



**NICIS**

NATIONAL INTEGRATED  
CYBERINFRASTRUCTURE SYSTEM

---

**SANReN**

# South African Conne

Renier van Heerden, Head of Network  
Ajay Makan, Head of

South American – African Astronomy Coordination  
(SA



# Outline

- South African NREN (SA NREN) Overview
- South African Connectivity (Local and International)
- Support to Astronomy
- SANReN Services

A national initiative of the Department of Science  
and Innovation and implemented by the CSIR



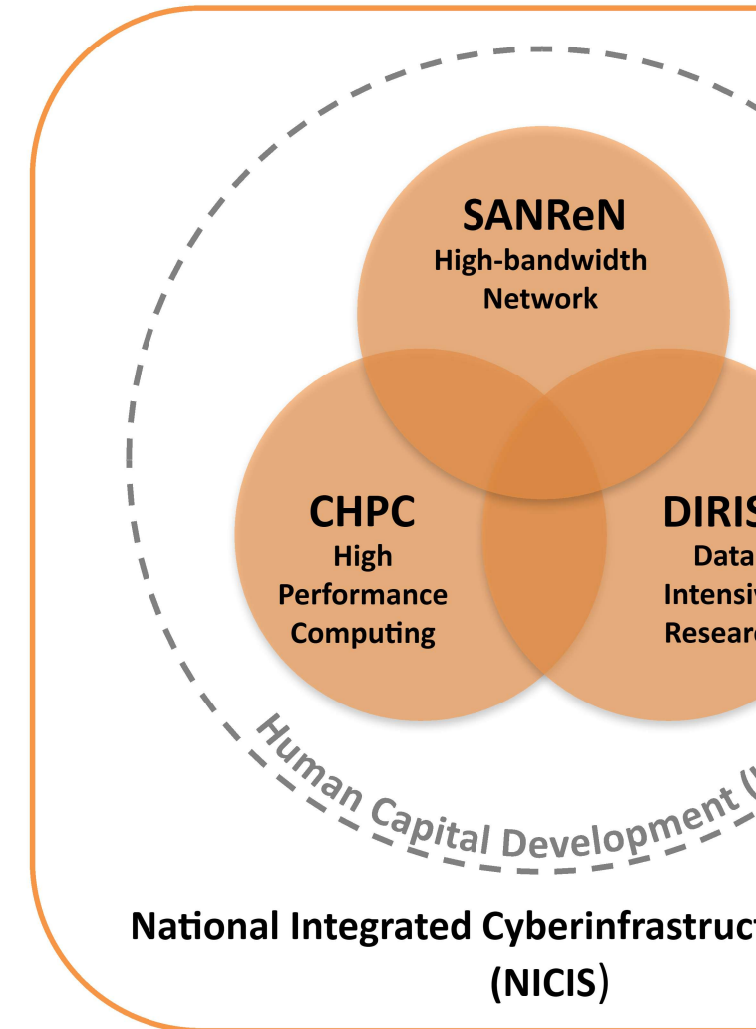
science & innovation

Department:  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA



# Background: NICIS

- **National Integrated Cyberinfrastructure System (NICIS)**
- Structure
  - **South African National Research Network (SANReN)**
  - **Centre for High Performance Computing (CHPC)**
  - **Data Intensive Research Initiative of South African (DIRISA)**
  - 3 pillars encompassed by HCD
- NICIS is a hosted programme of the DSTI
- Hosted at the CSIR as a centre in NGEI Cluster, Smart Society Division



A national initiative of the Department of Science and Innovation and implemented by the CSIR



science & innovation

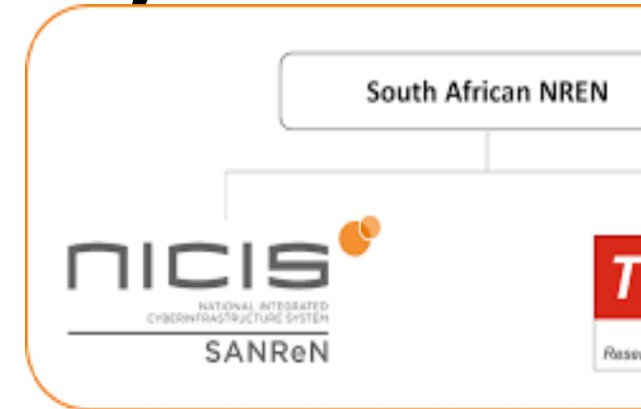
Department  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA



