**العطاء رقم م ش ع ٥/٥٠/١٣/٢٠٢٢/ شراء أجهزة (Microwave) وأجهزة (Multiplexer) لموقع القيادة العامة الجديد.**

**الملحق (ب) المواصفات الفنية والشروط الخاصة**
**المرفق (١) المواصفات الفنية لاجهزة الـ(Microwave)**

وزارة الدفاع

هيئة الاتصالات الخاصة
SPECIAL COMMUNICATIONS COMMISSION

# SCC-MICROWAVE
# 2022

# 1. INTRODUCTION

1.1. Special Communication Commission (SCC) is governmental agency, part of ministry of defense, managed by Jordan Armed Forces which provides communication services to both public (government and army) and private sector.

1.2. SCC is planning to install Two (2) Microwave links, the planned capacities of these links are listed in table (1).

1.3. The microwave links shall handle both SDH and packet Ethernet traffic in different configurations at the same time.

# 2. GENERAL

2.1. The new equipment shall handle all types of traffic (TDM, data packets, management data,).

2.2. All various equipment of this project shall be controlled and managed by one management system, this system will be installed at control site (site 05).

2.3. The management system shall be scalable to handle the addition of new equipment in future.

2.4. The bidder shall provide the detailed documents necessary to demonstrate that the proposed solution meets the requirements of these specifications. The details shall include schematics, mechanical assemblies, drawings … etc.

2.5. The bidder shall propose 10% of the total offer as spare parts and the list of the spare parts shall be priced separately as an optional.

2.6. Technical information related to the sites of this project are provided in this RFP:
- 2.6.1. Site coordinates and towers heights.
- 2.6.2. RF channels bands.

# 3. TECHNICAL REQUIREMENTS

3.1. All the equipment shall be **(equipped and licensed)** to handle the following scenarios of traffic configurations:
- 3.1.1. SDH traffic mode transport on all TRXs.
- 3.1.2. Packet traffic mode transport on all TRXs.
- 3.1.3. Hybrid mixed mode of traffic SDH and Packet traffic (Number of TRX's will be dedicated for SDH and the rest for Packet Traffic).

3.2. The numbers of transceivers in the required links and frequency bands are listed in table (1).

3.3. Each system /Node shall be managed and controlled and managed as a single unit, any customisations, modification or cascading to meet our requirements will not be accepted.

3.4. The current frequency bands shall be used for link calculations; the final exact frequencies will be submitted before contract signing.

3.5. The equipment shall be equipped with all the necessary modules and licensees to handle all of scenarios of traffic configurations mentioned above.

3.6. The offered equipment shall operate on at least **128QAM** modulation.

3.7. The offered equipment shall provide high availability and reliability according to ITU recommendations G821, G826 and R530-98 with appropriate fade margin (not less than 25 dB) for all links.

3.8. Bidder shall state all the modulation schemes the offered equipment support.

3.9. Bidder shall state the links availability, maximum TX power, RSSI threshold and Ethernet capacities by the different modulation schemes for the requested links.

3.10. The Bidder shall provide adequate calculations for all links based on supplied coordinates of the related sites.

3.11. Coordinates and tower heights information of the relevant sites are listed in table (2).

| No | MW Link | Required Transceivers | Traffic Type | Frequency Band |
|---|---|---|---|---|
| | | | | |
| 01 | 051-229 | 8 TRX | Refer to (3.1) | 7 GHz |
| 02 | 129-229 | 4 TRX | Refer to (3.1) | 18 GHz |

**Table (1): Required Capacities with Frequency-Bands**

| Link Site A – Site B | Site Code | Site Coordinate | | Tower Height (m) |
|---|---|---|---|---|
| | | Latitude | Longitude | |
| **051-229** | 051 | 31 56 54.85 | 35 56 58.45 | 60 |
| | 229 | 32 01 39.90 | 35 56 56.45 | 30 |
| **129-229** | 129 | 32 00 53.80 | 35 57 22.40 | 30 |
| | 229 | 32 01 39.90 | 35 56 56.45 | 30 |

**Table (2): Site Coordinates with Tower Heights**

3.12. All links shall comply with the ITU recommendations regarding channel spacing and duplex spacing and compatible with **CCDP** technique the table below shows the used frequency bands:

| RF Channels: | |
|---|---|
| RF 7 | Frequency Band 7 GHz<br>RF channel spacing = 28 MHz<br>Tx/Rx duplex spacing = 245 MHz<br>The number of frequency pairs = 4<br>ITU-R F.385-9 |
| RF 18 | Frequency Band 18 GHz<br>RF channel spacing = 27.5 MHz<br>Tx/Rx duplex spacing = 1010 MHz<br>The number of frequency pairs = 2<br>ITU-R F.595-8 |

3.13. The Links shall be **equipped** with the following traffic interfaces:

| | |
|---|---|
| SDH line interface | Optical (S1.1) LC type, comply with all relevant ITU-T recommendations depending on number of requested transceivers. |
| Ethernet interfaces | • (8)x STM-1 S-1.1 optical SFP interface (LC type) for link (051- 229).<br>• (4)x STM-1 S-1.1 optical SFP interface (LC type) for link (129- 229)<br>• (8)x Ethernet (4x100/1000Base-T, 4x100/1000 Base-LX single mode) SFP interface.<br>• (1)x 10Giga Base-LR Ethernet optical SFP interface for Link (51-229) only. |
| Tributary Interface | • 32 E1 75Ohm Unbalanced Interfaces for Link (129-229). |

3.14. Link (051-229) shall be "fully Indoor Unit Type and designed for this purpose" (only antennas will be mounted on towers) and the indoor units shall be modular and pluggable (any customization or modification of outdoor long-haul solution design to meet the requirement will not be accepted).

3.15. Link (129-229) could be either Fully Indoor Unit Type or Split-Unit Type and the indoor units shall be modular and pluggable.

3.16. For all radio links each indoor unit shall be dedicated for one radio direction, indoor units configured with multiple radio directions (Repeater mode) will not be accepted.

3.17. **SDH Protection**

Equipment shall support the following of SDH transport protection configurations:

3.17.1. **(N+0) and (N+1)** STM-1 Hot-Standby-Protection or any equivalent protection mechanism.

