Technical Requirements

The Provision of Managed Bandwidth Links for the South African National Research Network (SANReN) Connectivity to South African National Space Agency (SANSA) and Nuclear Energy Cooperation South Africa (NECSA) to the CSIR.

RFP No. 3645/19/08/2024

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Glossary

Abbreviation	Term	Description
BER	Bit Error rate	
CAC	Customer Acceptance Certificate	Certificate of Acceptance that the SANReN customer needs to sign off on when work done (including civil work) is done on the SANReN customer's premises.
CSIR	Council for Scientific and Industrial Research	A statutory body established in terms of Scientific Research Council Act 46 of 1988, as amended.
GIS	Geographic Information System	A system designed to capture, store, manipulate and visualise spatial or geographic data.
IETF	Internet Engineering Task Force	A body that defines standard Internet operating protocols such as TCP/IP.
ITU	International Telecommunication Union	The International Telecommunication Union, originally the International Telegraph Union, is a specialized agency of the United Nations that is responsible for issues that concern information and communication technologies. It is the oldest global international organization. Headquarters: Geneva, Switzerland Founded: 17 May 1865
LC/APC	Lucent/Little/Local Connector - Angled Physical Contact	Fibre optic connector of the LC type with angle-polishing on fibre end-face.
NECSA	South African Nuclear Corporation	Necsa was established as a public company by the Republic of South Africa Nuclear Energy Act in 1999 and is wholly owned by the State.
ODF	Optical Distribution Frame	A passive device that terminates fibre cables.
PoP	Point of Presence	A location where networking equipment may be accessed.
RFP	Request for Proposal	A request for organisations and companies to submit a proposal to supply goods and services to CSIR
RU	Rack Unit	Unit of measure describes the height of electronic equipment designed to mount in a 19-inch rack. One rack unit is 1.75 inches (44.45 mm) high

Abbreviation	Term	Description
SANReN	South African National Research Network	The South African National Research Network (SANReN) is a high-speed network dedicated to science, research, education and innovation traffic.
SANSA	South African National Space Agency.	South Africa's government agency responsible for the promotion and development of aeronautics and aerospace space research
UNISA	University of South Africa	Higher education institution in South Africa
Wits	University of Witwatersrand	Higher education institution in South Africa

Definition of Terms

Term	Definition
Managed Bandwidth Service	A service provided by telecoms companies where a point-to-point links/service of a particular bandwidth capacity is provided to the customer.
Underground Fibre Required	Only Underground Fibre solutions will be considered
Underground Fibre Preferred	Underground Fibre solutions are preferred but Overhead solutions will also be accepted.
Protected Circuit	Refers two diverse routes between 2 sites (the core and the access should be protected), the service is provisioned as an Active/Passive service, when the active link is down, the service provider is responsible to switch traffic onto the passive link between the 2 sites. The expected availability of a protected circuit is 99,5%
Cross Connect	Refers to a fibre connection between separate units of facilities within a data centre. A cross connect is required between the SANReN terminating point and the bidder's terminating point if a link terminates in a datacentre, e.g. Africa Data Centres, Internet Solutions, Teraco, etc.

Technical Requirements

Bidders must comply with the technical requirements in this document. These requirements will be evaluated in the Technical Compliance Matrix – Annexure C1 – Technical Evaluation Matrix. Bidders that wish to respond with solutions for this project must complete a **separate tab/sheet for each link proposed** in the Annexure C1 – Technical Evaluation Matrix . Failure to complete the technical compliance matrix will exclude the bidder from being considered.

1   Requirement Level Keywords

To eliminate ambiguity, bidders are to interpret the meaning of functional (technical) requirements using the keywords; "must", "must not", "required", "shall", "shall not", "should", "should not", "recommended", "may", and "optional", as defined by the IETF RFC (Request For Comments) document designated as RFC2119.

2   Technical Compliance

Bidders shall note the evaluation criteria applicable, and the weights attached to each criterion and complete the Technical Compliance Matrix accordingly.

2.1 Technical Evaluation Criteria

- The evaluation of the bidder's proposal will be based on their response to the Technical Compliance Matrix (in spreadsheet format) – Annexure C1 – Technical Evaluation Matrix.

- The bidder must complete the Technical Compliance Matrix in accordance with the instructions tabled in the Technical Compliance Matrix spreadsheet. The Technical Compliance Matrix is a mandatory submission designed to facilitate evaluation.

- Each link proposed will be evaluated individually and must be completed in a **separate tab** in Annexure C1 – Technical Evaluation Matrix.

- Proposals with functionality / technical points of less than the pre-determined minimum overall percentage of 70% or less than 50% on any of the individual criteria will be eliminated from further evaluation on Price and Preference Points Evaluation.