SANReN, <https://www.sanren.ac.za/> | CHPC, <https://www.chpc.ac.za/> | DIRISA, <https://www.dirisa.ac.za/> | <https://www.nicis.ac.za/>

# The South African National Research and Education Network (SA NREN)

- Structure
  - Roles and responsibilities of the de facto South African NREN are distributed between SANReN and TENET
- Functions
  - SANReN
    - Builds the Network (network reach and capacity)
    - Develops Advanced Services
  - TENET
    - Operates the SANReN Network under terms of collaboration agreement with CSIR
    - Build onto the network
    - Host Services
    - Represents South African NREN at UbuntuNet Alliance (founding member) – Regional REN for South East Africa
    - SABEN – entity for the connection of TVET colleges

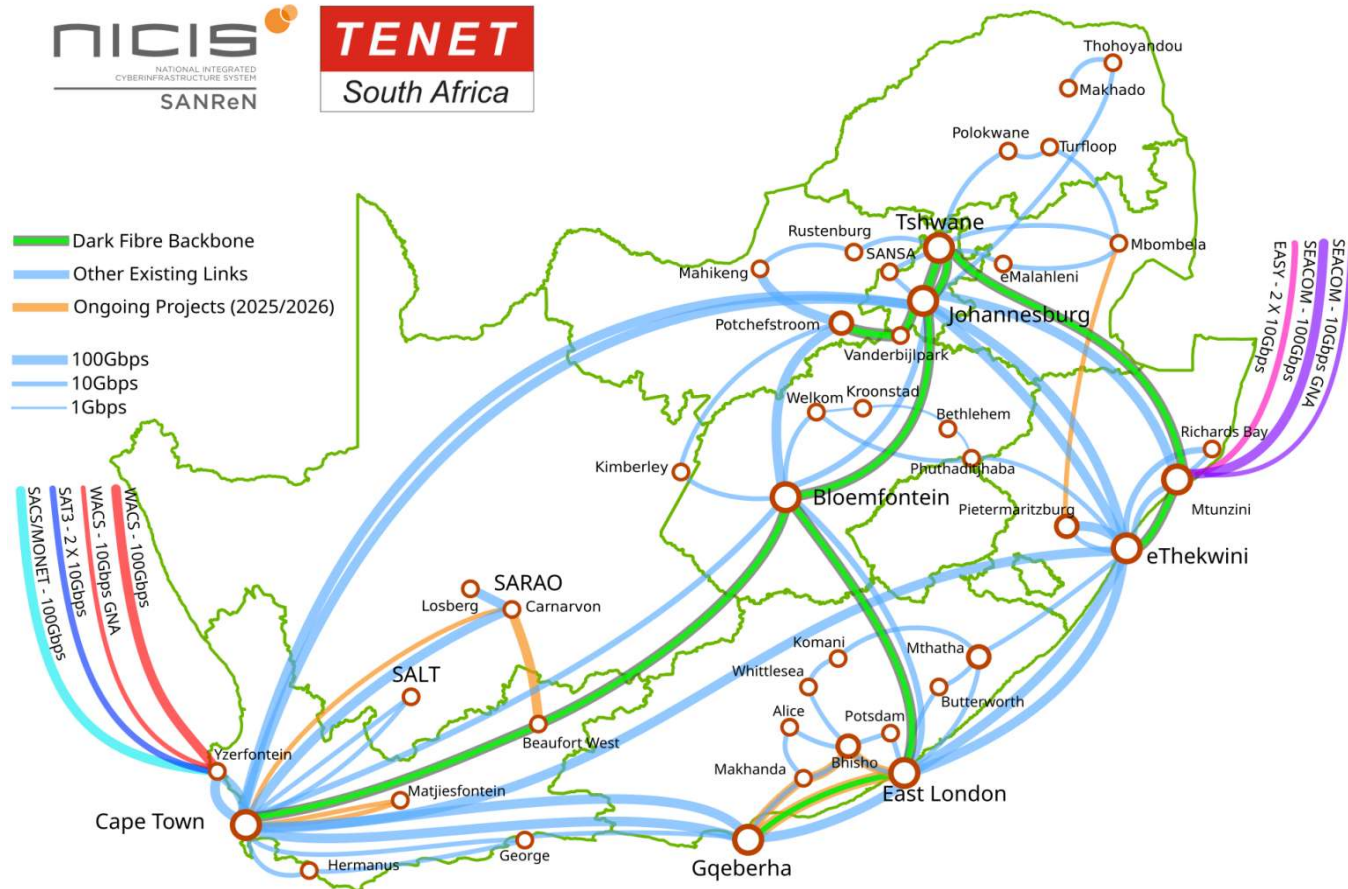


A national initiative of the Department of Science and Innovation and implemented by the CSIR



