



**TENDER DOCUMENTS FOR SUPPLY TENDERS  
FINANCED FROM TACIS FUNDS FOR**

**Supply of an optical cable system for communication and signalling  
to the Railways of Georgia, Armenia and Azerbaijan**

**MC 9901**

**(The award of contract is subject to financing being approved  
and made available by the European Commission)**

**COMMISSION OF THE EUROPEAN COMMUNITIES**

**TENDER DOCUMENTS  
FOR  
SUPPLY TENDERS FINANCED  
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**SUPPLY OF AN OPTICAL CABLE SYSTEM  
FOR COMMUNICATION AND SIGNALLING  
TO THE RAILWAYS  
OF GEORGIA, ARMENIA AND AZERBAIJAN**

**MC 9901**

**COMMISSION OF THE EUROPEAN COMMUNITIES**

## SUMMARY

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MC 9901

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FINANCED FROM TACIS FUNDS

## **A. TENDER DOSSIER**

## **A.1. INVITATION AND INSTRUCTIONS TO TENDERERS**

SUPPLY OF AN OPTICAL CABLE SYSTEM  
FOR COMMUNICATION AND SIGNALLING  
TO THE RAILWAYS OF GEORGIA, ARMENIA AND AZERBAIJAN

MC 9901

INVITATION TO TENDER  
FOR A PROJECT FINANCED FROM TACIS FUNDS

The European Commission (hereinafter Contracting Authority) invites tenders for Supply of an Optical Cable System for Communication and Signalling to the Railways of Georgia, Armenia and Azerbaijan, under the reserve of project approval by the European Commission).

The following documents are issued to enable you to tender

- a) Instructions to Tenderers
- b) Special Tender Conditions for Supply Contracts
- c) Technical Specifications
- d) Schedule of Prices
- e) General Regulations for Tender and the Award of Supply Contracts
- f) Tax and Customs Arrangements
- g) Form of Bank Guarantee
- h) Form of Bid Bond

These documents constitute the complete tender dossier.

Contract Form and General Conditions for Supply Contracts financed from Tacis Funds are attached for information only.

The total budget available for this contract amounts to : EURO 14 800 000 .

Tenderers must register at the same address as below at the latest 21 calendar days before the closing date, in order to receive eventual supplementary information (see § A.1. H.2 on p. 7).

Tenders must be submitted, marked as such to:

**Tacis Procurement Unit**

and have been received at

**rue de la Loi 99 (2<sup>ème</sup> étage),  
B - 1040 Brussels**

at the latest

on **12<sup>th</sup> October, 1999** at **11:00am** local time

## **Instructions to Tenderers**

By submitting a tender, the Tenderer accepts in full all the Special and General Conditions contained in this tender dossier as the sole basis for the tender, waiving his own conditions of contract. These Instructions to Tenderers take precedence over the General Regulations for Tenders and Award of Supply contracts financed from Phare/Tacis funds.

Tenderers are expected to carefully examine and respect all instructions, forms, Terms of Reference and specifications contained in this tender dossier. Failure to submit a tender containing all the required information and documentation within the deadline specified will generally result in the rejection of the bid.

### **A. Participation**

The general provisions for eligibility are defined in Article 1 of the General Regulations for Tenders and the Award of Supply Contracts financed from Phare/Tacis Funds.

The Contracting Authority reserves the right to reject any Tenderer or any consortia or one or more proposed members of a consortium or any subcontractor who do not comply with the rules on eligibility.

The participation of local firms or experts (i.e. of the partner country) is highly welcomed.

All goods and equipment offered and supplied must originate in a member state of the European Community or in one of the recipient states of the Tacis programme.

## **B. Conditions for Submission of Tenders**

Tenders will be accepted only if they comply with the following conditions:

1. Tenders must be submitted to the Contracting Authority and have been received at the place and by the time mentioned in the Invitation to Tender.  
Tenders may be sent by registered post with advice of reception, express mail or delivered by hand against receipt signed by the Contracting Authority's representative.  
Tenders shall preferably be submitted in English language.
2. All tender proposals and documents must be submitted in a sealed envelope bearing only:
  - a) The name and address specified for submission of tenders at point 1;
  - b) The following reference on the envelope: "Invitation to tender MC 9901 - Supply of an optical cable system for communication and signalling to the Railways of Georgia, Armenia and Azerbaijan".
  - c) Name and address of the Tenderer;
  - d) The indication: „Technical and Financial Proposal. Not to be opened before the tender opening session“
3. This envelope must contain in one sealed envelope („single envelope system“):
  - 3.1 the technical proposal (two originals and five copies) as described below (C.1).;
  - 3.2 the financial proposal (two originals and five copies) as described below (C.2).



### **C. Content of Tenders**

The tender submitted by the Tenderer shall fully comply with the requirements set out in the tender dossier and comprise:

1. A **Technical Proposal** consisting of :
  - 1.1 the detailed description of the supplies tendered in conformity with the requested technical requirements, including instruction manuals and documentation as appropriate;
  - 1.2 a list of manufacturer's recommended spare parts;
  - 1.3 a proposal of after-sales services;
  - 1.4 a training proposal.
2. A **Price Proposal** for:
  - 2.1 the supplies tendered;
  - 2.2 the spare parts;
  - 2.3 the after-sales services;
  - 2.4 the training proposal.

Prices should be quoted free of all duties and other charges, including VAT, as the communities are exempted from such charges under Articles 3 and 4 of the Protocol on the privileges and immunities of the European Communities.
3. A Bank Account to which payments may be made
4. A Statement by the Tenderer certifying his eligibility and a document attesting his nationality.
5. A statement by the Tenderer attesting the origin of the supplies tendered (and certificate(s) or other evidence of origin).
6. Duly authorised signature
7. A statement of compliance with the commercial warranty required
8. A bid bond as per art. 12 of § A.2 'Special Tender Conditions for Supply Contracts'.

### **D. Variant Solutions**

A Variant solution is an offer which suggests equipment alternative to that requested in the Specifications and which will better satisfy the requirements of the recipient. One variant solution, if justified, is allowed, provided that a complying offer is also submitted and that Art. 7 of the General Regulations for Tenders and the Award of Supply Contracts financed from Phare/Tacis funds is complied with.

## **E. Selection of the Supplier**

### E1/ Preliminary Examination of tenders (Conformity)

1. During the Public Tender Opening Meeting which will take place straight after the closing date and time in

**Rue de la Loi 99 (2<sup>ème</sup> étage),  
B - 1040 Brussels**

on **12<sup>th</sup> October, 1999** at **11:00 am** local time

The Evaluation Committee will examine each tender to see whether it contains all documents required in the Tender Dossier.

2. The documents will be also examined to see whether
  - a) They are correctly signed.
  - b) They satisfy the rules of eligibility.
  - c) They satisfy the rules of origin of goods.
  - d) The Financial Proposal is within the limits of the budget.
  - e) The Bid Bond.
3. Tenders which clearly fail to meet these requirements will be rejected. Where conformity is not clear, the Committee might decide to accept the tender for Technical Evaluation and will send the tenderer a fax requesting clarification.

### E2/ Technical Evaluation

1. The Technical Evaluation concerns only those Tenders, which satisfy the requirements of conformity (Section E1).
2. The evaluation committee will evaluate the Tenders on technical and commercial aspects.
3. Technical Aspects : The objective of the technical evaluation is to identify technically acceptable tenders. Technical criteria are defined in the technical specifications. Only tenders satisfying the requirements of the technical specification will be accepted.
4. Commercial Aspects : Tenders which are technically acceptable will be evaluated for the commercial aspects of their offers. Commercial criteria are defined in the technical specifications. Only tenders satisfying the requirements of the commercial criteria of the technical specification will be accepted.

In the unclear cases the Committee may ask further clarifications from the bidders.

### E3/ Financial Evaluation

1. The Financial Evaluation concerns only (technically and commercially ) acceptable offers.
2. The Evaluation Committee will select the economically most advantageous offer . It will be the cheapest offer satisfying the minimum technical and commercial requirements.

### **F. Suspensive Clause**

Save as provided in the General Regulations for Tenders and the Award of Supply Contracts financed from Phare/Tacis funds, the present open tender and the award of the contract are subject to the financing decision of the Commission of the European Commission and to the approval by the Partner State of the relevant project.

In the event that either the Commission of the European Commission does not deliver its decision, or the Partner State does not approve the relevant project, the present open tender will be cancelled in compliance with the provisions of the General Regulations.

By submitting a tender, the Tenderer accepts in full the present clause F.

### **G. Interventions or representations**

During the evaluation period (i.e. from the tender closing date until the signature of the contract) any interventions or representations by tendering firms or by others on their behalf or in their favour are not permitted.

Should there be any such intervention or representations this may lead to the exclusion of the Tenderer concerned.

The Commission reserves the right to bring any interventions or representations to the attention of all participating Tenderers.

## **H. Validity and Conditions of Tenders**

1. The Tenderer is bound by his offer for a period of 90 calendar days as from the final date for the submission of tenders. The Tenderer selected shall be bound by his tender for a further period of 60 days.
2. Any request for supplementary information by any Tenderer during the tendering period should be submitted to the Contracting Authority in written form (letter, telex or fax). The Contracting Authority will, where appropriate, answer such requests in the form of an addendum to the tender dossier, which will be sent simultaneously to all registered firms. The questions from the tenderers should be received latest 21 days before the closing date.

## ANNEX

### LIST OF BENEFICIARY COUNTRIES

#### *TACIS*

The list of beneficiary countries comprises all countries to which Council Regulation 2053/93 (JOCE L201 of 29.07 1993) applies at the closing date for the submission of tenders. They are at the date of 1.12.1993:

- Armenia
- Azerbaijan
- Belarus
- Georgia
- Kazakhstan
- Kyrgyzstan
- Moldova
- Mongolia
- Russian Federation
- Tadjikistan
- Turkmenistan
- Ukraine
- Uzbekistan

For updates contact Advisory Service.

**A.2. SPECIAL TENDER CONDITIONS  
FOR SUPPLY CONTRACTS**

## **SPECIAL TENDER CONDITIONS FOR SUPPLY CONTRACTS**

- 5.4. Training and instruction in the use of the goods supplied.

Project Title:  
**Supply of an Optical Cable System for  
Communication and Signalling  
to the Railways of Georgia, Armenia  
and Azerbaijan**

Tender Number: **MC 9901**

### *Article 1*

#### SUBJECT

1. Supply and installation of the following goods:  
optical cable system for communication and signalling to the Railways of Georgia, the Railways of Armenia and the Railways of Azerbaijan  
Bidding for partial lots is not permitted.
2. The supplies tendered must fully conform with the detailed description set out in the Technical Specifications.
3. Variant solutions may be proposed as a separate quotation in addition to the present tender, as specified in § A.1 D. on page 4.
4. Offers must be accompanied with descriptive literature, instruction manuals, catalogues, brochures or pamphlets for all items offered in English.
5. This tender includes the supply of :
  - 5.1. Installation and commissioning of the requested supplies.
  - 5.2. Manufacturer's recommended spare parts for a period of two (2) years.
  - 5.3. After sales services during the warranty period.

## *Article 2*

### VARIATION OF QUANTITIES

The Contracting Authority reserves the right to purchase, based on the unit-price tendered 20% less or more than the quantities of goods indicated under Article 1 above.

## *Article 3*

### PLACE OF DESTINATION/DELIVERY

1. The supplies must be delivered DDP (INCO Terms 1990) to the following destinations:  
**the Railways of Georgia** (Georgian Railway Ltd, Station Tbilisi Gruzovaia (freight), Central Material Technical Supply Base of Georgian Railways Ltd, station code 1560203, 11 Merab Kavtaradze, Tbilisi 380080), ready for acceptance;  
**the Railways of Armenia** (Armenian Railway Department, 50 Tigran Metsi Avenue, 375005 Yerevan, Republic of Armenia, tel. (3742) 52 04 28, fax (3742) 50 73 39), ready for acceptance;  
**the Railways of Azerbaijan** (Azerbaijan State Railways, Balajari Station N° 546808, District N° 2), ready for acceptance.  
See A.3. 'Technical Specifications' (Annex A).
2. The supplies must be delivered and installed within twenty-four (24) months from contract commencement.
3. All risks insurance from "warehouse to warehouse" in amount equal to 110% of DDP-value in EURO to be made in the name of the Contracting Authority.
4. Packing must be as per accepted international standards for air/surface transportation taking into account the climatic conditions prevailing in

Georgia, Armenia and Azerbaijan at the time of delivery.

5. A Works Test Certificate is required for all items. The Tender must confirm the inspection requirements will be met. See A.3. 'Technical Specifications' (Annex A).

## *Article 4*

### ACCEPTANCE

1. Delivery shall be subject to pre-shipment inspections and provisional and final acceptance by the Contracting Authority's duly-authorized representatives, appointed after contract award for technical supervision.
2. The Contracting Authority reserves the right to have pre-shipment inspections made by its duly-authorized representatives, just before shipment of the equipment. The Contractor will be responsible for the inspectors' travel (from a EU location) and accommodation costs.
3. Provisional acceptance by the concerned Railways shall take place within two weeks after the tendered supplies are installed and fully operational, and shall be endorsed by the European Commission (SCR-A3). The Railways will be represented by :  
**For the Railways of Georgia :**  
Georgian Railways Ltd  
15, Tamar Mepe Avenue, Tbilisi 380012  
**For the Railways of Armenia :**  
Armenian Railway Department  
50 Tigran Metsi Avenue, 375005  
Yerevan



**For the Railways of Azerbaijan :**  
Azerbaijan State Railways  
230, Alieva Street, Baku 370010

4. Final acceptance by the concerned Railways shall take place upon expiration of the warranty period, shall be pronounced upon the condition that the goods supplied are found in full working order and are compliant with the tender specifications, and shall be endorsed by the European Commission (SCR – A3). The Railways will be represented by : see art. 4, point 3.

#### *Article 5*

#### WARRANTY/AFTER-SALES SERVICES

1. The Tenderer shall provide a warranty for quality and performance of the goods supplied as defined in Article 14 of the General Condition for Supply Contracts for a period of 24 months as from the date of provisional acceptance.
2. The Tenderer shall provide or secure the provision of reliable and regular after-sales and maintenance service for a period of at least ten years thereafter at the places of destination, guaranteeing the upkeep and repair of the goods supplied and the rapid replenishment of spare parts.

The Tenderer shall state in detail how he proposes to meet this obligation including the duration for which the service is guaranteed available.

#### *Article 6*

#### SPARE PARTS

The Tenderer shall offer manufacturer's recommended spare parts and consumables

for all units, including those that require replacing more frequently (e.g. fast moving, exposed to heavy duty use) in quantities needed for 24 months of normal operation. The Tenderer shall submit a list of these spare parts and consumables drawn up in the light of his professional experience and taking account of the places of use. The spare parts shall be supplied with the goods purchased. See A.3. 'Technical Specifications' (Annex A).

#### *Article 7*

ACCESSORIES: *not applicable*

#### *Article 8*

#### TRAINING:

The Contractor shall place at his cost a competent representative at the Railways of Georgia, Armenia and Azerbaijan respectively to hand over all supplies in operational condition. The Contractor shall perform the full training program defined in A.3. 'Technical Specifications' (Annex A).

#### *Article 9*

#### PRICES

1. Prices must be expressed in EURO. Tenders in any other currency will be rejected.
2. Prices must be quoted separately for:
  - 2.1. the goods to be supplied: as unit and overall prices, DDP at final destinations, including the full cost of delivery of the goods to the place(s) of destination including packing, insurance, transportation etc.

- 2.2. the full cost of customs clearance, unpacking, installation and putting into operation ready for acceptance at the place(s) of putting into operation. Conventions for exoneration from import duties of TACIS funded supplies exist between TACIS and the Beneficiary States.
- 2.3. the full cost of distribution of the goods from the place of destination to the place(s) of putting into operation and the unpacking, installation and putting into operation there.
- 2.4. Spare parts and consumables:
- 2.4.1. individually item by item
- 2.4.2. as total value, expressed as a percentage of the overall value of the goods to be supplied.
- 2.5. After-sales service:  
included in the price as requested in art. 5.
- 2.6 Training/Equipment Familiarisation  
- as a lump sum
3. All prices quoted are firm and not subject to revision.
4. Prices must be quoted excluding all duties and taxes levied by the beneficiary country on the import of supplies, or other such as on their manufacture, stamp and registration duties.

### *Article 10*

#### PAYMENTS

1. Payments shall be made as follows (and not as specified in chapter B.4 ‘General Conditions for Supply Contracts Financed from TACIS Funds’):

#### Advanced Payment

representing 10% of the total Contract Price

Presentation date: upon signature of contract

Required documents:

- Commercial invoice
- bank guarantee

#### 1<sup>st</sup> Interim Payment

representing 10% of the total Contract Price

Presentation date: upon approval of the High-Level Design

Required documents:

- Commercial invoice
- “Approval of High-Level Design Certificate” duly signed by the appointed representative of the Commission

#### 2<sup>nd</sup> Interim Payment

representing 30% of the total Contract Price

Presentation date: upon issue of Site Installation Release Notices, issued on installation completion of each railway section; there are 3 railway sections in Armenia, 4 in Azerbaijan and 6 in Georgia; the amount of each payment instalment shall be a ratio of 30%, equal to the installed section length divided by the total line length of the concerned country

Required documents:

- Commercial invoice
- “Site Installation Release Notices” duly signed by the appointed representative of the Commission

#### 3<sup>rd</sup> Interim Payment

representing 20% of the total Contract Price

Presentation date: upon release of Site Partial Acceptance Test Certificates,

issued at PAT completion of each railway section; there are 3 railway sections in Armenia, 4 in Azerbaijan and 6 in Georgia; the amount of each payment instalment shall be a ratio of 20%, equal to the installed section length divided by the total line length of the concerned country

Required documents:

- Commercial invoice
- “Site Partial Acceptance Test Certificates” duly signed by the appointed representative of the Commission

#### 4<sup>rd</sup> Interim Payment

representing 20% of the total Contract Price

Presentation date: upon release of Test on Completion Certificate; this milestone corresponds to provisional acceptance; the bank guarantee, covering the 10% advance payment, is released at this point

Required documents:

- Commercial invoice
- “Test on Completion Certificate” duly signed by the appointed representative of the Commission
- “Provisional Acceptance Certificate” of the provisional acceptance duly signed by the appointed representative of the Commission

#### Final Payment

representing 10% of the total Contract Price

Presentation date: on expiry of the warranty period; this milestone corresponds to final acceptance

Required documents:

- Commercial invoice
- “Final Acceptance Certificate” of the final acceptance duly signed by the appointed representative of the Commission

However, payment of the 10% balance may be made if the Supplier provides a Performance Security/Payment

Guarantee covering 10% of the total Contract Price for warranty obligations (see A.9). The Performance Security/Payment Guarantee for warranty obligations will be released by the Contracting Authority’s on presentation of the “Final Certificate of Acceptance”.

2. Payment shall be made in EURO.
3. Payments shall be authorised by the Contracting Authority .
4. Payment shall be made within 60 days as from receipt by the relevant authority of the supplier's request and the required documentation in full.

### *Article 11*

#### TECHNICAL DOCUMENTATION

1. Prior to the final inspection, the Contractor shall supply the technical documentation as described hereinafter, in English and Russian languages.
2. Operating, maintenance and parts catalogues for each equipment category, for each location (Railways of Georgia, Armenia and Azerbaijan) and all its mechanical and electrical parts shall be provided in three (3) copies in Russian and three (3) copies in English.

The documentation shall be comprehensive to the extent that in the event of a failure of a working part of any manufactured component, maintenance personnel will be able to refer to the Parts Data Books to obtain the model number of the component and order the required part without being compelled to dismantle the component.

These Books will be utilised in training inexperienced personnel for operations and maintenance and shall be based on the Specifications for the operations, maintenance and illustrated spare parts manual as described in paragraph 3 hereinafter.

### 3. Specifications of the Operations Maintenance Manual (OMM).

The Manual shall consist of the following:

#### 3.1 General Description of the Equipment, its systems and mode of operation.

#### 3.2 Operation Instructions

This chapter will include the following paragraphs:

- Pre-operation check-out
- Start-up procedure
- Operations procedure (operations limitation should be stated clearly)
- Shut-down procedure
- Moving procedure
- Emergency procedure
- Changing attachment procedures.

#### 3.3 Preventive Maintenance Procedures

This chapter will include procedures for periodic cleaning, oiling, greasing, check-out, adjustments, etc. separately for each period inspection in the following frequencies:

- daily;
- weekly;
- monthly;
- three-monthly;
- semi-annually;
- annually.

and shall provide the following data elements:

- System application
- Location
- Description of the work to be performed
- Adjustment to be performed
- Type of oil/grease/compound to be used when performing the work.

The Contractor shall provide the Contracting Authority with maintenance cards to be used by the crew for all preventive maintenance procedures in the form of check-lists, inspection and regulating reports and records, etc.

#### 3.4 Maintenance Instructions

This chapter will include instructions and procedures for replacement of parts of components, adjustments and disassembly, repair, overhaul, assembly and testing of components.

#### 3.5 Spare Parts Catalogue

This chapter will include:

Illustrated parts breakdown (sub-contractor items included) with a set of section drawings or axonometric drawings. Each drawing shall include the following data elements:

- Drawing number
- Item number on the drawing
- Item's description
- Sub-contractor's part number (where applicable)
- Quantity per assembly.

The following diagrams shall be included:

- Wiring diagram
- Hydraulic diagram
- Load diagram

#### 4. The Contractor shall prepare framed, plastic-coated lubrication charts for all systems showing all points to be lubricated, type of lubricant to be used

at each location and recommended frequency of lubrication.

In order to enable usage of lubricants available in Georgia, Armenia and Azerbaijan, the Contractor will provide, upon signature of the contract, a list of recommended lubricants.

### *Article 12*

#### BID BOND

Each tender must be accompanied by a bid bond in the amount of 2% of the tender price, valid for a period of 150 days from the closing date for the submission of tenders as specified in § A.8 Form of Bid Bond.

**A.3. TECHNICAL SPECIFICATIONS  
( ANNEX A )**

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## ***Introduction***

### ***General***

An investment project, organised within the framework of the European Union Communities - The Program TACIS - have expressed the needs for the renewal / improvement of the railway infrastructures between POTI (GEORGIA) - TBILISI (GEORGIA) - BAKU (AZERBAĬDJAN) and TBILISI - YEREVAN (ARMENIA).

The Program TACIS/ TRACECA is dedicated to the development of the economic relations, trade and transport in the Black Sea region, the Caucasus, the Caspian Sea region and Central Asia, with the scope to resolve a major bottleneck in the development of railway operations in the region.

The figure in Appendix N° 1 shown the layout of the projected railway line to rehabilitate throughout GEORGIA, AZERBAÏDJAN and ARMENIA.

The rehabilitation works include, among other things, the design, installing and commissioning, all along the here-above railway line, of a telecommunication network based on the use of an optical fibre transmission technology (see here under section 2: Scope of the works).

This document constitutes the Technical Specification to call bids for the Construction of the here-above mentioned TACIS/TRACECA telecom railway project between the Black Sea and the Caspian Sea on the one hand, and between Georgia and Armenia on the other hand.

The here under Technical Specification forms the basic and minimum requirements for the telecommunication equipment to be offered.

The attention of the Bidder is drawn that all other alternative solutions will be nevertheless welcomed as alternative solution and will be carefully analysed by TACIS/TRACECA.

Bided system shall be complete and carefully specified on a turn-key project basis with all equipment, items and accessories necessary for its safe, efficient and trouble-free operation and maintenance (see here under section 2: Scope of the works).

### *The Telecommunication Project*

The rehabilitation of the railway telecommunication networks will be divided in two phases: a first phase for implementation of a Pilot Project (PP) and after the PP completion the starting of an eventual future second phase called hereunder the Extension Phase Project (EPP).

### **The Pilot Project (PP)**

The Pilot Project will form an indivisible contract comprising:

- The implementation of an optical fibre cable having a capacity of 24 fibres (12 pairs) along the main railway lines over the three countries.
- The implementation of a modern transmission technology ( synchronous and open transport system) with the required capacity to respond to:
  - The minimum needs of the existing user communication equipment, on the one hand;
  - The maximum capacity for which the system have been sized (to be specified by the Bidder), on the other hand. The Bidder shall also specify with these configurations the maximum reachable capacity for future expansion;
- The implementation of the user service equipment (level 0 equipment), connected to the transmission system.

This Technical Specification document covers exclusively the scope of the Pilot Project.

The attention of the Bidders is drawn on the fact that TACIS/TRACECA (T/T) will have a right to review and reduce before the contract award the ordered equipment quantities/lots in order to remain within the available budget.

### **The Extension Phase Project (EPP)**

Consecutively of the Pilot Project, an eventual second Project (called hereunder the Extension Phase Project) - Out of the scope of this document - will be envisaged to continue the rehabilitation of the telecommunication systems.

The scope of the Extension Phase Project will then be:

- The subsequent implementation of a second optical cable system to establish a full and physically true resilience, through an optical ring structure;
- The rehabilitation of the level 0 telecom equipment not renewed within the PP (for budgetary reasons) and the specific control and communication equipment intervening in the traffic and energy controls.

This Technical Specification document does not include the realisation at this stage of the Extension Project.

The bidders are therefore requested to offer a transmission system fully compatible, expandable and presenting the complete growing capabilities in view to cope perfectly with the future needs included within the Extension Phase Project.

As a minimum, all equipment shall be rated for and shall have sufficient capacity to accommodate and reach subsequently the entire telecommunication system operating at the ultimate extension phase.

## ***Scope of the works***

The scope of the works of the present bid call will include on a turnkey basis:

- The detailed design;
- The supply;
- The erection;
- The factory and site tests;
- The commissioning;
- The maintenance during the warranty period (2 years, from the completion certificate release);

of a state of the art optical fibre based transmission system in connection with the user services located all along the railway line between POTI - TBILISI – BAKU and TBILISI - YEREVAN.

