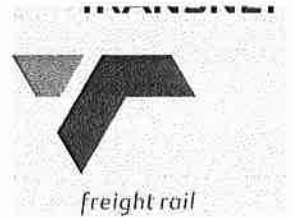


RFQ / TENDER

Tender No: AGG160



Vendor No: 11001386

BOARD LIST
BOARD LIST
TRANSNET FREIGHT RAIL
PROCUREMENT DEPARTMENT
2000

Purchaser : Antony Goldstone
Telephone : 033 897 2190
Fax Number: 086 522 6399

Please quote reference:
E60/6000615422

Deliver to:
The Manager
TRANSNET FREIGHT RAIL
INFRA T.E. PROJECTS - DURBAN
MR MARTIN POTGIETER (083-488-4053)
4000 1 RF CLARKE DRIVE, BAYHEAD, DURBAN

Closing Date : 30.07.2015
Validity Date : 31.08.2015
RFQ No : 6000615422

10AM

1. RETURN OF QUOTATION/S:

SUPPLY & DELIVERY OF OPTICAL TIME DOMAIN REFLECTOMETER FOR
TRANSNET FREIGHT RAIL INFRA TELECOMMS PROJECTS DURBAN.

PeDB REF: CRAC/DBN/18491. TFR PROJ REF:DBN/MW/016.
FOR TFR INFRA, TELECOMMS PROJECTS DEPOT, DURBAN

QUOTATIONS MUST BE EMAILED: TFRTENDERSDURBAN@transnet.net OR FAXED TO 011-584-1364

1.1 QUOTATION/S MUST BE SUBMITTED PUNCTUALLY AT 10:00 ON OR BEFORE CLOSING DATE AND LATE QUOTATIONS WILL NOT BE CONSIDERED.

1.2 IF POSTED: TFR SUPPLY CHAIN SERVICES

100 EEL ROAD
BAYHEAD
DURBAN
4000

1.3, IF DELIVERED BY HAND:

TRANSNET FREIGHT RAIL-SUPPLY CHAIN SERVICES
100 FFI ROAD
BAYHEAD
DURBAN, 4000, TELEPHONE: 031-361-4123

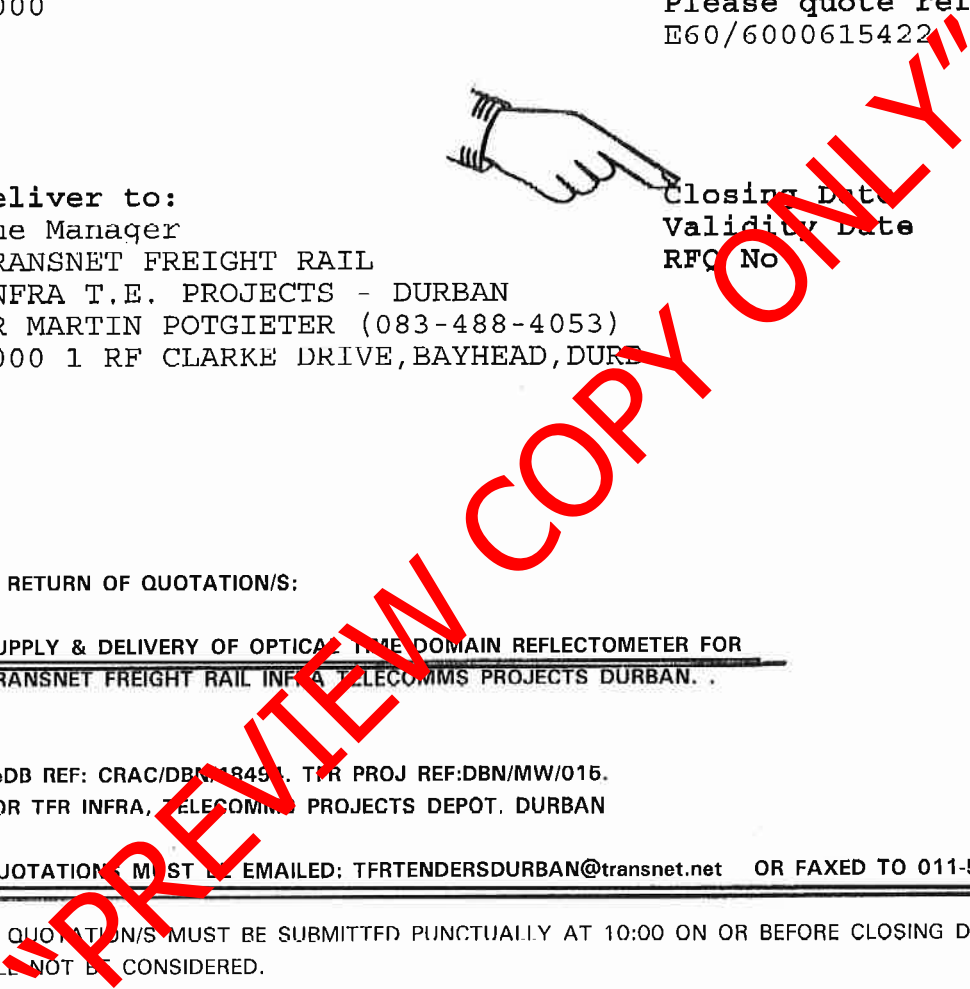
2. CONDITIONS:

2.2 ANY PURCHASE ORDER PLACED AS A RESULT OF YOUR QUOTATION WILL BE SUBJECT TO THE STANDARD TERMS AND CONDITIONS OF CONTRACT, FORM US7, (LATEST), GENERAL TENDER CONDITIONS, FORM CSS5 (LATEST) AND

DATE:

SIGNATURE OF TENDERER(S):

CONTACT PERSON: TEL No:



RFQ / TENDER

Tender No: AGG160
Date : 22.07.2015

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BOARD LIST
TRANSNET FREIGHT RAIL
PROCUREMENT DEPARTMENT

CONDITIONS MENTIONED HEREIN.

2.3 TENDRERS MAY OFFER AN EARLIER VALIDITY DATE, BUT THEIR QUOTATION MAY, IN THAT EVENT, BE DISREGARDED FOR THIS REASON.

2.4 TENDERERS ARE REQUIRED TO OFFER ONLY FIRM PRICES. PRICES SUBJECT TO REVIEW IN TERMS OF CLAUSE 32 OF FORM US7 WILL ONLY BE CONSIDERED SHOULD THE DELIVERY PERIOD REQUIRED EXCEED 6 MONTHS.

2.5 BEST DELIVERY TIME MUST BE OFFERED.

2.6 DISCOUNT (TRADE DISCOUNT) CASH DISCOUNT (CONDITIONAL DISCOUNT) VALUE VALUE ADDED TAX (VAT) MUST BE SHOWN SEPARATELY.

2.7 TRANSNET RESERVES THE RIGHT TO NEGOTIATE PRICES AND COMMERCIAL ASPECTS AFTER THE CLOSING DATE OF THE QUOTATION.

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DATE:

SIGNATURE OF TENDERER(S):

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Date : 22.07.2015

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2.8 DIRECT DELIVERY INTIMATES DELIVERY BEING EFFECTED INTO THE WAREHOUSE OR THE ACTUAL POINT OF SUPPLY AND SHOULD THEREFORE INCLUDE ANY TRANSPORTATION MODE DEEMED NECESSARY IN EXECUTING THIS METHOD OF DELIVERY BASIS IN ORDER TO MEET THE REQUIRED DELIVERY DATE.

TAX CLEARANCE CERTIFICATES:

The Regulations in terms of the Public Finance Management Act, 1999: Framework for Supply Chain Management as published in Government Gazette No. 25767 dated 5 December 2003, Clause 9 (1) (d), stipulates that the accounting officer or accounting authority of an institution to which these regulations apply must reject any bid from a supplier who fails to provide written proof from the South African Revenue that the supplier either has no outstanding tax obligations or has made arrangements to meet outstanding tax obligations.

Tenderers will be disqualified if a valid tax clearance certificate or written proof from the South African Revenue Service that supplier has made arrangements to meet outstanding tax obligations is not submitted with the tender.

COMPANY DETAILS:

NAME OF COMPANY: _____

CONTACT PERSON: _____

TEL. NO. _____ FAX NO: _____ <

REG. NO. _____

BROAD BASED BLACK ECONOMIC EMPOWERMENT (BBBEE)

Transnet fully endorses and supports the Government's Broad-based Black Economic Empowerment Programme and it is strongly of the opinion that all South African Business Enterprises have an equal obligation to redress the imbalances of the past. Transnet will therefore prefer to do business with local business enterprises who share these same values. Transnet will endeavour to do business with local business enterprises that possess a BBBEE "recognition level" of at least a level 5. Transnet urges Tenderers (Large Enterprises and QSE's - see below) to have themselves accredited by any one of the various Accreditation Agencies available, who do their BBBEE ratings in accordance with the latest Codes (i.e. those promulgated on 9 February 2007) and whose names appear on the present ABVA (Association of BEE Verification Agencies) - "List of Full Members" as displayed on the ABVA website (www.abva.co.za).

Although no agencies have, as yet, been accredited by SANAS (SA National Accreditation System), Transnet will, in the interim, accept rating certificates of tenderers who have been verified by any of the listed agencies.

Enterprises will be rated by such agency based on the following:

1. Large Enterprises (i.e. annual turnover > R35million;

" Rating level based on all seven elements of the BBBEE scorecard.

2. Qualifying Small Enterprises - (QSE) (i.e. annual turnover > R5million but < R35million;

" Rating based on any four elements of the BBBEE scorecard.