TENET, <https://www.tenet.ac.za/> | SANReN, <https://www.sanren.ac.za/>

# South African Connectivity



South African NREN - 2026-03-23 [John Hay]

A national initiative of the Department of Science and Innovation and implemented by the CSIR

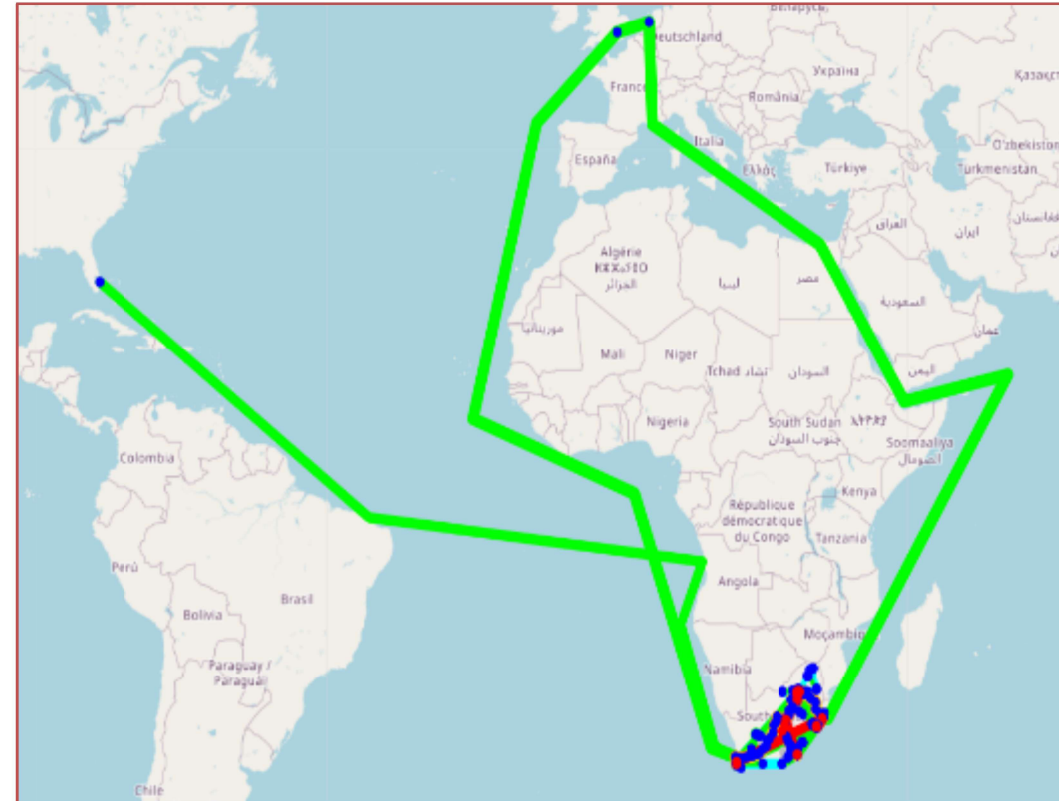


- Infrastructure:
  - a core national dark fibre backbone
  - Meshed with several high capacity bandwidth backbone links (100Gbps)
  - backbone extension links (typically at 10Gbps)
  - back-hauling from major metropolitan areas to submarine cable landing stations at Yzerfontein, East London, and Mtunzini
  - Capacity on undersubscribed links
  - several metropolitan area networks



# International capacity

- West African Cable System (WACS)
  - 110 Gbps
- South Atlantic 3 (SAT-3)
  - 20 Gbps
- South Atlantic Cable System (SACS)
  - 100Gbps
- Eastern Africa Submarine System (EASSy)
  - 20 Gbps
- SEACOM
  - 110 Gbps
- Equiano [TENET]
  - Capacity not yet activated



