



ANNEXURE F: SCOPE OF WORK

RFP
For
Transnet's
Computing and infrastructure resources in the
backend that have the capability to integrate with
the existing on-premises infrastructure and cloud
systems.

SCOPE:

This event aims to improve the performance, scalability, and efficiency of Transnet's on-premises ICT infrastructure, as well as to reduce the complexity and costs of managing and maintaining the infrastructure, details specifications will be outlined in the Master Services Agreement between Transnet Limited ("Transnet") and Service Provider.

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Definitions:

Product	Explanation
What is a hybrid cloud	A hybrid cloud—sometimes called a cloud hybrid—is a computing environment that combines an on-premises datacenter (also called a private cloud) with a public cloud, allowing data and applications to be shared between them. Some people define hybrid cloud infrastructure to include "multi-cloud" configurations where an organization uses more than one public cloud in addition to their on-premises datacenter. Structure that has a capability to link to a hybrid clouding solution.
A private cloud/ on-premises cloud	is a cloud computing environment dedicated to a single organization. Any cloud infrastructure has underlying compute resources like CPU and storage that you provision on demand through a self-service portal. In a private cloud, all resources are isolated and in the control of one organization.
In a public cloud	external cloud providers deliver the resources as a fully managed service. For example, applications require computing resources like internal memory, data storage, and CPU.
Back-End Infrastructure	The backend refers to devices that respond to ending user activities or requests, for example, routers, network servers, and storage servers
Infrastructure capabilities	infrastructure must be capable to natively integrate with a public cloud and current private cloud deployment at TNPA
Network Requirement	networking requirements to be specified by supplier and to be supplied by Transnet
Meet the requirement	supplier responses match all requirements in scope of work
Partial Information	supplier response does not match all the requirements as specified in the scope of work
virtual data centers (VDCs)	A resource allocation unit that aligns with the structure of an enterprise or organization, which can provide functions such as user management, product definition, resource provisioning, etc.
Cloud management platform/Cloud management software	A platform that provides cloud service and resource operation management and system O&M management.
Unified platform/ Unified cloud platform	Unified platform can integrate existing environment such as TNPA infrastructure, public cloud provider environment, and provide unified entry portal, unified user experience.
Extensible platform	The platform is deployed on the basis of loosely coupled architecture, which can quickly expand.
Virtual Machine (VM)	It is a virtual computing server composed of vCPU, memory, disk, etc. It is easy to obtain, flexible and expandable, and can be used on demand.
Migration specialists	Individual/Engineer who has sufficient knowledge, experience to implement data migration.
Spine-Leaf architecture	Spine-Leaf network architecture is leaf ridge network. Architecture has a Spine layer and a Leaf layer, including spine switches and leaf switches. Each blade switch is connected to all ridge switches, and the ridge switches are not directly connected to each other,

	forming a topology called full-mesh.
Cloud Management Capability	It provides ability to manage self-built cloud resources in a unified manner, including tenant self-service interface, cloud service management and service catalog, metering, automatic configuration of computing, storage and network resources, operation and maintenance monitoring of cloud services and cloud resources, and operation command analysis.
Cloud Function Capability	It provides services to help users quickly apply for computing, storage, and network resources, implementing quick service rollout.
Software Defined Network (SDN)	Software-defined networking (SDN) is an approach to networking in which control is decoupled from hardware and given to a software application called a controller.
WORM	It's a form of data protection. After information is written, it can be read, but it cannot be modified.
High level design	It is design process of overall scheme and overall technical approach to complete a large project. The design of system as a whole, that is, in addition to software design, it also includes equipment selection, network, security, and performance, corresponding to system requirements.
low-level design	It is process of refining and extending overall design of a system or component to achieve degree that design is sufficiently perfect and can be implemented.

1.0. Overview and Objectives

1.1. Background

The current IT Data Services MSA contract has formally commenced with the disengagement phase. The contract appointment would see the transitioning of Transnet services to a new service provider under the following conditions, at the end of the 5-year contract period or if the contract value reach depletion prematurely.

To rebuild its ICT infrastructure and human resource capacity, Transnet has identified the need to appoint a service provider for designing and implementing of Computing and Back-End Infrastructure. The purpose of this tender document is to solicit proposals from qualified bidders for the procurement of an On-premise Private Cloud Solution and to be implemented with strict adherence to international best practices for an On-premise Private Cloud Solution architecture model, in line with Transnet planned ICT Strategy and Cloud Strategy. The combination of this On-premise Private Cloud solution and its ability to integrate with Public Cloud solutions, will present Transnet with an opportunity to modernize the current traditional data centers into a more agile, scalable, resilient, and secure means to provide compute resources within its ICT landscape. It will also provide a flexible, shared network of preconfigured and integrated computing resources that will enable Transnet ICT services to be delivered more efficiently, faster, more reliably and more importantly it will be beneficial for business.