The bidder shall quote as a basic solution a telecom line using a buried optical cable. The bid shall also include as an alternative solution an aerial optical fibre cable mounted on the existing catenary poles.

The accomplishment of the PP works shall be divided into two parts:

- The tasks incumbent upon the National Railways duty (and responsibility);
- The part of the Contractor selected in the framework of this bid call.

### ***Tasks made by the respective National Railways***

The respective National Railways (Armenian, Azeri and Georgian) undertakes to achieve by themselves or by their sub-contractors the following works (in case of the basic solution):

- The civil works (performing of the trenches, handholes, temporary excavations, etc);
- The laying of the optical cable duct in trenches (under the contractor technical assistance);
- The optical cable laying (under the contractor technical assistance);
- The rehabilitation of the technical rooms where transmission equipment shall be installed (painting, lighting, raise floor where required, heating, ventilation, air conditioning where required);
- The rehabilitation of the existing cabling of the administrative telephone system;
- The feeding of the primary power supply, available to the contractor.

The annex 13 shows a copy of the Statement of Endorsement signed by each National Railways.

### ***Works/Supply within the contractor's scope***

The bidder shall include within its bid all tasks/supplies covered by the European Union investment, that is:

- The staking out of the civil works;
- The technical assistance for the civil works (specifications, recommendations, etc.);
- The supply of the HDPE optical cable duct (in case of cable blowing);
- The technical assistance and supervision for the cable and conduit laying;
- The supply of the optical cable and its fittings;
- The cable connections;
- The transmission equipment;

- The secondary power supplies;
- The renewing of the administrative telephone switches;
- The renewing of the local dedicated telephone handsets;
- The renewing of the administrative telephone handsets;
- The renewing of the dispatcher communication consoles;
- The spare parts;
- The tests/commissioning;
- The training for operation and maintenance staffs.
- Etc.

The Transmission system shall provide communications for data and voice signals between stations, maintenance areas, depots, control centres and public areas, etc.

The Contractor shall achieve the complete project (design, construction, installation and commissioning) in accordance with the ISO 9000 quality system.

## **Codes, Standards and Recommendations**

All design, equipment and installation shall comply with the latest applicable local regulations, and other relevant international Codes, Standards, and Recommendations. In case of proprietary standards, the bidder/contractor shall to specify within its bid/contract the non-compliant point of the proposed system with the international standards or with those cited in Appendix N° 8, or elsewhere in this specification.

The standards cited in Appendix N° 8 are specific to some equipment and are not exhaustive nor restrictive. The bidder/contractor shall complete it according to the needs of the design and/or the work execution (proprietary protocols, etc); the Contractor shall submit, prior any modification, to TRACECA/TACIS such a change or completion for approval. Where conflicts exist between standards, the more restrictive standard shall generally apply.

The international and local authorities shall include but not be limited to the following:

NFPA	:	National Fire Protection Association;
ANSI	:	American National Standards Institute;
IEC	:	International Electro-technical Commission;
ITU-T (CCITT/CCIR)	:	International Telecommunication Union;
UIC	:	“Union Internationale des Chemins de Fer”;
ISO	:	International Standardisation Organisation;
CENELEC	:	European Standards;
IEEE	:	Institution of Electrical and Electronic Engineers;
ETSI	:	European Technical Standard Institute;
EIA	:	Electronic Industry Association;
BS	:	British Standards

## **Basic information**

### *In general*

The present project is founded on the existing communication system inventory (see Appendix N° 10) and the following basic information:

- Length of the line in AZERBAÏDJAN : 503 km (the Bidder shall to precise the cable extra lengths included in the bid to take into account the laying inside the station, to reach the technical rooms);
- Length of the line in Georgia: 471 km (the Bidder shall to precise the cable extra lengths included in the bid to take into account the laying inside the station, to reach the technical rooms);
- Length of the line in Armenia: 302 km (the Bidder shall to precise the cable extra lengths included in the bid to take into account the laying inside the station, to reach the technical rooms);
- Electricity power system: 3.000 to 3.300 V DC;
- Average railway traffic before modernisation: 20 to 25 trains per day;
- Theoretical capacity rate before modernisation: 40 pairs of freight trains and 5 pairs of passenger trains;
- Traffic requirement for the years 2003-2005: 100 trains per day;
- Number of railway stations in AZERBAÏDJAN: 48;
- Number of railway stations in Georgia: 46;
- Number of railway stations in Armenia: 33;
- Average distance between the stations - minimum: 7 km - maximum: 15 km;
- Connections to the national manually operated network, to the Caucasian railway networks and manually operated international transits of third countries;
- Actual signalling standard for the analogue switchboard tie-lines: frequency audio signal (together with the signalling) in the band 300 - 3400 Hz (signal allowable upstream the HF transmission column);
- Actual signalling interface for the subscriber's lines: 2 wires, analogue, loop-disconnect.

### *Environmental Conditions*

The transmission system equipment shall be designed for the following ambient conditions:

- (1) Working Temperature: - for indoor equipment: minimum: 0 °C.  
maximum: 45°C.  
- for outdoor equipment : minimum: -30°C.  
maximum: +70°C.
- (2) Transport and storage temperatures: minimum: - 40 °C.  
maximum: 70°C.
- (3) Humidity and water: -relative humidity: - operation: 95% at 25°C  
- transport and storage : 95% at 30°C  
- water (indoor): IP x4x.  
- water (outdoor): IP x5x.



- (4) Protection of the equipment against the atmospheric perturbations to provide.
- (5) Protection against electrostatic discharge:  
The Contractor shall introduce for approbation the designed plan and the recommendations for achieving the electrostatic protection.
- (6) Dusts:    indoor :     IP 5xx.  
                  outdoor :    IP 6xx.
- (7) Vibrations:  
All transmission system cabinets located within 20 m of a railway line shall be mounted on anti-vibration supports.  
These anti-vibration mounts dampen the effect of vibration from nearby railway activity thereby reducing the negative effect of vibration on optical connections, backplane connections, PCB's, etc.
- (8) Winds :    maximum :    160 km/h
- (9) The Contractor shall introduce for approbation the design criteria that he intends to apply to cope with the ambient conditions of this project.

### *Power Supplies*

Each National Railway uses a 3,000 V DC catenary power supply. The nominal output voltage level of the substations is 3,300 V DC.

The voltages on the overhead line contact system are limited to :

- Minimal : 2,700 V DC;
- Nominal : 3,000 V DC ;
- Maximal : 4,000 V DC.

Feeding voltages from the National Energy Supplier Companies are AC 110 kV, 35 kV and 6 kV 50 Hz.

The National Railways LV distribution panels are equipped with circuit breakers at 220/380 V 50 Hz. The protected feeder cable (and associated circuit breaker) is supplied by the respective National Railways. The communication equipment distribution panels are within the scope of the contractor.

The LV distribution system comprises the 220 V main switchboards to various loads and in particular the control and communication systems. Stability of the primary power supply within 170 to 250 V AC.

The attention of the bidder is drawn on the decay of the primary power supply network which could degrade the operation continuity of the telecommunication network, in case the secondary power supply systems are not suitably provided by the contractor of this project.

The bidder shall propose, in separated price, the suitable non-interruptible power supplies (UPS) and accumulator/chargers to feed the various telecommunication sub-systems.

The telecommunication system shall be preferentially powered by 48 V DC and 220 V AC power supplies. These power supplies shall have an autonomy of 8 hours (AC/DC power supplies to quote).

The supply voltage range for the telecommunication equipment will be in accordance with ETS 300 - 132 standard or equivalent.

## ***Dedicated Railway Communication Requirements***

With the exception of a few punctual functionality, the service requirements are practically the same for the three Caucasian countries (if a functionality is different or non-existent in one country, a note will explain the situation in the paragraph ad hoc).

The hereunder communication services are based on the functionalities existing at this time throughout the 3 railways and achieved with very old technologies (electromechanical switchboards, HF transmission on physical line in MF, etc.): the bidder shall therefore propose the achievement of these requirements by using the modern technologies in force in western Europe.

The Annex 10 gives a description of the existing communication system to renew partially or totally. The currently existing dedicated communication requirements are summarised here under:

### ***Traffic Control Link (TD)***

Currently, the dedicated traffic control link consisting out of two wires for traffic control communication operates between the dispatching section and their stations. Each local station can be connected in parallel mode (with the other ones of the same railway section) with concerned dispatching ( B/C: broadcast/collect mode- same transport IT, if required-).

### **AZERBAÏDJAN**

On the Azeri railway line there are 4 dispatching sections, namely:

- one dispatcher located in BAKU manages the section BAKU - KASI-MAGOMED (KASI-MAGOMED not included);
- 3 dispatchers located in GYANDJA manage the following sections:
  - section GYANDJA - UDZARI;
  - section GYANDJA – BEYUK-KASSIK;
  - section UDZARI – KASI-MAGOMED;
- there is also a supervisor dispatcher at a higher level, located in BAKU HQ, supervising the 4 dispatching sections stipulated above.

The BAKU supervisor dispatching is linked to the dispatching sections of BAKU and GYANDJA. In case of emergency, the BAKU supervision dispatcher can also establish contact with the stations managed by the dispatching sections.

In Gyanja there is also a management dispatcher which is connected to the 3 section dispatchings; this management dispatcher is of course connected to the supervision dispatcher in BAKU.

### **GEORGIA**

The Traffic Dispatching communication system for Georgia is identical to the one described above, except for the following dispatching sections:

- a dispatching section located in TBILISI controlling the section TBILISI - KASHURI;
- a dispatching section located in TBILISI controlling the section KASHURI - ZESTAFONI;

- a dispatching section located in TBILISI controlling the section TBILISI - BEYUK-KASSIK;
- a dispatching section located in TBILISI controlling the section TBILISI - AYRUM;
- a dispatching section located in SAMTREDIA controlling the section SAMTREDIA - POTI;
- a dispatching section located in SAMTREDIA controlling the section SAMTREDIA - ZESTAFONI.

### ARMENIA

The Traffic Dispatching System for Armenia is identical to the one described for Georgia, except for the following dispatching sections:

- a dispatching section located in YEREVAN controlling the section AYRUM - GYUMRI;
- a dispatching section located in YEREVAN controlling the section GYUMRI - MASIS;
- a dispatching section located in YEREVAN controlling the section MASIS - YEREVAN;

In Armenia there is no supervisor dispatcher connected to the 3 dispatchers stipulated above. These 3 dispatchers are located at the same area in YEREVAN.

### *Energy Control Link (ED)*

A communication system identical to the one of traffic regulation is provided for the management of energy: each electrical substation of a railway section is connected by a dedicated line to the Energy Dispatching of the section (B/C mode).

In AZERBAĪDJAN and Georgia, for each traffic dispatcher there is an Energy Dispatcher for the same section.

In Armenia there are only 2 energy dispatchers, one in GYUMRI for the section AYRUM - KARHERT, the other one in YEREVAN for the control of the section DALARIL - YEREVAN.

In Armenia there is no supervision dispatcher.

### *Telephone operator link for rw station and/or distant subscriber calls (G)*

Two wire connections by means of which the Telephone Dispatching operators of :

- BAKU;
- GYANDJA;
- TBILISI;
- SAMTREDIA;
- YEREVAN; etc.

can contact the stations belonging to their sections and or some distant subscribers. The stations are parallel connected on the lines (B/C mode). The bidder/contractor attention is drawn on the fact that some existing long distant subscribers shall be connected at this stage of the project (approx. 10 km to the closest station – see appendix 4).

### *Dispatcher radio link (DR)*

The radio link between the Section Traffic Dispatcher and the stations (of the railway section) establishes the communications between the Dispatching Controller and the train drivers by means of the existing local radio base stations (VHF).

At present, although it is not being effected by a breakdown, the radio dedicated line (B/C mode) establishes radio contact along the whole line section but nevertheless limited to emitting area around the stations within a distance of 2 or 3 km).

While the replacement of the existing radio systems is provided during the EPP project, these existing radio base stations shall be temporary re-used in this PP project.

*Communication link for the electromechanical maintenance staff (GM) and for the signalling / communication maintenance staff (SM)*

A dedicated line for the communication between the dispatchers, the electromechanical and the signalling/communication maintenance department staffs (B/C mode).

*Emergency telephone line (PD)*

A dedicated line allowing in B/C mode, emergency communication from any point on the railway line to the protection dispatcher by mounting the telephone wires of the ground onto an aerial line.

This system, completely obsolete, shall be abandoned and replaced during the EPP project by a complete radio system.

*Communication for the ticket distribution (BD)*

This dedicated line links the ticket distribution centre with a number of large passenger stations.

*Station to station link (SS)*

This connection link on a two wires system allows communication between each station and the previous/next one (omnibus line).

*Teleconferencing line (C)*

A connection operating on 4 wires establishes teleconferencing between the head of the conference and his subordinates.

In Georgia, there is also a system of teleconferencing with Moscow (via the PSTN network).

*Electrical sub-station link for telecontrol (P)*

A connection operating on 4 wires provides communication between the Energy Dispatcher and the electric power sub-stations for passing instructions for the manually operated local control of the sub-stations.

*Water distribution plant link (AD)*

A connection allowing communication between the Water Distribution Dispatcher and the water reservoirs.

*Tie lines between manual switchboards (M)*

A connection operating on 2 wires between manually operated telephone switchboards.

*Link between switchboard and subscribers (S)*

Connections between telephone exchanges and subscribers.

*Telegraphy line (T)*

A connection to support the telegraphy.

In Armenia and Georgia, a telegraphic connection between YEREVAN and Moscow is also operational.

The existing telegraphy equipment shall be replaced in this project by fax machines, group 3 (to be quoted within the bid).

*Telephone exchange tie line between automatic switchboards (ATS)*

Connections between automatic telephone switchboards ATS (in reality analogue, automatic electromechanical switchboards for local traffic and manually operated switchboards for outgoing traffic). Long distance connections (< 12 km) with automatic switchboard are also operational between the switchboards.

These international automatic switchboard connections exist in Georgia as well as in Armenia.

*Information link (I)*

A dedicated data line operating on 4 wires is provided for information system.

*Link between traffic controller and sorting/shunting yards (WD)*

A dedicated line in B/C mode between the Traffic Dispatcher and the sorting / shunting yards.

*Link between supervision dispatching and major stations (DD)*

Dedicated line in B/C mode between the Supervision Dispatcher and the section dispatcher and/or the major railway stations (DD).

*Link with the railways Police (PoD)*

Connection between the Dispatching manager and the railway police station.

*Video teleconferencing link (TV)*

A connection is provided for future video teleconferencing (do not quote in this bid).

*Protected level crossing (TRAC)*

Link for the protected level crossing operator local and the dispatching in charge of the supervision of the level crossings.

*Department head to department head link (HH)*

A teleconferencing connection between Heads of concerned departments.

*Fire Brigade link (FB)*

A connection between the dispatching manager and the on-duty Fire Brigade.

*Medical services link (MD)*

A connection between the dispatching manager and the medical services.

*Border control link (BC)*

A connection between the dispatching manager and the border control posts.

*Mountain pass link (MP)*

A connection between the dispatching manager and the mountain pass posts or difficult passes.

*Stone quarry link (SC)*

A connection between the dispatching manager and the stone quarry for ballast supplies.

*Track works link (WT)*

A connection between the dispatching manager and the track works on the line.

## ***System Specifications***

### *Introduction*

The realisation of the telecommunication networks shall be based on the using of optical fibre cables and on the digital techniques (Synchronous Digital Hierarchy - Transport level 1 or other equivalent synchronous open transport system) to ensure a high quality of transmission in the harsh operating environment of this project.

It is envisaged, within the scope of this pilot project, to lay along the line one optical cable having a capacity of 24 fibres. A second cable (with a fibres capacity not yet defined) will be laid during the eventual future EPP (out of the scope of this specification).

The non-used fibres (within the first cable) in the railway application shall be reserved as dark fibres for commercial purposes.

The bidder shall highlight within his proposal the synchronous transport system that he intends to supply.

### *Layout*

The layout schema in Appendix N° 2.a shows the station distribution all along the railway lines for Georgia, AZERBAÏDJAN and Armenia with the High Order (HO) multiplexer nodes and the secondary nodes to serve.

Appendix N° 2.b presents the list of railway stations linked by the telecom network (the stations marked with capital letters represent the important stations (and/or the stations with some existing secondary railway lines) and those marked with small letters represent the secondary nodes or small stations).

It belongs to the bidder/contractor to define the primary and secondary distribution nodes that he intends to propose in this PP project. The bidder shall include and demonstrate within his offer what is his best choice regarding this HO and secondary node distribution.

The approximate interval distances between one railway station and the next one are given in appendix N° 2.c (the extra length to reach the technical rooms shall be estimated by the bidder (minimum 8 %)).

Appendixes N° 3.a, 3.b and 3.c present the layout of the optical fibre cables, showing:

- in bold line, the layout of the optical fibre cable for the PP project (within the scope of this tender);
- in dotted line, the eventual future network extensions (out of scope of this tender);
- in small line, the layout of the second optical fibre cable (out of scope of this tender).

The secondary stations to serve which are remote from the high order multiplexer location (HO node) are supplied via additional fibre optic links (alternative solution shall be accepted and analysed). The number of remote secondary stations served by each HO node shall be a trade-off between equipment cost versus line cost, whilst maintaining an acceptable reliability profile and/or sufficient spare channel capacity.



## *Architecture and system description*

### **Design Objectives And Concepts**

The overall design key objectives and concepts shall be:

- 1̃ a telecom network using the latest transmission techniques;
- 2̃ a structural system with several hierarchic levels (a primary network - backbone - serving a number of specific areas and a secondary 'user access' network);
- 3̃ minimisation of the amount and the complexity of the equipment located on the railway lines;
- 4̃ an open structure allowing the system to grow and evolve in time;
- 5̃ flexibility of the material and logical configuration; all different network element of the system shall constitute of a minimal combination of uniform and modular software element or version;
- 6̃ a mix of all types of user interfaces and covering a wide variety of interfaces;
- 7̃ a management system allowing local and long distance operations;
- 8̃ minimisation of the complexity of the management system, in particular with respect to system configuration and resilience to faults.

The bidder shall develop in his proposal the concepts and/or the techniques that he intends to apply to achieve the here-above objectives, in particular for :

- the 64 kbps and 2 Mbps channel manipulation equipment to provide multipoint connectivity throughout the line;
- the management/maintenance facilities of the equipment;
- the management of the informations required to build the network and to transform these informations into detailed Node Configuration Files for each multiplexer in the network (Network Definition Data Base : NDDB).

The bidder must include a proposal of a typical architecture that he intend to furnish according to the requirements of this specification.

### **Architecture**

The offered Transmission System shall be modelled, as far as possible, on a 3 level hierarchy basis comprising of:

- a level-2 subsystem: constituting the backbone network including optic transmission and high order multiplexer equipment (HO);
- a level-1 subsystem: constituting the access network overlaid on the backbone and serving a number of specific locations between 2 HO nodes (Secondary Distribution Node: SDN);
- a level-0 subsystem: represented by the communication user equipment for dedicated railway communication functions and administrative communications (telephone exchanges, faxes, etc ).

The system shall be flexible and shall accept:

- the mixing of different types of interfaces / services and different types of signalling;
- a broad range of tributary boards working with POTS, ISDN, 2 Mbps fractional and non fractional, low speed data, analogue data interfaces, etc.;
- the cross-connect functions between tributaries, between aggregates and between tributaries and aggregates within the same features;
- management equipment with local and/or remote operations;
- a complete network management build-up with access and transport products, managed locally and/or from one or more control centres.

### **Remarks.**

- 1̃ All alternative solutions presenting some advantages in comparison to the here-above architecture can be introduced in the bid and will be taken into account during the tender analysis.
- 2̃ The major part of the proposed products shall be members of the same family (same technology, same mechanical housings, same printed circuit boards reused in different access and transport products, etc.).

### **Primary Network**

The offered system shall respond to an architecture of the synchronous digital hierarchy type with open transport capabilities (SDH or equivalent) and with, at minimum, the lowest order flow rate (STM-1 at 155.52 Mb/s or 150 Mb/s equivalent). In any case the proposed order shall be defined by the bidder in relation of the needs. This network, will be called the primary network in what follows and the communication nodes on this network will be called the High Order nodes (HO).

The primary network shall be able to transport (on optical fibres) a capacity of 63 (or 64) 2 Mb/s channels per fibre and per country (1890 or 1920 channels operating at 64 kbps or equivalent POTS analogues).

These HO nodes will be repeated as often as possible along the optical fibre line at those spots where the regeneration of optical signal appears to be indispensable and they will correspond as much as possible with important or medium size railway stations.

The telecom system shall be able to manage, as a minimum, the needs expressed in section 5, section 6.5 , Appendix N° 4 ( by taking into account the expansion spare provision defined in section 6.6 and/or Appendix N° 7) and shall be able to integrate the following future demand:

- additional channels for implementation of an automatic traffic and energy control;
- expansion of the demand in communications as a result of the increase in railway traffic in the next 5 years (see section 4.1);
- additional channels for implementation of an automated maintenance system;

- future integration of other advanced services (teleconferencing, televideo, ISDN etc.);
- implementation of a track-to-train radio ( and a concession radio system) with a high degree of performance;

by adding additional transmission capacity by upgrading simply the aggregates of higher flow level (STM-4 or equivalent).

Appendix N° 5 shows a typical architecture for a section along the telecom line, given only for information at this stage of the bid call.

***Remarks.***

- 1 The bidder shall take into account the potential need for a future branching on the HO node located in SAMTREDIA and/or the one in POTI for the implementation of a new network branch connecting SAMTREDIA to BATUMI ( in order to replace the old optical fibre cable that is currently out of service) and shall indicate its proposal for a such provision.
- 2 The bidders are allowed to quote the optional alternative solution consisting to propose all serving node as HO node (on the whole network) shall be considered and quoted as the option A.
- 3 As the second cable (in view to increase the availability of the communications and to allow a loop working mode by a separate optical fibre cable) is not planned, to be achieved during the PP, bidder shall propose the possibility to operate during the PP with the transmission system working in a loop configuration by using one spare fibre pair within the same cable (equipment failure protection).

**Secondary Network**

The secondary network will consist of add/drop multiplexers (ADM) allowing user services access to the network and will be capable of supporting various linking structures (star, linear, ring, etc.).

The linear or equivalent (ring) structure, by far the smallest consumer of fibres and channels, will be chosen where possible as structure for this network (advantages of alternative solution, if any, shall be demonstrated in the bid).

The proposed architecture based on a secondary network serving the small stations situated between 2 HO nodes, and using the PDH technology of the PCM type with  $n \times 2$  Mbps (  $n = 1$  or 4 ) shall be considered as the basic solution.

Where applicable, the number of remote secondary nodes (at  $n \times 2$  Mbps) served by each HO multiplexer shall be a trade-off between equipment cost versus line cost, whilst maintaining an acceptable reliability profile (to be determined by bidders).

The secondary transmission system, if used, should be capable of growing with as less changes as possible, to a superior level of the type SDH or equivalent.

Bidders shall detail the solution proposed in order to considerably reduce the routing complexity of the user circuits (point-to-point or multi-point connectivity). For example by leading and routing all circuits by the secured active cross-connect matrices (CCM).

An alternative routing (A/B paths), at the exit level of the ADM multiplexers with 2 Mbps, will allow to secure the transmission in case of malfunctioning of one path (looping of the secondary network).

For those cases when in a certain section the number of small stations that are to be linked exceeds the network capacity of 2 Mbps (including the spare capacity), the bidder shall indicate clearly within his proposal the selected solution, for example by:

- switch to a secondary level with a flow of 4 x 2 Mbps or by;
- temporarily using 2 supplementary fibres for certain overcharged secondary sections so as to divide the transmission load over 2 semi-networks operating at 2 Mbps (in this case the supplementary fibres and equipment used to this extent can be recovered for other applications, as soon as the future needs will be felt through the course of life of the system) or by;
- adding of an intermediate HO node
- etc.

The bidders shall to include within the bid specification the principle followed by detailing the structure, protections, capacities, routings, etc.

The schema in Appendix n° 5 shows an overall typical organisation of the secondary nodes, located between two HO nodes.

### **Through Transmission Subsystem (TTS)**

Direct connections (within the same main 155,52 (or 150) Mbps fibres or on an extra fibre pair in the future) from control centre to control centre of minimum m x 2 Mbps (from TBILISI to POTI, from TBILISI TO BAKU, from TBILISI TO YEREVAN) should allow dispatching of information between the 3 Caucasian countries for the control and supervision of traffic, energy management and for the emergency/security service requirements between POTI - TBILISI - BAKU - TBILISI - YEREVAN.

The through transmission subsystem shall provides transmission circuit capacity (see Appendix N°4) for the inter-control centres traffics between (POTI)-TBILISI-BAKU and TBILISI-YEREVAN, such as :

- control centre computers (freight transport management, traffic management, etc.);
- telephone trunk connections;
- time distribution (clocks);
- security and emergency services for railways and public authorities;
- border post connections;
- PSTN links.

The TTS shall be designed with the following key objectives:

- 1̃ provide a high degree of commonality with the approach used in the Drop/Insert sub-system;
- 2̃ aim to minimise the complexity of the demands placed on the Network Management System by equipment failure;
- 3̃ facilitate interconnection of circuits between the primary/secondary distribution nodes and other parts of the transmission system.

If a separate fibre pair is proposed in this stage, the TTS shall consist by monomode fibre links, HO and primary rate multiplexers inter-connecting the control centre main equipment rooms at TBILISI, BAKU, YEREVAN and POTI where the attached services are connected at the main distribution frames (MDF).

The bidder shall describe precisely the proposed equipment and working principle.

The TTS requirements for resilience shall be two folds: duplication of circuits and the provision of resilience within a circuit.

The bidder shall take into account these requirements by :

- spreading multiple inter-control centre circuits over 2 sub-systems (or 2 cables after the EPP project - out of the scope of this bid invitation);
- using the Drop/Insert alternative A & B paths to provide resilience for individual TTS circuits;
- using the A/B switching technique to manage the two alternative paths.