A national initiative of the Department of Science  
and Innovation and implemented by the CSIR



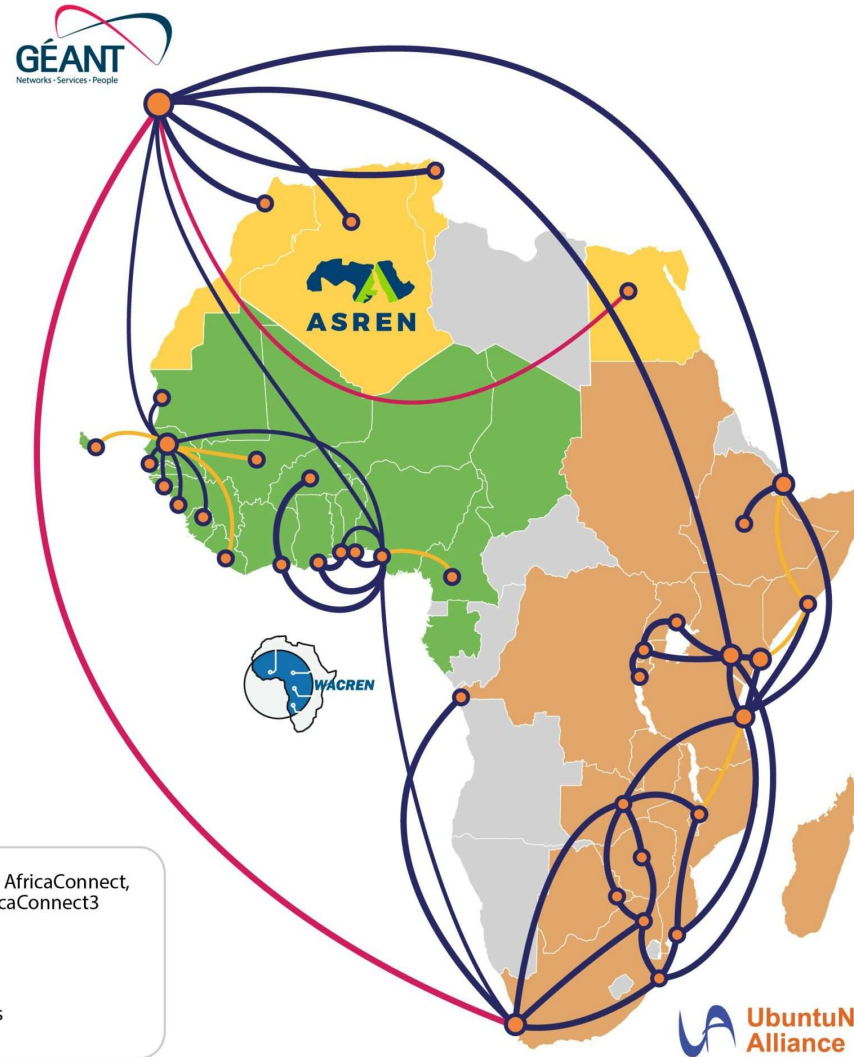
science & innovation

Department  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA



South African NREN link status: <https://linkmon.s>

# Africa Continental Interconnects



- Network built under AfricaConnect, AfricaConnect2, AfricaConnect3 & EUMEDCONNECT
- Planned links
- Non-AC funded links

A national initiative of the Department of Science and Innovation and implemented by the CSIR

# Some stats...



## Total Total International Bandwidth

- Number of users: 1.3 million (estimated)
- Number of sites connected by SANRENET: 400+
- Multiple 100Gbps backbone links between major cities
- International bandwidth: 360 Gbps
- Capacity on 5 undersea cables

Organisation	Number of links as at 24 April 2026	Organisation	Number of Devices as at 24 April 2026	Total Bandwidth Capacity as at 24 April 2026
SANReN	314	SANReN	333	11 482
TENET	389	TENET	244	
SABEN	22	SABEN	309	
Other	11	Other	1	
<b>Total</b>	<b>736</b>	<b>Total</b>	<b>887</b>	