3 Link Specifications

Proposals are hereby invited for the supply of fixed-line fibre managed circuits with the committed rates and between the SANReN sites identified in *Table 1* and the sections below.

Please note that bidders are not compelled to supply all links, bidders may opt to respond for any of the links they are able to provide. Due to increased vandalism, theft, and other risks, the CSIR prefers underground fibre solutions, but overhead fibre solutions will be accepted if there are no underground fibre solutions available and/or affordable.

The proposed links will be evaluated taking the whole project into account. The purpose is to design a solution that have no overlap or shared infrastructure. If that is impossible, the aim is to minimize the overlap or shared infrastructure of links that make up the solution, i.e. minimize common failures.

3.1 Requested Links

The bidder must provide managed bandwidth links between the endpoints specified below in *Table 1* and at the required bandwidth for specific links as indicated in the same table. The required links are schematically shown in section 3.4 below. The name, address and coordinates for each endpoint is provided in *Table 2*.

Table 1: Requested Links

Link	Capacity	Site A	Site B	Preferred Requirements
Link 1	10Gbps	SANSA Space Operations	Wits Main Campus	Not to share with Link 2
Link 2	10Gbps	SANSA Space Operations	UNISA Muckleneuk	Not to share with Link 1
Link 3	1Gbps	NECSA Pelindaba	SANSA Space Operations	Not to share with Link 4(a) and 4(b)
Link 4a	1Gbps	NECSA Pelindaba	CSIR Main Campus	Not to share with Link 3
Link 4b	1Gbps	NECSA Pelindaba	Teraco Isando JB1	Not to share with Link 3

Notes:

1. Link 4a and Link 4b are options. The intention is not to award both links.
2. Link 1, Link 2 and SANSA's own fibre to Teraco Isando (see *Figure 1*) should not share infrastructure.

3. Link 3 and Link 4(a) and 4(b) should not share infrastructure.

4. A cross connect will be required from the SANReN/TENET cabinet to the bidder's terminating point or meet-me room in the data centre for link 4b where it is terminating at Teraco Isando. The costs of the cross connect should be included in Annexure D1 – Pricing Schedule sheet. The SANReN/TENET cabinet details will be shared with the winning bidder.

Table 2: Site Details

Site Name	Address	Coordinates
CSIR Pretoria	Building 9 Meiring Naude Road Brummeria Pretoria 0184	Latitude: -25.744750 Longitude: 28.277530
NECSA Pelindaba	Building P3100 Elias Motsoaledi Street Ext. (Church Street West), R104 Pelindaba Madibeng Municipality 0240	Latitude: -25.799200 Longitude: 27.917000
SANSA Space Operations	SANSA Main Building Farm 502 JQ Hartebeesthoek District Krugersdorp	Latitude: -25.887300 Longitude: 27.707900
Teraco Isando JB1	5 Brewery Street Isando Johannesburg 1600	Latitude: -26.138000 Longitude: 28.198020
UNISA Muckleneuk	UNISA Muckleneuk Campus Cas van Vuuren Building Preller Street Muckleneuk Pretoria 0003	Latitude: -25.767800 Longitude: 28.199700
Wits Main Campus	Solomon Mahlangu House Jorissen Street Braamfontein Johannesburg 2001	Latitude: -26.192800 Longitude: 28.030300

3.2 Network Design Philosophy

Bidders are requested to take note that network descriptions (including diagrams) serve to communicate to the bidders the CSIR's intent from a logical networking point of view. The mapping of a logical topology onto physical infrastructure may introduce common failure points that are not obvious from the logical design. The circuits speeds must be provisioned on optic fibre end-to-end as per the link requirements, refer to table 1.

The CSIR is aware that it is not always feasible (in terms of cost and time constraints) for bidders to offer services that map cleanly from the logical design to physical infrastructure (in other words, without introducing common failure points), and it is therefore necessary to find a compromise on the acceptable level of failure risk.

To make the above determination, the CSIR requires detailed information about the underlying physical infrastructure over which the required link(s) will be provisioned. Bidders must avoid provisioning circuits using shared infrastructure between the sites in this tender as much as possible. All instances of shared infrastructure must be clearly identified and communicated to the CSIR as part of the bidder's response. Bidders shall disclose this information with at least the level of detail necessary to identify all shared infrastructure within the scope of the bid, including the physical routing of cable infrastructure, shared equipment and exchange points. This will be used by the CSIR to independently determine where infrastructure is shared between link(s) or with other providers that the CSIR could be obtaining services from. If overlapping infrastructure exists, the CSIR may request, during negotiations, that the bidder revise the physical routing of their solution to provide a solution without any overlapping infrastructure that may cause single points of failure on the network.

Partnership solutions must be specified and completed as one bid, identifying the partnership members and their individual responsibilities for service delivery.