NB:

3. Emerging Micro Enterprises - (EME) (i.e. annual turnover < R5m) are exempted from being rated/verified:

DATE:

SIGNATURE OF TENDERER(S):

RFQ / TENDER

Tender No: AGG160
Date : 22.07.2015

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BOARD LIST TRANSNET FREIGHT RAIL PROCUREMENT DEPARTMENT

- " Automatic rating of Level 4 BBEE irrespective of race of ownership, i.e. 100% BBEE recognition
- " Black ownership >50% or Black Women ownership >30% automatically qualifies as Level 3 BBEE, i.e. 110% BBEE recognition
- " EME's should provide certified documentary proof of annual turnover (i.e. audited financials) plus proof of Black ownership if Black ownership >50% or Black Women ownership >30% from the EME's Auditor/Accounting Officer.

4. In addition to the above, Tenderers who wish to enter into a Joint Venture or subcontract portions of the contract to BBEE companies, must state in their tenders the percentage of the total contract value that will be allocated to such BBEE companies, should they be successful in being awarded any business. A rating certificate in respect of such BBEE JV partners and / or sub-contractor/s, as well as a breakdown of the distribution of the aforementioned percentage, must also be furnished

In view of the high emphasis which Transnet places on Broad-based Black Economic Empowerment, Transnet will allow certain preference points for BBEE in the evaluation of all responses. Depending upon the value of the ensuing business award (i.e. below or in excess of R2m), the 80/20 or 90/10 point preference systems will be utilized where BBEE will count out of 20 or 10 respectively in the evaluation process.

EACH RESPONDENT IS REQUIRED TO FURNISH PROOF OF THE ABOVE TO TRANSNET. FAILURE TO DO SO WILL RESULT IN A SCORE OF ZERO BEING ALLOCATED FOR BBEE.

Turnover: Kindly indicate your company's annual turnover for the past year R_____

- " If annual turnover <R5m, please attach certified confirmation from your Auditor/Accounting Officer
- " If annual turnover >R5m please attach original or certified copy of accreditation certificate and detailed scorecard by an ABVA accreditation agency (registered as a "Full Member")

PAYMENT TERMS

The following payment terms will apply as from 1 October 2008.

- " All suppliers will be paid 30 days from receipt of month end statement, i.e. payment term F055.

CONDITIONS

This quotation is subject to the provisions of the Standard Terms and Conditions of Contract, Form US7, (Latest) and the General Tender Conditions, Form CSS5 (Latest) and any other standard or special conditions mentioned and/or embodied in the quotation request.

SCHEDULE OF REQUIREMENTS

PRICES TENDERED ARE TO BE "DIRECT" AND EXCLUDE VAT.

IN THIS REGARD THE TENDERER'S ATTENTION IS DIRECTED TO PARAGRAPH 16 OF FORM CSS5 (LATEST).

DATE:

SIGNATURE OF TENDERER(S):

.....

RFQ / TENDER

Tender No: AGG160 Page
Date : 22.07.2015 5

BOARD LIST TRANSNET FREIGHT RAIL PROCUREMENT DEPARTMENT

TRANSNET INSISTS ON HONESTY AND INTEGRITY BEYOND REPROACH AT ALL TIMES AND WILL NOT TOLERATE ANY FORM OF IMPROPER INFLUENCING, BRIBERY, CORRUPTION, FRAUD, OR ANY OTHER UNETHICAL CONDUCT ON THE PART OF BIDDERS/ TRANSNET EMPLOYEES. IF, IN THE OPINION OF TRANSNET'S CHIEF OPERATING OFFICER, A TENDERER / CONTRACTOR / SUPPLIER HAS OR HAS CAUSED TO BE PROMISED, OFFERED OR GIVEN TO ANY TRANSNET EMPLOYEE, ANY BRIBE, COMMISSION, GIFT, LOAN, ADVANTAGE OR OTHER CONSIDERATION, TRANSNET SHALL BE ENTITLED TO REVOKE THE TENDER / CONTRACT BY FOLLOWING ITS INTERNAL POLICIES THAT GOVERN THE ECLUSION PROCESS. IN SUCH AN EVENT TRANSNET WILL BE ENTITLED TO PLACE ANY TENDERER / CONTRACTOR / SUPPLIER WHO HAS CONTRAVENED THE PROVISIONS OF TRANSNET'S BUSINESS ETHICS ON ITS LIST OF EXCLUDED TENDERERS. THIS LIST WILL ALSO BE DISTRIBUTED TO ALL OTHER STATE OWNED ENTERPRISES AND GOVERNMENT DEPARTMENTS.