3.17.2. The protection switching shall be configurable (manual and automatic) for both TX side and RX side, The RX switching shall be Hitless.

3.18. **Ethernet Protection**

The Offered Equipment shall support the following of Ethernet transport protection configurations:

3.18.1. Spanning Tree Protocol (STP) including RSTP and MSTP.

3.18.2. Link Aggregation (LAG), which shall handle from 2 up to the maximum number of TRX's for each radio link with all the required licenses.

3.19. **Ethernet VLAN transport**

3.19.1. The Offered equipment shall support transparent transmission of IEEE 802.1Q VLAN tagged frames.

3.20. **Ethernet capability**

3.20.1. The Offered equipment shall support Layer 1/Layer 2 Ethernet transport.

3.20.2. The Offered equipment shall support advanced QoS features including port and VLan prioritization.

3.21. **MPLS capability:**

3.21.1. The radio links shall support IP/MPLS transport.

3.22. **Synchronization**

3.22.1. All synchronisation functions in the equipment shall comply with ITU recommendations.

3.22.2. Offered equipment shall support the following:

3.22.2.1 Synchronous Ethernet (G8262)

3.22.2.2 IEEE 1588v2

3.22.2.3 DS1 line clock

3.23. **Jitter and Wander**

3.23.1. Jitter & Wander accumulation shall comply with latest relevant ITU recommendations for SDH and Ethernet traffic.

3.24. **Interfaces**

**3.24.1. SDH Interfaces (SFP)**

Equipment shall **support** the following SDH interfaces:

3.24.1.1 Electrical interface: (STM-1) electrical according to ITU-T G703.

3.24.1.2 Optical interface: STM-1 Short Haul (S-1.1).

**3.24.2. Ethernet Interfaces:**

Equipment shall **support** the following interfaces:

3.24.2.1 100/1000 BASE-T/TX.

3.24.2.2 100/1000 BASE-SX/LX.

3.24.2.3 10G Base-SR/LR/LH/ER

**3.24.3. Management Interface:**

3.24.3.1 Equipment shall have separate NMS and LCT ports.

3.24.3.2 NMS interface shall be Ethernet RJ-45 and shall support IPv4.

3.24.3.3 In case of a Local Craft Terminal software is used for local access/configuration to the Radios it shall be executable on a portable laptop PC equipped with Microsoft Windows operating system.

3.24.3.4 Tow laptops with the needed software for local access (and license if needed) shall be provided by the bidder as the manufacturer recommended specifications for hardware and software.

3.24.3.5 The bidder shall specify and provide the following:

- Type of port for LCT.
- The protocol that supports the NMS interface.

**3.24.4. Operation and Maintenance**

3.24.4.1 The equipment shall have the capability of creating software loops on traffic ports towards network side and customer side.

3.24.4.2 It shall be possible to download software to equipment centralized from the Management System and locally from the LCT.

3.24.4.3 It shall be possible to download and upload data (shelf, alarm and traffic configuration) between the equipment and the Management System or the LCT.

## 4. LINK AVAILABILITY AND RELIABILITY

4.1. Availability and reliability calculations according to ITU recommendations.

4.2. The availability of the links shall not be less than 99.999% by 128QAM modulation using the proposed Antenna type and dimensions.

4.3. Bidder shall provide availability and fading margin calculations for the links by different modulation configurations.

4.4. All measurements of bit-error ratio (BER) shall be done in accordance with ITU-R recommendations; pseudo-random tests with patterns (2**15-1, 2**21-1) shall be used.

4.5. All types of fading effects shall be considered with appropriate fading margin (not less than 25 dB) for all links.

4.6. The manufacturer shall present m-curves and C/I curves (carrier to interference ratio).

## 5. PERFORMANCE IMPROVEMENT

5.1. The manufacturer shall provide calculations to estimate the improvement of the service reliability of the system with:

5.1.1. Automatic Transmit Power Control (ATPC).
5.1.2. Adaptive Modulation.
5.1.3. Antenna diversity if needed.
5.1.4. Any additional methods to improve performance and reliability.

5.2. Path performance calculations for microwave links shall be provided.

## 6. ALARMS, EVENTS AND SYSTEM PARAMETERS

6.1. The equipment shall be provided with the measurements and control devices that are necessary for supervision, adjustment and quick fault location. By means of software using a PC or any kind of device, it shall be possible to measure at least the following operating values:

6.1.1. Transmit output power.
6.1.2. Received signal level.

6.2. Other measurements such as BER, ES, SES and DM at both local and remote sites.

6.3. By means of local alarms it shall be possible to locate the faulty units and at least the following alarms should be identified:

6.3.1. Power supply unit failure.
6.3.2. Low transmitted power.
6.3.3. Low received signal.
6.3.4. BER exceeding pre-set threshold.
6.3.5. Others specified by the manufacturer.

6.4. These alarms should be identified and displayed remotely through the internal digital supervisory system of the proposed digital radio that also should give information about switching status, quality measurements and alarm history.

6.5. The Bidder shall list all functional blocks and all alarms submitted by these in the following areas:

6.5.1. Communication & Routing
6.5.2. Connection & Protection
6.5.3. Equipment and Software
6.5.4. Generic Support Functions
6.5.5. Overhead Access/User Channels
6.5.6. Performance Management
6.5.7. Security
6.5.8. Synchronisation
6.5.9. Test & Diagnostics
6.5.10. Transmission

6.6. The alarms shall have following associated severity levels (ITU-T X.733):

6.6.1. Critical
6.6.2. Major
6.6.3. Minor
6.6.4. Warning
6.6.5. None

6.7. **Performance Management**

6.7.1. The equipment shall support end to end performance management functions described in the ITU-T Recommendation.
6.7.2. Performance management information shall be available in accordance with ETSI terminology.

6.8. **Data Collecting**

6.8.1. Equipment shall contain at least 24 hours performance data (static or differential) reported in 15 minutes interval.
6.8.2. Equipment shall contain 3 days performance data that was reported in 24 hour interval.
6.8.3. It shall be possible to investigate the performance data with NMS and LCT.
6.8.4. It shall be possible to reset performance data by the NMS and the LCT.