3.3 Leased or otherwise Shared Infrastructure

Bidders that lease the underlying infrastructure offered as part of this bid with other downstream providers must disclose such information as part of their response. Bidders will not be penalised for offering solutions based leased infrastructure if this is disclosed.

Bidders that have provided SANReN with services that are not part of this bid must clearly indicate if their proposed solution shares any infrastructure with any such service already offered to SANReN.

3.4 Network Diagram

The network diagram below, i.e. *Figure 1: Network Diagram,* illustrates the envisioned network. This diagram is for illustration purposes only and bidders must design the network to optimize their available infrastructure. Bidders must, wherever possible, provide a reasonably direct route between the endpoints.

Bidders must provide a diagram or detailed text description illustrating how the circuit is provisioned over their core infrastructure. This diagram or description must be detailed enough to understand the physical routing of each of the links and any shared infrastructure as described in section 3.2 above. A high-level diagram or detailed text description is sufficient, but a KML file showing the physical routing will be preferred. If the winning bidder does not provide a KML file with detailed physical routing information, they will be required to provide it during negotiations.
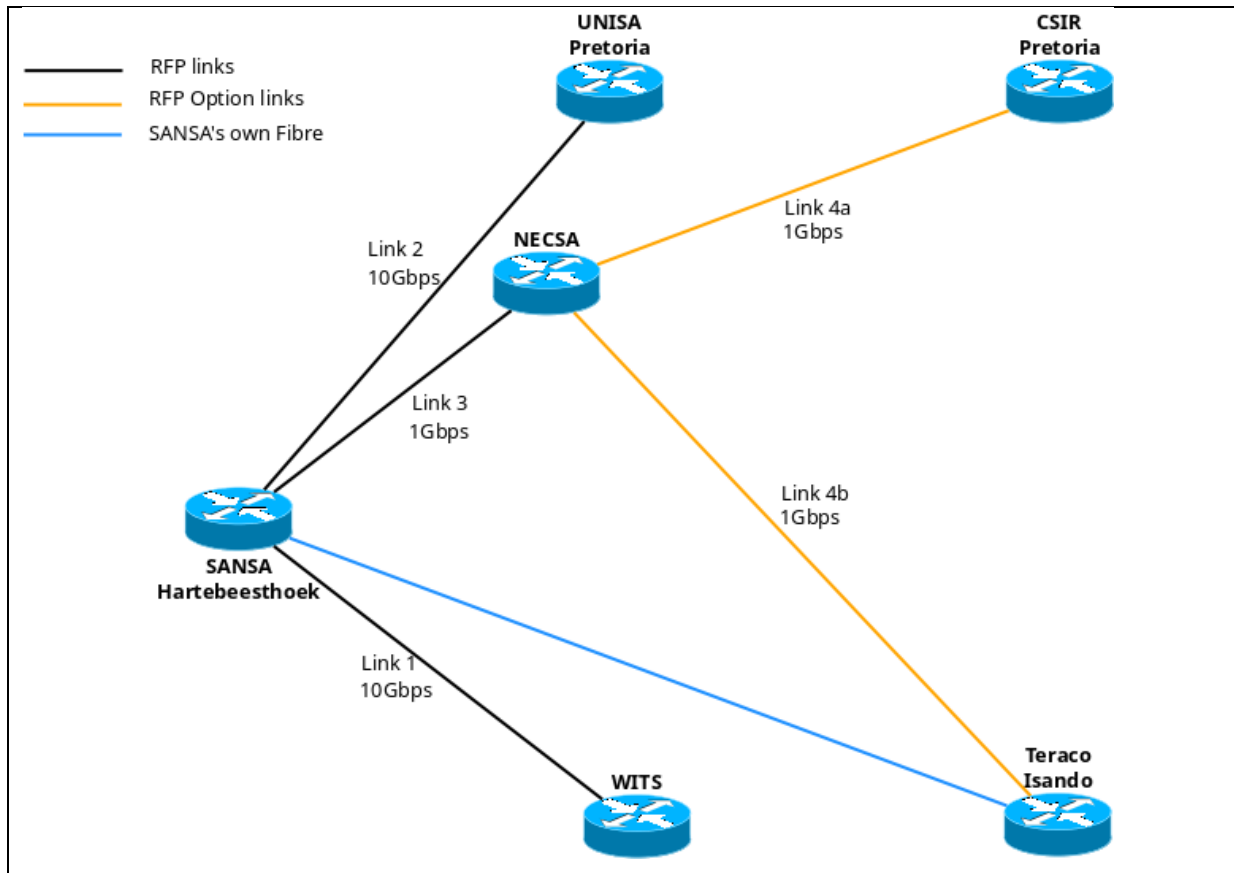
Figure 1: Network Diagram

3.5 Build Specifications

The bid is for end-to-end connectivity between the SANReN PoPs (this must include any "last mile builds" or links from the Bidder's PoP to the endpoints). Should additional infrastructure be required in order to meet the specification, provisioning of the link must be delivered within the timelines stated in section 6 below.