The bidder shall detail within its quotation the overall architecture including the additional multiplexers to grant access and the border structure/interconnection proposed.

The basic concepts outlined for the drop/insert system shall be applied, thereby eliminating complex multipoint equipment from the network side of the control centres.

### **Connectivity**

The bidder shall propose a system with the ability to perform (in general and/or where required) a wide range of connectivity types in view to meet:

- the specified requirements;
- the minimisation of the amount and complexity of equipment;
- the minimisation of the complexity of system management, in particular with respect to system configuration and resilience to faults (during all along of the various phases of the project).

In particular the following connectivity types shall be possible:

- Point-to-Point Control Centre Nodes to Local Station Nodes;
- Point-to-Point Local Station Nodes to Local Station Nodes;
- Multipoint Control Centre Master to Local Station Slaves;
- Multipoint Local Station Master to Local Station Slaves;
- Broadcast Control Centre Master to Local Stations.

### **Drop/Insert Multiplexers**

The higher order transmission multiplexers shall be based on Synchronous Digital Hierarchy (or equivalent) operating with synchronous transport modules working at a minimum of level 1 (optical line interface operating at 155 or 150 Mbps). The drop/insert multiplexer working at the plesiochronous hierarchies shall also clearly indicated for the secondary transmission nodes.

The Drop/Insert multiplexers shall perform, as a minimum, the following functions :

- star nodes;

- drop/insert multiplexers in linear connections;
- drop/insert multiplexers in ring connections;
- terminal multiplexers;
- broadcasting features;
- up-grade at upper level (Mbps rates), for the future evolutions .

Moreover, the equipment shall easily include the:

- aggregate subsystems;
- tributary subsystems;
- automatic protection subsystem;
- synchronisation subsystem;
- control/auxiliary subsystems;
- network management system;
- power supplies subsystems.

The transmission system shall be able to evolve, with a minimum of changes, in:

- an optical upper level (STM level- 4 and above) aggregates;
- a protected ring configuration during the Extension Phase of the Project.

Access multiplex equipment shall be able to interface all analogue and low speed data circuits to the HO multiplexers for transmission over the network.

Where applicable, the ITU-T Digital plesiochronous Transmission Hierarchy shall be used throughout the design:

<b>ORDER</b>	<b>TYPE</b>	<b>ITU-T bit rate</b>
1st	2 Mbps	2048 kbps
2nd	8 Mbps	8448 kbps
3rd	34 Mbps	34.368 kbps
4th	140 Mbps	139264 kbps
5th	563 Mbps	-

It is reminded to the bidder that he must describe within his quotation the functional capabilities, the operation/maintenance facilities and the technical characteristics of these D/I multiplexers subsystems and shall propose the best configuration regarding the distribution of the High Order Nodes (H.O.) and the secondary nodes, in relation of the proposed equipment possibilities.

The bidder shall also describe the precise characteristics of the drop/insert architecture that he intends to propose.

### **Primary Rate Multiplexers (Access Multiplexers)**

The SDN shall operate at 2 Mbps (as a minimum) or at 8 Mbps (4 x 2 Mbps) rate according to the channel capacity to provide in a secondary network section.

The proposed primary rate multiplexers shall accommodate, according to the needs, the following possible tributary functionality (data sheet to be inserted within the bid):

- mixed traffic for both telephony and data (subscriber PCM a/b wire POTS side, a/b wire Exchange side, ISDN, 7/15 kHz audio CODEC, etc.);

- achievement of configurations like as drop/insert or digital channel distribution;
- voice channel (POTS compatible devices, analogue switches, remote extension for the PBX, etc.) using different types of signalling (CAS, CCS, V5.1);
- hot line services;
- ring down connections;
- interface with the central alarm system;
- supervision of different line systems;
- automatic protection switching systems;
- the fibre optical transceiver (G.703/G.704);
- High Bit rate Digital Subscriber (HDSL) line integrable equipment;
- low speed data adaptation;
- data modem channel interface;
- subscriber line test system under operator control;
- master/slave conference or full conference unit;
- the remote downloading from the centralised Network Management System;
- AC/DC converters used in a redundant configuration;
- specific conversion card for the connection of the existing telephone switchboards (conversion of the frequency audio signal -together with the signalling- in the band 300 to 3400 Hz to a digital one conform with G.703/G.704); this signal is available within the HF transmission column.

Interface cards shall be installed in each chassis to provide the appropriate functionality for services at a location and shall provide the conversion of the connected services to 64 kbps PCM channels. The primary rate multiplexers shall multiplex the 64 kbps individual channels onto a dedicated 2 Mbps link to the cross-connect modules and/or the concerned other multiplexers.

The access multiplex equipment shall support multiple 2 Mbps aggregate interfaces and shall provide drop and insert facilities such that any 64 kbps timeslot from any 2 Mbps aggregate may be dropped to or inserted from a local access channel, or switched through to a timeslot within another 2 Mbps aggregate.

### **Cross-Connect Matrices (CCM)**

A set of 2 cross-connect matrices or equivalent structure ( for example, connection functions distributed amongst each node) will be installed at the end of each line for each one of the Caucasian countries (POTI - TBILISI; BEYUK-KASSIK - BAKU; YEREVAN - AYRUM).

The bidder shall to precise the chosen structure in order to facilitate the organisation of circuit protection and management (it is recommended to let the point-to-point and multipoint connections transit through the active CCM centre). The bidder shall to precise in the bid how this facility is assumed and secured.

The amount and organisation of the CCM circuits and channels should allow the following minimum of functionality:

- PCM 2 Mbps trunk interfacing to allow 64 kbps channel routing between any incoming and outgoing PCM;
- distribution of multipoint services to ADM;
- accommodation of combination of data and vocal channels and clock repeater modules;

- control and command by a Network Management System;
- the switching of the signalling information;
- the grouping of CCM's in clusters, if necessary;
- the capability to replace a single CCM by the stand-by CCM (in case of failure or maintenance of one of them);
- the monitoring of the system alarms from any individual CCM, reported to the Network Management System;
- fully controlled and configured using the Network Management System.

The cross-connect matrices shall be on a software controllable type.

The CCM shall interface 2 Mbps PCM trunks to provide 64 kbps channel routing between any incoming and out-coming PCM channel.

### **Optical Receiver/Transmitters**

All optical interfaces shall conform to ITU - T/CCITT G.652 recommendation. The optical transmitter shall be designed such that a break in the fibre routes shall cause the associated laser to shut down to a safe level as defined by IEC - 825.

The laser shut down mechanism shall not depend on any software for its operation. Laser warning labels shall be fitted to all shelves containing optical components.

Tenderers shall indicate the different types and characteristics of the optical transmitters and receivers.

The mean output power of these optical transmitters shall be determined during the detailed design and confirmed during the commissioning tests with the optical budget calculations.

All arrangements shall be taken :

- to measure easily at the power meter;
- to provide a sufficient laser bias current;
- to monitor the laser bias current;
- etc;

in accordance with the optical budget calculation.

A prediction of the laser degradation with age shall also be performed by the contractor, during the detailed design.

Contractor shall give for each optical transmitters used the recommended maximum laser bias current in relationship with the laser bias current on initial installation and provide an alarm indication when the laser bias current will reach these levels.

Moreover, all arrangements shall be taken by the Contractor to allow the monitoring of the performance of the optical links.

In the same way, the bidder shall specify the types and qualities of the optical receivers in the transmission system (corresponding to the optical transmitters). In particular, the minimum receive power shall be specified ensuring the specific BER (and also the distance at which the equipment may begin to run errors) and the designed system margin in order to avoid to approach these levels of BER.



## **Link Loss Budgets**

The theoretical link loss budgets shall be calculated for each link in the system.

The contractor shall insure the total loss on any link will be retained within the theoretical loss calculations in all cases and particularly for the worst link cases (distances, connections, vibrations, bit rates, etc.) and be under 50 % of the remaining spare margin.

## **Network Synchronisation**

The input reference signals shall be highly accurate and stable (e.g. by caesium source or equivalent) providing a long term 2 Mbps frequency.

There is need for at least 2 synchronisation sources (or one synchro source and one GPS) for the 3 countries.

The Contractor shall produce an outline overall synchronisation plan and shall consider all fault scenarios for the network and incorporate suitable synchronisation fallback plans.

Selection of alternative synchronisation sources in the event of a network fault shall be automatic and not require the intervention of the NMS or any manual intervention.

Intelligent tracking oscillators (ITO) shall be used to filter out the jitters and wanders of the incoming signals before distributing the synchronisation signals to the transmission system.

The ITO will use two sets of clock timing extraction units, the master and the slave. Selection of the master or the slave will be achieved via automatic switch-over in case of failure of one source.

In the event of failure of both reference input signals, the VCO shall continue to provide high quality synchronisation information (to be specified by the bidder).

The clock distribution amplifier and the power supplies units shall operate in a fully redundant mode.

Each multiplexer and CCM in the transmission system shall be configured to select a desired clock source.

Eventually, for signals carried by the transmission system which traverse synchronisation borders (interconnection of two devices which have different synchronisation sources from Georgia, AZERBAĪDJAN and Armenia), plesiochronous buffers (or equivalent) shall be installed.

One synchronisation unit in dual cabinets will be installed in each control centre equipment room.

The bidder shall give an outline description of the transmission system synchronisation distribution that he intends to put in place and shall quote separately each item.

Each synchronisation unit and each plesiochronous buffer chassis shall have alarm outputs (tracking oscillator fail, sync error, etc.) connected to the NMS.

The alarms shall be normally open dry contact relays.

## *Level -0 equipment*

### **Railway Dedicated Communication Lines/ User Devices.**

The dedicated communication lines for the National Railways needs shall be renovated completely within the PP with modern equipment. In the same way the current telegraphy installations need to be replaced at this stage, by fax equipment group 3 (to include within the bid).

Refer to the sections 5 and 6.5 for more details.

Taking into account the limited budget available in the PP project and in order to ensure these dedicated lines, the hereunder procedure shall be followed:

For stations with a very low amount of dedicated users (small or medium railway stations), the railway dedicated user services (and communication set) can directly be connected to the transmission system by access on the primary rate multiplexer equipment. In this case the CCM matrices will be charged with providing the required functionality for these dedicated lines (exchanges to/from dispatcher, teleconferencing, etc.).

For Rail Control Centres (RCC), like as TBILISI, BAKU, GYANSHA, SAMTREDIA and YEREVAN, the railway dedicated user services shall be connected via operator consoles of adequate size located on the control desks of every railway section dispatcher (traffic and energy) .

A minimum of 2 unmarked (non banalised) operator consoles for every rail traffic dispatcher and for every energy dispatcher of each considered railway section shall be provided within the quotation (18 in AZERBAÏDJAN, 24 in Georgia and 12 in Armenia). These operator consoles shall be quoted separately.

### **Temporary Radio Interfaces.**

To reminder, the replacement of the existing radio systems is provided during the EPP project, thus the existing radio base stations shall be temporary re-used in this PP project.

The bidder/contractor shall quote/furnish the appropriated interface for the radio communication link to cope with these existing radio systems (see Appendix N°10 for more details regarding the existing radio system). The bidder shall to take into account in the quotation the necessity to achieve a technical site survey in every Caucasian country in view to determine the type of the interface cards to employ between existing base stations and the transmission system. The price of the interfaces shall be split from the price of the technical site survey (as separate item ) and shall be as precise as possible.

The interface circuit type given in appendix 4 a, b, c for the DR links shall thus be subject to modification in relation to the here above preliminary technical site survey.

### **Administrative Telephone Exchanges**

The existing telephone switchboards (PBX), even if certain have been installed recently, have an outdated technology of at least of 3 ancient generations (see Appendix N°10). The greater part amongst those (from soviet origin, from the ATS series) correspond with the analogue automatic switchboards with electromechanical commutation. These PBX automatically carry out the connections for local telephone exchanges while inter-commutator exchanges operate :

- Either manually by means of an operator or;
- Automatically by electromechanical commutation (long distance connections).

Some other existing switchboards are even from a more ancient technology (complete manual commutation).

The list of the existing telephone switchboards with their extension quantities are given in Appendix N° 10.

The bidder shall quote for the replacement of all existing telephone switchboards belonging to the PP line (listed within the Appendix N° 10) with the indicated subscriber extension capacities, by modern digital PABXs.

The bidder shall propose moreover the best inter-commutator tie-line organisation that he intends to apply (maintain the existing tie-lines structure or new star structure with open numbering plan, etc.) between the furnished modern PABXs .

***Option:***

The bidder shall take into account in his quotation that a technical site survey shall be achieved in view to determine the appropriate interface (voice + signalling) for the temporary integration of those switchboards who need connections from the renewed PABX's (belonging to the PP project) to the remaining old commutators (belonging to the secondary railway lines branched out to some PP railway stations).

This adaptation can be achieved , for example, by the conversion of the analogue signals (voice + signalling) into digital ones according to the standards G703/ G704 or equivalent.

The concerned tie-line connections are for the following PABX's:

- ***Georgia:***
- PABX of SAMTREDIA to BATUMI : 40 channels;
- PABX of POTI to BATUMI (25 channels);
- ***Armenia:***
  - PABX of YEREVAN to ABOVIYAN: 3 channels;
  - PABX of YEREVAN to ARARAT: 12 channels;
  - PABX of YEREVAN to EGVARD: 3 channels;
  - PABX of YEREVAN to HRAZDAN: 36 channels;
- ***Azerbaijan:***
  - PABX of BAKU to Russia Direction: 4 channels;
  - PABX of KASI- MAGOMED to OSMANLI: 6 channels;

The bidder shall quote the required interfaces as precisely as possible, by splitting the technical site survey from the price of the interface cards in separate item, as an option.

***Remark:***

The attention of the bidder is drawn on the fact that temporary operation on two networks, the old one with the old switchboard and the new one shall be assumed whilst the commissioning will be on going. The Contractor shall be in charge to propose to the railway operation and maintenance staffs, a procedure in order to operate safely and in the best possible conditions with these 2 temporary coexisting configurations.

### **Administrative Telephone Handset Replacement.**

The network of subscriber telephones as well as the telephone handsets are generally very out-dated (analogue, decimal numbering etc.). So it is extremely important that in the short or medium term this network will be replaced by a replacement programme set up by the railways concerned.

The bidder shall quote the replacement of the existing administrative telephone handsets by modern ones (digital and/or analogues). The quantities to take into consideration are those given within the column "Subscribers connected" in Appendix N° 10 with the following allocation (for every switch):

- Digital telephone sets for offices: 67 % of the total amount of subscriber handsets;
- Digital telephone handsets with functional and management facilities: 10 % of the total amount of subscriber handsets;
- DTMF analogue telephone sets for distant subscribers: 10 % of the total amount of subscriber handsets;
- Outdoor telephone handsets (inside locked waterproofed wall box IP 65): 10 % of the total amount of subscriber handsets;
- the Attendant consoles: 1 for PABX capacity < 50 extensions, 2 for > 50 extensions;
- the fax machines group 3 : 3% of the total amount of subscriber handsets.

For budgetary reason, a possible reduction of 25 % of these subscriber handset replacements can be done before the contract award (reduced price in separated item, as an option).

In this last case, the attention of the bidder/contractor is drawn on the fact that, this part of non renewed extension sets (and their copper pre-cabling) shall be re-used with the new system and that the eventual intervention and furniture to adapt these handsets are within the scope of this bid.

### **Administrative Telephone Cabling.**

The renewing of the concerned telephone pre-cabling is not provided inside the scope of this tender. So the existing telephone pre-cabling shall be re-used in this PP project (To reminder only the telephone sets shall be replaced).

The bidder shall nevertheless provide the quotation of an overall survey of the re-used copper cables between the telephone/fax sets (in general from the existing user equipment) and the existing main and/or local distribution frames (MDF - LDF).

The respective National Railways will renew in time the telephone pre-cabling, where required, in case of bad state of the cabling (it is incumbent on the National Railways to do the checking of the re-used cables on basis of the minimum acceptable specification delivered by the contractor).

In case of the contractor will detect some bad quality or bad state on the recovered wires/cables planned, the National Railways shall to replace these cables without delay.

The bidder shall to integrate within his quotation the supply to the National Railways of the recommended characteristics for the required cables and wiring, coping with his device furniture.

The appropriated Main Distribution Frames (MDF) in the various RCC and the various Local Distribution Frames (LDF) shall be renewed and quoted in the bid.

The switching operations between the existing distribution frames and the new ones shall be organised and proposed by the Contractor ( with a procedure) to the National Railways for approval.

### **PSTN Tie-Lines.**

The PSTN line connections shall in particular be used to secure via the public network some operational railway communications in case of failure of the sole optical cable installed within the PP project. See section 6.4.6.7 for more details.

The bidder shall to take into account in his quotation that a technical site survey on every Caucasian country involved in this project may be necessary to determine exactly the interface standards (voice + signalling) in force for the tie-lines connection between the private PABXs (according ITU-T Standards) and the Public Switched Telecom Network in the Caucasian countries.

The bidder shall to quote, for every supplied PABX, the furnished PSTN tie-line cards and the related connections to the Public Telecom Operator Cabinets (located within the same building where the installed PABX is located) by splitting the technical site review price.

### **Telephone System Specification.**

#### **General**

- The telephone system shall be based on the using of automatic modern telephone exchanges (PABX) with dual processor facilities.
- The exchanges will include the interface with all the extension lines to be provided, the facilities to maintain the central and to define the line numbers and the functions dedicated to every line (access or not to the public network, access or not to international communications, etc.).

It must be installed in the technical room of the concerned building;

- Operator communication consoles and push buttons telephones in the control centre (control room and technical room), in the administrative, technical and maintenance area's, in the electrical substations;
- in the public area's (if any), the telephones must be specially well protected in a small locked waterproof cabinet;
- the communications recorder;
- auxiliary equipment and works.
- Emergency telephone plugs: not applicable in this PP project

### **Main Characteristics and Functions.**

The telephone calls will be completely automatic and shall use all kind of dialling types (frequencies, decimal for the re-using of the existing telephone handsets, etc.).

The system shall respond to the following characteristic family:

- high efficient, reliable and secure communication system;
- high quality and easy to use system;
- high efficiency in integration of voice and data;
- reduced costs through networking ( for eventual later network integration);
- extended telecommunication system and voice functions;
- functional separation of the hardware and the software packages enabling the configuration the range of services to provide;
- modular concept to make possible the adding of new features step by step (growing capabilities);
- protection of the external lines against lightening (over-voltage protections);
- internal non blocking system;
- high performance processors;
- integrated and digital system compatible ( ISDN compatible);
- no lost calls (high accessibility, waiting queues, waiting call signal, follow me, etc.);
- conference calls capabilities.

The PABX central shall allow the classical facilities provided by modern computerised exchanges, among others the following ones :

- easy allocation of the call numbers (at least seven figures);
- access or not to the public network;
- access or not to international numbers;
- DDI incoming access mode;
- possibility for telephone Attendant and the central Operators to interrupt established communications;
- integrated music on hold;
- discreet tonality in case of external call during a conversation.

### **Main Software Packages.**

The bidder shall to define in the quotation the summary of the available telephone software package included within their proposals such as : the Attendant Break-in feature, Attendant recall, auto-dialling, automatic answer-back, automatic line pre-selection, automatic telephone relocation, bridging, etc.

### **Communication Recordings.**

A dual voice recorder shall be quoted in separated item (as an option) to allow the recording of the telephone and radio communications from/to the dispatching central operators in TBILISI, BAKU, GYANDJA and YEREVAN.

The minimum configuration of the dual voice recorder shall be as following:

- 8 channels;
- hard disk of minimum 180 channels.hours;
- dual tape (minimum 330 channel.hours per tape);
- display and control panel.

### **Detailed Design Requirements.**

The Contractor shall submit (in addition to the applicable document listed in section 11) to Engineer in due time according to the concerned time-schedule, a concise dossier of detailed design related to the telephone system. This detailed design shall include but not limited to the following documents:

- the design principles regarding the loss plan (transmission characteristics for private switching systems, loss parameters);
- the positioning of the telephone extension at individual locations;
- the adopted tone plan;
- the numbering plan;
- the routing and barring plan;
- the detailed design drawings giving a good understanding of the configuration, physical layout, functions and operation;
- the functional specification (hardware and software architecture, column hardware, system capacity, administration and maintenance: alarm, call detail recording, diagnostics);
- the description of the sub-systems and facilities;
- the software feature descriptions;
- the connection to the others systems (PSTN, Safety Authorities, hot lines, radio, time system);
- the failure analysis;
- the equipment and software packages supplied;
- the configuration details;
- the power consumption for each sub-equipment;
- the traffic calculations;
- the effective failure rates for each assembly or sub-assembly;
- the installation requirements ( grounding, power supplies requirements, MDF, LDF, pre-cabbling, etc.);
- the line circuit specifications;
- the technical standard product documentation.

### **Main Equipment And Works.**

The telephone equipment to provide, with all the auxiliary equipment (MDF, LDF, cables, connecting boxes, etc.), shall integrate the existing extension networks of the 3 countries.

The Appendix N° 10 gives a recapitulation of the telephones to integrate.

The PABX shall be equipped for all these telephones and plugs plus spare connections (at least 10 %).

It shall be at least extensible to two times the installed capacity.

The communications recorder shall be equipped to record permanently with the exact time, all the telephonic and radio communications in relation with the central operators. It shall offer at least 10 % of spare channels.

### **Connection to PSTN.**

Where already existing, the renewed PABX's (in this PP project) shall re-use the existing PSTN tie-lines (analogue exchange lines) according to the PSTN standards used by the caucasian countries. A part of some public telephone exchanges are already renewed or on going to be achieved.

The bidder/contractor shall to indicate the interface card specifications on which the quotation are based.

To reminder the attention of the bidder/contractor is drawn on the fact that the here above PSTN line connections shall be used to secure via the public network some operational railway communications in case of failure of the sole optical cable.

The PSTN line quantity to provide shall be a minimum of 10 % of the subscriber capacity for each existing switch ; the awarded Contractor shall nevertheless check the sizing of the PSTN lines for the following assessed traffic:

- total traffic / ext line : 0,24 E
- incoming traffic /ext handset : 0,08 E
- outgoing traffic / ext handset : 0,08 E
- local traffic /ext handset : 0,08 E

### **Attendant Console.**

An attendant console per supplied PABX, for the supervision and extension of incoming and outgoing calls by an Attendant shall be supplied and installed.

This system shall be PC based with a friendly operating program.

### **Management And Maintenance System**

The telephone system shall be proposed with a configuration management and maintenance server allowing a range of comprehensive and powerful management services such as the management of the subscriber lines and their features.

Such system shall offer the following advantages:

- easy to operate;
- requiring no special knowledge;
- providing a clear display of subscriber lines and their features;
- ensuring shorter response times in making changes;
- providing a comprehensive help functions.

### *Circuit Requirements*

#### **General**

The transmission system shall be able, directly during this PP or in the future (provided that the required user interfaces are added) to carry all data's, audio and video signals from/to the following eventual subsystems:

- the rail traffic management system (for computer communications, Freight Transport Operation Systems, information systems, ...).
- the administrative and operational/emergency telephone systems (analogue and digital types);
- the voice communication subsystems (public address, interphony, etc.);
- the track-to-train radio system;
- the concession radio system;
- the fax equipment;
- the engineering management system (for electrical and mechanical equipment management, etc.);



- the clock distribution system.

Moreover, the attention of the bidder is drawn on the possibility to connect to the new telecom network the following existing very old control and communication installations:

- the telephones (analogue, electromechanical manual and automatic switchboards);
- the telegraph equipment (to be replaced by fax machines group 3);
- the traffic dispatching systems;
- the energy dispatching systems;
- the dispatching systems of the maintenance staffs.

The safety signalling signals and trackside functions are not within the scope of this project.

### **Circuit List**

The Appendix N° 4 shows the circuit requirements for which a quotation on a detailed unit card price basis is required.

In particular, each element occurring in the multiplexing strings and the transport process shall be quoted individually and separately (unit price basis). The hardware configuration of each node shall be detailed within the quotation.

The TTS circuits types required are mainly point to point and broadcast circuits.

The bidder shall consider that the circuit requirement list in Appendix N°4 is given for bid purpose only. Therefore a possible adaptation of the user circuit requirement list will be probably achieved and/or clarified during the tender analysis phase and before the Contract Award (in complete co-ordination and agreement with the bidder). It is thus important to reminder that all prices shall be given on a unit price basis (card price basis).

The bidder shall take into account that functional railway communication can use the same transport IT on the concerned section (TD, ED, SS, DR, etc. see also Annex 12) and shall to describe the solution that he intends to apply.

In particular, the bidder shall define and quote in separate item the necessary actions and/or concepts to implement for interfacing the existing manual and/or automatic Exchanges to the new transmission system. One possible way to solve this problem is the implementation of the conversion of the frequency audio signal (together with the signalling) in the band 300 - 3400 Hz (signal allowable upstream the HF transmission column) to a digital one conforming with G.703/G.704.

The V24/ V11 interfaces shall, as a minimum, support 1.200, 2.400, 9.600, 19.200 and 28.800 bps transmission rates (refer to ITU-T Recommendations).

It shall be possible to implement any of these interfaces on multipoint or omnibus circuits for any number of points on the network. This includes analogue 4-wires.

Analogue circuits shall employ A- Law digital encoding as specified in ITU-T Recommendation G. 711.

The bidder shall detail the quantity per card, type, housing type and description of the required tributary circuits. Even if not immediately required in this application, the capacity

per card and the maximum card quantity per frame of the following tributary interfaces shall be indicated within the bid document (unit card price basis):

- Analogue 2/4 Wire E&M telephone connections;
- 2 Wire Loop Disconnect (exchange) telephone connections;
- 2 Wire Loop Disconnect (subscriber) telephone connections;
- telephone Ringing Generator used by the specific National Railways;
- 64 kbps, X 21 Data Channel;
- N x 64 kbps Data (128 kbps to 1920 kbps);
- 64 kbps Sub-Multiplexer (V.24/V.28 Data Channel);
- 64 kbps V.24 Multipoint Data Channel;
- Optical 2 Mbps G.703 Module;
- Electrical 2 Mbps Line Interface Unit;
- Interface for existing reused equipment, if any.