TRANSNET INVITES ITS VALUED SUPPLIERS TO REPORT ANY ALLGATIONS OF FRAUDCORRUPTION OR OTHER UNETHICAL ACTIVITIES TO TRANSNET TIP-OFFS ANONYMOUS,AT ANY OF THE FOLLOWING ADDRESSES / CONTACT NUMBERS:-

TOLL-FREE ANONYMOUS HOTLINE - 0800 003 056
EMAIL - Transnet@tip-offs.com
FAX NUMBER - 0800 007 788
FREEPOST DN 298, UMHLANGA ROCKS, 4320

CONFIDENTIALITY IS GUARANTEED

Item	Qty	Material	Description	R.....
00010	1		Optical Time Domain Reflectometer (OTDR)	Each

Delivery Date: 30.10.2015

FULL DETAILS OF DESCRIPTION

SUPPLY & DELIVERY OF FIBRE OPTIC EQUIPMENT : 1 EACH : OPTICAL TIME DOMAIN REFLECTOMETER (OTDR); AS PER SPEC DOCUMENT SPC 0032 OF 2006 REV.3

DATE:


SIGNATURE OF TENDERER(S):

**TRANSTEL**

A Division of Transnet Limited
Registration Number 1990/000900/06

SPECIFICATION FOR OPTICAL FIBRE TESTING EQUIPMENT



1. OPTICAL TIME DOMAIN REFLECTOMETER (OTDR) 
2. POWER METER, LASER SOURCE
3. VISUAL FAULT LOCATOR
4. TALK-SET
- OPTICAL ATTENUATOR

SPC-00033
OCTOBER 2006

Revision 3.0

NON-DISCLOSURE OF INFORMATION

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"PREVIEW COPY ONLY"

I DOCUMENT AUTHORISATION

FUNCTION	NAME	TITLE & DIVISION	SIGNATURE	DATE
Compiled by :	BG Nel	Technologist, Project Services, Johannesburg		
Reviewed by :	FJ Nel	Technologist, Project Services, Johannesburg		
Authorised by :	ML Nuttall	Divisional Manager, Transmission		

II DISTRIBUTION

Once updated, a copy of the latest revision will be published in the document management system in use. E-mail to this effect will be sent to the relevant personnel or heads of department.

III DOCUMENT CHANGE HISTORY

ISSUE NO.	DATE ISSUED	ISSUED BY	HISTORY DESCRIPTION
2.00	June 2001	BG Nel	Converted to ISO standard
3.00	October 2006	BG Nel	Minor changes

IV CHANGES SINCE LAST REVISION

CLAUSE	DESCRIPTION
Various Clauses	Adapted for the latest generation of OTDRs. Replace all Transnet with Transtel

V ABBREVIATIONS, ACRONYMS AND DEFINITIONS

ABBREVIATIONS AND ACRONYMS	DESCRIPTION
AC	Alternating Current
DC	Direct Current
DWDM	Dense Wavelength Division Multiplexing
EMC	Electromagnetic Compatibility
GPS	Global Positioning System
LC	Inductor - Capacitor Circuit (L is the symbol for Inductance and C for capacitance)
OTDR	Optical Time-Domain Reflectometer
PC	Personal Computer
PCB	Printed Circuit Board

DEFINITIONS	DESCRIPTION
None	

VI RELEVANT DOCUMENTATION**APPLICABLE**

DOCUMENT NO.	DESCRIPTION	LOCATION
SCED-89	The number has changed to SPC-00033	Document Control Centre

1. GENERAL

1.1 Scope

- 1.1.1 This specification covers the requirement for various optical instruments.
- 1.1.2 The instruments must be portable, robust and simple to operate and be ideally suited for South African conditions.
- 1.1.3 This specification replaces Specifications No. SCED-77, SCED-79, SCED-89 and SPC-00033 before October 2006 and is adapted for the latest generation of OTDR's.

1.2 Compliance

- 1.2.1 Tenderers must indicate clause by clause how their offer complies or differ from this specification.
 - 1.2.1.1 A broad statement to the effect that the equipment is in accordance with this specification is not acceptable.
- 1.2.2 Tenderers must submit their main offers in terms of this specification.
- 1.2.3 Offers, which include minor deviations from this specification, might be considered at the sole discretion of Transtel.
 - 1.2.3.1 The tenderer must detail any deviation from this specification; failure to comply with this requirement might invalidate the Tenderers response.
- 1.2.4 Tenderers may submit alternative offers for equipment considered by them to be equal to or better than the called for in this specification.
 - 1.2.4.1 Such alternative offers might be considered at the sole discretion of Transtel.
 - 1.2.4.2 Such alternative offers might be considered at the sole discretion of Transnet.
- 1.2.5 Failure to supply detail information on non-compliance / partial-compliance issues will cause disqualification from this tender.

1.3 Composition

1.3.1 This document consists of three sections :

- Section 1 – Information relevant to all equipment offered.
- Section 2 – Technical Specifications for Optical Time Domain Reflectometer (OTDR).
- Section 3 :
 - (a) Optical Talk-set (Communications device)
 - (b) Visual Fault Locator
 - (c) Optical Power Meter
 - (d) Laser Source

1.3.2 The Tenderer can offer a combined "all in one" unit with these functions, or may offer as alternative to the above mentioned products, separate units.