4   Link Requirements

The links must comply with the following requirements:

1. The links must be provisioned on fixed-line fibre infrastructure.
2. The links must terminate on active equipment at the sites specified.
3. All equipment deployed at the specified sites must be AC powered (220V 50Hz).
4. All equipment used must have their dimension requirements specified.
5. The links must support Link Loss Forwarding.

6. The links must support Jumbo Frames of 9000 bytes.
7. The links handoff must be an Ethernet handoff on either 1000BASE-LX (LAN) PHY or 10GBASE-LR PHY as per the speed requirements of table 1.
8. The client hand-off must terminate on a patch panel.

5   Reliability

5.1 Service Requirements

The CSIR requires that a minimum end-to-end uptime of 98%, but would prefer an uptime of 99% or better, (calculated per month) to be maintained for all links. To manage these requirements, the CSIR encourages all bidders to include a standard SLA (Service Level Agreement) as part of its response. The bidder must commit, as a minimum, to comply to the following criteria to pass the evaluation:

1.   24/7 access to a Network Operations Centre (NOC) to log support requests;
2.   Maximum response time of 4 hours;
3.   Maximum service restoration time of 8 hours; and
4.   Quarterly end-to-end uptime reports for each circuit that is part of this tender.

The minimum end-to-end uptime to be maintained will be calculated using the following formula:

- Formula: total number of days in the month, multiplied by 24 hours multiplied by minimum end-to-end uptime percentage, equals minimum end-to-end uptime

For example, the minimum end-to-end uptime percentage of 99% is calculated as follows:

- Using the formula: total number of days in the month, multiplied by 24 hours multiplied by 99% equals minimum end-to-end uptime;
- For a 30-day month, 99% equates to an effective uptime of 712, 8 hours out of 720 hours, allowing for 7.2 hours of downtime in the month; and
- For a 31-day month, 99% equates to an effective uptime of 736.56 hours out of 744 hours, allowing for 7.44 hours of downtime in the month.

For suppliers who wish to calculate the minimum end-to-end uptime on a quarterly basis, the number of days in the quarter under review, multiplied by 24 hours multiplied by minimum end-to-end uptime percentage will equal the minimum end-to-end uptime. Suppliers need to **explicitly state** whether their minimum end-to-end uptime percentage will be calculated either monthly or quarterly.

5.2 Maintenance

Details about the following aspects of the bidder's maintenance and support capabilities are required in order to evaluate the quality of the maintenance that the bidder will provide with respect to this link:

1. Mean Time to Repair;
2. Same day response, Working day response only, etc.;
3. Fault Logging Procedures;
4. Maintenance down time procedures and advance warning procedures;
5. Fault Monitoring and Alerting capability;
6. Scheduled reporting of incidents & performance measurements; and
7. Customer responsibilities indicated;

The bidder must specify whether the link being provided in this tender will be actively monitored or not. If the link is actively monitored, the bidder to provide the CSIR, or a CSIR designated party, regular notifications on the status of the link and other specific details when requested.

6   Project Plan

Bidders who plan to deliver the links within 6 months from the date of award will obtain full marks in the project plan section of the Technical Compliance Matrix. Bidders who plan to deliver the links after 6 months will score points as per the Technical Compliance Matrix.

Bidders must submit a project plan and schedule for this Project. The project plan must, at a minimum, cover the following items:

1. Planning Planned activities

2. Last Mile Civil Works (if applicable)

    a. Way Leaves

    b. Trenching

    c. Blowing Fibre

3. Circuit Provisioning

    a. Equipment procurement

    b. Equipment deployment

    c. Equipment configuration

4. Link Testing

5. Handover

7   Acceptance and As-deployed Documentation

In accepting a link(s), the CSIR will require several documents:

1. Test results for link(s).
2. CACs for the access builds at the end points (if applicable).
3. As-deployed documentation e.g., KML file; and
4. Acceptance test certificate documentation.
5. Photographs of the deployed equipment at each endpoint with clearly identifiable and labelled demarcation points

7.1 Test results

The test results are to be provided for each link tested. The following information must be included on the Test Result Sheet / Acceptance Test Sheet:

1. 24-hour soak test results
2. BER Test results
3. Routing maps (Logical or Physical) of the actual service that was provisioned.

7.2 Customer Acceptance Certificates

For access builds, CACs need to be signed off to ensure that all involved parties are satisfied with the work done by the supplier including required plans developed by the supplier be approved by relevant parties.

7.3 Sample Acceptance Documentation

Bidders must provide sample test results for previous similar work. The sample of the test result documentation must include samples of all acceptance documentation described above.