### *System capacity and Expansion*

In addition to the requirements specified in Appendix N° 4, the transmission system shall be designed and installed with a minimum of 50 % spare capacity in terms of access equipment shelf space (including cabling) and in terms of channel bandwidth to/from each access mode. This facility will be quoted in separate item in the bid.

The bringing into operation of the spare capacity shall be achieved by the simple insertion of modules or cards with the minimum of disruption to the working system. The high order subsystem shall be designed such that for future expansion (namely during the EPP) it can easily be upgraded to the next hierarchical level (i.e. for the return loop, etc.).

### *Network Resilience and Availability*

#### **General**

Two classes of service shall be offered by the transmission system:

- Essential : a service necessary to permit normal passenger carrying operation and/or to permit the operation continuity.
- Non-essential : all other services.

Essential services shall normally be provided with duplicated data/audio/video/control circuits and shall have two independent access ports to the transmission system.

This functionality shall to be quoted in separate item as an alternative solution (option H) for the circuits coming from/going to the Rail Control Center (RCC).

No single failure within the transmission system shall cause loss of any essential service.

Protection switching shall be done on a local basis without any intervention from the Network Management System (NMS).

All such switching and fault identification shall be reported to the NMS.

The Contractor shall moreover issue for approval by TACIS/TRACECA a transmission system failure analysis during the detailed design phase.

## **Circuit Securisation**

For budgetary reasons and for the current state of the project, it is not planned at this stage to secure the network from accidental cuts in the optical fibre cable.

However, in view of covering the minimum needs of protection during the period situated between the first (PP) and the second phase (EPP) of the project (when a second cable will be installed), the bidder shall provide the using of a pair of supplementary fibres inside the same cable so that they can act as a loop transmission circuit (operating at 155.52 Mbps or equivalent).

This temporary protection method could cover the failure in the transmission equipment. Some of the supplementary equipment needed for the realisation of this function could afterwards be reused and the fibres recycled when implementing the second phase.

In the same way, the commutation function between two paths of access multiplexers in the network allows to secure this level of the network (loop within the primary and secondary network). This circuit securisation function shall be available from the local node and from the control centre node as well.

A spare CCM module (if any), placed at the centre of each CCM, allows to replace a deficient one. The detection of the deficient module and the accommodation on the spare one is done automatically. At least the RCC communications shall be secured.

The securisation of the railway control centre communications shall be quoted as an option.

A dual “black box” voice recorder shall be provided for the communications from/to the RCC (to be quoted in separate item).

As for the power supplies for the control and communication equipment, these will be of the type of batteries and chargers that allow autonomy for at least 8 hours (48V DC).

In the same way, the management equipment that functions on a alternative power source will be powered by UPS allowing autonomy during at least 8 hours (220 VAC).

Once the back-up power supply is off, the transmission system can be restarted automatically as soon as the primary supply regains its normal regime.

## ***Equipment Cabinets***

All required equipment cabinet shall be provided and quoted by the bidder.

## **Physical Characteristics**

The transmission system cabinets must be designed for implementation in a harsh physical, climatic and electrical environment. Aspects such as electromagnetic compatibility (EMC), temperature, corrosion, vibration, dust, water and static shall be thoroughly considered and tested before implementation by the Contractor.

All the equipment cabinets shall be standard indoor type and installed inside existing technical rooms. The degree of protection of the indoor cabinets shall be IP 549 as a minimum and all the cabinets shall be protected against the corrosion. The colour standards will be defined later on according to the National Railways standardisation in use.

All other outdoor cabinets, like as junction boxes, shall be at a minimum degree of protection of IP 659.

Each cabinet shall have a locking door and an internal 19” chassis (standard sizes requested).

The bidder will include in his proposal an outline typical general arrangement of each type of equipment cabinet containing the multiplexers, the converters, fibre optic joint racks, local distribution frame (I/O panel), the power supplies and for each node type.

Fans and temperature sensors shall also fitted. The cabinets will be complete, fitted with all accessories (document jacket, hooks, cable glands, etc.).

Each door cabinet shall be provided of a limit switch (open contact type) for monitoring in NMS.

### **Cabinet Build Specifications**

Higher order equipment cabinets shall contain approximate the same equipment as the secondary equipment room cabinets with the addition of the higher order muxes and the higher order patch panel for interconnection of 155 Mbps signals.

An internal swing frame is recommended to guarantee an easy access to the entire elements within the cabinet.

All circuits on the muxes shall be presented on the I/O panel. The I/O panel shall not be used for presentation of circuits to users, but rather for presentation to the transmission system frames. Digital circuits shall be presented on the D type I/O panel and analogue circuits shall be on the VF I/O panel.

The multiplexers, patch panels and converter chassis shall be mounted in the swing frame. All other equipment shall be mounted in the fixed part of the cabinet, behind the swing frame.

All cabinet door openings shall be monitored and alarmed in the network management systems to the attention of the central operator.

Cabinet build specifications shall be achieved by the Contractor for approval by the TACIS/TRACECA for every type of cabinets in the transmission system. The documents shall include information such as location, identification, equipment layouts, card layouts, accessories lists, equipment lists, cable index, cable diagrams and cabinet cable schedules. The cabinets can be fully assembled using the sole cabinet build specification.

### **Cabinet Earthing**

Each cabinet in the transmission system shall have all internal equipment earthing to a cabinet bus bar. The bus bar will be then connected to the main cabinet earth stud. All transmission system cabinets will have a separate earthing cable installed from the main cabinet earth stud to the functional earth bar of the equipment room.

Protective earthing arrangements for all control centre and secondary local equipment rooms shall be detailed within the related Contractor documents (such as earth interconnections and earthing schematics).

### **Cabinet Layout (Floor Plans)**

The Contractor shall elaborate floor layout drawings showing the physical layout of transmission system cabinets (and including the cabinet functional identification numbers) for all equipment rooms and control centres.

### *Frames*

#### **General**

The interconnections of all types of equipment in the transmission system shall use specific frames in view to provide enough flexibility between interconnections. All transmission system cabinet I/O panels will be connected to a frame of some description.

The connectors used within the entire transmission system shall be of high quality type and the technical characteristics of the connectors chosen by the Contractor shall be submitted for approval prior implementation on site (the Tenderer shall nevertheless specify the origins and types of connectors that he intends to propose).

#### **Main Distribution Frame (MDF)**

The renewing of the Main Distribution Frames (MDF) in the technical room of the Control Centres shall be quoted in separate item.

The MDFs shall be self standing cabinets located in main control centre equipment rooms and shall be used for analogue VF circuits only to interconnect transmission system users to the transmission system equipment.

The MDFs will be assembled from many individual Insulation Displacement Connectors (IDC) termination devices and shall be organised into two sides, the line side and the equipment side.

The line side will be used for transmission system users to terminate cables on and the equipment side will be used to terminate transmission system cables on (see Appendix N°6). The line and equipment sides will be connected using jumper wires, thereby completing the circuit.

The IDC arrangement and identification shall be submitted to TRACECA/TACIS for approvals during the Contractor design.

#### **D Type Distribution Frame**

The D type frames, if required, will be located in main control centre equipment rooms and will be used for digital circuits only (which are terminated on D type connectors) to interconnect transmission system users to the transmission system equipment.

The D type frames shall be organised with separate panels (of 15 ways, 25 ways and 37 ways D type connectors) and will not use line and equipment side as in § 4.16.2 here-above (transmission system cables connected to the back of the panels and users terminate their cables on the front using a mating connector).

### **Local Distribution Frame (LDF)**

The renewing of the necessary Local Distribution Frames (LDF) shall be quoted.

The LDFs will be self standing cabinets located in primary and secondary equipment rooms and will be used for analogue VF circuits and digital circuits.

LDFs will contain as well IDCs for analogue circuits and individual D type connectors for digital circuits (arrangements in relation of the state of the art).

The analogue VF part of the LDF will be divided into two sides, the line side and the equipment side. The line side will be used for transmission system users to terminate cables on and the equipment side will be used to terminate transmission system cables on (see Appendix N° 6). The line and equipment sides will be connected using jumper wires, thereby completing the circuit.

The digital part of the LDF will not use line and equipment side as in § 4.16.2 here-above. The transmission system cables will be connected to the back of the panels and users terminate their cables on the front using a mating connector.

### **Digital Distribution Frame (DDF)**

The Digital Distribution Frames, if required, shall be quoted and shall be self standing cabinets (with access on both front and rear sides) located in main control centre equipment rooms and used for digital circuits only to interconnect transmission system at transmission speeds of 2 Mbps and above.

All interconnections at these speeds will use pairs of coaxial cables. Each coaxial cable will terminate on the DDF using a type 43 connector.

The DDFs will be assembled from many individual High Density Connector blocks (HDC).

All equipment cabled to the DDF will be connected to the line side of the HDC blocks.

Interconnections between two pieces of equipment will be achieved by installing a pair of jumper cables between the jumper sides of the respective HDC blocks.

U-links (or equivalent) on the HDC will connect the line and jumper sides of the HDC blocks.

### **Building Distribution Frame (BDF)**

The Building Distribution Frames (BDF) shall be renewed in so far as they are associated to the renewed railway dedicated communication devices of this project.

The renewing of the BDFs associated to the administrative telephone devices are not within the scope of the PP project (the existing BDFs shall be re-used). The bidder shall at this stage take into account that he must to pick up the concerned signals within the existing BDFs, LDFs or MDFs.

They will be part of the existing telephone system and are located within the railway station buildings. More details concerning these BDFs will be given later on before contract awarding.

### **Optical Distribution Frame (ODF)**

Connectors and fusion splices will be the two methods agreed within the frames of the PP.

Each joint must be housed in a secure frame to prevent tampering and damage. Three types of frame will be used in the transmission system:

- fibre optic junction boxes (FOJB);
- fibre optic jointing racks (FOJR);
- optical distribution frames (ODF).

The specification of the FOJB is given in section 6.11 hereunder.

The FOJRs will be located in the transmission cabinet in each local equipment room and will house both fusion splices and a panel of optical fibre connectors (manufacturer, type and quality to be defined within the tender).

Within the FOJR a subset of the optical fibres will be spliced to pigtails with an optical connector at one end. These then will connect through the panel to the local transmission equipment.

There will be an ODF in each of the HO equipment rooms. These frames will serve as the main distribution node for all drop/insert and through transmission system.

A fibre optic storage tray will be installed below the ODF and the excess length of the fibre optic pigtails will be coiled securely in this tray.

A special arrangement shall be paid for the dark fibres whilst connection in waiting. To satisfy the low tolerance conditions to obtain a good connection quality, the Tenderer shall specify in its quotation the different types of optical connectors that he intends to employ in the PP (for fibre optical line driver units, 2 Mbps, etc.).

The Contractor needs to specify during the detailed design the procedure to avoid the degradation and attaining a high system margin by the operating and maintenance instructions (cleaning, matching gel, splicing, etc.).

### *Engineer's Order Wire*

An engineer's order wire shall be provided at each node. This shall facilitate both point-to-point and multipoint voice communication with any other node(s) in the networks.

### *Fibre Optic Junction Boxes (FOJB)*

#### **General**

The base solution to consider and to quote is the buried cable solution. The aerial cable solution shall be bided as an alternative solution only or for those sections where the buried solution shall not be technically feasible (tunnels, bridges, railway stations, etc.). The approximate lengths of the aerial cable sections shall be given in time to the contractor for the contract award.

The furniture of the FOJBs and the appropriated workforce for the installing/connecting are within the scope of the present PP project. The bidder shall quote in separate item the furniture and the installing of a such apparatus.

In every FOJB, the fibres shall be spliced/fused in such a way that the identification continues along the whole cable. The FOJBs shall be:

- used to house and protect optical fusion splices;
- pressurised at the time of installation to prevent the ingress of moisture (this pressure should be maintained throughout the life of the FOJB).

The Contractor shall issue before implementation the operating and safety instructions, and the splicing procedures regarding FOJB, FOJR and ODF as well.

### **Characteristics**

- (a) The fusion/splice box shall be waterproof with a minimum of IP 659 (aerial) or IP 679 (buried).
- (b) The box shall be UV and resist to bullets fired from a hunting gun calibre 20 fired at a distance of 15 meters (aerial) and/or corrosion resistant (aerial and buried). After the test no holes or sleeves shall be observed.
- (c) The box shall be vandalism proofed and can only be opened with a special key or tool.
- (d) Special attention should be paid to the fact that the boxes are installed on catenary poles and submitted to vibrations caused by passing trains (aerial cable).
- (e) The installation of the boxes on catenary poles shall be done without drilling holes in the concrete poles (aerial cable).
- (f) The boxes shall be installed at a height of at least 3 meters (aerial cable).
- (g) Before closing the joint box, after splicing the fibres, silicagel grains or equivalent will be enclosed to absorb moisture.

### ***Cable Trays And Trunkings***

Cable trays and trunkings (where required) used for the telecommunication system shall be manufactured from mild steel and hot dip galvanised to BS 729 or equivalent (to be defined in the bid).

The cable trays and trunkings shall be finished with epoxy powder coating in colours to meet the code requirements of each National Railways.

The cable trays and trunkings shall not present sharp edges, burrs or projection which are injurious to the insulation or sheaths of the cables.

All tray and trunking joints shall have a tinned copper bond bolted to adjacent tray/trunking and adjacent terminal boards to ensure electrical continuity.

Appropriate labelling shall be marked on the underside of the cable trays and trunkings.



## **Optical Cable Specification**

### *General*

The offer must to cover the supply, the technical assistance for the laying achieved by the National Railways contractors or their sub-contractors, the connection, the tests / commissioning and the bringing into operation of the optical fibre cables represented schematically in Appendix N° 3a, 3b and 3c.

As a general rule, buried optical fibre cable shall be considered as the basic solution in the quotation and aerial optical fibre- self supporting type - cables shall be considered as the alternative solution (see section 7.4) to quote as an option in the pricing document.

The quantity and the type of the junction boxes shall be determined by the bidder according to the proposed cable characteristics.

To reminder the respective National Railways (Armenian, Azeri and Georgian) undertakes to achieve by themselves or by their sub-contractors the following works (in case of the basic solution):

- The civil works (performing of the trenches, etc);
- The laying of the optical cable conduit in trenches (supplied by the contractor) under the contractor technical assistance;
- The optical cable laying (under the contractor technical assistance);
- The rehabilitation of the technical rooms where transmission equipment shall be installed (painting, lighting, raise floor where required, heating, ventilation, air conditioning, administrative telephone cabling, where required);
- The making of the primary power supply feeder, available to the contractor.

### ***Technical assistance for the civil works.***

*The contractor is requested to punctually assist the civil work and the cable laying achieved under the responsibility of the respective National Railways (NR). In particular, this assistance shall be achieved by furnishing to the NR the required overall technical characteristics and /or all interesting data/main procedure for a good work realisation (civil and laying works in view to allow the NR to reach the best installation condition for the optical cable).*

*The contractor shall in particular to determine/approve the quantity and sizes of the handholes, temporary excavations and the equipment needed by the laying with a blowing-in technique, in case of the buried solution (the bidder shall to quote the technical assistance in separated item).*

Moreover, bidder shall to consider in the bid (characteristics and prices in separate item) for the buried cable, the two sub-solutions as:

- the cable requiring the laying of a conduit (HDPE minimum 50 mm diameter cable duct);
- the cable ducts needed for passing through the bridges, tunnels, etc. (quotation on unit price basis and separated item in the bid). The quantity to deliver shall be clarified before the contract award);

- the cable equipped with the external anti-deterrent animals protection.

The grounded optical fibre type cable shall be buried at a deep of 0,8 m (trench of 1 m in earth) and 0,6 (trench of 0,8 m in rocks).

***Option:***

In case where the aerial solution shall be partly or totally selected, a possible suggested supporting will be on the existing infrastructure (in general mounted at the catenary pylons) along the railway line.

The suspension and the laying method shall be described briefly in the bid proposal.

In case of selection of the aerial method the Contractor shall furnish to the Railway Operator all required data regarding the additional static and dynamic loads (due to the fibre optic cable installation). This is in view to allow the National Railways to determine the acceptability of such additional load on the existing catenary poles.

The bidder shall nevertheless also consider that, in case of selection of the aerial type cable, an amount of approximately 5 % of the optical fibre cable length will be buried instead of suspended. This ratio of cable length corresponds mainly for the laying of the cable within the railway stations - these lengths shall be considered in conduits -).

All not used fibres (dark fibres) shall be terminated inside a specific Optical Distribution Cabinet at each end of country boundary transmission room.

***Optical Characteristics***

- (a) The proposed optical fibre cable shall be high grade silica, single mode, according to ITU-T G.652 Recommendation, with 24 optical fibres (12 pairs) , 9/125 microns fibres.  
The bidder shall propose in his quotation, as an alternative solution (in Option J1-buried; option J2-aerial), the optical fibre cable capacity of 12 fibres (6pairs).
- (b) All optical fibres shall be suitable for operation in the 1300 nm and 1550 nm wavelength bands and shall be protected against penetration of moisture/water (methodology to be described within the tender).
- (c) Maximum attenuation : 0.35 dB / km for 1300 nm wavelength operation.
- (d) Dispersion coefficient : max 3,5 ps / nm.km (at 1300 nm).
- (e) At each terminating node the optical fibre shall be terminated in an optical distribution frame. All fibre terminating locally shall be connected at the frame.
- (f) Optical fibre cable splices and distribution points, which are external to the equipment cubicles, shall be avoided (as far as it is possible) and shall be contained in fibre optic boxes.
- (g) Fusion splicing shall be used for splicing the optic fibres.
- (h) The average loss per splice shall not be more than 0.1 dB, with a maximum of 0.3 dB for any individual splice.
- (i) Each spliced fibre shall be tested to ensure correct fibre continuity and splice loss.
- (j) High quality optical connector shall be used for all applications. The coupling loss of the optical connector shall be below 0.3 dB (higher attenuation shall be argued in the bid). The optical connector shall use a dry technology.

- (k) Bidder shall provide the link budget calculations for all optical links in the system. The margin to provide is at least 6 dB. All calculation results and data shall be fulfilled in the related data sheet inserted in Appendix n. 4.

### *Ground Cable Specification*

#### **General**

The optical cable offered as the basic solution shall have the capability to be buried into the ground and is of all dielectric type (so metal-free).

It should be possible to install it in buildings without the necessity of additional joints.

In case the distance in-house is greater than 5 meters than the zero halogen low smoke requirement is applicable (same average length as for aerial cable - see § 7.5.1). This may alternatively be fulfilled with a special tube.

The cable also suits for short distances in the air in order to avoid additional joints.

The cable shall not contain any metal. The resistance between two contact rings each 1 cm large installed at a distance of 1 meter on the cable outer shield should be greater than 3000 Mohm measured with a potential difference of at least 2000 Veff (test price to be quoted in separate item in the bid).

#### **Installation**

The NR shall install the buried cables at a depth of 0,8 m (trench of 1 m) meter beneath ground level. Where possible, the cable shall be installed using mechanical machines (blowing-in technique).

In the near of places where other cables or ducts crosses the cable route manual ducting shall be performed.

Crossing the permanent way (e.g. in order to enter a station building) shall be done by pressing a hole under the permanent way at a depth of 1 meter beneath the ballast bed and filling it up with a tube (not within the scope of this contract).

Special attention should be paid to the maximum bending radius of the cable.

The bidder shall to provide the quotation of cable ducts needed for passing through the bridges, tunnels, etc. (quotation on unit price basis and separated item in the bid). The quantity to deliver shall be clarified before the contract award). Moreover, the contractor shall perform a site survey and shall made alternative proposals to the National Railways for difficult situations such as entrance to buildings, route crossings and so on.

#### **Ground Cable Structure**

The cable has to be of the loose tubed type (overlength 4 %). The central element is a wire of FRP (Fibre Reinforced Plastic).

The bidder shall give the cross-section of the cable and describe its structure. The following minimum information shall be given:

- type and material of the central wire element;
- the composition and quantity of the necessary modules and fillings;
- mechanical reinforcement / protection layer type and nature of the module surrounding and the filling compound type used against moisture penetration/propagation, against rats, etc.;
- the protection used against tensile forces;
- the purpose of each layer;
- the outer shield (coat) material, type, density, carbon black % and thickness;
- the possibility to have other layers in order to obtain some eventual specific characteristics;
- the identification code number.

Moreover, the proposal shall include the technical characteristics regarding the following elements:

- the mass per meter;
- the thermic expansion coefficient;
- ExS of the cable as a whole;
- diameter for the required number of fibres and for the next higher capacity;
- the maximum tensile force by installation and influence of the temperature (tensile force with 15 °C is indicated by Ti).

The efficiency of the reinforcement and protection elements shall be guaranteed between -20°C and +60° C.

The stability of the gel and/or compound (eventually used) by the above mentioned temperatures shall be confirmed within the bid.

### **Mechanical Characteristics**

The ground cable shall have the same mechanical characteristics as the aerial cable excepting for the differences described beneath. The indicated values for attenuation are measured with 1310 nm wave length.

#### **Fibre tensile test according to CEI-794- 1 -E1**

Applying the maximum acceptable tension to the cable the increase in attenuation shall be less than 0.015 dB/km. The increase shall be reversible.

#### **Repetitive bending according to CEI-794-1-E6**

Radius of the cylinder: 20 times the cable diameter. Mass: 8.5 kg. Number of cycles: 1000. The variance of the attenuation shall be less than 0.1 dB during the test and less than 0.05 dB after the test.

#### **Temperature cycling according to CEI-794-1-F1**

The cable shall be submitted to 3 cycles each 24 hours. Minimum temperature: -20°C. Maximum temperature: +60° C. The minimum and maximum temperature shall be submitted during at least 3 hours. The variance in attenuation shall be less than 0.1 dB/km. The increase in attenuation shall be reversible.

## *Aerial Cable Characteristics*

### **General**

Although the strong intention of TACIS/TRACECA is to apply the solution with a buried optical cable, the bidder shall quote as an alternative solution the aerial type cable one. In this case, the optical cable shall have the capability to be hanged up between catenary poles and is of all dielectric (so metal-free) self-supporting type.

The proposed method of suspension, if used, shall be approved by the AZERI, GEORGIAN and ARMENIAN Railways during the project design. In any case no holes shall be drilled in the catenary poles. The bidder shall undertake a study to determine the forces introduced to the catenary structure. The obtained figures are to be accepted by the National Railways.

It should be possible to install it in buildings without the necessity of additional joints. The cable can be buried in over short distances as specified in § 7.3 here above.

The bidder shall provide the quotation of cable ducts needed for passing through the bridges, tunnels, etc. (quotation on unit price basis and separated item in the bid). The quantity to deliver shall be clarified before the contract award. Moreover, the contractor shall perform a site survey and shall make alternative proposals to the National Railways for difficult situations such as entrance to buildings, route crossings and so on.

Should the distance in-house is greater than 5 meters then the zero halogen low smoke requirement is applicable (to consider in the bid an average of 300 m length per large station and 100 m in small station). This may alternatively be fulfilled with a special tube.

The cable shall not contain any metal. The resistance between two contact rings each 1 cm large installed at a distance of 1 meter on the cable outer shield should be greater than 3000 Mohm measured with a potential difference of at least 2000 Veff. (this test shall be quoted in separate item in the bid).

The bidder shall describe the protection he intends to take inside and outside the cables to avoid the penetration and the propagation of moisture (In case of gel use, to mention the physiological and physical properties, means or method for cleaning, etc.).

### **Aerial Cable Structure**

The cable has to be of the loose tubed type (overlength 4 %).

The bidder shall give the cross-section of the cable and describe its structure. The minimum following information shall be given:

- type and material of the central wire element;
- the composition and quantity of the necessary modules and fillings;
- mechanical reinforcement / protection layer type and nature of the module surrounding and the filling compound type used against moisture penetration / propagation;
- the protection used against tensile forces;
- the purpose of each layer ;
- the outer shield (coat) material, type and thickness;
- the possibility to have other layers in order to obtain some eventual specific characteristics;

- the identification code number.

Moreover, the proposal shall include the technical characteristics regarding the following elements:

- the load (tensile strength) by installation and influence of temperature;
- the mass per meter;
- the thermic expansion coefficient;
- ExS of the cable as a whole;
- diameter for the required number of fibres and for the next higher capacity;
- the arrow with wind speed up to 160 km/h;
- to specify the load by wind speed of 160 km/h.

The efficiency of the reinforcement and protection elements shall be guaranteed between - 30°C and + 70° C.

The stability of the gel and/or compound (eventually used) by the above mentioned temperatures and arrows shall be confirmed.

## **Installation**

### **General**

The distance between two adjacent catenary poles is typically 50 meters. The Contractor shall insure that the catenary poles are able to sustain without any problem the proposed cable.

The dielectric suspension and the dielectric dead-end shall be used to hang-up and terminate the cable sections. To describe within the quotation the concepts of the dielectric suspension hanging up on the catenary console (clamp, hook length, articulations, support points, ...). The diameter of the fibre optic cable for which the suspension has been designed shall be marked on the clamp.

At a temperature of 15° C and no wind the arrow shall be less than 0.5 meters.

The arrow with maximum acceptable load shall be less than 1.5 meters.

With this maximum load there shall be no tension to the fibres.

Special attention should be paid regarding the maximum bending radius of the cable.

The cable shall be hanged up on a long console (or equivalent, sizes to be specified by Bidder) mounted on every catenary pole in the direction away from the track and at a height of at least 4 meters above the track.

In case the cable cannot be installed on a catenary pole an alternative solution shall be proposed. In case of installation alongside a wall (e. g. a bridge or a tunnel) a cable duct has to be provided.

The fixation for the termination of a cable section will be described in the bid.

The connections and the junction boxes will be waterproofed IP 659.

The ends of both cable sections are guided in a plastic tube along the catenary pole up to the joint box which shall be installed at 3 meters above ground level.

