



# SCC-MICROWAVE 2023

## 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 and install **five (5)** 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, packets 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. TDM traffic mode transport on all TRXs.
  - 3.1.2. Packet traffic mode transport on all TRXs.
  - 3.1.3. Hybrid mixed mode of traffic TDM and 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 licenses to handle all of scenarios of traffic configurations mentioned above.
- 3.6. The offered equipment shall operate on at least **128 QAM** 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
1	(192-193)	2 TRX	Refer to (3.1)	7 GHz (with XPIC)
2	(193-194)	2 TRX	Refer to (3.1)	7 GHz (with XPIC)
3	(191-Tower 35)	2 TRX	Refer to (3.1)	18 GHz
4	(193-Tower 30)	2 TRX	Refer to (3.1)	18 GHz
5	(194-Tower 27)	2 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	
192-193	192	32 43 22.70	37 40 18.30	60
	193	32 51 07.60	37 52 17.90	60
193-194	193	32 51 07.60	37 52 17.90	60
	194	32 59 55.00	38 12 35.90	60
191-Tower 35	191	32 34 46.70	37 27 09.25	60
	Tower 35	32 36 57.6	37 27 57.60	45
193-Tower 30	193	32 51 07.60	37 52 17.90	60
	Tower 30	32 52 53.05	37 52 28.06	45
194-Tower 27	194	32 59 55.00	38 12 35.90	60
	Tower 27	33 03 18.00	38 11 49.2	45

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

- 3.12. All links shall comply with the ITU recommendations regarding channel spacing and duplex spacing, the table below shows the used frequency bands:

<b>RF Channels:</b>		
	RF 7	Frequency Band 7 GHz RF channel spacing = 28 MHz Tx/Rx duplex spacing = 245 MHz ITU-R F.385-9
	RF 18	Frequency Band 18 GHz RF channel spacing = 27.5 MHz Tx/Rx duplex spacing = 1010 MHz ITU-R F.595-8

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

SDH line interface	Optical (S1.1), comply with all relevant ITU-T recommendations depending on number of requested transceivers.
Ethernet interfaces	(4)x(100/1000Base-T) Ethernet Interface
Tributary Interface	16 E1 75Ohm Unbalanced Interfaces for all links.

- 3.14. The links could be either Fully Indoor Unit Type or Split-Unit Type and the indoor units shall be modular and pluggable.
- 3.15. 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.
- 3.16. Each TRX shall be dedicated for only one (single) carrier, dual carrier TRX will not be accepted.

**3.17. TDM Transport**

Equipment shall support and equipped with required cards and licenses for the transport of TDM Traffic over Ethernet.

**3.18. Ethernet Protection and Transport**

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

- 3.18.1. Radio Link Aggregation according to the number of the requested TRX's.
- 3.18.2. Spanning Tree Protocol (STP) including RSTP and MSTP.



### **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

### **3.23. 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.

#### **3.24.3. 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 One laptop 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.

#### **3.24.4. 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. It shall be possible to investigate the performance data with NMS and LCT.
  - 6.8.3. 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 shall be **dual-polarized** for all links.
- 7.4. All offered Antennas shall be not less than (0.6 m) in diameter.
- 7.5. Antenna design shall exhibit all high-performance merits with the followings included:
  - 7.5.1. Minimized spill 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 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. LIGHTNING 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.
- 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 six (6) engineers for not less than five (5) working days, Training shall cover theoretical aspect of:

- Training shall cover theoretical aspect related to installation, operation and maintenance of equipment (TDM 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. Air tickets.

17.6.3. Accommodation.

17.6.4. Transportation.

## **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. 2x 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.

## 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 Management system shall be offered as **OptionalItem** in the technical and financial offer of the tender and SCC reserves the right to consider it or not.
3. 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.
4. The bidder shall prepare the offer in an itemized manner and give a clear list of equipment in each site to meet the requirements.
5. All various manufacturers of equipment proprietor of trade mark (**brand name**) must be either North American, West European, New Zealand or Japanese origin.
6. All information supplied by Bidder as well as all markings and designations on the equipment, drawings and circuit diagrams shall be in English.
7. The training shall provide both theoretical and practical aspects, and cover all sections of this project.
8. All software and hardware of the proposed equipment shall be of proven industrial quality and workmanship according to relevant international standards.
9. The bidder shall guarantee the availability of spare parts for at least 7 years.
10. 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.
11. In case of multiple bidding options, bidder shall contain each option in separate offer with maximum two options.
12. SCC shall disregard the offer if any of the followings:
  - 12.1. Ambiguous or Incomplete offers.
  - 12.2. Missing or incomplete compliance sheets.
  - 12.3. Offer not accompanied by original catalogues, technical drawings and calculations or does not match the related items in the document.
13. The bidder shall fulfil each of the following requirements:
  - 13.1. 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.
  - 13.2. 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.
  - 13.3. 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.
  - 13.4. Present original catalogues, and software releases by the mother company in English.

- 13.5. 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.
14. 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.
15. 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.
16. 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.
17. Any abbreviation or symbol used in the schematics, drawings and calculations shall be clearly described.
18. 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".