## 7. ANTENNA SPECIFICATIONS

7.1. The antennas to be supplied should meet the performance requirements for the links, based on the length of the hop, path characteristics and Radio Frequency Band used.

7.2. The required antennas shall be **high performance** type and the radiation pattern for each antenna should be supplied.

7.3. The offered antennas for links Group A& B shall be **dual-polarized**.

7.4. All offered Antennas shall be not less than (0.9 m) in diameter.

7.5. Antenna design shall exhibit all high-performance merits with the followings included:

7.5.1. Minimized spell over.
7.5.2. Edge illumination taper.

7.5.3. Absorber material lining for improved pattern performance e.g. Teflon or other specialized coating materials that minimize water or antenna Radom.
7.5.4. Cross-polarization discrimination (XPD) equal or better than 30dB.

7.6. The mechanical design of antenna feeders shall be such that they can withstand without distortion or damage a wind speed of **150 Km/h.**

7.7. Antenna shall be designed for ease of installation and maintenance. The Bidder shall specify the height of each antenna on the tower, so that performance objectives are met.

7.8. All antennas accessories needed (i.e. grounding kits, mounting kits, transmission lines clips, etc.) shall be provided.

## 8. MANAGEMENT SYSTEM

8.1. **The management system shall be offered separately in the technical and financial offer within the Microwave part of the tender and SCC reserves the right to consider it or not.**

8.2. All equipment shall be managed by a unified element management installed and configured by manufacturer at the control centre (site 5).

8.3. All documents, plans and schematics of the system and connections to equipment shall be clearly provided as soft copy and hard copy after installation.

8.4. The manager shall be equipped with redundant power supply and hard disk array (e.g. RAID configuration).

8.5. The system shall be based on the FCAPS standards model (Fault, Configuration, accounting, performance and security Management and shall provide following capabilities:

8.5.1. Automatic and manual Backup and restore of manager's hard disk and configurations.
8.5.2. Remote equipment configuration.
8.5.3. Configuring software loops on traffic ports on RF, IF and Line on both directions.
8.5.4. Transmit output power and Received signal level.
8.5.5. Show alarms and status of equipment.
8.5.6. Remote equipment software upgrade.
8.5.7. Remote access to equipment (similar to LCT GUI capabilities).
8.5.8. Alarms and notifications (active and history).
8.5.9. Performance data for traffic and equipment on a time period basis.
8.5.10. Remote equipment's configuration files upload and download.

8.6. Bidder shall provide complete management solution including the client workstation which will be installed in the control centre.

## 9. MECHANICAL DESIGN

9.1. The equipment shall be designed for fixed installation and comply with international recognized standards such as those approved by CEPT practices.

9.2. Attention should be paid to ensure dissipation of the heat generated.

9.3. The separate units of the equipment shall be designed to be easily handled.

## 10. POWER SUPPLY AND POWER CONSUMPTION

10.1. Offered equipment shall operate on nominally - 48 VDC.

10.2. Each indoor unit shall have its own redundant power supply and to be connected to a designated circuit breaker panel.

10.3. The Bidder shall state the power consumption of all relevant equipment boards listed after equipment types

10.4. The Bidder shall state maximum and average power consumption for all offered equipment.

## 11. LIGTHNING PROTECTION

Transmission lines lightning protection devices are required for all radios.

## 12. Waveguides and Transmission Lines:

12.1. Waveguides and Transmission Lines with sufficient lengths (including horizontal run-in shelter 30m min for the Sites 051, 129 and **120m min in site 229)** shall be provided according to suggested antenna height.

12.2. Waveguides and Transmission Lines accessories:

12.2.1. Connectors.

12.2.2. Other Needed items (clamps, wrap locks, connector reattachment kit …).

## 13. REQUIRED CIRCUIT BREAKER AND PANELS

13.1. Bidder shall provide distribution panels for each site as recommended from manufacturer.

13.2. The distribution panel shall fit into a 19" EIA Rack.

## 14. SIZE AND DENSITY

**Offered equipment shall be provided with the suitable rack or cabinet.**

## 15. EXPECTED LIFETIME

Manufacturer is requested to submit MTBF figures for all offered modules where applicable, and to calculate the expected life time of the offered systems.

## 16. OFFERED EQUIPMENT

The Bill of material of the offered equipment shall provide the part number, version number and description of the unit in an itemized matter for each site.

## 17. TRAINING

17.1. Intensive training course for eight (8) engineers for not less than seven (7) working days, Training shall cover theoretical aspect of:

- Training shall cover theoretical aspect related to installation, operation and maintenance of equipment (SDH traffic transport, Packet traffic transport, and other recommended topics from manufacturer).

- Training shall cover theoretical aspect (DCN, management system operation and administration, NE administration, Ethernet and TDM traffic configuration and other recommended topics from manufacturer) operation and maintenance of manager.

17.2. **Training shall be prior to shipment of equipment.**

17.3. **Training shall be held in manufacturer training centre.**

17.4. **Detailed** training schedule shall be provided by manufacturer showing the timetable for each day of the course and the training materials prior to training, and SCC have the right to modify the topics of the training according to actual needs.

17.5. Instructor qualifications:

17.5.1. A good command of English.

17.5.2. Qualified and have a good technical experience in the field he is tutoring.

17.6. Training cost shall cover:

17.6.1. Training fees.

17.6.2. Training subsistence (respectable accommodation, meals and local transportation).

17.6.3. Air tickets.

17.6.4. Visa fees.

## 18. DOCUMENTATION

18.1. Two sets of documents (hard copy) and one set (software copy) covering in details installation, operation and maintenance of equipment shall be provided.

## 19. CONFIGURATION SOFTWARE

19.1. All firmware, software and licenses needed for the operation, installation and maintenance of the equipment shall be supplied by the Bidder.

19.2. The LCT software shall be bugs free and bidder shall specify the login duration.

## 20. WARRANTY

20.1. Warranty period shall be at least 24 months from in country final acceptance.

20.2. Warranty shall cover all equipment including software.

20.3. All software updates during warranty period shall be provided to SCC free of charge.

20.4. During the warranty period, defective units or modules shall immediately and free of charge be replaced by the Contractor through express mail service (i.e. DHL, Aramex) within two weeks of notification.