To specify within the tender the cable box entry locations.

The contractor shall perform a side survey and shall made alternative proposals to the National Railways for difficult situations such as bridges, entrance to buildings, permanent way crossings, etc.

Detailed information about the catenary can be obtained from side survey and from National Railways.

### **Maximum Load Calculations**

The acceptable force to the dead-end construction shall be at least 50% greater than the maximum force calculated from the most disadvantaged circumstances.

The load for which the cable does not move in the clamp shall be independent of the force with which the boards tie together the two halves of the clamp and be minimum 1000 N.

The bidder shall indicate the maximum acceptable force to be applied on the cable.

All the necessary calculations for a temperature range from -30° C up to +70° C and wind speeds up to 160 km/h shall be performed and the results communicated.

For these extreme conditions no damage shall occur to the cable and no tension applied to the fibres.

### **Mechanical Characteristics**

The proposed fibre cable shall comply with the standards CEI - 794 - 1 (the indicated values for attenuation are measured with 1310 nm).

In particular the hereunder tests shall be performed:

#### **Fibre tensile test according to CEI-794-1-E1**

Applying the maximum acceptable tension to the cable the increase in attenuation shall be less than 0.015 dB/km . The increase shall be reversible.

#### **Compressive test according to CEI-794-1-E3**

Load : 500 kg/dm; duration 1 minute. The increase in attenuation shall be reversible.

#### **Impact resistance test according to CEI-794-1-E4**

Mass: 3 kg; height: 150 mm; radius of the hammer: 12.5 mm; number of impacts: 5.  
The increase in attenuation shall be reversible. The outer coat shall not be damaged.

#### **Repetitive bending according to CEI-794-1-E6**

Radius of the cylinder: 20 times the cable diameter; mass: 8.5 kg ; number of cycles : 1000.  
The variance of the attenuation shall be less than 0.1 dB during the test and less than 0.05 dB after the test.

#### **Temperature cycling according to CEI-794-1-F1**

The cable shall be submitted to 3 cycles each 24 hours.

Minimum temperature: -30° C.

Maximum temperature: +70° C.

The minimum and maximum temperature shall be submitted during at least 3 hours. The variance in attenuation shall be less than 0.1 dB/km. The increase in attenuation shall be reversible.

#### **Penetration of water according to CEI-794-1-F5**

Height of the water column: 1 meter.

Length of the cable: 3 meter (if more than one module, else 1 meter).

Duration of test: 7 days.

No trace of any water shall occur at the free end of the cable.

### **Bullet test**

Cables shall be protected against rodent attack.

Tenderers shall describe and specify which test the cable comply or whether the cables comply to the following test:

- the cable shall fully protect the fibres against bullets fired with a hunting gun calibre 20 at a distance of 15 meters;
- a shot is to be considered executed if 5 bullets are found by dissection;
- there will be 4 shots:
  - the cable shall be loaded with  $T_i$  (the load by installation at 15 °C and no wind);
    - . one shot with bullets with a diameter of 2.7 mm;
    - . one shot with bullets with a diameter of 3.0 mm,
  - the cable shall be loaded with  $T_s$  (the load by wind speed of 160 km/h);
    - . one shot with bullets with a diameter of 2.7 mm;
    - . one shot with bullets with a diameter of 3.0 mm.
- Non of the fibres shall be damaged. Non of the modules shall have a perforation or a sleeve.

### **Cable elongation**

Tenderers shall describe and specify which test the cable comply or whether the cables comply to the following test:

- suppose a cable loaded with  $T_i$  having a length of  $L$ ;
- this length becomes  $L+AL$  if loaded with  $0.5 (T_i+T_s)$ ;
- this load shall be applied during 4 hours;
- by decreasing of the load again to  $T_i$  the length will become  $L+AL^*$ ;
- the requirement is that  $AL^*/L < 1,5 \cdot 10^{-4}$ .

### **Tube tests**

A representative set of tubes for modules will be tested according method 512 from the specification EN 187000.

The maximum diameter of the loop will be 50 mm.

### **Identification**

Individual fibres shall be identified by colour coding in accordance with standards in force and positioned within the cable core. Colours shall be readily identified and not be adversely affected or eroded during the working life of the cable. The outer cable shield shall be marked at regular intervals with the distance in meter to the beginning of the section.

### **Sample Cables**

The bidder is required to include within the bid, a sample (approximately 50 cm) of each proposed cable that he intends to supply.



## **Network Performances**

### *General*

The network performance shall respect the Standards in force and shall be established in accordance with the commissioning procedures explained in section 12 hereunder.

The system shall be designed such that the transmission performance of digital circuits conform to the standards set out by ITU - T recommendations G.826, G. 821 and G. 921.

Protection switching shall occur when, under fault conditions, error rates of  $1E^{-6}$  higher are achieved.

Error performance for any 64 kbps channel shall not exceed  $1E^{-10}$  on the theoretical worst case link in the system as measured over a 28 day period on commissioning, and shall be better than  $1E^{-10}$  measured over a 24 hour period throughout the specified service lifetime.

The performance of the analogue circuits shall be in accordance with ITU - T Recommendations G. 713 and G. 712.

Primary rate clocks shall conform to  $\pm 5 E^{-12}$  (ITU-T G.811).

### *Optical Transmitter/Receivers*

Optical transmitter mean output power for 155 Mbps: - (to be defined by the bidder) dBm.

Optical transmitter mean output power for 2 Mbps: - (to be defined by the bidder) dBm.

Optical receiver minimum receive levels and corresponding BER :

155 Mbps : - (to be specified by the bidder) dBm for  $1 E^{-9}$  BER;

2 Mbps : - (to be specified by the bidder) dBm for  $1 E^{-10}$  BER;

Power losses within the theoretical loss calculation (to be specified by the bidder).

### *Optical Fibre Losses and Margins*

Loss (1300 nm)	0.35 dB/km;
Dispersion coefficient (1300nm)	3,5 ps/nm.km;
Fusion splice loss	< 0.1 dB;
Connector coupling loss	< 0.3 dB;
Minimum link margin	6 dB.

### *Electrical connections*

Conformity to G.703

### *Performance Criteria*

The bidder shall to precise (by calculation supported) the worst case propagation delays and signalling delays for each type of circuits.

The following criteria shall be also specified in the tender:

- Bit error rates;
- Jitters and wander;
- Slip;
- Overall circuit MTBF and MTTR;
- Availability;
- Analogue interfaces.

### *Performance Measurements and Statistics*

Performance measurements and statistics shall include availability and performance as per ITU - T / CCITT Recommendation G. 732 at the 64 kbps level.

The Bidder shall to indicate in the bid, the performance criteria to perform during the liability period (2 years).

### *Data Sheets*

The Bidder shall fulfil the data sheets included in Appendix N° 11.

The purpose of these data sheets is to provide basic technical information for the multiplexers and fibre optic transceivers.

## **Network Management Systems (NMS)**

A Network Management System for each country shall be provided and shall perform the following functions:

- status monitoring, gathering and log alarm events from the networks elements for the SDH and PDH circuit level as well (SDH and PDH integrated systems shall be a plus);
- provide control and configuration access for the networks;
- maintain a configuration database for all elements within the network;
- management of all transmission system elements from a single integrated NMS (at least two independent NMS communication paths shall be provided to each network element).

It shall be possible to easily add nodes to the NMS in the event that network expansion is required. From the network control terminal it shall be possible to configure new circuits from end to end.

Alarm provided shall enable quick identification of the faults and its sources. All events (status changes and alarms) shall be logged and time-stamped to an accuracy of  $\pm 1$  s.

The NMS shall be at minimum capable of the following functionality:

- graphical display of network status;
- collection and logging of node alarm reports;
- node fault history log management;
- node configuration for primary muxes, aggregates, CCM, and system control units;
- configuration management;
- CCM cluster operation;
- remote control of a node;
- remote control of one node from a terminal attached to the local port of another node, via the NMS;
- message transfer NMS to node, node to NMS and node to node;
- performance statistics (including availability and performance as per ITU - T / CCITT Recommendation G. 732 at the 64 kbps level);
- network definition data base to ease in off-line mode the implementation of the overall circuits into the transmission system (NDDDB).  
Nevertheless, a separate device for this purpose should be preferred.

## ***Technical And Electromagnetic Compatibility***

### ***General***

The bidder shall assume the technical compatibility between the existing systems and the furnished equipment within the framework of this contract, but also with the other installations whose the transmission system is connected (Public Switched Telecommunication Network, existing user services, etc.).

In order to achieve this, The Contractor shall especially respect and refer to the enforced Standards, Rules and Recommendations for each system and equipment (individually and globally) installed by him-self (see section 3 here-above) in regard to third party subsystems.

### ***Electromagnetic Compatibility (EMC)***

The Bidder shall furnish within his quotation :

- 1̃ the listing of the equipment and sub-systems for which the Compliance Certificates to the European Instruction 89/336/EEC have been already released;
- 2̃ the severity criteria regarding the EMC of the proposed equipment;
- 3̃ the proposed methodology to treat and ensure the EMC within the Contract;
- 4̃ the preliminary approach of the probable problem that he will meet in regard of his knowledge of the sites.

The Contractor shall limit to the minimum the EMC aggressions (by increasing the equipment immunity and their “hardness”) and shall respect as a minimum, in matters concerning the EMC, the following Codes, Instructions and Recommendations:

- European Instructions 89/336/EEC dated on 3 May 1989 enforced from the 1 January 1996
- European Standard EN 50082-2 : Electromagnetic Compatibility including Standards IEC 1000 and CISPR. To note however, while some specific standards are existing regarding some family products or sub-equipment, these standards will have the precedence on the EN 50082-2;
- EN 45001 : definition of the accreditation criteria for the qualification of the Organisations or Laboratories to deliver the CE Label;
- ITU-T (CCITT) Standards for the protection of the telecom lines against the harfull perturbations and the acceptable perturbations on the analogue voice transmission for the public and private telecommunication networks ;
- IEC 801; IEC 268 .

The Contractor shall follow the following approach and methodology regarding his EMC actions:

1. measurements and perturbation study :

- Inventory of the perturbator sources and the perturbed receptors;
  - determination of the characteristic of the perturbations, if any (emission spectral, coupling mechanisms, calculations of acceptable thresholds, conflict zone identifications, review of the existing perturbator installations, etc.);
  - definition of the appropriated solutions;
2. definition of the possible solution(s);
  3. Choice and execution of the best solution;
  4. EMC tests : refer to the paragraph regarding the Commissioning activities for the procedural approach.

## **Documentation**

The bidder shall furnish within his quotation the overall product documentation (in 3 exemplars in English) that he intends to propose and shall insert the complete specific document and/or information required within these technical specifications.

The contractor shall, at least, issues in 3 exemplars in English and 3 exemplars in Russian language, the following documents for approval before implementation :

- high level design and execution documents, including, in particular :
  - overall transmission network - schematic;
  - architecture;
  - transmission system failure analysis;
  - Synchronisation plan and synchronisation distribution;
  - Standards;
  - identification schemes for cabinets, nodes, ports, cables, within frames;
  - time slot allocation scheme;
  - circuit allocation system;
  - MUX, CCM, aggregate, tributary, etc. data sheets;
  - fibre trunk routing- schematic;
  - typical X km section line;
  - drop/insert transmission system;
  - through transmission system;
  - fibre optical cable specifications;
  - control centre alarm interconnection;
  - all interconnection drawings;
  - MDF, LDF, DDF, ODF drawings;
  - control centre equipment- schematic;
  - primary node- schematic;
  - secondary node - schematic;
  - fibre splicing philosophy;
  - fibre optic link design specification;
  - fibre optic link loss calculations;
  - fibre optic splicing and connector diagrams;
  - control centre fibre optic frame schedules;
  - realisation of a fusion splice;
  - etc.;
- test procedure for fibre optic cable after installation;
- site method statement for fibre optic cable test after installation;
- procedure for installation of fibre optic cables in jointing box;
- fibre optic repair policy and procedure;
- chromatic dispersion and dark fibre attenuation factory test procedure and test reports;
- intermediate test procedures and test reports;
- factory acceptance test procedures and test reports;
- partial acceptance test procedures and test reports;
- system acceptance test procedures and test reports;
- tests on completion procedures and test reports;
- OMM;
- factory acceptance test release certificate;

- partial acceptance certificate;
- system acceptance certificate;
- completion certificate;
- etc.

In the same way, the contractor shall supply as “As Build” documents the here-above specified items (3 exemplars in English and 3 in Russian).

## ***Tests and Commissioning***

### ***General***

The commissioning shall be in accordance with ISO 9000 Standard.

Material and/or equipment provided under this Contract shall be factory tested and/or field tested in accordance with the requirements of the Contract and Specifications. No less than 30 days in advance of the commencement of testing, the Contractor shall provide TACIS/TRACECA Engineer and/or National Railways with detailed test procedures for acceptance.

The Contractor shall notify the Engineer or his representatives at least three working days in advance to witness local tests and inspections.

The QA and QC Programme Plan shall include methods of monitoring the effectiveness of calibration / certification methods used. The validity of measurements and test shall be ensured by the use of suitable equipment of the range and type necessary to determine conformance with contractual requirements and by verification of calibration using certified standards directly traceable to those used as an inspection medium.

The Contractor shall provide within his quotation the prices for each specific tool, measurement devices and test equipment (OTDR, voltmeters, etc.) required for the maintenance of the transmission system achieved by the National Railways (1 set per country) after the completion of the Liability Period.

The following commissioning activities shall be organised and thoroughly respected by the Contractor :

### ***Commissioning Lots (CL)***

The Contractor shall divide into a certain number of functional commissioning lots to take into account the geographical extent and the significant volume of the transmission system.

The Commissioning lot plan shall be submitted to the Engineer, by the Contractor for approval.

### ***Intermediate Tests (IT)***

In order to check proper installation of a Commissioning Lot, Intermediate Tests will be carried out to confirm that equipment, materials, components, sub-assemblies and assemblies have been installed in a manner which is acceptable to the Contractor.

### ***Installation Release Notice (IRN)***

The Installation Release Notice is a document describing the transfer of responsibility for part of a system (Commissioning Lot) from Installation to Commissioning after completion of the I.T and approval of the Intermediate Test Reports.



### *Partial Acceptance Tests (PAT)*

Once the IRN is issued, Partial Acceptance Tests may begin in order to ensure that equipment with the related Commissioning Lots runs satisfactorily and may be operated under safe conditions.

No less than 30 days in advance of the commencement of PAT, the Contractor shall provide the Engineer and/or National Railways with detailed test procedures for acceptance.

It should be noted that a Partial Acceptance Test refers to the acceptance for service of a part of a system. It is not a provisional acceptance of the whole system.

No more than 14 days after completion of the PAT, the PAT report shall be issued by the Contractor.

In case of some anomalies are remaining in the system, the FAT shall again be performed as soon as possible and until the correction of the anomalies has been demonstrated and accepted by the witness Engineer.

Each used fibre and dark fibre shall be tested to ensure correct fibre continuity and splice/fusion loss.

### *Partial Acceptance Certificate (PAC)*

When the FAT have been satisfactorily completed, a Factory Test Certificate (FAC) will be formalised by the Engineer to release the tested equipment for site delivery.

In case of the subsystem partially accepted must to enter in operation ( putting the equipment in operation gradually, step by step), it is the responsibility of the Contractor to propose the corresponding procedure. This procedure shall be approved by the concerned National Railways before the putting the equipment in operation.

### *System Acceptance Tests (SAT)*

When all Commissioning Lots of the transmission system have been properly tested through their Partial Acceptance Tests, then Acceptance Tests on the transmission systems itself may be performed.

Systems Acceptance Tests will be carried out to demonstrate that the transmission system as a whole is capable of operating in accordance with the requirements.

No less than 30 days in advance of the commencement of SAT, the Contractor shall provide the Engineer and/or the concerned National Railway with detailed test procedures for acceptance.

No more than 14 days after completion of the SAT, the SAT report shall be issued to the Engineer and the concerned National Railway for acceptance.

### *System Acceptance Certificate (SAC)*

Once the System Acceptance Tests have been satisfactorily performed on the system concerned, a System Acceptance Certificate will be issued by the Engineer and the concerned National Railway.

### *Tests on Completion (TOC)*

When all the above activities are substantially completed, the Contractor can carry out the tests to prove collective operation of all the system, demonstrate normal operation and ability of the transmission system to meet the performance criteria. This phase is known as Tests on Completion.

No less than 30 days in advance of the commencement of TOC, the Contractor shall provide the Engineer and the concerned National Railway with detailed test procedures for acceptance.

No more than 14 days after completion of the TOC, a TOC report shall be issued by the Contractor to the Engineer and the concerned National Railway.

Tests on Completion satisfactory performance culminate in the release of the Tests on Completion Certificate.

### *Completion Certificate (CC) – Provisional Acceptance*

A Completion Certificate is given by TACIS/TRACECA/concerned National Railway to the Contractor on satisfactory conclusion of the Tests on Completion.

The Test on Completion Certificate corresponds to the provisional acceptance of the telecom system.

### *System Hand-Over*

The telecom system of the whole installation shall be taken over from the Contractor to every National Railways, immediately after the provisional acceptance certificate release.

### *System Final Acceptance*

Final acceptance shall be pronounced of the earliest possible opportunity after the expiration of the warranty period (2 years) and on the condition that the system is found in full working order and compliance with the contract specifications.

A Final Acceptance Certificate shall be drawn up entitling the Supplier to the relevant payments.

## ***Operation and maintenance manual (OMM)***

The Contractor shall furnish the OMM before the starting of the partial acceptance tests and in any case 4 weeks before the on site training.

## ***Training***

Personnel training will include all functions needed to train all operation and maintenance personnel.

The bidder shall quote separately the training for:

- the maintenance personnel ;
- the operation personnel.

The training shall be given in two stages :

- 1̃ the training performed in the Contractor premises (European Headquarters) and shall be given in English language by the Contractor to the National Railway Group Leaders concerned by the maintenance and the operation (training given separately for each country staff);
- 2̃ on site training performed by the Contractor in Russian language (or in English in case of individual agreement by the National Railways); the quotation price shall be given separately for English training and Russian training.

The bidder shall give, for every type of training, all details concerning the number of trained people, the type of expenses included and the training duration for which the training prices are given.

## ***Maintenance.***

The maintenance of the supplied material/equipment shall be provided within the bid for the complete duration of the warranty period.

In view to inform the respective National Railways, the bidder shall also to include within his bid a proposal (prices and contract type) for a maintenance contract on a 3 years basis (renewable 2 times) for the period beginning after the warranty time.

The maintenance operation shall respond as a minimum to the following specification:

### ***General.***

The bidder/contractor shall take into account that Maintenance shall be addressed from the beginning of the system design. It shall imply hardware and software constraints, some of them being defined in the Q. A. requirements.

Maintenance considerations include the following:

- all design to ensure the required availability, e.g. selection of components, duplication of computers, etc.
- all system design to allow planned maintenance to take place without affecting the overall service. For essential devices this requires duplication.
- all hardware to be designed to reduce failure probability or limit failure consequences, for instance, electrical inputs to primary rate access multiplexers shall be protected against outside interference, etc.

Transmission equipment and level-0 equipment shall consist of independent modules (so that a faulty card does not damage the other cards).

All hardware shall be designed to reduce planned maintenance requirements, for instance mechanical sub-assemblies must be protected against dust.

All hardware shall be designed to make easier planned maintenance requirements and first level repair (as defined below) and hence reduce time of repair e.g.:

- provision of visual indications to ensure rapid identification of faulty sub-assemblies (LEDs, etc.);
- sub-assemblies or units shall be of the plug in type, with key way location. connections shall be clearly identified;
- equipment construction design together with its definitive layout in the room shall enable easy access for measurement, repair and replacement;
- configuration of a sub-assembly shall be achievable by software without the necessity to manipulate switches, or jumpers.

All hardware shall be designed to facilitate second and third line level maintenance e.g. provide test points on electronic cards, provide visual indications, etc. (see §. below).

All hardware shall be designed to facilitate future management of maintenance, i.e.: reducing of spares holding by use of standard components and subassemblies.

Consistency in the supply of computers and peripherals, in order to reduce the number of trademarks and facilitate management of future maintenance contracts with computer suppliers.

All software requirements to facilitate failure detection and diagnostic. The following functions shall be available:

- failure detection reports to the operator;
- tests to check operation of functions , VDU's, computers, etc ;
- on-line remote fault diagnosis for all microprocessor based modules.

They shall be used during preventive maintenance or after repair to allow on-line equipment automatic failure detection .

These faults shall be reported to the operator.

Local on-line and off-line facilities shall also be available for transmission and level-0 equipment.

Maintenance staff shall have access to these tests by means of a dedicated terminal, either permanently located in the main equipment or of a hand portable type. Connection, use and disconnection of the hand portable terminal shall be transparent to the on-line remote operation.

Comfort of the operator during tests shall be achieved by:

- sufficient size of the keyboard and of the display ;
- efficient Man/Machine Interface to guide and display to him the results of the tests, without need of documents.

#### *Planned Maintenance.*

Planned maintenance relates to activities which can be incorporated in a maintenance programme, and can be achieved by regular inspection.

The Contractor shall establish and propose to the Engineer the programme of the recommended planned maintenance for the complete systems.

#### *Unplanned Maintenance.*

Unplanned maintenance shall occur after failure of equipment and shall result in diagnostic, repair and re-commissioning activities.

Unplanned maintenance shall be undertaken in accordance with operational procedures and safety measures.

The levels of repair shall be defined as following:

#### **First Line Level.**

First line repair is defined as the replacement of failed sub-assemblies by serviceable equipment at the site of the failed installation.

The definition of sub-assembly is dependent on the equipment involved but shall take into account:

- (i) - ease of removal, replacement and re-test;
- (ii)- depth of diagnostic data available remotely or on site.

For each sub-assembly replaceable at first line level, a minimum percentage of spares shall be required. The bidders shall to propose within the quotation the list (quantity and unit prices) of the first line level spare parts recommended for the system.

A list of all Special Test Equipment required for first line and second fine maintenance, including complete test benches, is to be provided.

### **Second Line Level.**

Second line repair consist of the repair of the sub-assemblies removed under first line procedures by replacement of units e.g. printed circuit boards. The repair and test facilities shall ensure that the repaired subassembly is fit for service.

The bidders shall to indicate within their quotation the:

- (i) cost of the stock of spares;
- (ii) frequency of failure;
- (iii) cost of the repair facilities;
- (iv) The skill level required if achieved by the National Railways Maintenance Staffs.

A list of all Special Test Equipment required for second line maintenance, including complete test benches, is to be provided.

### **Third Line Level.**

Third line repair is the repair of units diagnosed as being faulty at the second line level. It is characterised by the concentration of similar types of repair requiring costly resources in terms of skill and equipment. It shall be carried out at a centralised workshop, perhaps that of the manufacturer.

The bidders shall to indicate within their quotation the unit price of the overall sub-assemblies, cards, included in the proposed system.

### ***Test Procedures And Specifications .***

The Contractor shall to provide the following information:

- a) all procedures for the first, second and third line maintenance, before provisional acceptance of the material;
- b) post-design services proposal to ensure the continuing reliability of the equipment during its economic life;
- c) the implementation of second and third line maintenance during the life of the equipment, in the event that the supplier is not able to assume these activities;
- d) availability of training material for use by the national railways Maintenance Staffs for giving staff training and of training courses/support.

### ***Software Maintenance***

The maintenance policy shall be addressed during the design and development phases of the control and communication systems softwares.

Control and communication systems softwares may evolve during the life of the telecom line and some modifications shall be required throughout its life.

These modifications shall be carried on-line by means of the data entry position. Some other changes shall need modification to be carried out on the software modules. Therefore, the standard software Q.A procedures are to be applied very carefully.

The main requirements shall be:

- The use of modules programs shall allow easy modification for programmers and independence of modules, so that modification carried out to one module shall not have consequences on other modules.
- The use of high level proven languages shall also allow easy modification.
- The use of a configuration management tool may be required to encompass the control of hardware, software and documentation, associated with the project.
- Similarly, standardised configuration and change control procedure of software shall also be necessary after commissioning in order to ease maintenance and simplify support.
- It shall be essential that a central identification scheme is set up.
- All items related to the design shall use the identification scheme.

### ***Spare Parts after warranty period***

The bidder shall propose a list of quoted spare parts (on a unit price basis) that he recommends as a first emergency kit repair for each concerned country.

### ***Warranty period***

The warranty period shall be of two years from the provisional acceptance date (test on completion certificate release).

### ***RECENT REFERENCES***

The bidder shall to submit within the bid a Reference list of the last 5 years (1993 - 1998).

### ***Project Program - Schedule of Key Dates***

The maximum duration of the PP project shall be on a period of 2 years from the contract award date.

Taking into account this maximum duration, the bidder shall to indicate his programme key dates and may be required to provide further detailed information on programme over and above the key dates listed. In particular, the key dates corresponding to the terms of payment shall be indicated in table of Appendix N° 13.

The bidder shall to include within his bid the overall planning that he intend to apply in this project. The attention of the bidder is drawn on the fact that the contractor shall to develop and detail after the contract award the appropriated detailed planning for execution, in conformity to the planning introduced during the bid process.

## **pricing document**

The bidder shall to detail in his pricing document, for each of the hereunder tasks and/or supply, the unit price and the quantity forecasted to furnish for:

1̃ the basic solution by splitting the price of each item:

- staking-out work and supervision/technical assistance for the National Railways works;
- buried optical (24) fibre cable;
- cable conduit for buried cable (suitable for blowing-in);
- primary network;
- secondary network;
- level 0 equipment and their cabling, where required;
- MNS and NDDDB system;
- power supplies;
- synchronisation equipment;
- tests and commissioning;
- documentation;
- training;
- spare parts, special tools and measurement devices, etc.