1.3.3 Specify interoperability with current fibre test instruments used in Transtel.

1.3.3.1 OTDR's (Software Analysis).

1.3.3.2 Optical Talk sets, Integrated power meters and laser sources.

1.3.4 The Tenderer should highlight all automated features of equipment offered and indicate advantages of equipment combinations offered.

1.3.5 The equipment shall preferably be modular to accommodate a variety of plug-in options to extend the functions or features of the equipment and allow future field upgrades.

1.3.6 Tenderers shall outline the concept of modularity and expandability in terms of hardware and software of the equipment offered.

1.3.7 Tenderers must submit detailed descriptive literature, illustrations and specifications together with sufficient information to demonstrate how the equipment offered will meet the requirements of Transtel.

1.3.8 Tenderers must indicate and offer future upgrade possibilities for the test unit and elaborate on all the options available on the test unit for future test requirements like DWDM.

1.3.9 Tenderers must give details of the software capabilities to analyse existing OTDR traces in both. SOR and TRC. format.

1.4 Standard Products and Options

- 1.4.1 It is the intention of Transtel to use, as far as possible, standard products to facilitate extensions and upgrading using standard products, thus reducing customisation cost and to facilitate maintenance and the holding of spare parts.
- 1.4.2 The Tenderer shall indicate which parts of the systems offered are standard products (equipment and software), and which require special design for this Contract.
- 1.4.3 In the case of non-standard items, a breakdown of the cost of customisation of such items shall be given in the price schedules.

1.5 Software

- 1.5.1 The software, where applicable, shall contain all features specified under the functional requirements.
- 1.5.2 Software shall preferably be Windows based.
- 1.5.3 The equipment, software input and output interfaces shall be compatible with PC based systems to facilitate interconnection, networking, downloading and post processing of data offline on Windows 2000, and Windows XP type operating systems.
- 1.5.4 It shall be capable of accurate fibre fault location as well as splice loss and reflectance measurements with the minimum keystrokes by the operator.
- 1.5.5 All functions shall preferably be menu driven.
- 1.5.6 Help functions shall be provided, where applicable.
- 1.5.7 All upgrades or revisions of the software, to overcome shortcomings and limitations, identified by the supplier, or by Transtel, in accordance with this specification shall be provided to Transtel when they become available. The cost of these upgrades shall be considered part of the original product price.
- 1.5.8 New versions of software that offer additional functionality and enhanced capabilities shall be offered to Transtel when available.
- 1.5.9 Installation procedures shall be supplied with each software upgrade or release. Specialised support shall be available whilst loading of software is being performed. Initial installation of the software shall be performed by the supplier in conjunction with Transtel. Training shall be provided by the supplier to enable Transtel to load any further additional software.

- 1.5.10 Tenderers must indicate the procedure and cost of adapting to future hardware and software upgrades or extensions.

1.6 Physical and Electrical Requirement

1.6.1 Mechanical Design

- 1.6.1.1 The equipment shall be of a robust design. (Tenderer to specify standard of compliance).
- 1.6.1.2 The equipment shall be compact and light-weight. (Tenderers to specify dimensions).
- 1.6.1.3 The equipment shall meet the requirements of flexibility and provide favourable growth modularity, where applicable. (Tenderers to specify possible future upgrades for current and/or future technologies).
- 1.6.1.4 The mechanical modules and printed board assemblies shall be easily accessible and easy to change for repair.
- 1.6.1.5 All external metal surfaces shall be suitable protected from corrosion.
- 1.6.1.6 All equipment and sub-assemblies shall be labelled in English for easy and logical identification.

1.6.2 Component

- 1.6.2.1 All components or, where applicable, sub-units shall be suitably designated on the PCB, chassis or framework or by suitable designation on lay-out diagrams.
- 1.6.2.2 Adequate margins shall be observed in the ratings of all electronic components to be used, in order to ensure good reliability in operation.
- 1.6.2.3 For PC boards, the laminated material shall preferably be epoxy glass filament. The patterns shall be adequately protected against corrosion. Unprotected copper conductors may not occur.

1.7 Surge Protection

All equipment which is mains operated shall be fitted with the necessary surge protection as required for lightning protection, suppression of mains-borne surges or interference, safety of personnel and suppression of radio frequency interference.