20.5. The faulty unit or module will be return back to manufacturer by the Contractor.

20.6. The manufacturer is required to provide the Repair and Return (R&R) or Replacement policy after warranty period.

20.7. R&R/Replacement policy shall include both equipment and software bugs.

## 21. DELIVERY

21.1. All prices shall be CPT QAIA or CIF Aqaba port, bidder shall be responsible for the delivery of the equipment to SCC Warehouses, Amman-Jordan

21.2. Prior to shipment the materials shall be packed and marked for each node.

21.3. All materials excluded from custom duties, sales tax and any other governmental fees. (Freight cost included).

21.4. SCC shall be responsible for custom clearance and any other expenses shall be under supplier's responsibility.

21.5. Delivery period of the equipment shall be during 150 days after awarding notification.

## 22. ACCEPTANCE:

22.1. Final acceptance for the management system will be carried out after the installation to ensure that the equipment performance is according to technical specifications.

## 23. INSTALLATION MATERIALS

23.1. All necessary recommended installation materials from manufacturer needed for the installation shall be provided for each node:

23.1.1. 8x Programming cable for Local Access.
23.1.2. 30m Power cables.
23.1.3. 30m grounding cable.
23.1.4. Recommended Circuit panels and circuit breakers.
23.1.5. Wave-guide Dehydrator if recommended from manufacturer.

## 24. SPARE PARTS

24.1. The Bidder shall supply all necessary spare parts on modular level covering 10% of equipment prices and must cover all main units of the offered system and this list shall be priced separately as an optional.

24.2. The spares shall be divided into:

24.2.1. Consumable spares shall be stated and provided by the manufacturer.
24.2.2. Other spares and modules recommended by manufacturer.

24.3. The manufacturer must guarantee the supply of spare parts (when required) of the offered equipment for a period of at least 7 years and shall provide a commitment letter stating that.

24.4. Bidder is required to provide the prices of the recommended spare modules.

## 25. DEFINITIONS:

25.1. MICROWAVE LINK Means fully operational link between two sites comprising of:

25.1.1. Radio equipment in both sites.
25.1.2. Antenna system.
25.1.3. Transmission lines/waveguides.
25.1.4. Accessories.
25.1.5. Software and licenses.
25.1.6. Dehydrator if recommended from manufacturer.

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الملحق (ب) المواصفات الفنية والشروط الخاصة

المرفق (٢) المواصفات الفنية لاجهزة الـ(Multiplexer)


# SCC SDH/ETHERNET-MULTIPLEXER 2022

# 1. INTRODUCTION

1.1. Special Communication Commission (SCC) is governmental agency, part of ministry of defense, managed by Jordan Armed Forces which provides communication services to both public (government and army) and private sector.

1.2. SCC is planning to purchase (4) SDH/ETHERNET Multiplexers, the new equipment shall handle the existing SDH/PDH traffic and new packet traffic, the planned capacities of these equipment are listed in table (1).

# 2. GENERAL

2.1. The new equipment shall handle all types of traffic (TDM, data packets, management data, etc…).

2.2. All various equipment of this project shall be controlled and managed by one management system; this system will be installed at control site (site 05).

2.3. The management system shall be scalable to handle the addition of new equipment in future.

2.4. The bidder shall provide the details necessary to demonstrate that the proposed solution meets the requirements of these specifications. The details shall include schematics, mechanical assemblies, drawings … etc.

2.5. The bidder shall propose 10% of the total offer as spare parts and the list of the spare parts shall be priced.

# 3. TECHNICAL REQUIREMENTS

3.1. The required systems shall be a non-blocking cross connects type, and each system shall have one and only one back plane.

**3.2. The required equipment shall be equipped with:**

- (2)x STM-16 L16.2 optical SFP interface (LC Type).
- (24)x STM-1 S-1.1 optical SFP interface (LC type).
- (24)x Ethernet (18x100/1000Base-T, 6x100/1000 Base-LX single mode) SFP interface.
- (3)x 10Giga Base-LR Ethernet optical SFP interface.
- (126)x E1 interface (75 ohm Unbalanced, BNC connector, HDB3 line code with DDF).

| Site Code | Qty. |
|---|---|
| 051,080,229,129 | 4 |

Table (1): Sites Requirements.

# 4. TECHNICAL SPECIFICATIONS:

## 4.1. General Functionality:

- The specification in this part covers the technical requirements of SDH/Ethernet transmission for optical line equipment operating on NZDF, standard single mode and DSF optical fibres conforming to latest relevant ITU-T Recommendations.
- All the firmware and software needed for operation, installation and maintenance of the equipment shall be supplied by the bidder.
- The SDH/Ethernet transmission for line equipment systems shall conform to the relevant ITU-T recommendations.

- **Operating Modes**

4.1..1 The transmission equipment has to provide flexible SDH and Ethernet functionality so it can be configured in the following operating modes:

4.1..1.1 TDM over Ethernet.

4.1..1.2 Termination Node.

4.1..1.3 ADM (Add-Drop Multiplexer).

4.1..1.4 SDXC (Synchronous Digital Cross-Connect) node.

4.1..1.5 Ethernet over SDH.

4.1..2 The switch matrix shall provide non-blocking cross-connect capability for both TDM/SDH and packet traffic for at least double the requested capacities.

4.1..3 bidder shall provide switch-matrix capabilities and calculations for both TDM/SDH and packet traffic.

4.1..4 Offered equipment shall map the SDH signal according to ETSI ETS 300 417.

- **Architecture**

4.1..1 All equipment shall support the following network applications:

4.1..1.1 Line network.

4.1..1.2 Mesh network.

4.1..1.3 Ring network.

- **Equipment Redundancy**

4.1..1 Equipment protection:

4.1..1.1 1+1 on switching module (for both TDM and Packet traffic).

4.1..1.2 1+1 on power supply module.

- **Protection**

4.1..1 Equipment shall support the following SDH protection based on relevant ITU recommendations:

4.1..1.1 1+1 Multiplex Section Protection (MSP).

4.1..1.2 Sub Network Connection Protection (SNCP).

4.1..1.3 MS-SPRing.

4.1..2 Equipment shall support the following Ethernet protection based on relevant ITU recommendations:

4.1..2.1 Spanning Tree Protocol (STP) including RSTP and MSTP.
4.1..2.2 Link Aggregation (LAG) including LACP.
4.1..2.3 Ethernet Ring Protection (ERP).