# Supporting Astronomy and Space activities in South Africa



Connectivity for the South African Astronomical Observatory (SAAO) in Sutherland for optical telescopes (South African Large Telescope (SALT))



Connectivity for the South African Radio Astronomy Observatory (SARAO) site at Losberg for radio telescopes (Karoo Array Telescope (KAT), MeerKAT, HERA and SKA telescopes). MeerKAT archived at the CHPC



Connectivity for the South African Radio Astronomy Observatory (SARAO) at Hartebeesthoek



Connectivity for the South African National Space Agency (SANSA) Space Operations at Hartebeesthoek



Connectivity for the South African National Space Agency (SANSA) Deep Space Network at Matjiesfontein (in process)

# Supporting Astronomy and Space activities in South Africa, Cont.



Connectivity for the University of the Free (UFS) Boyden Observatory in Maselspoort, Bloemfontein – in process



Connectivity for the University of the Free State (UFS) Naval Hill Planetarium, Bloemfontein – in process

# NREN Connectivity: SARAQ and SKA

Losberg



SARAQ Fibre

Klerfontein

SARAQ Fibre

SARAQ  
Carnarvon  
PoP

10Gbps Link (busy commissioning)  
N7, Springbok, Upington, Brandvlei,  
Williston, **Carnarvon**

SANReN  
(Cape Town  
PoPs)

100Gbps Link  
N1, Victoria west, Loxton, Carnarvon

SANReN Backbone Fibre

SANReN  
(Beaufort  
West PoP)



A national initiative of the Department of Science and Innovation and implemented by the CSIR

# SARAO and SKA NREN Connectivity

Losberg



SARAO Fibre

Klerfontein

SARAO Fibre

SARAO  
Carnarvon  
PoP

10Gbps Link (busy commissioning)  
N7, Springbok, Upington, Brandvlei,  
Williston, **Carnarvon**

100Gbps Link  
N1, Victoria west, Loxton, Carnarvon

SANReN  
(Cape Town  
PoPs)