1.2. The Objective of the Transnet's On-premise Infrastructure Architecture

One of Transnet's operating divisions, TNPA has recently procured and deployed an On-premises Private Cloud Solution, to service its computing needs. This solution currently supports their critical workloads, including some of the TCC workloads. In line with Transnet ICT strategy and cloud strategy, Transnet has identified the need to build its own primary on-premises data center infrastructure and disaster recovery data center infrastructure solutions, and we may use TNPA existing on-premises cloud environment as an extension of a disaster recovery site in the future due to the following reasons:

- **Unified platform:** The unified cloud platform manages the primary and disaster recovery site which can reduce the operation challenges and cost.
- **Extensible platform:** The TNPA existing On-premises Private Cloud infrastructure solution environment which has the features of elasticity and rapid expansion; hence it can expand the resource capacity and reduce the configuration and commission periods.

1.3. Overview of "AS IS" TNPA Compute and Back End Environment located at Port of Durban

TNPA's existing On-premises Cloud solution environment has a Production site and a disaster recovery site which are both located in the port of Durban. Specifically, the production site located in Queens Warehouse which service production, development and QAS workload environments and the disaster recovery site located in TPT straddle workshop which provides disaster recovery virtual machines for the production workloads.

The architecture of the existing environment is as per Figure 1 as follows.

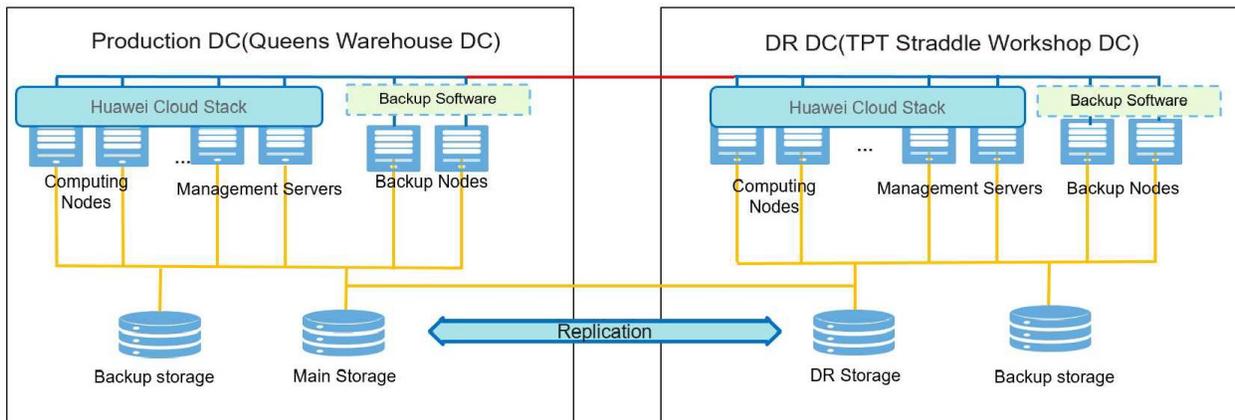


Figure 1: TNPA Existing Cloud Environment Architecture

The features of this environment are available as per below:

➤ **Unified Cloud Platform**

- A unified cloud platform can manage production data center and disaster recovery data center, reducing operation and maintenance cost.
- A unified cloud platform can manage computing resource pool, network resource pool and storage resource pool to achieve resource sharing and maximize capacity utilization.

➤ **Storage replication-based disaster recovery solution**

- Tenant-level disaster recovery provides self-help disaster recovery service, tenants choose Virtual Machine (VM) to protect as they want.
- The cloud platform issues instructions to storage to protect data and directly replicate data between storages to ensure high performance and security of data replication.

2.0. Scope of Work

2.1. "TO BE" Compute and Infrastructure Architecture

Bidders are required to design and implement a solution based on an on-premises architecture as per Figure 2 below, which enables unified management and deployment of the data center to ensure its consistency and scalability.