## 4.2. Ethernet Functionality:

- **Ethernet Module**

4.2..1 Ethernet module/card shall support the following interfaces:
4.2..1.1 For 100/1000 Mb/s:
4.2..1.1.1 100/1000Base-T/TX.
4.2..1.1.2 100/1000Base-FX/SX/LX/LX10.
4.2..1.2 For 10 Gb/s
4.2..1.2.1 10G Base-SR/LR/LH.
4.2..2 Interface modules shall support simultaneously a mixture of optical and electrical interfaces.
4.2..3 Bidders shall provide details on their implementation and/or future plans for other interfaces, where such interfaces are planned Bidders should indicate when they will be available.

- **Link Loss Forwarding(LLF)**

4.2..1 All multiplexers shall support link loss forwarding feature.

- **Ethernet Switching Functionality**

4.2..1 The equipment must be capable of switching Ethernet frames based on both MPLS/MPLS-TP labels and Ethernet MAC Addresses.
4.2..2 The equipment must offer the capability of allocating one or more virtual MAC switches to a certain customer's VPN.
4.2..3 The system should be able to mix MPLS/MPLS-TP switching and MAC switching within a single customer domain.
4.2..4 Using the MPLS/MPLS-TP label and MAC switching functionalities, Equipment should be used to provide either Layer 1 and Layer 2 Ethernet Private Line service, or Layer 2 Ethernet VPN services.
4.2..5 The equipment shall support transparent transmission of IEEE 802.1q VLAN tagged frames.

- **Ethernet Virtual Connection (EVC)**

4.2..1 Point-to-point:
4.2..1.1 In this mode one port is bound to another port forming a point-to-point Ethernet tunnel.
4.2..1.2 These two ports can be either in the same equipment or in separate units.
4.2..1.3 The tunnel must be completely transparent.
4.2..1.4 A Minimum of two modes of connections shall be implemented in the system:
4.2..1.4.1 Layer 1 Ethernet Private Line based on mapping into an adjustable size VCG

4.2..1.4.2 Layer 2 Ethernet private line based on Ethernet frames mapped into MPLS/MPLS-TP, assuring QoS guarantees and differentiated services.

4.2..1.5 At each Ethernet port, where Ethernet Layer 2 Capability is available in the Card, the equipment shall be able to label the frames using MPLS/MPLS-TP.

4.2..1.6 Point-to-point Ethernet connections from customer end site to the Virtual MAC Switch shall be established based on either Layer 1 Ethernet private lines (i.e. Ethernet mapped into VCG's) or at Layer 2 Ethernet private lines (i.e. based on MPLS/MPLS-TP).

4.2..2 Multipoint-to-Multipoint:

4.2..2.1 In this mode many ports (end user) in the same equipment or in separate equipment are bound together and connected in a virtual LAN.

4.2..2.2 Connections from the same customer domain can be established via Layer 1 Ethernet private lines or Layer 2 Ethernet private lines to the virtual MAC.

4.2..2.3 The equipment connecting a customer port must also be able to transparently forward incoming Ethernet frames that already have an 802.1q VLAN tag.

4.2..2.4 In a network with transparent customer ports the equipment connecting the aggregation port must be able to forward incoming Ethernet frames to the correct customer port by examination of the 802.1q/802.1ad VLAN tag on the incoming packets.

- **Circuit Emulation Services (CES)**

4.2..1 Equipment shall support the mapping of TDM Circuits over the Packet-switched Network according to ITU/IETF/MEF standards.

- **Ethernet Mapping over SDH Frame**

4.2..1 The format of Mapping/encapsulation of Ethernet traffic into SDH shall be according to ITU-T G.7041 Generic Framing Procedure (GFP).

4.2..2 GFP and LAPS mapping/encapsulation shall be supported simultaneously, i.e. it shall be possible to map the traffic from two Ethernet ports on the same module in different ways, e.g. one port using GFP and the other using LAPS.

4.2..3 The Bidder shall indicate other supported mapping/encapsulation techniques.

4.2..4 Granularity

4.2..4.1 It shall be possible to map/encapsulate variable length payload to virtually concatenated groups at a granularity of VC-12/3/4-Xv in accordance with ITU-T G.707 and ETSI EN 300 147.

4.2..4.2 The burst size shall be configurable.

4.2..5 Bandwidth Allocation

4.2..5.1 VCG bandwidth allocation shall be possible with VC-12/3/4-Xv.

4.2..5.2 It shall be possible to allocate bandwidth up to full line-rate through the use of virtual concatenation (VC).

4.2..5.3 At each Ethernet port it shall be possible to rate-shape incoming frames to the maximum configured values.

4.2..5.4 It shall be possible for multiple Ethernet tunnels to share a common transport path through the use of general framing procedure (GFP) as defined in ITU-T G.7041.

4.2..5.5 GFP must support the encapsulation of entire client frames (i.e. Frame-mapped GFP), in which a single client frame is mapped into a single GFP frame for the purpose of encapsulating Ethernet MAC frames (w/o preamble & Start of Frame Delineator (SFD)), and subsequently map these into a VC-n(-Xv) path in an SDH network.

4.2..5.6 The Bidder shall state whether the Payload FCS is appended or not when the GFP frame is transmitted. The equipment shall accept GFP frames with or without Payload FCS

4.2..5.7 The system must support The Link Capacity Adjustment Scheme (LCAS) according to G.7042.

4.2..5.8 When using LCAS, it shall be possible to route trails over diverse physical paths.

4.2..5.9 Following management system commands shall be supported:

- Add a member to the VCG.
- Remove a member from the VCG.

- **Quality of Service**

4.2..1 In Contention based point-to-point and Multipoint-to-Multipoint services, the equipment shall support MPLS/MPLS-TP Functionality as the means to preserve Quality of Service.

4.2..2 The equipment shall support classification of frames and association of these into service classes based on:

4.2..2.1 Physical port.

4.2..2.2 802.1q/802.1ad VLAN tag.

4.2..2.3 MPLS/MPLS-TP tag.

4.2..3 The equipment shall support a QoS algorithm supporting:

4.2..3.1 A "Real-time" class suitable for voice or video applications.