2̃ the aerial optical fibre (24) cable, as an alternative solution;

3̃ the grounded optical (12) fibre cable, as an option;

4̃ the aerial optical (12) fibre cable, as an option;

5̃ the backbone with all HO nodes as an optional alternative solution, if wished;

6̃ the interfaces for connection of some new PABXs to some existing switchboards on the secondary railways networks, as an option;

7̃ the replacement of 70 % (instead of 100 % in the basic solution) of administrative telephone handsets;

8̃ the securisation of the control centre communications not provided in the basic solution;

9̃ the dual voice recorders in every control room.

In particular, the tender dossier shall to include:

- the summary of bills ( basic solution), as indicated in section A.4.1 of the tender document;
- the pricing document per each country (basic and alternative/optional solution), as indicated in section A.4.2 of the tender document;
- the unit price list per each country giving the list of the unit price of every card and sub-assembly proposed in the furniture, for as the minimum, the following items:

- Cable installation (cable duct supply/laying, connections, etc.).

- Optical (24) fibre cable:

- aerial;
- buried with and without conduits.

- Optical (12) fibre cable :

- aerial;
- buried with and without conduits.

- The HO node (for each type and size of node) with equipment breakdown.



- The secondary multiplexer equipment (for each type and size of node) with equipment breakdown.
- Primary rate multiplexer breakdown.
- User circuit interface cards for every tributary circuit (including the adapted interface to connect the existing radio base station to the transmission system).
- A/B switching.
- Optical fibre junction boxes.
- Optical fibre connections.
- Uninterruptible Power Supplies (48 V DC and 220 V AC) for each node.
- Cross-connect matrices.
- Loop configuration within the same cable (equipment details).
- Through Transmission Subsystem.
- Synchronisation equipment.
- MDF, LDF, ODF, DDF, BDF supplies, installation and connections.
- Installation and connections for every node and every power supply;
- Tests and Commissioning
- Network Management Systems (NMS) for:
  - ARMENIA;
  - AZERBAÏDJAN;
  - GEORGIA.
- Network Definition Data Base system (NDDB) for each country.
- Spare parts (first level, second level and third level maintenance and Specific tools / measurement devices (OTDR, network analysers, etc.) for every country.
- Documentation in English.
- Documentation in Russian.
- Training in Contractor premises for:
  - maintenance personnel;
  - operation personnel.

- On site training for:
  - maintenance personnel;
  - operation personnel.

## **A.4. SCHEDULE OF PRICES**

**(ANNEX B)**

#### **A.4.1. SUMMARY OF BILLS**

**SCHEDULE OF PRICES**

Name of Supplier \_\_\_\_\_ Contract Number \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_

Country	Supply and Installation of Optical Cable System	Spare Parts (as described in A.3, §16)	Training (as described in A.3, §14)	TOTAL
Georgia				
Armenia				
Azerbaijan				
TOTAL				

The Bills of Quantities, included with the Technical Specifications, shall be attached hereunder

## **A.4.2. PRICING DOCUMENT**

**PRICING DOCUMENT FOR GEORGIA**

<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COMMENTS</b>
1	Staking-out and Supervision/technical assistance to NRs	* Staking-out works * Civil works characteristics *Technical assistance					Base solution
2	Optical cable	24 fibres, buried type					Base solution
3	Cable duct for buried cable	HDPE (diameter 50 mm)					Base solution
4	Accessories for optical cable connections, in buried solution	24 fibres buried cable					Base solution
5	Optical cable Connections (workforce)	24 fibres buried type					Base solution
6	Optical cable Connection Cabinets (ODF)	24 fibres					base solution

7	SDH Backbone equipment						Base
8	PDH nodes						Base
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COMMENTS</b>
9	User interfaces						
10	Railway dedicated user sets	* Digital * Analogue * Faxes					Base
11	Operator consoles for dispatchers						Base
12	Temporary Radio Interfaces	*Interface cards; *site survey.					Base/ Optional
13	PABXs (hardware and software)						Base
14	Attendant Consoles for admin.tel.						Base



15	Replacement of 100 % of Administrative telephone handsets	* Digitals * Analogues *faxes					Base
16	LDF, MDF (for dedicated com. and 100 % of the admin. Com.)						Base
17	Copper Cables for the dedicated railway com. devices						Base
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COMMENTS</b>
18	Cable laying & connections of dedicated railway com.devices (workforce)						Base
19	Connections of admin. Com. devices (workforce)						Base
20	Tie-lines to PSTN	*Interface cards; *site survey.					Base
21	Connections of tie-lines to PSTN						Base

22	Management Network System and maintenance system (NDDDB)						Base
23	Power supplies, and accessories for dito						Base
24	Cabling of power supplies						Base
25	Synchronisation equipment						Base
26	Tests and Commissioning						Base
27	Documentation	* English *Russian					Base
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COMMENTS</b>
28	Training	* contractor premises *on site					Base
29	Spare parts, special tools and measurement devices						Base
30	Miscellaneous						Base

31	<b>TOTAL</b>						
<b>OPTIONS</b>							
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COMMENTS</b>
1	Optical cable	24 fibres, aerial type					Alternative solution
2	Optical cable	12 fibres, buried cable					Option
3	Optical cable	12 fibres, aerial cable					Option
4	Boxes, Accessories for optical cable connections, in buried solution	12 fibres, buried cable					Option
5	Boxes, Accessories for optical cable connections, in aerial solution	24 fibres aerial type					Alternative solution

6	Boxes, Accessories for optical cable connections, in aerial solution	12 fibres aerial type					Option
7	Optical cable Connections (workforce)	24 fibres aerial type					Alternative solution
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COMMENTS</b>
8	Optical cable Connections (workforce)	12 fibres buried type					Alternative solution
9	Optical cable Connections (workforce)	12 fibres aerial type					Option
10	Backbone with all H.O. nodes						Alternative solution
11	Tie-lines to secondary railway lines	*Interface cards; *site survey.					Option
12	Replacement of 70% of Administrative telephone handsets and connections	* Digital * Analogue * outdoors					Option

13	Securisation of control centre com.						Option
14	Recording devices in RCC's						Option

**PRICING DOCUMENT FOR AZERBAÏDJAN**

N°	ITEM	Type	UNIT	QTY	UNIT PRICE (EUR)	TOTAL PRICE DDP (EUR)	COMMENT
1	Staking-out and Supervision/technical assistance to NRs	* Staking-out works * Civil works characteristics * Technical assistance					Base solution
2	Optical cable	24 fibres, buried type					Base solution
3	Cable duct for buried cable	HDPE (diameter 50 mm)					Base solution
4	Accessories for optical cable connections, in buried solution	24 fibres buried cable					Base solution

5	Optical cable Connections (workforce)	24 fibres buried type					Base solution
6	Optical cable Connection Cabinets (ODF)	24 fibres					base solution
7	SDH Backbone equipment						Base
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COMME</b>
8	PDH nodes						Base
9	User interfaces						
10	Railway dedicated user sets	* Digital * Analogue * Faxes					Base
11	Operator consoles for dispatchers						Base
12	Temporary Radio Interfaces	*Interface cards; *site survey.					Base Option
13	PABXs (hardware						Base

	and software)						
14	Attendant Consoles for admin.tel.						Base
15	Replacement of 100 % of Administrative telephone handsets	* Digitals * Analogues *faxes					Base
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COMME</b>
16	LDF, MDF (for dedicated com. and 100 % of the admin. Com.)						Base
17	Copper Cables for the dedicated railway com. devices						Base
18	Cable laying & connections of dedicated railway com.devices (workforce)						Base
19	Connections of admin. Com. devices (workforce)						Base

20	Tie-lines to PSTN	*Interface cards; *site survey.						Base
21	Connections of tie-lines to PSTN							Base
22	Management Network System and maintenance system (NDDDB)							Base
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COMME</b>	
23	Power supplies, and accessories for dito							Base
24	Cabling of power supplies							Base
25	Synchronisation equipment							Base
26	Tests and Commissioning							Base
27	Documentation	* English *Russian						Base
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE</b>	<b>TOTAL PRICE</b>	<b>COMME</b>	



					PRICE (EUR)	DDP (EUR)	
28	Training	* contractor premises *on site					Base
29	Spare parts, special tools and measurement devices						Base
30	Miscellaneous						Base
31	<b>TOTAL</b>						

### OPTIONS

N°	ITEM	Type	UNIT	QTY	UNIT PRICE (EUR)	TOTAL PRICE DDP (EUR)	COMME
1	Optical cable	24 fibres, aerial type					Alterna solutio
2	Optical cable	12 fibres, buried cable					Optic
3	Optical cable	12 fibres, aerial cable					Optic

4	Boxes, Accessories for optical cable connections, in buried solution	12 fibres, buried cable						Optic
5	Boxes, Accessories for optical cable connections, in aerial solution	24 fibres aerial type						Alterna soluti
6	Boxes, Accessories for optical cable connections, in aerial solution	12 fibres aerial type						Optic
7	Optical cable Connections (workforce)	24 fibres aerial type						Alterna soluti
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>		<b>COMME</b>
8	Optical cable Connections (workforce)	12 fibres buried type						Alterna soluti
9	Optical cable Connections (workforce)	12 fibres aerial type						Optic

10	Backbone with all H.O. nodes						Alternative solutions
11	Tie-lines to secondary railway lines	*Interface cards; *site survey.					Optional
12	Replacement of 70% of Administrative telephone handsets and connections	* Digital * Analogue * outdoors					Optional
13	Securisation of control centre com.						Optional
14	Recording devices in RCC's						Optional

**PRICING DOCUMENT FOR ARMENIA**

N°	ITEM	Type	UNIT	QTY	UNIT PRICE (EUR)	TOTAL PRICE DDP (EUR)	COM
1	Staking-out and Supervision/technical assistance to NRs	* Staking-out works * Civil works characteristics *Technical assistance					E sc
2	Optical cable	24 fibres, buried type					E sc

3	Cable duct for buried cable	HDPE (diameter 50 mm)						E SC
4	Accessories for optical cable connections, in buried solution	24 fibres buried cable						E SC
5	Optical cable Connections (workforce)	24 fibres buried type						E SC
6	Optical cable Connection Cabinets (ODF)	24 fibres						b SC
7	SDH Backbone equipment							E
8	PDH nodes							E
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COM</b>	
9	User interfaces							

10	Railway dedicated user sets	* Digital * Analogue * Faxes						
11	Operator consoles for dispatchers							
12	Temporary Radio Interfaces	*Interface cards; *site survey.						
13	PABXs (hardware and software)							
14	Attendant Consoles for admin.tel.							
15	Replacement of 100 % of Administrative telephone handsets	* Digitals * Analogues *faxes						
16	LDF, MDF (for dedicated com. and 100 % of the admin. Com.)							
17	Copper Cables for the dedicated railway com. devices							
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COM</b>	

18	Cable laying & connections of dedicated railway com.devices (workforce)							E
19	Connections of admin. Com. devices (workforce)							E
20	Tie-lines to PSTN	*Interface cards; *site survey.						E
21	Connections of tie-lines to PSTN							E
22	Management Network System and maintenance system (NDDDB)							E
23	Power supplies, and accessories for dito							E
24	Cabling of power supplies							E
25	Synchronisation equipment							E
26	Tests and Commissioning							E
27	Documentation	* English *Russian						E
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT</b>	<b>TOTAL PRICE</b>	<b>COM</b>	

					PRICE (EUR)	DDP (EUR)	
28	Training	* contractor premises *on site					E
29	Spare parts, special tools and measurement devices						E
30	Miscellaneous						E
31	<b>TOTAL</b>						

**OPTIONS**

N°	ITEM	Type	UNIT	QTY	UNIT PRICE (EUR)	TOTAL PRICE DDP (EUR)	COM
1	Optical cable	24 fibres, aerial type					Alte sc
2	Optical cable	12 fibres, buried cable					O
3	Optical cable	12 fibres, aerial cable					O

4	Boxes, Accessories for optical cable connections, in buried solution	12 fibres, buried cable					
5	Boxes, Accessories for optical cable connections, in aerial solution	24 fibres aerial type					
6	Boxes, Accessories for optical cable connections, in aerial solution	12 fibres aerial type					
7	Optical cable Connections (workforce)	24 fibres aerial type					
<b>N°</b>	<b>ITEM</b>	<b>Type</b>	<b>UNIT</b>	<b>QTY</b>	<b>UNIT PRICE (EUR)</b>	<b>TOTAL PRICE DDP (EUR)</b>	<b>COM</b>
8	Optical cable Connections (workforce)	12 fibres buried type					
9	Optical cable Connections (workforce)	12 fibres aerial type					



10	Backbone with all H.O. nodes						Alte sc
11	Tie-lines to secondary railway lines		*Interface cards; *site survey.				O
12	Replacement of 70% of Administrative telephone handsets and connections		* Digital * Analogue * outdoors				O
13	Securisation of control centre com.						O
14	Recording devices in RCC's						O

### **A.4.3. UNIT PRICE LIST**

(to be provided by the bidder)

**A.5. GENERAL REGULATIONS FOR TENDERS AND  
AWARD OF SUPPLY CONTRACTS**

**( ANNEX C )**

**I. GENERAL REGULATIONS FOR TENDERS  
AND THE AWARD OF SUPPLY CONTRACTS  
FINANCED FROM TACIS FUNDS**

- Article 1: Eligibility
- Article 2: Origin
- Article 3: Division into Lots
- Article 4: Applicable conditions
- Article 5: Content of Tenders
- Article 6: Technical Specifications
- Article 7: Variant Solutions
- Article 8: Spare Parts
- Article 9: After Sales Service
- Article 10: Prices
- Article 11: Drafting of Tenders
- Article 12: Sealing and Marking of Envelopes
- Article 13: Signing of Tenders
- Article 14: Joint Tenders
- Article 15: Transmission and Reception of Tenders
- Article 16: Period of Validity
- Article 17: Computation of time-limits
- Article 18: Withdrawal and Amendments
- Article 19: Acceptance/Variations
- Article 20: Bid Bonds
- Article 21: Award of Contracts

**GENERAL REGULATIONS**

Tenders and the award of supply contracts financed from the resources of the European Community Tacis programme<sup>1</sup> shall be governed by these General Regulations

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<sup>1</sup> See list in Annex

## *Article 1*

### ELIGIBILITY

1. Participation in the invitation to tender and in the award of contracts shall be open on equal terms only to natural and legal persons of the Member States of the European Community or of one of the beneficiary countries of the Tacis programme.
2. These terms refer to all nationals of said states and to all legal entities, constituted under and governed by civil, commercial or public law, formed in accordance with the law of any one of said States and having their statutory office, central administration or principal place of business in one of these States; however a legal entity, company or partnership having only its statutory office there must be engaged in an activity which has an effective and continuous link with the economy of the respective State.
3. This rule applies to:
  - a) all individual Tenderers
  - b) all members of a consortium taking part in a joint tender
  - c) subcontractors eventually to be associated in the performance of the contract. Not considered as subcontracting are: packing, transportation or shipping of the goods concerned or their prior purchase by the Tenderer on its own behalf.
4. Tenderers shall certify that they meet these conditions and prove their eligibility by a document, dated less than 90 days previously, drawn up in accordance with their national law or practice, or copies of the original documents defining the constitution and/or legal status and establishing the place of registration and/or statutory seat and, if it is different, the place of central administration. The Contracting Authority may accept other satisfactory evidence that these conditions are met.
5. Tenderers shall not be eligible for the award of contracts and the Contracting Authority may exclude them from (further) participation in the invitation to tender, without compensation, as of right and without recourse to prior legal proceedings where:
  - a) they are bankrupt.
  - b) payments to them have been suspended in accordance with the judgement of a court or a judgement declaring bankruptcy and resulting, in accordance with their national laws, in the total or partial loss of the right to administer and dispose of their property;
  - c) legal proceedings have been instituted against them involving an order suspending payments and which may result, in accordance with their national laws, in a declaration of bankruptcy or in any other situation entailing the total or partial loss of the right to administer and dispose of their property;

- d) they are guilty of serious misrepresentation with regard to information required for participation in an invitation to tender;
- e) they are in breach of contract on another contract with the Contracting Authority.

Tenderers shall certify and, upon request, provide evidence satisfactory to the Contracting Authority that none of these situations applies to them.

### *Article 2*

#### ORIGIN

1. The goods must originate in a Member State of the European Community or in one of the beneficiary countries of the Tacis programme<sup>2</sup>.
2. The origin of a product shall be determined according to the rules laid down in the Community Customs Code.
3. In submitting his tender, the Tenderer expressly certifies that all of the goods fully comply with this origin requirement, specifying the respective country of origin. The Supplier may be required to provide more detailed information in this respect and/or to provide an official certificate of origin.

### *Article 3*

#### DIVISION INTO LOTS

Unless otherwise provided

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<sup>2</sup> See list in Annex

1. If the supplies which are the subject of the invitation to tender are not divided into lots, the quantity or quantities required shall be indivisible. The Tenderer must therefore offer the whole of the quantity or quantities indicated, Tenders for part of the quantities required are not being taken into consideration.
2. If the supplies are divided into lots, the quantities indicated for each individual lot shall be indivisible.

The Tenderer shall therefore offer the whole of the quantity or quantities indicated for each lot, Tenders for part of the quantity required not being taken into consideration.

3. If the supplies are divided into lots, the Tenderer may tender for one or more lots or for all the lots.
4. The Tenderer shall submit a separate quotation for each lot he offers to supply.
5. A Tenderer may include in his tender the overall rebate he would grant in the event of amalgamation of some or all of the lots for which he has submitted individual tenders.

### *Article 4*

#### APPLICABLE CONDITIONS

1. Except in case of lots or variant solutions, only one tender may be submitted by each Tenderer. No Tenderer may participate in the tender of another for the same contract in any capacity whatsoever.

2. The submission of a tender in reply to an invitation to tender entails the Tenderer's accepting in full all the special and general terms and condition stipulated in the tender dossier, waiving his own conditions of sale. Any clause to the contrary shall be disregarded or entail the rejection of the tender.

### *Article 5*

#### CONTENT OF TENDERS

The tender prepared and submitted by the Tenderer shall, in accordance with the requirements stated in the Instructions to Tenderers, comprises:

1. The list and detailed descriptions of the supplies tendered according to the specifications set out in the Special Conditions, and, in particular, in its Technical Specifications, containing all information by which the proposed supplies may be evaluated, (e.g. technical characteristics, operation capacities, consumption, maintenance cost, useful life etc.) together with manuals or instructions for use or any other relevant information and documentation; delivery/ installation schedules, etc. (Technical Proposal)
2. The prices tendered for these supplies, calculated as required by the Special Conditions. (Price proposal)

3. A statement by the Tenderer certifying, and, if so requested, evidence or proof, that the tendered supplies originate in one of the Member States of the European Community, or in one of the beneficiary countries of the Tacis programme, specifying the respective country of origin. In case of tendering for systems composed of various elements, the origin of each of the elements must be specified.

The Tenderer may be required to provide further detailed information and evidence in this respect and/or to provide an official certificate of origin.

4. Full identification of the Tenderer and his statement certifying that he satisfies all conditions of origin.
  - 4.1. Proof that the Tenderer is a national of one of the Member States of the European Community, or of one of the beneficiary countries of the Tacis programme, in accordance with Article 1 of the General Regulations.
  - 4.2. A statement by the Tenderer that none of the situations listed in Article 1 (3) apply to him.
  - 4.3. If required, certification or evidence of other eligibility criteria.
5. If required, the list, description and prices of spare parts/accessories.
6. If required, a detailed description of how the Tenderer proposes to meet the obligation of providing after-sales service.
7. If required, a detailed training proposal.

8. A statement of the commercial warranty for quality and performance of the goods supplied.
  9. If required, the necessary financial guarantees.
  10. The bank account to which payments may be made.
  11. Signature by the Tenderer or his duly authorised agent. The Contracting Authority may require specific proof that the signature is duly authorised.
3. Variant solutions may not derogate from the requirements of these General Regulations. Tenders based on the tender dossier and those for variant solutions shall be evaluated simultaneously.
  4. The Special Conditions must state whether the Tenderer submitting a variant solution is to be responsible for the design of the variant solution, and if this is the case, must specify procedures, in particular for checking, revision and approval.
  5. The submission of any variant solution shall comprise
    - a) an individual tender for the variant solution;
    - b) a demonstration of the benefit of the variant solution over the conforming solution, including quantifiable justification of any economic advantage;
    - c) a draft of the amendments to the technical provisions of the Special Conditions necessitated by the variant solution;
    - d) the drawings and specifications provided for in the conforming solution, but not affected by the variant solution;
    - e) the drawings and specifications particular to the variant solution;
    - f) a technical note on the basic concept of the variant solution and, where appropriate, drawings and calculations;

#### *Article 6*

#### TECHNICAL SPECIFICATIONS

The supplies tendered must in all respects satisfy the requirements laid down in the Technical Specifications (Annex A of Special Conditions).

#### *Article 7*

1. Any supplies may be proposed which are functionally equivalent, similar or better and adapted to local conditions of use in the country of destination.
2. Unless otherwise provided, Tenderers may submit a tender based on a variant solution. The Special Conditions must specify any limitations, design criteria and other requirements applicable to a variant solution. Unless stated otherwise in the Special Conditions, the submission of a tender based on a variant solution is conditional upon the submission of a tender based on the prescribed specifications.



- g) for lump sum contracts, an itemised Breakdown of the Overall price as modified by the variant solution;
- h) for unit-price contracts, a Bill of Quantities and/or a Price Schedule as modified by the variant solution.

### *Article 8*

#### SPARE PARTS

1. If the Special Conditions so provide, the Supplier shall include in the items supplied a quantity of spare parts, drawn up in accordance with the Special Conditions and in the light of his professional experience and taking account of the place of use and including those, that require replacing more frequently (e.g. fast moving, exposed to heavy duty use etc.).
2. Unless otherwise provided, the spare parts shall be delivered together with the supplies themselves.
3. The list of spare parts must quote their prices either individually as unit prices or as overall prices, which may be expressed as a percentage of the value of said supplies. The Contracting Authority may amend the list of spare parts within said percentage.

### *Article 9*

#### AFTER-SALES SERVICE

If the Special Conditions so provide, and in accordance with the details stipulated there, the Supplier shall provide or secure the provision of reliable and regular after-sales and maintenance service at the places of installation of the goods supplied, guaranteeing their upkeep and repair and the rapid replenishment of spare parts.

The obligation to provide after-sales service shall begin after the warranty period has expired.

### *Article 10*

#### PRICES

1. Prices shall be expressed in EURO.
2. Prices for the goods supplied shall be quoted as specified in the special conditions, in general unit and overall prices on the basis of the prices ex works or warehouse to which shall be added all costs incurred for full delivery to the places of delivery, including all operations necessary to present the supplies there ready for acceptance.
  - 2.1. For imports under EC Grants, not being subject in the recipient state to customs or import duties, taxes or fiscal charges having equivalent effect, unit and overall prices shall be quoted excluding such duties and taxes.
  - 2.2. Unit and overall prices for supplies, manufactured in the recipient State, shall be quoted excluding all internal charges applicable to their manufacture. Such charges may be included into the definite contract price.

2.3. Unit and overall prices shall be quoted excluding any documentary stamp or registration duties or fiscal charges having equivalent effect in the recipient State.

3. Prices shall be quoted for delivery to the places of destination, notified in the Special Condition, where the supplies are to be delivered, installed or accepted.
4. If the Special Conditions so provide, prices may be quoted for delivery to any other place of reference, different from the place or places of destination.

If the costs of transport and all other costs relating thereto (e.g. insurance, transit) to places of destination should exceed the respective transport costs included in the prices quoted, the difference will be refunded to the supplier upon production of supporting documents and after provisional acceptance of the supplies at the places of destination.

5. Unless otherwise provided, the unit and overall prices tendered are firm and not subject to revision. The Supplier shall be solely responsible for any errors or omissions in the calculation of the prices tendered.
6. The above mentioned rules shall also apply to the prices quoted for spare-parts and accessories.

## *Article 11*

### DRAFTING OF TENDERS

1. Tenders and all correspondence relating to them shall be in the language(s) stated in the Special Tender Conditions. In the absence of such instructions, any of the official languages of the EC or of the respective beneficiary state may be used.
2. It is not necessary to use officially stamped paper for which a national stamp duty has been paid.

## *Article 12*

### SEALING AND MARKING OF ENVELOPES

1. The tender, the annexes thereto as stipulated in the instructions to Tenderers and the supporting documents shall be placed in a sealed envelope. If self-adhesive envelopes are used they shall be closed with adhesive tape and the tender shall sign over the top of the tape, any equivalent method admitted.
2. The envelope shall bear only:
  - a) the address designated for submission of tenders in the notice of invitation to tender or in the invitation to tender;
  - b) the Tenderer's name and address;

- c) the reference to the invitation to tender in reply to which the tender is being submitted and the tender number;
  - d) where appropriate, the numbers of the lots tendered for; and
  - e) the words "not to be opened before the tender opening session" written as instructed in the Instructions to Tenderers.
3. All technical and price proposals shall be submitted together in one envelope.
  4. Variant solutions shall be submitted separately and be marked with the additional wording "Variant Solution".
2. A tender submitted by an agent must state the name of the principal on whose behalf he is acting. No agent may represent more than one Tenderer. Agents shall attach to the tender the simple contract or notarial act or deed which empowers them to act on behalf of Tenderers. A signature to a deed must be certified in accordance with the national law of the State of the principal.

### *Article 13*

#### SIGNING OF TENDERS

1. The Tender shall be signed by the Tenderer or by his duly authorised agent as required by the Instructions to Tenderers. It shall be drawn up in a single original bearing the word "original". The number of copies to be supplied by the Tenderer shall be stated in the Instructions to Tenderers. Copies shall be signed in the same way as the original and shall bear the word "copy".

### *Article 14*

#### JOINT TENDERS

1. If a Tenderer is a joint venture or consortium of two or more persons, the tender must be single with the object of securing a single contract. Each person must sign the tender, and all such persons shall be jointly and severally bound by the tender and any resulting contract according to the law applicable to the contract. The Tenderer shall designate one of such persons to act as leader with authority to bind the joint venture or consortium. The composition or constitution of the joint venture or consortium shall not be altered without the prior consent in writing of the Contracting Authority.