1.8 Power Supply

- 1.8.1 It shall be possible to operate the equipment from the following power source :
- 1.8.1.1 A nominal 230 volt AC power source.
 - 1.8.1.2 Internal Li-Ion rechargeable batteries, 8 hour of operation as per Bellcore TR-NWT-001138. Preference will be given to units capable of > 8 hour of operation under general testing with OTDR.
 - 1.8.1.3 An external 11 to 16 volt DC supply (optional).
- 1.8.2 The Tenderer must provide full details of the power consumption and voltage tolerances of all equipment offered, as well as the operating time available during battery operation. Full details of the battery type and expected lifetime or number of charge / discharge cycles shall be given in the Tender.
- 1.8.3 The Tenderer must indicate whether it is possible to easily exchange the battery in the field. The Tenderer may offer, as an option, spare rechargeable batteries and a separate battery charger, if available.
- 1.8.4 The unit shall display the battery condition and remaining operating time at all times.
- 1.8.5 Suitable power cords must be supplied with the equipment. The mains power cord shall be not less than 1,5 m in length and shall be fitted with the standard 15 ampere three-pin plug used in South Africa. If the external DC supply option is offered, a 3 m DC cable fitted with crocodile clips suitable for connection to a car battery shall be supplied.
- 1.8.6 All DC inputs shall be reverse voltage protected.

1.9 Environmental Conditions

- 1.9.1 The equipment must operate without loss of performance within a temperature range of -5°C and +50°C and relative humidity levels between 10% and 80%.
- 1.9.2 The equipment must be capable of operating on a 24 hour basis under the above environmental conditions.
- 1.9.3 The Tenderer must verify and confirm that this equipment will be able to function according to all required provisions in this Specification in the environment provided, and must provide in the Tender full details of the environmental operating limits of the equipment.

- 1.9.4 The equipment must be capable of operating in conditions of severe dust and shall therefore be suitably sealed.
- 1.9.5 The equipment shall be sealed against moisture and water splashes.
- 1.9.6 The Tenderer must specify the standard of environmental compliance.

1.10 **Electromagnetic Compatibility (EMC)**

The Tenderer shall provide full details of the EMC standards applicable to this equipment and shall provide proof of compliance to the EMC standards. Failure to supply this information might invalidate the tender.

1.11 **Transport Case**

- 1.11.1 The equipment shall be supplied complete with a rugged transport case to protect the equipment against transport hazards such as shock, dust and moisture. Details and prices of case options shall be supplied in the offer.
- 1.11.2 The case shall accommodate accessories and test cables required to perform measurements in the field.

1.12 **Documentation**

1.12.1 Documentation structure

The documentation to be provided with the equipment shall be structured as follows :

A list of all documents supplied with the equipment

1.12.1.1 Operation manuals describing all operational features and activities, as well as all maintenance activities required on a regular basis or in case of failures.

1.12.1.2 Software documents, where applicable.

1.12.1.3 Test manuals for testing of installed functions, where applicable.

1.12.2 Operation and maintenance manuals

The operation and maintenance manuals shall give a description of the equipment and the facilities offered with sufficient information for the following :

1.12.2.1 Operation of each function of the equipment.

1.12.2.2 Fault locating to enable faults to be cleared.

1.12.2.3 Handling of data.

1.12.2.4 Handling of measuring facilities.

1.12.2.5 Description of periodic routine maintenance, where applicable.

1.12.3 A card shall preferably be provided containing abbreviating operating instructions.

2. TECHNICAL SPECIFICATION : OTDR TEST EQUIPMENT

2.1 Functional Requirements

2.1.1 The OTDR shall have a dual wavelength capability of 1310 nm and 1550 nm . The specifications shall be the minimum requirements for both the 1310 nm and 1550 nm wavelengths.

2.1.2 The Tender will be adjudicated primarily in respect of ease of operation, dynamic range, dead zone, software and price.

2.1.3 The OTDR shall be capable of performing a fully automated test.

2.1.4 The Tender should offer the option of adding additional test wavelength to the OTDR at 1625 and 1490 nm .

2.1.5 The following automated test shall be possible :

2.1.5.1 Determine and display the length of fibre tested.

2.1.5.2 Identify fibre breaks, splices or irregularities and determine the distances in metres from the test point to the respective splices and irregularities.

2.1.5.3 Determine the event losses using the least-squares method.

2.1.6 Distance and loss measurements shall be made using at least two movable markers. The following results shall be displayed automatically :

2.1.6.1 Distance from the beginning of the trace to the first marker in metres.

2.1.6.2 Distance between the markers in metres.

2.1.6.3 The absolute loss of the fibre between the markers in dB .

2.1.6.4 The loss of the fibre between the markers in dB/km using the least-squares method.

2.1.6.5 Software must be capable of detecting possible false events like echoes and merged events.

2.1.7 Splice loss measurements shall be made by positioning the marker at the beginning edge of an event on the horizontal trace. The OTDR shall then perform the splice loss measurement automatically.

2.1.8 The OTDR shall be capable of combining results from two traces, acquired from both ends of a fibre span, to determine the resultant attenuation per event/irregularity (bi-directional analysis).

2.2 Optical Specification

2.2.1 The OTDR shall have transmitted wavelengths of 1310 nm and 1550 nm ± 20 nm at the environmental conditions specified in this Tender.