4.2..3.2 An "Assured quality" class suitable for bursty business data.

4.2..3.3 A "Best effort" class without any guarantees.

4.2..4 It shall be possible to specify a committed Information Rate and a Peak Information Rate for any customer flow of data traffic.

4.2..5 The relation to the Service Classes shall be so that

4.2..5.1 Real Time: CIR=PIR

4.2..5.2 Assured Quality: PIR>CIR>0

4.2..5.3 Best Effort: CIR=0

4.2..6 It shall be possible to overbook the system so that the sum of PIR exceeds the bandwidth of the link between two Network elements

4.2..7 It shall be possible to deliver "hard" QoS for the Ethernet traffic by ensuring that the CIR value is met i.e. to fulfil and guarantee the service characteristics that are promised to an end user. (802.1p is considered "soft" QoS only).

- **Resiliency**

4.2..1 Equipment shall support Link Capacity Adjustment Scheme (LCAS) according to ITU-T G.7042.

### 4.3. Interworking

4.3..1 Bidder shall provide a reference list over vendors to whom the Bidder has proven the Equipment's Ethernet capabilities e.g. GFP, LCAS, MPLS/MPLS-TP, QoS.

### 4.4. Synchronization

- All synchronisation functions in the equipment shall comply with ITU recommendations.
- Offered equipment shall be able to derive timing from the following ports:

4.4..1 Synchronous Ethernet (TE).

4.4..2 IEEE 1588v2.

4.4..3 STM-N interface (T1).

4.4..4 2.048 MB/s G.703 Tributary interface (carrying reference sync) (T2).

4.4..5 2.048 MHz G.703 or 2.048 MB/s G.703 external sync interface (T3).

- Offered equipment shall support at least one, T4 sync output.
- Depending on the application, more than one timing reference input may be available and equipment should have the ability to switch between these automatically if the selected input fails. Bidders are requested to provide full details on the capability of the offered equipment.

### 4.5. Jitter and Wander

- Jitter & Wander accumulation shall comply with latest relevant ITU recommendations for SDH and Ethernet traffic.

### 4.6. Auxiliary Alarms (AUX)

- Offered equipment shall support at least four (4) auxiliary user I/O alarms.
- The AUX alarms shall be a 5V CMOS level, and shall be able to source 5mA as output alarm.
- It shall be possible from the management system to configure the AUX output alarms to be activated when the contact opens or when the contact closes.
- It shall be possible from the management system to configure the AUX output alarms as active-high or active-low.
- It shall be possible to associate the AUX alarms with a pre-defined list of environmental alarms according to relevant parts of ITU-T M.3100
- It shall be possible to set the severity level (Critical, Major, Minor, Warning, None) of the individual AUX alarms

- It shall be possible for AUX alarms of severity Critical or Major to be set as a Rack Alarm
- It shall be possible for AUX alarms of severity Critical or Major to be set as a Visual Rack Alarm.

**4.7. Multiplex Structure**

- Bidders must confirm that the essential interfaces provided on the offered equipment are multiplexed as per ITU-T Recommendation G.707 multiplexing structure ETS EN 300 147.
- For each of the desired or other tributary interfaces offered, Bidders are requested to give a full description of the multiplexing path used.

**4.8. Multiplex transport function:**

- Bidder shall confirm that the equipment conforms with ETS EN 300 417.

**4.9. Interfaces**

- **Tributary Interfaces**

  4.9..1 Equipment shall support the ITU-T G.703 interface 2.048 MB/s (E1), line code is HDB3, and impedance of 75 ohm Unbalanced.

  4.9..2 Equipment shall support framed and unframed 2.048 Mbit/s signals on the same interface card, and it shall be configurable using the associated LCT / EMS.

  4.9..3 Equipment shall have an external Digital Distribution Frame ( DDF ) with the number of requested interfaces with all necessary materials (**3m industrial Baseband cables terminated with connectors between device and DDF** ), this DDF shall have interfaces for traffic monitoring and switches for traffic Loops.

- **SDH Interfaces (SFP)**

  4.9..1 Equipment shall support the following SDH interfaces:

  4.9..1.1 Electrical interface: (STM-1) electrical according to ITU-T G703.

  4.9..1.2 Optical interfaces for equipment:

  - STM-1 Short Haul (S-1.1).
  - STM-1 Long Haul (L-1.1).
  - STM-1 Long Haul (L-1.2).
  - STM-4 Short Haul (S-4.1).
  - STM-4 Long Haul (L-4.1).
  - STM-4 Long Haul (L-4.2).
  - STM-16 Short Haul (S-16.1).
  - STM-16 Long Haul (L-16.1).
  - STM-16 Long Haul (L-16.2).

- **Ethernet Interfaces:**

  4.9..1 Equipment shall support the following interfaces:

  - 100/1000 BASE-T/TX.
  - 100/1000 BASE-SX/FX/LX/LX10.
  - 10G Base-SR/LR/LH/ER/ZpR/ZpW

- **Management Interface**

  4.9..1 Equipment shall have separate NMS and LCT ports.

  4.9..2 NMS interface shall be Ethernet RJ-45 and shall support IPv4.

  4.9..3 The Local Craft Terminal software shall be executable on a portable laptop PC equipped with Microsoft Windows operating system.

  4.9..4 Two laptops with local Craft Terminal software (and license if needed) shall be provided by the bidder as the manufacturer recommended specifications for hardware and software.

  4.9..5 The bidder shall specify and provide the following:

  4.9..5.1 Type of port for LCT.

  4.9..5.2 The protocol that support the NMS interface.

## 4.10. Alarms

- The Bidder shall list all functional blocks and all alarms submitted by these in the following areas:

  4.10..1 Communication & Routing

  4.10..2 Connection & Protection

  4.10..3 Equipment and Software

  4.10..4 Generic Support Functions

  4.10..5 Overhead Access/User Channels

  4.10..6 Performance Management

  4.10..7 Security

  4.10..8 Synchronisation

  4.10..9 Test & Diagnostics

  4.10..10 Transmission

- The alarms shall have following associated severity levels (ITU-T X.733):

  4.10..1 Critical

  4.10..2 Major

  4.10..3 Minor

  4.10..4 Warning

  4.10..5 None

- It shall be possible to suppress emission of an alarm
- It shall be possible to link alarms with severity "Critical" or "Major" to the Rack Alarm and/or Visual Rack Alarm
- Offered equipment shall maintain a Current Problem List (CPL) of all active alarms. It must be possible to read this list from the LCT/EMS
- Offered equipment shall maintain a list of the most recently alarms, active and cleared. It must be possible to read this list from the LCT/EMS.