Each member of a joint venture or consortium must comply individually with the eligibility requirements stated in Article 1.

2. The tender may be signed by the representative of the joint venture or consortium only if he has been expressly so authorised in writing by the members of the joint venture or consortium, and the authorising contract, notarial act or deed is attached to the tender. All signatures to the authorising instrument must be certified in accordance with the national laws and regulations of each of the parties comprising the joint venture or the consortium together with the Powers of Attorney establishing in writing that the signatories to the tender are empowered to enter into commitments on behalf of the members of the joint venture or consortium. Each member of such joint venture or consortium must provide proof or evidence of eligibility as if he, himself, were the Tenderer.

### *Article 15*

#### TRANSMISSION AND RECEPTION OF TENDERS

1. Tenders may be sent by registered mail with proof of receipt or delivered by hand against receipt to the address stated in the Instructions to Tenderers. The Contracting Authority shall not be held liable for proof of arrival in case any other method of transmission is used.
2. Tenders must be received by the Contracting Authority at the address and no later than the date and time specified in the instructions to Tenderers.

Tenders received at a later date or time than specified shall be rejected and returned to the Tenderer.

3. The Contracting Authority may, at its discretion, extend the deadline for the submission of tenders. Such extension shall be made public or notified to the Tenderers in the same way as the invitation to tender.

### *Article 16*

#### PERIOD OF VALIDITY OF THE TENDER

1. Tenderers shall remain bound by their tenders for the period prescribed by the Contracting Authority. Any tender valid for a shorter period may be rejected.

2. In exceptional circumstances, prior to the expiry of the original tender validity period, the Contracting Authority may request the Tenderers for a specified extension in the period of validity. Tenderers agreeing to the request will neither be required nor permitted to modify their tenders.
3. The successful Tenderer shall remain bound by his tender for a further period of 60 days following the receipt of the communication notifying him of his selection.

### *Article 17*

#### COMPUTATION OF TIME-LIMITS

The periods and time limits referred to in these General Regulations shall be computed as follows:

The time-limit referred to in these General Regulations and in the other contract documents shall begin to run from the beginning of the day following the date of the act or deed which serves as the starting point for those time-limits.

Where a time-limit is fixed in days, it shall expire at the end of the last day of the period laid down. Where the time-limit is fixed in months, it shall end on the day having the same number as the day on which it began. In the event of the last month of a time-limit fixed in months not having a day with at the same number as the date on which it began, the time-limit shall expire at the end of the last day of the month.

Where the last day of a time-limit falls on a public or any other general holiday in the State in which the obligation subject to the time-limit is to be performed, the time-limit shall be extended until the end of the next working day.

### *Article 18*

#### WITHDRAWALS AND AMENDMENTS

Any Tenderer may modify or withdraw his tender before the deadline for the submission of tenders, provided that written notice of such modification or withdrawal is received by the Contracting Authority prior to that deadline.

Withdrawals are unconditional and end further participation in the tendering procedure.

The modification notice shall be prepared, sealed, marked and dispatched as the original tender. It shall be identified as modification of the original tender.

### *Article 19*

#### ACCEPTANCE OF TENDERS/VARIATIONS

1. The carrying out of an invitation-to-tender procedure shall not oblige the Contracting Authority to accept any tender or to award any contract.

2. The Contracting Authority may deal with any Tenderer of its choice for any one or more parts of the tender.

The Contracting Authority may accept or reject any tender for any lot or partially accept it for one or more lots and may reject the offers for spare parts, after-sales service and training whilst accepting the main order for applies.

3. The Contracting Authority may reserve the right to vary the quantities stipulated at the time of ordering and purchase less or more than the quantities indicated in the Invitation to tender. The limits of such variations shall be indicated in the Special Conditions.

The unit and overall price of the tender shall then be applicable to the quantities ordered within the limits of these variations.

4. The Contracting Authority shall not be liable for any compensation with respect to Tenderers whose tenders have not been accepted, nor shall it be liable in the event of its deciding not to award a contract, to award one only for part of the goods tendered or otherwise vary the quantities purchased.

5. All Tenderers shall be informed in writing about the result of their tender. The Contracting Authority shall not be obliged to state the reasons for its choice nor enter into any discussion or correspondence with Tenderers on the results of the invitation to tender.

### *Article 20*

#### BID BOND

If the Special Tender Conditions so provide, Tenderers shall, as an earnest of their tenders, provide a bid bond. The amount of this bond to be specified in the Special Conditions, shall not be less than 1% of the tender price, but shall in no case exceed 2%.

Any tender not accompanied by the requested bid bond shall be rejected.

The bonds of Tenderers who have not been selected shall be released not later than 60 days after the expiration of the tender validity period, as extended, where appropriate, or upon the award of the contract, whichever is earlier.

The bid bond of the successful Tenderer shall be discharged, when the Tenderer has signed the contract.

### *Article 21*

#### AWARD OF CONTRACTS

1. The Contracting Authority shall conclude a contract with the Tenderer or Tenderers whose tenders have been accepted.
2. The contract shall be composed of the following documents, each of them constituting an integral part of it, in the following order:
  - a) Contract Form (supplies)
  - b) Technical Specification
  - c) Price Schedule
  - d) General Conditions for Supply Contracts financed from Tacis funds
3. The contract shall be concluded by notification in writing to the Tenderer that his tender has been accepted. Such notification shall be in the form of the contract form used for Tacis funded Supply Contracts. If the acceptance does not conform in all respects with the tender or if a tender is accepted after the period of its validity has expired, the conclusion of the contract shall be subject to the Tenderer's agreement in writing.
4. The Supplier returns the acknowledgement copy of the contract form signed by him to validate the order and accept all the conditions stated in it.
5. The contract shall become effective on the date stipulated by the parties.

## **ANNEX**

### **LIST OF BENEFICIARY COUNTRIES**

#### ***TACIS***

The list of beneficiary countries comprises all countries to which Council Regulation 2053/93 (JOCE L201 of 29.07.1993) applies at the closing date for the submission of tenders. They are at the date of. 1.12.1993:

Armenia  
Azerbaijan  
Belarus  
Georgia  
Kazakhstan  
Kyrgyzstan  
Moldova  
Mongolia  
Russian Federation  
Tadjikistan  
Turkmenistan  
Ukraine  
Uzbekistan

For updates contact Advisory Service.



## A.6. TAXES AND CUSTOMS ARRANGMENTS

## GRANT OF FACILITIES

### ARTICLE 1 - GENERAL PRIVILEGES

Personnel taking part in Community financed measures and members of their immediate family may be accorded no less favourable benefits, privileges and exemptions than those usually accorded to other expatriates employed in states of the NIS under any other bilateral or multinational agreement or arrangements for economic assistance and technical co-operation programmes.

### ARTICLE 2 - ESTABLISHMENT, INSTALLATION, ENTRY AND RESIDENCE FACILITIES

In the case of works, supply or service contracts, natural persons or representatives of legal persons eligible to participate in tendering procedures shall be entitled to temporary installation and residence where the importance of the contract so warrants. This right shall be acquired only after the invitation to tender has been issued and shall be enjoyed by the technical staff needed to carry out studies preparatory to the drawing up of tenders. This right shall elapse one month after the Contractor is designated.

The NIS shall permit personnel taking part in works, supplies, or service contracts financed by the Community, and members of their immediate family, to enter the State of the NIS, to establish themselves in the State, to work there and to leave the said State, as the nature of the contract so justifies.

### ARTICLE 3 - IMPORT AND RE-EXPORT OF EQUIPMENT

The NIS shall grant the permits necessary for the importation of professional equipment required to execute the measures, subject to existing laws, rules and regulations of the NIS.

The NIS shall further grant natural and legal persons who have executed works, supplies or service contracts the permits required to re-export the said equipment.

### ARTICLE 4 - IMPORTS AND EXCHANGE CONTROL

For the execution of the measures, the NIS undertakes to grant import authorisations as well as authorisations for the acquisition of the foreign currency and to apply national exchange control regulations without discrimination between Member States of the Community and the NIS.

## ARTICLE 5 – TAXATION AND CUSTOMS

1. Taxes, customs and import duties shall not be financed out the EC Grant.

2. Imports under supply contracts concluded by the authorities of the NIS and financed out of the EC Grant shall be allowed to enter the State of the NIS without being subject to customs duties, import duties, taxes or fiscal charges having equivalent effect.

- The NIS shall ensure that the imports concerned will be released from the point of entry for delivery to the Contractor as required by the provisions of the contract and for immediate use as required for the normal implementation of the contract, without regard to any delays or disputes over the settlement of the above mentioned duties, taxes or charges.

- Where a supply contract financed out of the EC Grant involves a product originating in the NIS, the contract shall be concluded on the basis of the ex-works price of the supplies in question, to which shall be added the internal fiscal charges applicable in the NIS to those supplies.

3. Contracts financed out of the EC Grant shall not be subject in the NIS to documentary stamps or registration duties or fiscal charges having equivalent effect, whether such charges exist or are to be instituted.

4. Natural and legal persons, including expatriate staff, from the Member States of the European Community executing technical co-operation contracts financed out of EC Grant shall be exempted from business and income tax in the NIS.

5. Personal and household effects imported for personal use by natural persons (and members of their immediate families), other than those recruited locally, engaged in carrying out tasks defined in technical co-operation contracts shall be exempt, from customs duties, import duties, taxes and other fiscal charges having equivalent effect, the said personal and household effects being either re-exported or disposed of in the state in accordance with the regulations in force in the NIS after termination of the contract.

6. Natural and legal persons importing professional equipment, as provided for in paragraph 2, shall, if they so request, benefit from the system of temporary admission as defined by the national legislation of the NIS in respect of the said equipment.

**A.7. FORM OF ADVANCED PAYMENT BANK GUARANTEE**

## FORM OF BANK GUARANTEE

To: The European Commission  
SCR/D4  
Attn: Mr. Melendro-Arnaiz  
Financial Management Europe Projects  
Rue de la Loi, 200  
B-1049, Brussels, BELGIUM

Subject: Guarantee No .....

Dear Sirs,

Whereas:

- the contract No (hereinafter Contract) has been entered into by and between you (the European Communities) and with registered once at (hereinafter Contractor).

Object of the Contract is

- according to clause of the Contract, the European Communities will make in favour of the Contractor an advance payment amounting to EURO ( ) upon signature of the Contract and submission by the Contractor of a bank guarantee in your favour securing the same amount of EURO ( ).

WHAT ABOVE STATED:

We, the undersigned Bank with registered office at hereby irrevocably and unconditionally guarantee and undertake to pay you the amount of EURO ( ) upon your first demand in writing and notwithstanding any opposition by the Contractor as well as waiving the benefit of any objection about the existence and/or validity of your credit.

The amount of the present guarantee will be automatically reduced by the successive repayments of the above-mentioned advance made by the Contractor according to the Contract.

We, Bank declare that the present guarantee shall come into effect as of the date hereof to remain in force until the advance has been completely repaid by the Contractor or until the date, if earlier, of receipt by us of your written authorisation to withdraw the present guarantee.

The present guarantee shall be governed by, and construed in accordance with, the laws of Belgium.

Any dispute arising from, or relating to, the present guarantee, which cannot be amicably resolved, shall be subject to the exclusive jurisdiction of the Courts of Brussels, Belgium

Date:

Place:

## **A.8. FORM OF BID BOND**

## FORM OF BID BOND

Bank (Name and identification)

Official Stamp

To: The Commission of the European Communities,  
Takis Procurement Unit,  
Rue de la Loi, 99,  
B-1040 Bruxelles,  
BELGIUM.

Guarantee Number:.....

Date of Expiry: ..... (150 days after closing date for  
submission of tenders)

Amount: EURO .....

Title: MC 9901 'Supply of an Optical Cable System for Communication  
and Signalling to the Railways of Georgia, Armenia and Azerbaijan'

..... (hereinafter called 'the Tenderer') has submitted a tender dated  
..... for the execution of the supply of an optical cable system for communication and  
signalling to the Railways of Georgia, Armenia and Azerbaijan (herein called 'the Tender').

We ..... of ....., having our  
registered office at ..... (hereinafter called 'the Bank'), at the request of the  
Tenderer agree unconditionally and irrevocably to guarantee as primary obligator and not as a surety  
merely and hereby confirm that we hold at your disposal an amount of EURO .....  
(representing 2% of the total tender amount), payable without any reference to and in spite of any  
contestation by our client, on your first written claim, stating that our client has not performed all of its  
obligations in relation to the above mentioned Tender and that you claim payment under this  
guarantee.

Without prejudice to the generality of the preceding paragraph, this guarantee may be called upon:

- (1) If the Tenderer withdraws his Tender during the period during which tenders are valid as  
specified in the Form of tender  
or
- (2) If the Tenderer, having been notified of the acceptance of his Tender by you during the period  
during which tenders are valid, fails or refuses to sign the Form of Agreement in accordance  
with the Instructions to Tenderers, if required.

It is understood that the total liability of the Bank hereunder is limited to the above amount.

This guarantee will be valid until the above mentioned date of expiry and all claims hereunder should  
be submitted to us in writing and in time to be received by the Bank not later than this date after which  
our obligation hereunder lapses and this guarantee becomes null and void and of no effect  
whatsoever.

At: .....

Date: .....

Name and Title: .....

## **A.9. FORM OF PERFORMANCE SECURITY**



## FORM OF PERFORMANCE SECURITY

Bank (Name and identification)

Tacis Procurement Unit,  
Rue de la Loi, 99,  
B-1040 Bruxelles,  
BELGIUM.

Official Stamp,

Guarantee Number:.....

Date of Expiry: ..... (24 months after release of Test on Completion Certificate)

Amount: EURO ..... (10% of contract amount)

Title: MC 9901 'Supply of an Optical Cable System for Communication  
and Signalling to the Railways of Georgia, Armenia and Azerbaijan'

..... (hereinafter called 'the Contractor') has signed a contract dated  
..... for the execution of the supply of an optical cable system for communication and  
signalling to the Railways of Georgia, Armenia and Azerbaijan (herein called 'the Contract').

We ..... of ....., having our  
registered office at ..... (hereinafter called 'the Bank'), at the request of the  
Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as a  
surety merely and hereby confirm that we hold at your disposal an amount of EURO .....  
(representing 10% of the total contract amount), payable without any reference to and in spite of any  
contestation by our client, on your first written claim, stating that our client has not performed all of its  
obligations in relation to the above mentioned Contract and that you claim payment under this  
guarantee.

Without prejudice to the generality of the preceding paragraph, this guarantee may be called upon if  
the Contractor fails to honour his warranty obligations described in the Contract.

It is understood that the total liability of the Bank hereunder is limited to the above amount.

This guarantee will be valid until the above mentioned date of expiry and all claims hereunder should  
be submitted to us in writing and in time to be received by the Bank not later than this date after which  
our obligation hereunder lapses and this guarantee becomes null and void and of no effect  
whatsoever.

At: .....

Date: .....

Name and Title: .....

To: The Commission of the European Communities

## **B. CONTRACT DOSSIER**

**B.1. CONTRACT FORM FOR SUPPLY CONTRACTS  
FINANCED FROM TACIS FUNDS**

**CONTRACT FORM**  
**for Supply Contracts financed from TACIS Funds**

BETWEEN: The European Communities represented by the Commission of the European Communities, on its part represented by

name/title

AND:

Name/Address

by

Represented

hereinafter referred to as the "Supplier"

Project Title & Number: MC 9901 Supply of an Optical Cable System for  
Communication

and Signalling to the Railways of Georgia, Armenia and  
Azerbaijan

Contract No: .....

The contract follows tender MC 9901 Supply of an Optical Cable System to the Railways of Georgia, Armenia and Azerbaijan.

and the supplier's offer [date] .....(as amended hereafter).

It is agreed to supply the goods specified hereafter according to the conditions laid out in:

- this Contract form
- the Technical Specification (Annex A)
- the Schedule of Prices (Annex B)
- the General Conditions for Supply Contracts (Annex C)

all these documents being attached hereto forming an integral part of this contract.



## *Article 1*

### SUBJECT

1. The Supplier shall supply the following goods:

optical cable system for communication and signalling to the Railways of Georgia, Armenia and Azerbaijan.

2. The Supplies shall fully conform with the detailed description set out in the Technical Specification. (The tender specification amended as appropriate or variant solution).

3. This contract includes the provision of:

3.1 Manufacturer's recommended spare parts for a period of 24 months as set out in the Technical Specifications.

3.2 Training and instruction in the use of the supplies as described in the Technical Specifications.

## *Article 2*

### ORIGIN

The supplies shall originate in the European Community or in one of the beneficiary countries of the Tacis programme. (See list at end of Annex C - General Conditions). (With the first request for payment the supplier shall provide a certificate of origin of supplies).

The origin of a product shall be determined according to the rules laid down in the Community Customs Code.

## *Article 3*

### DELIVERY, INSTALLATION & ACCEPTANCE

1. The supplies shall be delivered to the central depots of the Railways on a DDP basis within 24 months (all risks insurance from warehouse to warehouse in amount equal to 110% of the DDP value in EURO.)

All packages must be marked as follows:

Tacis MC 9901 'Supply of an Optical Cable System to the Railways of Georgia, Armenia and Azerbaijan' – "specification" – "address".

2. The supplier shall be responsible for unpacking of the goods and their installation at

address(es)

**The Railways of Georgia**  
Station Tbilisi Gruzovaia  
(freight)  
Central Material Technical  
Supply Base of Georgian  
RW  
Station code 1560203  
11, Merab Kavtaradze  
Tbilisi 380080

**Armenian Railway Dept.**  
50 Tigran Metsi Avenue  
375005 Yerevan  
Republic of Armenia

**Azerbaijan State  
Railways**  
Balajari Station N° 546808  
District N° 2

As specified in the technical specifications and ready for acceptance within 24 months.

Independent inspection by a technical supervisor appointed after contract award by the European Commission.

3. Delivery shall be subject to provisional and final acceptance, technical certification by the technical supervisor appointed by the EC and endorsement by the EC (SCR – A3) by:

4. Provisional acceptance shall take place within 2 weeks after the supplies are delivered/installed and fully operational.

5. Final acceptance shall take place upon expiration of the warranty period, and shall be pronounced upon the condition that the goods supplied are found in full working order and comply with the tender specifications. (Manufacturer's Inspection Certificate or Work-test certificates are required for all items, as described below in art. 4).

#### *Article 4*

#### PRICE & PAYMENT

a) provisional acceptance:

Name/ address	<b>Georgian Railways Ltd</b> 15, Tamar Mepe Avenue Tbilisi 380012
	<b>Armenian Railway Dept.</b> 50 Tigran Metsi Avenue 375005 Yerevan Republic of Armenia
	<b>Azerbaijan State Railways</b> 230 rue Alieva Baku 370010

b) final acceptance:

name/ address	<b>Georgian Railways Ltd</b> 15, Tamar Mepe Avenue Tbilisi 380012
	<b>Armenian Railway Dept.</b> 50 Tigran Metsi Avenue 375005 Yerevan Republic of Armenia
	<b>Azerbaijan State Railways</b> 230 rue Alieva Baku 370010

1. The prices for the goods are specified in the Schedule of Prices (Annex B). The total value of this order is .....EURO.

2. Payment shall be due:

see A2. 'Special Tender Conditions for Supply Contracts', Article 10 'Payments' as follows: (and not as specified in chapter B.4 'General Conditions for Supply Contracts Financed from TACIS Funds') :

#### Advanced Payment

representing 10% of the total Contract Price

Presentation date: upon signature of contract

Required documents:

- Commercial invoice
- bank guarantee

#### 1<sup>st</sup> Interim Payment

representing 10% of the total Contract Price

Presentation date: upon approval of the High-Level Design

Required documents:

- Commercial invoice
- “Approval of High-Level Design Certificate” duly signed by the appointed representative of the Commission

#### 2<sup>nd</sup> Interim Payment

representing 30% of the total Contract Price

Presentation date: upon issue of Site Installation Release Notices, issued on installation completion of each railway section; there are 3 railway sections in Armenia, 4 in Azerbaijan and 6 in Georgia; the amount of each payment instalment shall be a ratio of 30%, equal to the installed section length divided by the total line length of the concerned country

Required documents:

- Commercial invoice
- “Site Installation Release Notices” duly signed by the appointed representative of the Commission

#### 3<sup>rd</sup> Interim Payment

representing 20% of the total Contract Price

Presentation date: upon release of Site Partial Acceptance Test Certificates, issued at PAT completion of each railway section; there are 3 railway sections in Armenia, 4 in Azerbaijan and 6 in Georgia; the amount of each payment instalment shall be a ratio of 20%, equal to the installed section length divided by the total line length of the concerned country

Required documents:

- Commercial invoice
- “Site Partial Acceptance Test Certificates” duly signed by the appointed representative of the Commission

#### 4<sup>rd</sup> Interim Payment

representing 20% of the total Contract Price

Presentation date: upon release of Test on Completion Certificate; this milestone corresponds to provisional acceptance; the bank guarantee, covering the 10% advance payment, is released at this point

Required documents:

- Commercial invoice
- “Test on Completion Certificate” duly signed by the appointed representative of the Commission
- “Provisional Acceptance Certificate” of the provisional acceptance duly signed by the appointed representative of the Commission

#### Final Payment

representing 10% of the total Contract Price

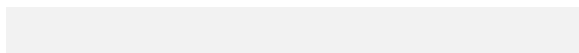
Presentation date: on expiry of the warranty period; this milestone corresponds to final acceptance

Required documents:

- Commercial invoice
- “Final Acceptance Certificate” of the final acceptance duly signed by the appointed representative of the Commission

However, payment of the 10% balance may be made if the Supplier provides a Performance Security/Payment Guarantee covering 10% of the total Contract Price for warranty obligations. The Performance Security/Payment Guarantee for warranty obligations will be released by the Contracting Authority’s on presentation of the “Final Certificate of Acceptance”.

3. Payments shall be made in EURO to the supplier's account number





4. Requests for payments shall be addressed to

Name/addresses	The European Commission SCR – D4 / Financial Unit Rue de la Loi 200 1049 Bruxelles
----------------	---------------------------------------------------------------------------------------------

Payments shall be authorised by

Name/addresses	The European Commission SCR – D4 / Financial Unit Rue de la Loi 200 1049 Bruxelles
----------------	---------------------------------------------------------------------------------------------

and made by

Name/addresses	The European Commission SCR – D4 / Financial Unit Rue de la Loi 200 1049 Bruxelles
----------------	---------------------------------------------------------------------------------------------

5. Payments shall be made in accordance with Article 18 of the General Conditions.

### ***Article 5***

#### **ADVANCE GUARANTEE**

The supplier shall provide an advance guarantee, in the amount of (10)% of the total price, in favour of :

name/address	The European Commission SCR – D4 / Financial Unit Rue de la Loi 200 1049 Bruxelles
--------------	---------------------------------------------------------------------------------------------

This advance guarantee shall be released upon release of Test on Completion Certificate; this milestone corresponds to provisional acceptance – see A.2 art. 10 (4<sup>rd</sup> Interim Payment).

### ***Article 6***

#### **WARRANTY & AFTER SALES SERVICE**

1. The Supplier shall provide a warranty for quality and performance of the goods supplied as defined in the General Conditions for Supply Contracts for a period of 24 months as from the date of provisional acceptance.
2. The Supplier shall provide or secure the provision of reliable and regular after sales and maintenance service thereafter at the place(s) or destination guaranteeing the upkeep and repair of the goods supplied and the rapid replenishment of spare parts.

### ***Article 7***

#### **LAW**

Belgian law shall govern the performance of the contract.

### ***Article 8***

#### **SETTLEMENT OF DISPUTES**

All disputes arising out of the performance of this contract, which cannot amicably settled:

1. shall be referred to be exclusively jurisdiction of the Brussels Courts.

### ***Article 9***

This contract becomes effective on ...  
date/signature and will remain valid for 24  
months.

For the [Contracting Authority]

Signed

Name and Title

Date:

For the Supplier

Signed

Name and Title

Date:

## **B.2. TECHNICAL SPECIFICATIONS**

( ANNEX A )

The Technical Specification should, in principle, be the same as those of the Tender, but may contain precisions or amendments reflecting the contracting parties' final agreement.

### **B.3. SCHEDULE OF PRICES**

## SCHEDULE OF PRICES

Name of Supplier \_\_\_\_\_ Contract Number \_\_\_\_\_ Page \_\_\_\_\_  
\_\_\_\_\_ of \_\_\_\_\_

1	2	3	4	5	6
Item	Description	Quantity	UNIT PRICE FOB Port <sup>(1)</sup> of Loading (Specify Port)	UNIT PRICE DDP Port <sup>(2)</sup> of Entry (Specify Port)	Total DDP Co per Item (column 3 x 5)

---

<sup>1</sup> This indication is given as an example only

<sup>2</sup> Select as appropriate, e. g. ex warehouse, etc.