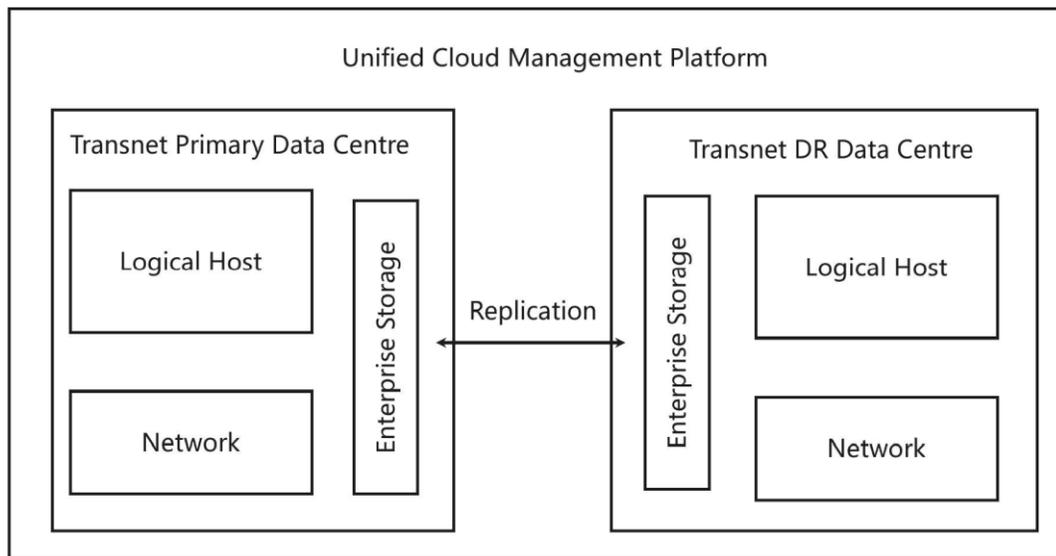


Figure 2: To be High Level Hardware Architecture

The project involves providing, delivering, and setting up an on-premises infrastructure at a Transnet nominated data center facility. This includes migrating from previous on-premises infrastructure to the newly commissioned infrastructure, as well as providing technical support and maintenance for a period of 36 months post implementation. The scope can be broken down into the following areas:

- a) **Hardware:** All hardware components required to implement an on-premises cloud infrastructure i.e. servers, storages, switches, etc.
- b) **Software:** Software licenses for any new software components proposed that Transnet is not licensed to utilize i.e. cloud management software, backup software, migration tool software etc.

c) **Services:** Hours that is required for the implementation specialists to implement the hardware and software for the solution to be fully functional.

d) **Migration:** Hours that is required for the migration specialists to migrate the workloads from the existing infrastructure to the new purchased infrastructure.

e) **Skills transfer:** Hours required to transfer the knowledge to Transnet system administrators on how to administer the solution going forward (post project) by themselves without any hand holding.

f) **Post implementation maintenance:** For a period of 3 years commencing after project is declared complete.

2.2. Hardware Capacity Specification

To accommodate the existing Transnet workloads that are currently accommodated/hosted on the old infrastructure, the bidder must design and commission the solution as per the specifications set out in below table:

Resource	Specification requirement
Computing capacity	Support Virtual machine services and Bare metal services, computing resource requirements in total: 6076 vCPU Core, 33494 Gigabytes Memory
Storage capacity	All-flash storage with 500TB effective usable capacity in total, support Synchronous and asynchronous replication
Backup storage capacity	All-flash storage with 500TB physical capacity in total, no less than 1TB Cache per storage array, support Synchronous and asynchronous replication

Network capacity	<ol style="list-style-type: none"> 1. Spine-Leaf architecture, dual-device deployment ensures service reliability. 2. The Core Switch is a chassis switch that support 36*40GE port, the TOR switch includes storage switch (support 48*10GE/25GE and 8*100GE) and convergence switch (support 48*10GE and 6*100GE), out-of-band management. 3. Border firewalls throughput 100 Gbit/s and management plane firewalls throughput 50 Gbit/s.
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Transnet is considering executing the whole project in two phases according to the specific circumstances of the investment. Ideally, the primary data center will be implemented in the first phase and the disaster recovery data center will be implemented in the second phase. The proposed bidding solution must include both two phases cost separately as per the *Annexure E_ Pricing Schedule* provided.

- **Phase 1**

Supply, install and commissioning of a primary on-premises infrastructure solution in an existing Transnet owned/nominated data center.

- **Phase 2**

Supply, install and commissioning of a disaster recovery on-premises infrastructure solution in an existing Transnet owned/nominated data center.

2.3. On-premises Private Cloud Features Specification

All hardware, software, networking and service requirements must enable the solution to function as an on-premises private cloud to be provided by the bidder.

The following private cloud features are required:

1. Scalability: High levels of utilization (through virtualization capabilities, the size and

maturity of data centers).

2. Accessibility: Transnet can self-provision.
3. Elasticity: Appearance of infinite capacity on demand.
4. Shared: Workloads are multiplexed, capacity is pooled.
5. Hybrid cloud computing: Seamless interoperability among the private cloud and

public clouds.

The following capabilities must be present in the private cloud solution:

➤ **Cloud Management Capability**

- Unified cloud management platform can manage the main data center and disaster recovery data center to meet the unified architecture and management of all Transnet private cloud data centers in the future, reducing management difficulty and costs.
- The proposed solution should support customize the content to be displayed on a dashboard, including capacity, performance, resource statistics, and alarms. Centrally manages alarms of physical devices and virtual resources, and allows you to clear alarms, assign alarms, adjust alarm severities, and set alarm sounds.