### 4.11. Performance Management

- The equipment shall support end to end performance management functions described in the ITU-T Recommendation.
- Performance management information shall be available in accordance with ETSI terminology.

### 4.12. Data Collecting

- Equipment shall contain at least 24 hours performance data (static or differential) reported in 15 minutes interval.
- Equipment shall contain at least 3 days performance data that was reported in 24 hour interval.
- It shall be possible to investigate the performance data with NMS and LCT.
- It shall be possible to reset performance data by the NMS and LCT.

### 4.13. Operation and Maintenance

- The equipment shall have the capability of creating software loops on traffic ports towards network side and customer side.
- It shall be possible to download software to equipment centralized from the Management System and locally from the LCT without affecting the traffic.
- Activating new software shall not affect any transport traffic.
- It shall be possible to download and upload data (shelf, alarm and traffic configuration) between the equipment and the Management System or the LCT without affecting the traffic.

### 4.14. Power Source and Consumption

- Offered equipment shall operate on nominally - 48 VDC (1+1 protected).
- The Bidder shall state the power consumption of all relevant equipment modules.
- The Bidder shall state maximum and average power consumption for all offered equipment

### 4.15. Safety

AUTOMATIC LASER SHUTDOWN (ALS)

- Offered equipment shall support ALS according to ITU-T G. 958 on all interfaces.
- It shall be possible to disable ALS
- When disabled ALS it shall be possible to force the Laser on and off
- In case of Laser shutdown by the ALS, the device shall periodically check for connection re-establishment condition in a preconfigured period. If the connection re-established, the device shall turn-on the laser automatically.

## 5. MANAGEMENT SYSTEM

5.1. **The management system shall be offered separately in the technical and financial offer within the SDH/Ethernet multiplexer part of the tender and SCC reserves the right to consider it or not.**

5.2. It shall be the bidder's responsibility to install, configure and operate the management system

5.3. The bidder shall design and plan the DCN for all the requested equipment based on SCC network topology, which will be provided prior to installation.

5.4. The bidder shall provide the management system as a complete solution (operational) including hardware, software, licenses.

5.5. During installation of the system an OJT (On Job Training) is required.

5.6. All documents, plans and schematics of the system and connections to equipment shall be clearly provided as soft copy and hard copy after installation.

5.7. The manager shall be equipped with redundant power supply and hard disk array ( e.g. RAID configuration).

5.8. The system shall be based on the FCAPS standards model (Fault, Configuration, Accounting Performance and security).

5.9. Manager shall provide following capabilities:

- Automatic and manual Backup and restore of manager's hard disk and configurations.
- Remote equipment configuration.
- Remote Circuit (TDM and Ethernet) configurations with end-to-end circuit creation ability.
- Configuring software loops on traffic ports towards network side and customer side.
- Show alarms and status of equipment.
- Remote equipment software upgrade.
- Remote access to equipment (similar to LCT GUI capabilities).
- Alarms and notifications (active and history).
- Performance data for traffic and equipment on a time period bases.
- Remote equipment's configuration files upload and download.

## 6. SIZE AND DENSITY

6.1. Offered equipment shall be rack mounted on 19" EIA rack, in case of ETSI rack shall be offered.

6.2. The Bidder shall state the dimensions of the offered equipment.

## 7. CONFIGURATION SOFTWARE

All firmware, software and licenses needed for the operation, installation and maintenance of the equipment shall be supplied by the Bidder.

## 8. EXPECTED LIFETIME

Manufacturer is requested to submit MTBF figures for all offered modules where applicable, and to calculate the expected life time of the offered systems.

## 9. OFFERED EQUIPMENT

The Bill of material of the offered equipment shall provide both part number and version in an itemized matter.

## 10. TRAINING

10.1. Intensive training course for eight (8) engineers for not less than seven (7) working days, Training shall cover theoretical aspect of:

- (SDH theory, Ethernet over SDH, Packet data, TDM over Ethernet, and other recommended topics from manufacturer,…..) installation, operation and maintenance of equipment.
- Management training (DCN, management system operation and administration, NE administration, Ethernet and TDM traffic configuration and other recommended topics from manufacturer,…) operation and maintenance of manager.

10.2. Training shall be prior to shipment of equipment.

10.3. Training shall be held in manufacturer training centre.

10.4. Detailed training schedule shall be provided by manufacturer showing the timetable for each day of the course and the training materials prior to training, and SCC have the right to modify the topics of the training according to actual needs.

10.5. Instructor qualifications:

- A good command of English.
- Qualified and have a good technical experience in the related field.

10.6. Training cost shall cover:

- Training fees.
- Training subsistence (respectable accommodation, meals and local transportation, medical insurance if required).
- Air tickets.
- Visa fees.

## 11. DOCUMENTATION

11.1. Two sets of documents (hard copy) and one set (software copy) covering in details installation, operation and maintenance of equipment shall be provided.

## 12. WARRANTY

12.1. Warranty period shall be at least 24 months from in country final acceptance.

12.2. Warranty shall cover all equipment including software.

12.3. All software updates during warranty period shall be provided to SCC free of charge.

12.4. During the warranty period, defective units or modules shall immediately and free of charge be replaced by the Contractor through express mail service (i.e. DHL, Aramex) within one week of notification.

12.5. The faulty unit or module will be return back to manufacturer by the Contractor.
12.6. The manufacturer is required to provide the Repair and Return (R&R) policy after warranty period.
12.7. R&R policy shall include both equipment and software bugs.

## 13. DELIVERY

13.1. All prices shall be CPT QAIA or CIF Aqaba port, bidder shall be responsible for the delivery of the equipment to SCC Warehouses, Amman-Jordan
13.2. Prior to shipment the materials shall be packed and marked for each node.
13.3. All materials excluded from custom duties, sales tax and any other governmental fees. (Freight cost included).
13.4. SCC shall be responsible for custom clearance and any other expenses shall be under supplier's responsibility.
13.5. Delivery period of the equipment shall be during 150 days after awarding notification.

