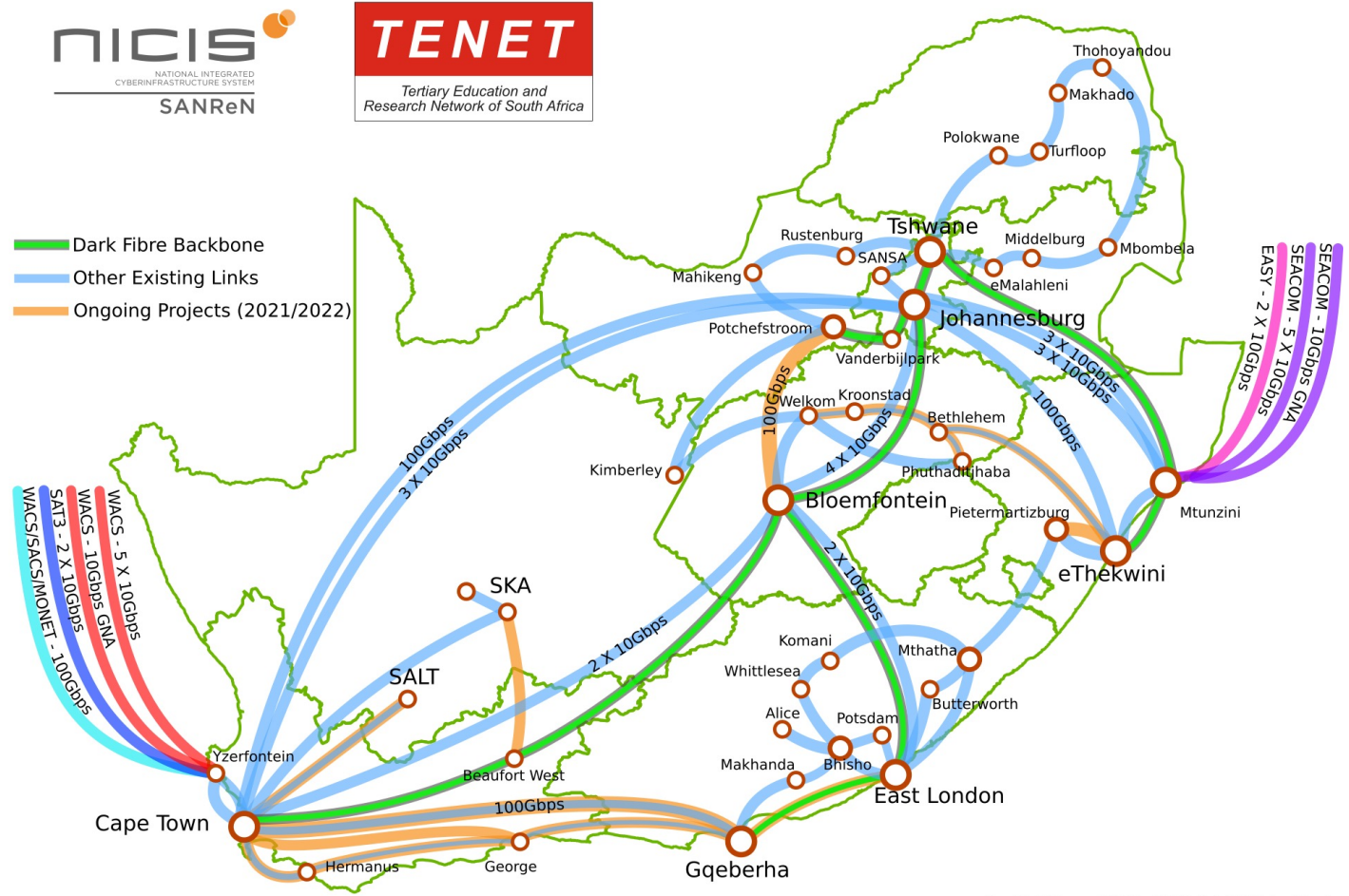


Image: AfricaConnect3

National Connectivity

- All Universities and Research Councils Connected
- Backbone
 - Managed 10G Links
 - DWDM (100G/200G transport)
 - 100G IP Links



South African NREN - 2021-04-07 [John Hay]

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Southern African Large Telescope (SALT)

- South African Astronomical Observatory (SAAO) field station near the small town of Sutherland
- 400km from Cape Town
- SA NREN Connection – 10Gbps



Image: Copyright © Wynand Basson Images

South African Radio Astronomy Observatory (SARAO) – MeerKAT/SKA



Image: SARAO – MeerKAT Arial View 2017

- MeerKAT – pathfinder to SKA
- Karoo – 700km from Cape Town
- SA NREN Connection:
10Gbps (current), 100Gbps (2021), DWDM (future)

South African Radio Astronomy Observatory (SARAO) – HartRAO Facility

- 70km from Johannesburg
- SA NREN Connection:
50Gbps



Image : HartRAO – 26m Radio Telescope and other instruments

Southern Hemisphere Collaboration



Fortaleza (Image: ROEN)



Hartebeesthoek (Image: M Gaylard / HartRAO)



Pereyra (Image: CONICET)

Geodetic VLBI, under the auspices of the International VLBI Service (IVS)

Co-observations:

- **Hartebeesthoek Radio Astronomy Observatory (HartRAO)** – Hartebeesthoek, South Africa
- **Rádio Observatório Espacial do Nordeste (ROEN)** - Fortaleza, Brazil
- **Argentine-German Observatory (AGGO)** - Pereyra, Argentina

Other International Collaboration - HartRAO



Astronomical VLBI with EVN

- Realtime and recorded modes
- L2 1Gbps REN link to JIVE

Astrometric VLBI under auspices of IVS

Maser Monitoring Organisation (M2O)

Thank you

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