SANReN  
metro  
Fibre

iThemba  
LABS

SANReN Backbone Fibre

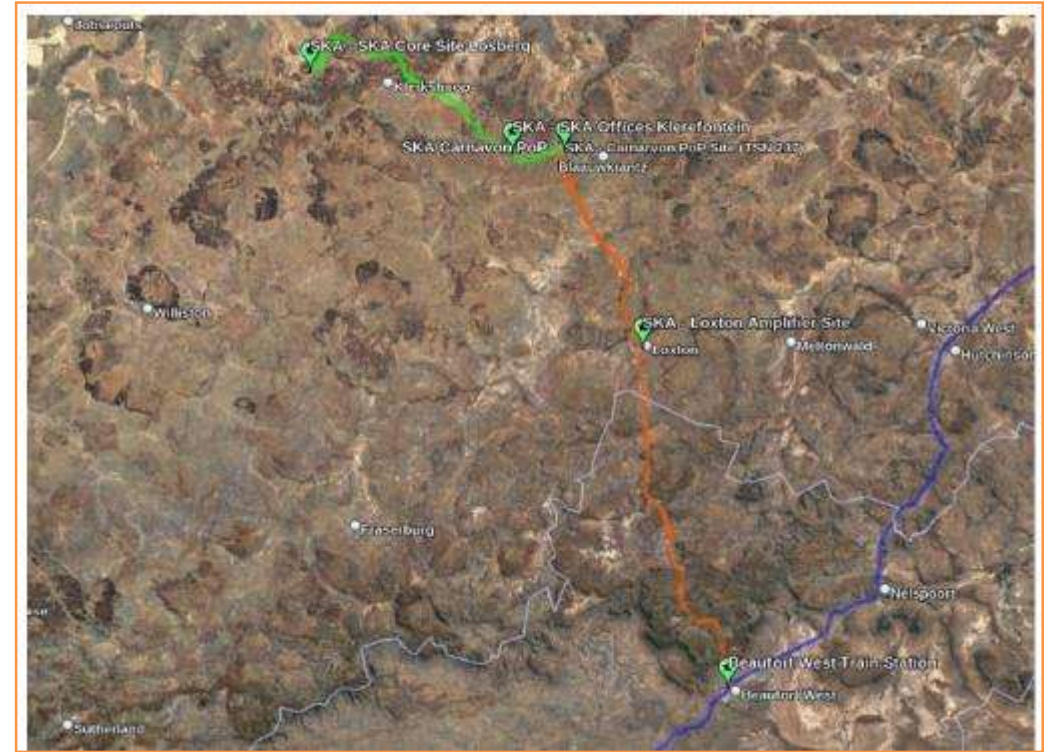
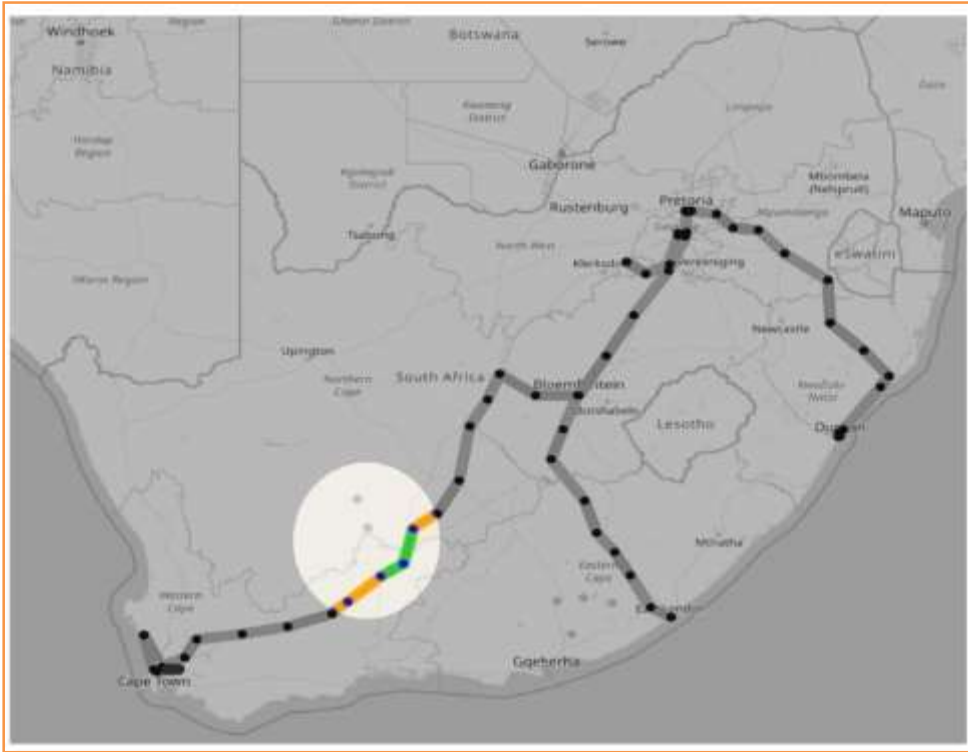
SANReN  
(Beaufort  
West PoP)

SKAO fibre



A national initiative of the Department of Science and Innovation and implemented by the CSIR

# Dark fibre build



- Dark fibre build from Carnarvon to Beaufort West (orange)
- Approximately 180km build
- Project transferred to SKAO, expected by the end of 2026.

A national initiative of the Department of Science and Innovation and implemented by the CSIR



science & innovation

Department:  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA



# SANReN Services

- PERT (Performance Enhancement Response Team)
  - A team at SANReN that assists with resolving network performance issues on research and academic networks
  - PERT team ([pert@sanren.ac.za](mailto:pert@sanren.ac.za))
  - Primarily uses perfSONAR to interrogate network performance issues
- perfSONAR (Performance-oriented Service-Oriented Network Monitoring Architecture)
  - Network measurement and monitoring framework designed to provide detailed insights into the performance of network connections
  - Several 100G nodes and 10G nodes deployed in the network
  - Upgrade of the perfSONAR to 100G nodes in process
  - perfSONAR and DTNs implemented on the same hardware for 100G nodes

A national initiative of the Department of Science and Innovation and implemented by the CSIR



science & innovation

Department:  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA



# SANReN Services: Data Transfer

- SANReN Data Transfer Service
  - FileSender
    - Allows users to share files of up to 100 GB
    - Used extensively by universities and students to share large volume of data
  - Specialized Data Transfer Nodes (DTNs)
    - Large File Transfer: 100s of Gigabytes or even many Terabytes of data
    - Using Globus File Transfer Software on specialized DTNs
    - 100G DTN nodes deployed at:
      - Teraco Isando, Johannesburg
      - Teraco Rondebosch, Cape Town
      - Teraco Riverhorse Valley, Durban
      - Losberg for SRAO (Not a full DTN, limited disk space, intending to upgrade once disks procured)
      - SANReN Lab, Building 43, CSIR Campus (Not a full DTN, limited disk space, for testing)