➤ **Cloud Function Capability**

- The proposed solution should have the ability to provision and configure virtual machines (VMs) and change or optimize computing resources on demand using administration utilities that are user friendly, similar to those used in the public cloud.
- The proposed solution should have bare metal capabilities to support critical enterprise workloads. The bare metal network should be automatically configured by Software Defined Network (SDN) technology, provide the same operation

experience as the virtual machine provisioning.

➤ **Reliability, Security and Disaster Recovery Capability**

- The proposed solution must include local backup and remote site disaster recovery capability to protect the data and workloads. Reverse switchback should be supported. The disaster recovery testing must be done on the Cloud management platform.
- Tenant level disaster recovery services must be available and provided on the Cloud platform, allowing the end users (tenant) to create and configure a cross data center disaster recovery strategy for specific virtual machine's environments. End users should be able to modify the disaster recovery protection policies. Provide one-click switch over capability when fault occurs.
- The proposed solution should provide disaster recovery protection based on storage replication technologies. Virtual machine data is replicated to the disaster recovery center through storage volumes.
- The proposed solution should support ransomware protection capabilities, including ransomware detection, secure snapshot, WORM for data security.

➤ **Compatibility and Interoperability Capability**

- Transnet is considering using Transnet National Ports Authority (TNPA) Queens Warehouse Durban data center as an extension of a disaster recovery site as an option in the future, hence the proposed solution should have the capability to integrate with the Transnet National Ports Authority (TNPA) existing environment. Integration includes but not limited to service catalogue, organization management, authentication, quota management, metering, resource center.

2.4. Implementation and Maintenance Service Specification

The Bidder should be present when the goods are delivered to help with logistics and to help verify that all goods have been received and that nothing is short delivered. The implementation and maintenance services are as follows:

- a) **High level design and low-level design** for the proposed solution to ensure the solution meets the requirements outline in this RFP Transnet process. The design must be approved by Transnet Architect before any execution of the implementation in a Transnet owned or Transnet nominated data center.
- b) **Hardware installation and commissioning**: The hardware must be delivered to data centers, assembled, installed, powered up and connected to the network.
- c) **Software configuration**: Set up the proposed solution, create the corresponding capacities for each application or database, the operational guide should be provided after the software configurations completed as a proof of configurations.
- d) **Backup and disaster recovery**: The backup and disaster recovery solution should be configured to protect the data and service.
- e) **Workloads migration**: Hardware data transfer utilities can be used for all workloads and the target environment should work with minor change if the target environment is also Intel. Changing the platform would require a migration plan. The migration plan should be approved by Transnet Architect before any migration or cutover happens on the live environment. The workloads detailed information will be provided by Transnet when the project implementation starts.
- f) **Hardware maintenance specification**: Post implementation maintenance for a period of 3 years. Hardware maintenance should include but not limited to the following

aspects:

- ✓ Routine and proactive maintenance of hardware, including microcode and firmware upgrades to prevent hardware failures.
- ✓ Source, deliver, and install hardware spares when hardware failure occurs.
- ✓ The service provider must provide 24 x 7 x 365 same day remote and onsite technical expertise support.
- ✓ OEM hardware maintenance and not 3rd party maintenance is required.
- ✓ Hardware replacement parts must be brand new, genuine, compatible, and equivalent in performance to existing parts and certified by the OEM.
- ✓ All work, including spares must be accompanied by applicable warranties and/or guarantees.
- ✓ Where possible, hardware maintenance must be done without the interruption to business. In cases where downtime is required, the service provider must negotiate with Transnet for a downtime period which will be after normal working hours or weekends.
- ✓ The service provider must have an established service desk and incident management process.

g) **Managed Service (OEM resident support):** 3 years' support for specialist assistance when required. OEM operation engineers should be resident with the service provider's engineer together to answer the questions from Transnet, including but not limited to the operation of the proposed solution, troubleshooting of the errors or alarms for hardware or software, disaster recovery test regularly, change control support for the infrastructure or the cloud.

The service SLA/response time is required as follows.

Service Item	Service Coverage Window
Remote Service Centre	Available 24 hours a day, 7 days a week; Responding within 30 minutes;
Spares	Available 9 hours a day, 5 days a week. Spare parts should arrive within the next Business Day (NBD);
Onsite replacement	Available 9 hours a day, 5 days a week. Field engineers should arrive at the site within the next Business Day (NBD);
Faulty parts collections	Available 9 hours a day, 5 days a week;
Operating System Software Updates	Patches and minor releases of OS Software Updates available;
Product Documentation	Product documents and OEM tools should be handed over to Transnet after the implementation;
Skills Transfer / Training	Certified program – 10 x Transnet Employees