## 14. ACCEPTANCE:

14.1. Final acceptance for the management system will be carried out after the installation to ensure that the equipment performance is according to technical specifications.

## 15. INSTALLATION MATERIALS

15.1. All necessary recommended installation materials needed for the equipment shall be provided with each node:
- 1x Programming cable.
- 30m Power cables.
- 30m grounding cable.
- Recommended Circuit panel and circuit breakers.
- Batch cord (20m) according to number of interfaces.
- DDF with 3m industrial baseband cables equipped with connectors (separate cables and connectors will not be accepted) according to number of requested E1 interfaces.

## 16. SPARE PARTS

16.1. The Bidder shall supply all necessary spare parts on modular level covering 10% of equipment prices and must cover all main units of the offered system.
16.2. The spares shall be divided into:
- Consumable spares shall be stated and provided by the manufacturer.
- Other spares and modules recommended by manufacturer.

16.3. The manufacturer must guarantee the supply of spare parts (when required) of the offered equipment for a period of 7 years.
16.4. Bidder is required to provide the prices of the recommended spare modules.

# العطاء رقم م ش ع ٥/٥٠/١٣/٢٠٢٢/ شراء أجهزة (Microwave) وأجهزة (Multiplexer) لموقع القيادة العامة الجديد.

## الملحق (ب) المواصفات الفنية والشروط الخاصة
## المرفق (٣) الشروط الخاصة

## SPECIAL TERMS AND CONDITIONS

1. The proposed equipment shall be 100% brand new and shall be of the latest up to date product (old product equipment will be disqualified).
2. The RFP consists of two parts (Microwave Links & Multiplexers); each part will be evaluated and awarded independently from the other part.
3. The bidder shall enclose two Bills of material for each part of the tender (one priced with the financial offer and the other unpriced with the technical offer).
4. The Management system shall be offered as Optional Item in the technical and financial offer within the Microwave and Multiplexer parts of the tender and SCC reserves the right to consider it or not.
5. SCC reserves the right to increase and/or decrease quantities of system items with the same prices according to any updates might require any modification and has the right to terminate the tender at any time without justifications.
6. The bidder shall prepare the offer in an itemized manner and give a clear list of equipment in each site to meet the requirements.
7. All various manufacturers of equipment proprietor of trade mark (brand name) must be either North American, West European, New Zealand or Japanese origin.
8. All information supplied by Bidder as well as all markings and designations on the equipment, drawings and circuit diagrams shall be in English.
9. The training shall provide both theoretical and practical aspects, and cover all sections of this project.
10. All software and hardware of the proposed equipment shall be of proven industrial quality and workmanship according to relevant international standards.
11. The bidder shall guarantee the availability of spare parts for at least 7 years.
12. The bidder is required to fill in and sign a point-by-point compliance list for all sections and points of this document, the bidder shall complete the filling of compliance list and shall indorse it, the final compliance list will be considered as a vital part of project documents and will be used as a reference for all related matters in future.
13. In case of multiple bidding options, bidder shall contain each option in separate offer with maximum two options.
14. SCC shall disregard the offer if any of the followings:
    - 14.1. Ambiguous or Incomplete offers.
    - 14.2. Missing or incomplete compliance sheets.
    - 14.3. Offer not accompanied by original catalogues, technical drawings and calculations or does not match the related items in the document.

15. The bidder shall fulfil each of the following requirements:
    15.1. Be well established and have efficient, reliable, and technical capabilities for the technical support and supervision when needed free of charge during the installation and the warranty period.
    15.2. Quote for the equipment in an itemized manner for each site separately and SCC reserves the right to determine the final number of sites and equipment subject to budget.
    15.3. Provide the necessary documentation (manuals, data sheets and schematic diagrams of the supplied system in soft & hard copy versions in English) and accessories needed for the installation.
    15.4. Present original catalogues, and software releases by the mother company in English.
    15.5. All mandatory "missing in the offer" appliances or cards and licenses recommended from the manufacturer for proper operation (as per the requirements) of equipment shall be delivered free of charge.

16. In case where the bidder is not fully compliant with the specifications, bidder shall state the reason and/or why SCC should reconsider his position.
17. The bidder is invited to suggest any change to any required specification which will improve the performance of the required equipment together with the reasoning for this alteration, SCC reserves the right to accept this change (solution) or refuse it.
18. All the connectors and cables shall be of high quality and in compliance with code recommendations and SCC reserves the right to reject any item not in conformance with the international standards.
19. Any abbreviation or symbol used in the schematics, drawings and calculations shall be clearly described.
20. The proposed equipment, materials and services shall be in accordance with these technical specifications. Any comments regarding transmission plan, network management, etc. shall be included in the technical proposed solution as "Engineering considerations".

بسم الله الرحمن الرحيم

القيادة العامة للقوات المسلحة الأردنية - الجيش العربي

مديرية المشتريات الدفاعيـــــــــــة

الرقم : م ش ع/ ٥٠/ ١٣/ ٢٠٢٢/ ٢٤٨

التاريخ : ٢٨ ربيـــع الاول ١٤٤٤

٢٤ تشرين الأول ٢٠٢٢

السادة

الموضوع : الاستفسارات الفنية

الاشارة: دعوة العطاء رقم م ش ع ٥/٥٠/١٣/٢٠٢٢ شـــــراء( أجهـــزة (Microwave) وأجهزة (Multiplexer) لموقع القيادة العامة الجديد )

١. يرجى العلم ما يلي :

أ. بالنسبة للمواصفة رقم (3.13)

- **The (10Gbps) interface shall be offered as main item and the radio shall be ready to install this card at any time later instead of STM-1 card .**

ب. - **The redundant power card shall be offered as optional item**

٢. يعتبر هذا جزء لا يتجزأ من دعوة العطاء ولا تعديل على باقي المواصفات والشروط .

" و اقبلوا فائق الاحترام "

العقيد المهندس

رئيس لجنة الشراء المركزيـــــــــــة

غازي عبدالوهاب الشوابكـــــــــــه