**B.4. GENERAL CONDITIONS FOR SUPPLY CONTRACTS  
FINANCED FROM TACIS FUNDS**

## **GENERAL CONDITIONS FOR SUPPLY CONTRACTS**

### **FINANCED FROM TACIS FUNDS**

- Article 1: Obligations of the Supplier
- Article 2: Assignment
- Article 3: Sub-Contracting
- Article 4: Origin
- Article 5: Technical Specifications
- Article 6: Spare-parts
- Article 7: Delivery Conditions
- Article 8: Packaging
- Article 9: Delivery Period
- Article 10: Delayed Delivery
- Article 11: Acceptance Conditions
- Article 12: Provisional Acceptance
- Article 13: Final Acceptance
- Article 14: Warranty Obligations
- Article 15: After-sales Service
- Article 16: Payments
- Article 17: Spreading of Payments
- Article 18: Payment Procedures
- Article 19: Delay of Payment
- Article 20: Guarantee
- Article 21: Taxation
- Article 22: Liability
- Article 23: Communications
- Article 24: Financial Control and Audit
- Article 25: Force majeure
- Article 26: Terminating of Contract
- Article 27: Law applicable
- Article 28: Arbitration

## *Article 1*

### OBLIGATIONS OF THE SUPPLIER

1. Award of the contract obliges the successful Tenderer and Supplier to deliver the goods tendered to site, including such installation, testing and commissioning as the Contract provides, to perform all other requirements and respect all other conditions laid down in the contract.
  2. If the Supplier is a joint venture or consortium of two or more persons, all such persons shall be jointly and severally bound to fulfil the terms of the contract according to the law applicable.
  3. The Supplier shall deliver the goods to full property and unrestricted use of the Contracting Authority or the persons for whom they are purchased, free from any lien in favour of third parties.
  4. If the Supplier has assigned his Contract without authorisation, the Buyer may, without giving formal notice thereof, apply as of right the sanctions for breach of Contract.
  5. Assignees must satisfy the eligibility criteria applicable to the award of the Contract.
- b) assignment to the Supplier's insurers, of the Supplier's right to obtain relief against any other person liable in cases where the insurers have discharged the Supplier's loss or liability.
3. The approval of an assignment by the Buyer shall not relieve the Supplier of his obligations under the contract, neither for the part of the Contract already performed nor the part not assigned.

## *Article 3*

### SUB-CONTRACTING

- ### ASSIGNMENT
1. An assignment shall be valid only if it is a written agreement by which the Supplier transfers his Contract or part thereof to a third party.
  2. The Supplier shall not, without the prior written consent of the Buyer, assign the Contract for any part thereof, or any benefit or interest thereunder, except in the following cases:
    - a) a charge, in favour of the Supplier's bankers, of any moneys due or to become due under the Contract; or
1. A subcontract shall be valid only if it is a written agreement by which the Supplier entrusts performance of a part of his Contract to a third party.
  2. The Supplier shall not subcontract without the prior written authorisation of the Buyer. The elements of the Contract to be subcontracted and the identity of the subcontractors shall be notified to the Buyer. The Buyer shall, within 30 days of receipt of the notification, notify the Supplier of its decision, stating reasons should be withhold such authorisation.



3. Sub-contractors must satisfy the eligibility criteria applicable for the award of the Contract.

4. The Buyer shall have no contractual relations with the sub-contractors, but may prevail itself of any rights the Supplier has acquired against them.

#### *Article 4*

##### ORIGIN

1. The goods must originate in a member State of the European Community or in one of the beneficiary countries of the Tacis programme<sup>3</sup>.
2. The origin of a product shall be determined according to the rules laid down in the Community Customs Code.
3. The Supplier must certify that the goods tendered comply with this requirement, specifying the respective country of origin. The Supplier may be required to provide more detailed information in this respect and/or to provide an official certificate of origin.

#### *Article 5*

##### TECHNICAL SPECIFICATIONS

Unless otherwise provided, the supplies must in all respects satisfy the requirements laid down in the Technical Specification.

#### *Article 6*

##### SPARE PARTS

---

<sup>3</sup> See list in Annex

1. If the Contract so provides, the Supplier shall include in the items supplied a quantity of spare parts, drawn up in accordance with the Special Conditions and in the light of his professional experience and taking account of the place of use and including those, that require replacing more frequently (e.g. fast moving, exposed to heavy duty use etc.).

2. Unless otherwise provided, the spare parts shall be delivered together with the supplies themselves.

#### *Article 7*

### DELIVERY CONDITIONS

1. The Supplier shall deliver the supplies to their respective place(s) of destination in accordance with the terms specified in the Contract. Unless otherwise provided, delivery shall include all operations necessary to provide the supplies there ready for acceptance, such as packaging, shipping, carriage and insurance, completion of all administrative or commercial formalities involved therein, customs clearance and installation, unloading and storage at arrival, conveyance from storage to the place of installation, assembly, installation, verification, testing adjustment, supervision of all operations, or any other service to ready the supplies for acceptance at their places of destination. He shall be responsible for the lay out and equipment of his site unless otherwise provided.

2. Unless otherwise provided, the Supplier shall bear all risks until provisional acceptance is pronounced. With provisional acceptance the Contracting Authority acquires full title and ownership to the goods supplied and the right to make full and unimpaired use of the supplies delivered.

#### *Article 8*

### PACKAGING

1. The Supplier shall provide such packaging of the Supplies as is required to prevent their damage or deterioration in transit to their final destination. The packaging shall be sufficient to withstand, without limitation, rough handling, exposure to extreme temperatures, salt and precipitation during transit and open storage.

Package size and weights shall take into consideration, where appropriate, the remoteness of the final destination of the Supplies, and the possible absence of heavy handling facilities at all points in transit.

2. The packaging of the supplies shall become the property of the Buyer.

#### *Article 9*

### DELIVERY PERIOD

1. The supplies shall be delivered to their place(s) of destination within the delivery period specified in the Contract. Unless otherwise provided the delivery period shall include all operations necessary for installation, verification and testing to present the supplies ready for acceptance.

### *Article 11*

2. If a special delivery period is fixed for each lot, the periods shall not be cumulative where more than one lot is awarded to the same supplier. In this case the delivery period for each lot shall run concurrently.

### *Article 10*

#### DELAYED DELIVERY

1. The Supplier shall ensure that the Supplies are delivered to the place of destination as stipulated and in time to allow the person responsible to proceed with acceptance of the Supplies. The Supplier is deemed to have fully appreciated the difficulties which he might encounter in this respect, and he shall not be permitted to advance any grounds for delay in fulfilling his obligations.
2. In the case of delay in delivery of more than one week the Supplier shall be liable to pay liquidated damages calculated from the expiry of the contractual period for each day the delay lasts, such damages to be fixed at 1/1000 of the value of the undelivered supplies.  
Such penalty shall not exceed 15% of the total contract value.
3. However, if the defaulting party prevents the normal use of the supplies as a whole, the liquidated damages for delay will be calculated on the basis of the total cost of all the supplies.
4. The damages shall be deducted from the sums due under the contract.

#### ACCEPTANCE CONDITIONS

1. Delivery of the supplies shall be subject to provisional and final acceptance. If there is no warranty for the supplies, provisional acceptance shall be deemed to constitute final acceptance.
2. The organisation responsible for provisional and final acceptance of the supplies shall be specified in the Contract. The supplies shall be accepted at the place of destination and in the presence of the supplier, if so requested by him. The European Communities may be represented at the acceptance formalities.

### *Article 12*

#### PROVISIONAL ACCEPTANCE

1. The Supplies shall be taken over on provisional acceptance, when they have been delivered to their place of destination in accordance with the contract, have satisfactorily passed the required tests and are ready for use.
2. Provisional acceptance will take place at the earliest possible opportunity and at the latest within two weeks of presentation of the supplies for acceptance at the place of destination. The Supplier must give notice thereof to the organisation responsible for acceptance.

3. If the supplies are found to be damaged or defective or not in conformity with the order, a report shall be drawn up forthwith and forwarded to the Supplier, who shall be requested to verify the facts (possibly on the spot)- and to notify his findings within 15 days. Supplies which do not comply with the conditions laid down in the contract shall be either repaired or replaced, as may be decided by the Buyer, by the supplier at his own expense. If replacement or repair is not performed satisfactorily, the Buyer shall have the right to reject the supplies, which shall be returned to the supplier.

A certificate of final acceptance shall be drawn up entitling the Supplier to the relevant payments.

4. A certificate of provisional acceptance will be drawn up recording acceptance or rejection together with any reservations or observations made. This certificate shall state the date of provisional acceptance and shall entitle the Supplier to the relative payments.

5. This certificate is deemed to have been issued, if provisional acceptance or rejection have not been pronounced within a period of 30 days as from the date at which the responsible organisation has received the Supplier's notice or from any other date as may have been arranged between them.

### *Article 13*

#### FINAL ACCEPTANCE

Final acceptance shall be pronounced of the earliest possible opportunity after the expiration of the warranty period and on the condition that the goods are found in full working order and compliance with the contract specifications.

## *Article 14*

### WARRANTY OBLIGATIONS

1. The Supplier shall warrant that the Supplies are new, unused, of the most recent models and incorporate all recent improvements in design and materials, unless otherwise provided. The Supplier shall further warrant that all Supplies shall have no defect arising from design, materials or workmanship, except in so far as the design of materials are required by the specifications, or from any act or omission of the Contracting Authority or Buyer, that may develop under use.
  - 1.1. The Supplier shall warrant that the supplies are fit for the purpose for which they are to be used, operate as stated in the manufacturer's technical specifications and may be freely used without infringing third parties industrial property and patent rights or copyrights.
  - 1.2. Unless otherwise provided this warranty shall cover spare parts and accessories.
2. Unless otherwise provided, this warranty shall remain valid for 360 days after the Supplies or any portion thereof, as the case may be, have been delivered and commissioned at the final destination. The obligation to maintain the Supplies shall be subject to any stipulations in the Contract and specifications which shall determine the period and conditions thereof.
3. The Supplier shall be responsible for making good any defect in or damage to any part of the Supplies which may appear or occur during the Warranty Period, or within 30 days after its expiration and which arise either:
  - a) from the use of defective materials, faulty workmanship or design of the Supplier; or
  - b) from any act or omission of the Supplier during the Warranty Period; or
  - c) in the course of an inspection made by, or on behalf of, the Buyer.
4. The Supplier shall at his own cost make good the defect or damage as soon as practicable.

The Warranty Period for all items replaced or repaired shall recommence from the date when the replacement or repair was made to the satisfaction of the Buyer. If the Contract provides for partial acceptance, the warranty period shall be extended only for the part of the Supplies affected by the replacement or repair.
5. If any such defects appear or such damage occurs during the warranty period, the Buyer shall notify the Supplier. If the Supplier fails to remedy a defect or damage within the time limit stipulated in the notification, the Buyer may:
  - a) remedy the defect or the damage itself, or employ someone else to carry out the work at the Supplier's risk and cost, in which case the costs incurred by the Buyer shall be deducted from moneys due to or from guarantees held against the Supplier or from both; or

b) terminate the Contract.

6. In case of emergency, where the Supplier cannot be reached immediately or, having been reached, is unable to take the measures required, the Buyer may have the work carried out at the expense of the Supplier. The Buyer shall as soon as practicable inform the Supplier of the action taken.

### ***Article 15***

#### **AFTER-SALES SERVICE**

If the Contract so provides, and in accordance with the details stipulated there, the Supplier shall provide or secure the provision of reliable and regular after-sales and maintenance service at the place of destination/installation of the goods supplied, guaranteeing their upkeep and repair and the rapid replenishment of spare parts.

The obligation to provide after-sales service shall begin after the warranty period has expired.

### ***Article 16***

#### **PAYMENTS**

Unless otherwise provided payments shall be made in EURO or the currency provided for in the contract on the basis of the equivalent value of the EURO on the day preceding payment.

### ***Article 17***

#### **SPREADING OF PAYMENTS**

Unless otherwise provided, payments shall be spread as follows:

1. 60% of the contract price for the goods to be supplied, at the time the contract is placed, on provision of a guarantee securing repayment of the full amount of the payment instalment. The guarantee will be released on provisional acceptance, against presentation of any document proving provisional acceptance endorsed by the Authority or Authorities specified in the Contract.
2. 30% of the contract price for the goods to be supplied following provisional acceptance of the supplies at the place indicated for delivery. This amount will be paid on presentation of any document proving acceptance endorsed by the competent Authority or Authorities.
3. 10% of the contract price, for the goods to be supplied, as payment of the balance outstanding, on expiry of the guarantee period and following final acceptance of the supplies. This amount will be paid on presentation of any document proving final acceptance endorsed by the Authority of Authorities named in the Contract.

However, payment of the 10% balance may, if the Supplier so wishes, be made at the same time as the 0% instalment referred to above, if the Supplier provides a guarantee securing repayment of the full amount of the 10% payment instalment.

The guarantee will be released on final acceptance, against presentation of any document proving final acceptance endorsed

by the Authority or the Authorities named in the Contract. When no such acceptance has been granted, it will be released two months after expiry of the guarantee period, save where the Buyer has submitted a claim.

4. Where only part of the supplies have been delivered, the 30% payment instalment due following provisional acceptance shall be calculated not on the total contract price, but on the value of the part of the supplies which have actually been accepted.

#### *Article 18*

#### PAYMENT PROCEDURES

1. Payments shall be authorised and made by the authority or authorities specified in the Contract.
2. Unless otherwise provided, in order to obtain payments, the Supplier or his representative must forward to the relevant authority above the following documents:
3. For the first instalment of 60%, in addition to the invoices in duplicate, a photocopy of the Letter of Contract and the original of the guarantee, with one photocopy.
4. For the second instalment of 30% the invoices in triplicate.

5. For the balance of 10%, the invoices in triplicate or where appropriate, the original of the guarantee, with one photocopy.

6. In all cases where invoices are forwarded to the authorities of the country issuing the invitation to tender, the Supplier must inform the Commission delegate, if any, thereof by sending a copy of the correspondence to the address given in the Contract.

7. The percentages referred to in this article shall mean the unit and overall price of the goods to be supplied, excluding the separately quoted prices of spare-parts, accessories, after-sales-service or training. The latter prices shall be paid in full after delivery of such parts or services.

#### *Article 19*

#### DELAY OF PAYMENT

1. Unless otherwise provided, payments shall be made within 60 days of receipt of the request for payment and shall be deemed to have been made on the date on which they are debited to the Contracting Party's account.

If acceptance takes place after receipt of said request, the payment period shall commence upon receipt of proof of acceptance.

2. The Contracting Party may, however, after giving notice to the Contractor, defer payment if the services covered by the request for payment are contested by the Contracting Party or if the vouchers in support of the request are incomplete.

Where payment is so deferred, the Contracting Party shall not be liable to pay interest or indemnities of any kind.

3. The Contracting Party shall be bound to comply with payment periods only if requests for payment are properly presented at the address indicated in Article 4 of the Contract.
4. The 60 days payment period does not include any delays occurring as a result of banking procedures followed by the banks in the state of the registered office of the Supplier.
5. If the time-limits fixed for payments are exceeded, and the contract has not given rise to any claim, the Supplier shall be automatically and without notice be entitled to interest calculated pro rata on the basis of the number of calendar days by which payment is delayed, at the rediscount rate of the issuing institute of the state in which the Supplier has his registered office.
6. The Supplier shall be entitled to such payment without prejudice to any other right or remedy under the contract.

### *Article 20*

#### GUARANTEE

1. The guarantee to secure repayment of advances must be provided for the full amount of the advance paid. The guarantee may include interest for the full period of validity at a rate to be determined. No payments shall be made to the supplier prior to the provision of this guarantee.

2. The guarantee shall be denominated in the currency in which payments are to be made and drawn up in favour of the Buyer or any other Authority specified in the Contract.
3. The guarantee may be provided in the form of a bank guarantee, a banker's draft, a certified cheque, a bond provided by an insurance and/or bonding company, an irrevocable letter of credit or a cash deposit made with the Buyer. If the guarantee is to be provided in the form of a bank guarantee, a banker's draft, a certified cheque or a bond, it shall be issued by a bank or bonding and/or insurance company established in the recipient State or a Member State of the EC and approved by the Contracting Authority in accordance with the eligibility criteria applicable for the award of the Contract. The guarantee shall be independent and payable on first demand.

If acceptance takes place after receipt of said request the payment period shall commence upon receipt of the proof acceptance. The Contracting party may, however, after giving notice to the Contractor, defer payment if the services covered by the request for payment are contested by the Contracting party or if the vouchers in support of the request are incomplete. Where payment is so deferred, the Contracting Party shall not be liable to pay interest or indemnities of any kind.

4. The guarantee may also contain the following provision:



- 4.1. Any request to pay under the terms of the guarantee must be countersigned by the Commission delegate, if any, in the recipient State:
- 4.2. The guarantee may stipulate a specific expiry date, on condition that this falls at least three months following the date laid down in the contract for provisional acceptance, or two months following the expected date of final acceptance; alternatively, the guarantee may be stated to expire:
- on return of the original of the guarantee.
  - on receipt of any document signed by the authority responsible for acceptance and transmitted by the Commission delegate, if any, in the recipient State, certifying that provisional or final acceptance has been granted.
- 4.3. Where the guarantee bears an expiry date, and should it appear that acceptance may be delayed until after the expiry date, the validity of the guarantee must be extended, at the request of said authority by successive periods of three months, until such time as acceptance is granted.
5. If the natural or legal person providing the guarantee is not able to abide by his commitments, the Buyer shall give formal notice to the Supplier to provide a new guarantee on the same terms as the previous one; Should the Supplier fail to provide a new guarantee, the Buyer may terminate the Contract.
6. If the Contract is terminated for any reason whatsoever, the guarantees securing the advances may be invoked forthwith in order to repay the balance of the advances still owed by the Supplier, and the guarantor shall not delay payment or raise objection for any reason whatever.
7. Unless otherwise provided, the guarantee shall be released as stated in Article 17 of the General Conditions.
8. The law applicable to the guarantee shall be that of the State of the institution issuing the guarantee.

### *Article 21*

#### Taxation

1. Taxes, duties and charges (such as customs and import duties) shall be excluded from Community financing.
2. The Contractor shall be responsible for complying with the national tax laws applicable to him in respect of revenue received under the contract.

### *Article 22*

#### LIABILITY

1. The Contractor shall be liable to the Buyer for full performance of all obligations resulting from the Contract, repair any damage caused to the Buyer or the persons for whom the supplies were purchased as a result of any action or omission relating to the performance of the Contract, which is attributable to him  
as a result in particular of his warranty or negligence, errors or omissions.
2. Whenever the use of the supplies involves copyrights patents, registered designs, trade marks, brand names, industrial designs or models belonging to third parties, the Supplier shall indemnify the Buyer or the persons for whom they are purchased against any claim or action for infringement which may be brought against them.

### ***Article 23***

#### **COMMUNICATIONS**

1. The contractor shall follow the guidelines imparted by the contracting party when undertaking communications activities concerning Tacis.
2. The contractor shall follow Tacis written and visual identity standards which apply to design for publications, stationery and all other communications, promotional and branded materials as well as the delivery of goods.

These identity standards are specified in two respective identity booklets “Tacis identity standards - Written identity” and “Tacis identity standards for working contractors - How to promote your Tacis project”. These booklets form an integral part of the present contract and are provided in Annex D of this contract.

In special cases or where further clarification is required; the contractor shall seek from the contracting party’s competent Information Office instructions on how to implement the Tacis identity standards.

The Tacis identity standards may only be used in connection with the performance of the contract.

3. The contractor shall forward to the contracting party’s competent Information Office photographic proof of supplies and/or copies of all communications materials disclosed to third parties.

### ***Article 24***

#### **FINANCIAL CONTROL AND AUDIT**

1. The Contractor is responsible for maintaining sufficiently detailed and accurate financial records of the work performed under the contract including man/days and man/months worked, and the direct costs and reimbursable expenses incurred thereunder.

2. The Contractor shall make available to the Commission, without delay, any information which the latter may request, concerning the performance of the work specified under the terms of the contract.

Throughout the duration of the contract and for a minimum period of four years following its completion or cessation, the Contractor shall on ten working days notice, make available to any official of the Commission or the Court of Auditors, or any contracted third party especially authorised for this purpose, free access to all and any records and documents required to verify the proper performance of the contract; such records and documents may, if necessary, be verified at the place where they are normally kept.

### *Article 25*

#### FORCE MAJEURE

1. Neither party shall be considered to be in default or in breach of his obligations under the Contract if the performance of such obligations is prevented by any circumstance of force majeure which arise after the date of notification of award or the date when the Contract becomes effective, whichever is the earlier.

2. The term 'force majeure', as used herein shall be construed according to Community law as interpreted by the jurisprudence of the European Court of Justice. In order to rely upon force majeure, the Supplier or the Buyer must show that they were unable to perform the relevant operations within the periods laid down, as a result of unusual circumstances outside their control, the consequences of which, in spite of the exercise of all due care on their part, they could not have avoided except at the cost of excessive sacrifice.

3. Notwithstanding the provisions of Article 20, the Supplier shall not be liable for liquidated damages or termination for default if, and to the extent that, his delay in performance or other failure to perform his obligations under the Contract is the result of an event of force majeure. The Buyer shall similarly not be liable, notwithstanding the provisions of Article 19, to payment of interest on delayed payments, for non-performance or for termination by the Supplier for default, if, and to the extent that, the Buyer's delay or other failure to perform its obligations is the result of force majeure.

4. If either party considers that any circumstances of force majeure have occurred which may affect performance of his obligations, he shall promptly notify the other party, giving details of the nature, the probable duration and the likely effect of the circumstances. Unless otherwise directed, the Supplier shall continue to perform his obligations under the Contract as far as is reasonably practicable, and shall seek all reasonable alternative means for performance of his obligations which are not prevented by the force majeure event. The Supplier shall not put into effect such alternative means for performance of his obligations which are not prevented by the force majeure event. The Supplier shall not put into effect such alternative means unless directed so to do.

5. If circumstances of force majeure have occurred and continue for a period of 90 days then, notwithstanding any extension of time for completion of the Contract that the Supplier may by reason thereof have been granted, either party shall be entitled to serve upon the other 30 days' notice to terminate the Contract. If at the expiry of the period of 30 days, force majeure still continues, the Contract shall terminate and, in consequence thereof under the law governing the Contract, the parties shall be released from further performance of the Contract.

#### *Article 26*

#### TERMINATION OF THE CONTRACT

1. Unless otherwise provided, the Buyer may, after giving 7 days notice to the Supplier, terminate the Contract in any of the following cases where:

- a) the Supplier fails to provide the Supplies in strict accordance with the provisions of the Contract;
- b) the Supplier fails to comply within a reasonable time with a notice given by the Authority responsible for acceptance requiring him to make good any neglect or failure to perform his obligations under the Contract which seriously affect the proper and timely performance of the Contract;
- c) the Supplier refuses or neglects to carry out Administrative Orders given by the Buyer;
- d) the Supplier assigns the Contract or sub-contracts without the authorisation of the Buyer;
- e) The Supplier becomes bankrupt or insolvent; or has a receiving order made against him, or compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or goes into liquidation;
- f) any adverse final judgement is made in respect of an offence relating to the professional conduct of the Supplier;
- g) any other legal disability hindering performance of the Contract occurs;

- h) any organisational modification occurs involving a change in the legal personality, nature or control of the Supplier, unless such modification is recorded in an endorsement to the Contract;
  - I) the Supplier fails to provide the required guarantee or insurance, or if the person providing the earlier guarantee or insurance is not able to abide by his commitments;
2. Termination shall be without prejudice to any other rights or powers under the Contract of the Buyer and the Supplier. The Buyer may, thereafter, conclude any other contract with a third party for the account of the Supplier.

The Supplier's liability for delay in completion shall immediately cease upon termination without prejudice to any liability thereunder that may have already occurred.

### ***Article 27***

#### **LAW APPLICABLE**

1. All texts of the contract shall be construed according to the provisions and principles of the law of the European Community. For all matters not covered by the contract provisions, the performance of the contract shall be governed by the law referred to, where appropriate, in the Contract Form.
2. Contracts concluded with the Commission on its own behalf shall be subject to Belgian law.

### ***Article 28***

#### **RESOLUTION OF DISPUTES/ ARBITRATION**

1. In the case of a dispute between the Buyer and a Supplier, which is a national of the recipient State, the dispute shall be referred to the competent tribunals of this State.
2. Where disagreement arises in the course of performance of the contract between the Contracting Authority and a foreign Supplier, all disputes shall be finally settled under the rules of Conciliation and Arbitration of the International Chamber of Commerce (PARIS) by one or more arbitrators appointed in accordance with the said Rules. The venue and the language of such arbitration or the arbitrators shall be determined in the Contract Form.
3. No request for settlement shall be submitted to the arbitrator unless an attempt has first been made to settle the dispute amiably within 120 days as from the notification of the complaints or any other period the parties agree upon. The request for arbitration must be submitted within 60 days as from the end of said period of conciliation.
4. All disputes arising out of Contracts concluded with the Commission on its own behalf shall be referred to the exclusive jurisdiction of the Brussels Courts.

## **ANNEX: LIST OF BENEFICIARY COUNTRIES (TACIS)**

The list of beneficiary countries comprises all countries to which Council Regulation 2053/93 (OJEC L201 of 29.07.1993) applies:

Armenia  
Azerbaijan  
Belarus  
Georgia  
Kazakhstan  
Kyrgyzstan  
Moldova  
Mongolia  
Russian Federation  
Tadjikistan  
Turkmenistan  
Ukraine  
Uzbekistan

## ANNEX: LETTER OF CONTRACT

# LETTER OF CONTRACT

THIS AGREEMENT, made the \_\_\_\_\_ day of \_\_\_\_\_ 1997

BETWEEN the European Commission (hereinafter called "the Purchaser") of the one part and

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(hereinafter called "the Contractor") of the other part:

WHEREAS the Purchaser is desirous that certain Equipment, Spares and Materials should be provided by the Contractor and has accepted a bid by the Contractor for the provision of those Equipment, Spares and Materials in the sum of

EURO

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(hereinafter called the "Contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meaning as are respectively assigned to them in the Conditions of Contract hereafter referred to.
2. The following documents shall be deemed to form and be read and construed as part of Agreement:
  - a) Covering Letter (Invitation for Bids)
  - b) Instructions to Tenderers
  - c) Special Tender Conditions
  - d) Technical Specifications
  - e) General Regulations
  - f) General Conditions
  - g) Letter of Contract
  - h) General Conditions of Contract
  - i) Performance Security
  - j) Form of Handing-Over and Acceptance Certificates
  - k) Bills of Quantities

3. In consideration of the payments to be made by the Purchaser to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Purchaser to supply the Equipment, Spares and Materials in conformity in all respects with the provisions of the Contract.

4. The Purchaser hereby covenants to pay the Contractor in consideration of the supply of the Equipment, Spares and Materials the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Belgium, the day and year first above written.

Signed, sealed and delivered

Contracting Authority

Signed, sealed and delivered

for the Contractor

In the presence of