2.2.2 The fibre type shall be 9/125 μ m single mode fibre.

2.2.3 The OTDR equipment shall have an optical connector of the type E2000/APC. Tenderers shall indicate whether this requirement can be met and the range of alternative connectors available.

2.2.4 The refractive index shall be adjustable in the range 1,400 to 1,599.

2.2.5 All equipment shall conform to Safety Classification CFR 21 class 1.

2.2.6 The OTDR shall be capable of operating in the continuous wave mode at 1310 nm and 1550 nm with a stability of 0,1 dB or better over a 15 minute period.

2.2.7 It shall be possible to modulate the continuous wavelength as described in subclause 2.3.6 for detection purposes.

2.3 Measurement Parameters

2.3.1 The dynamic range shall be at least 32 dB (for 1310 nm and 1550 nm) using a 10 μ s pulse width.

2.3.2 Tenderers shall indicate whether higher dynamic ranges are available as an option and the cost of such option and with additional wavelengths like 1625 nm .

2.3.3 It shall be possible to zoom in on any section of the trace and start measurement at a point on the trace.

- 2.3.4 It shall be possible to display both the full trace and the zoomed trace simultaneously on the screen.
- 2.3.5 The OTDR shall have variable pulse width settings within a range of at least 10 ns to 10 μ s .
- 2.3.6 Loss measurements shall have a minimum accuracy of 0,03 dB and a minimum resolution of 0,01 dB .
- 2.3.7 The loss measurement dead zone shall be less than 10 metres.
- 2.3.8 Loss measurements shall have a minimum accuracy of 0,03 dB and a minimum resolution of 0,001 dB .
- 2.3.9 The event dead zone shall be less than 1 metre.
- 2.3.10 The loss measurement dead zone shall be less than 5 metres.
- 2.3.11 Field trial test: Transtel will conduct a field trial test. The tenderer will supply the applicable OTDR for this purpose. The test will be conducted on an existing single mode fibre OFC section of 120 km .

2.4 **Software / Hardware Requirements**

- 2.4.1 The OTDR shall be equipped with a large, high contrast backlit LC display. Tenderers shall provide details of the display size and type (monochrome or Colour).
- 2.4.2 The display shall enable viewing under all lighting conditions including direct sunlight.
- 2.4.3 All measurements and test results shall be displayed digitally on the screen.
- 2.4.4 The trace on the display shall be displayed in amplitude (dB) versus distance (km).
- 2.4.5 Data point sampling shall be > 120 000 data points on the horizontal axis to form a continuous trace and to enable accurate distance location in both the normal and zoom modes. (The tenderer to provide information on the exact amount of sampling points per range and distance accurate per range.)
- 2.4.6 It shall be possible to connect the OTDR directly to a computer via USB port to down load and upload traces.
- 2.4.7 The tenderer must offer additional type connection like WiFi or LAN (RJ45) for easy transfer and storage of OTDR and Power meter results.

- 2.4.8 The tenderer must offer additional type connection: USB-A (Main) USB B (remote) RJ-45 LAN 10/100 Compact Flash Fibre Inspection probe.
- 2.4.9 Tenderers shall preferably offer storage of at least 50 000 traces on an internal hard disc drive in addition to the 3,5 inch Microdisks diskette.
- 2.4.10 It shall be possible to superimpose and compare a trace being measured with a stored trace.
- 2.4.11 Hardware and software interfaces shall be provided to download all traces and stored results to a personal computer (PC) for storage and/or post-processing.
- 2.4.12 Post-processing software shall be provided to enable all measurements available on the OTDR to be performed on the stored data, both on the OTDR system and also on the off-line PC. Software shall preferably be Windows based.
- 2.4.13 The OTDR shall be capable of producing a hardcopy of traces and test results on a plotter and/or printer. Parallel and/or serial ports shall be provided for this purpose. The Tenderer shall indicate which plotter and printers his system is capable of supporting and which interfaces are provided.
- 2.4.14 Tenderers should indicate the possibilities for accessing information on the OTDR via a remote connection. Special emphasis on remote operation of the OTDR is required.
- 2.4.15 It shall be possible to add details such as project information, titles, cable data, geographic data, operator information and comments to any stored trace or measurement result using an integrated keyboard or an external keyboard on the OTDR.
- 2.4.16 The unit shall provide an indication or warning in case of a failed or dirty front panel optical connector.
- 2.4.17 The unit shall provide an indication or warning in case of a failed or dirty front panel optical connector.
- 2.4.18 Post processing and or trace analyzing software shall be supplied with each OTDR. The following features shall be possible from an IBM compatible PC to analyze and evaluate all stored results.
- 2.4.18.1 Re-analyse OTDR trace to verify compliance to Transtel limits, and to show all events detected by the OTDR.
- 2.4.18.2 Show all events on the trace, including user-deleted events after post process analysis.