A national initiative of the Department of Science  
and Innovation and implemented by the CSIR



science & innovation

Department  
Science and Innovation  
REPUBLIC OF SOUTH AFRICA

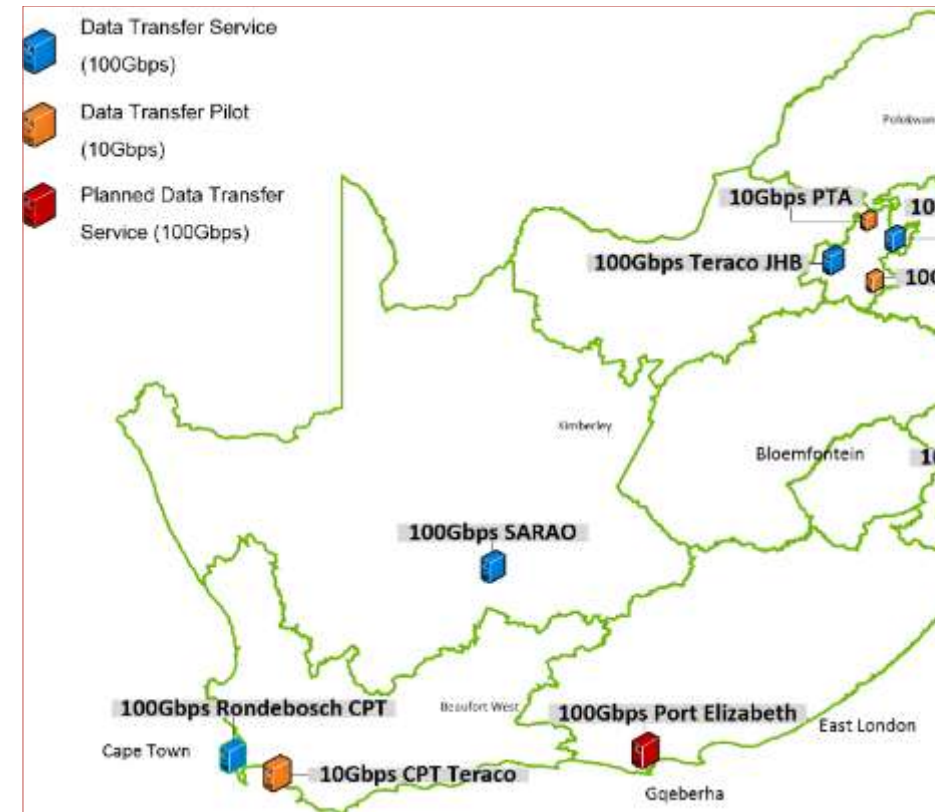


<https://filesender.sa>

See <https://www.globus.org/> and contact [pert@sanren.ac.za](mailto:pert@sanren.ac.za) to create account and

# SANReN Services: Data Transfer, cont.

- SANReN Data Transfer Service Activities
  - Implemented 100Gbps DTN and perfSONAR node on single hardware platform (Supermicro AS-1114S-WN10RT)
  - Benchmarking our 100G DTNs with EPOC team at Indiana University (top results)
    - 1TB data transfer from Washington to Cape Town: 8min, 45 seconds (1.90GB/s)
    - 1TB data transfer from Colorado (NCAR GLADE) to Johannesburg: 3mins, 2 seconds (5.48 GB/s)



A national initiative of the Department of Science and Innovation and implemented by the CSIR

A large, stylized graphic of a circular dial or gauge with orange and grey segments, serving as a background for the NICIS logo.

**NICIS**

NATIONAL INTEGRATED  
CYBERINFRASTRUCTURE SYSTEM

---

**SANReN**

**Thank You!**

- [ajay@sanren.ac.za](mailto:ajay@sanren.ac.za)
- [renier@sanren.ac.za](mailto:renier@sanren.ac.za)

<https://www.sanren.ac.za/>