- 2.4.18.3 Super-impose two stored waveforms.
- 2.4.18.4 Zoom in on any part of the stored trace and perform manual loss measurements.
- 2.4.18.5 Perform splice and fibre loss measurements.
- 2.4.18.6 Make distance measurements.
- 2.4.18.7 Perform bi-directional trace measurements, to compensate for different indexes of refraction in a spliced cable.
- 2.4.18.8 Insert events and comments, GPS co-ordinates on any event and or part of the trace for future reference purposes.
- 2.4.18.9 The field for adding events and/or comments shall be at least 50 characters long.
- 2.4.18.10 Tenderers shall specify the capability of the software (on line and/or off line) to evaluate/interpret trace's from other vendors and/or manufacturer's of OTDR's.

2.5 **Optional Equipment**

2.5.1 Visible Light Source

- 2.5.1.1 Tenderers shall offer an optional visible light source to be integrated into the OTDR and/or the talk set described above, with a minimum output of -1 dBm at 635 nm .
- 2.5.1.2 The output of the visible light source must be Class 2, eye safe compliant.
- 2.5.1.3 The Tenderer may offer optional features, equipment or accessories, in which case he shall supply a complete list of all items offered, and the price of each item.
- 2.5.1.4 The function of each optional item shall be fully described in the offer.

3. **TECHNICAL SPECIFICATION : PLUG-IN MODULES**

3.1 **Scope**

- 3.1.1 Tenderers shall offer these items as separate units, but may, as an additional alternative, offer two or more of these functions combined into one unit.
- 3.1.2 This specification covers the requirements for optical plug-in modules in addition to the OTDR modules.

3.1.3 As a minimum requirement, the following test units are required :

3.1.3.1 Optical power meter.

3.1.3.2 Optical source.

3.1.3.3 Optical attenuator.

3.1.3.4 Optical Talkset.

3.1.4 Tenderers may optionally offer return loss measurements, a visual light source and a talk set as part of the above unit(s).

3.1.5 All equipment shall be rugged, compact and shall preferably be plug-in modules.

3.1.6 All equipment shall have exchangeable optical connectors of the type E2000/APC. Tenderers shall indicate whether this requirement can be met, and the range of connectors available.

3.2 **Optical Power Level Meter**

3.2.1 The power meter shall operate in the range of 850 to 1550 nm with calibrated wavelengths of 850 nm, 1310 nm and 1550 nm .

3.2.2 The optical power meter shall have a sensitivity range of +10 dBm to -68 dBm or greater.

3.2.3 The accuracy shall be better than $\pm 0,2$ dB .

3.2.4 The resolution shall be better than 0,01 dB .

3.2.5 Measuring results shall be displayed in dBm, dB and watt.

3.3 **Optical Source**

3.3.1 The optical source shall operate at wavelengths of 1310 and 1550 nm, with the option of additional 850, 1300 and 1625nm outputs.

3.3.2 The continuous wave output power shall be not less than -4 dBm at 1310 nm and 1550 nm into 9/125 μ m fibre.

3.3.3 The output stability shall be better than 0,1 dB over an 8 hour period.

3.3.4 The spectral width shall be less than 5 nm .

3.4 Optical Attenuator

- 3.4.1 The optical attenuator shall be suitable for use on single-mode 9/125 μm fibre.
- 3.4.2 The attenuator shall operate in the range of 1260 m to 1600 m with calibrated wavelengths of 1310 nm and 1550 nm .
- 3.4.3 The attenuation shall be variable in the range 3 to 60 dB with a display resolution of better than 0,05 dB .
- 3.4.4 The linearity shall be better than $\pm 0,2$ dB .
- 3.4.5 The optical signal path shall remain uninterrupted during attenuator setting changes.

3.5 Optical Talk Set

- 3.5.1 The optical talk set module shall enable full duplex voice communication over one single mode fibre (9/125 μm) fibre. Tenderers should indicate the modularity of this option on the product offered and the compatibility with current fibre Talksets in use by Transtel.
- 3.5.2 It shall be possible to use the talk set while OTDR testing and or Loss Testing is in progress.
- 3.5.3 The talk set shall operate at the 1550 nm wavelength over 9/125 μm single mode fibre cable.
- 3.5.4 The dynamic range of the talk set shall be greater than 48 dB .
- 3.5.5 In addition to the integrated talk set, Tenderers shall offer a compact talk set to serve as the remote unit for voice communications. This separate talk shall have the same technical specifications and must be compatible with the integrated talk set.

3.6 Optional Equipment and Features

- 3.6.1 The Tenderer may offer optional features, equipment or accessories, in which case he shall supply a complete list of all items offered, and the price of each item.
- 3.6.2 The function of each optional item shall be fully described in the offer.
- 3.6.3 Tenderers may offer an optical return loss feature as part of the above mentioned equipment.