



## SCOPE of WORK and SUPPLY

### CE18-011: UPGRADE of the TELEPHONE EXCHANGE NETWORK

#### **SUMMARY**

The general concept of the project is for the existing ISDN Telephone Exchange Network composed of Hicom Exchanges which are purely Time Division Multiplexed (TDM) switches and presently are outdated, to be upgraded to the latest Voice over IP (VoIP) technology.

Telephone Exchange Network shall be upgraded as a turnkey project, with all the engineering, procurement, construction/installation (EPC) works to be executed by the qualified Bidder, which will eventually be the main Contractor for the project.

As part of its standard functionalities, the new VoIP telephone system shall be of latest version with the capability to support the existing old TDM technology (Hybrid IP PBX) / Hicom 300. During and after the new system construction, installation and integration process, the existing telephone network shall be fully functional and with the normal operation unhampered and uninterrupted.

All the required software shall be of latest version at the time of acceptance. All succeeding updates on the software/firmware version and upgrades to the hardware will be backward-compatible for a minimum period of twenty-five (25) years.

Actual quantities of materials to be supplied shall be based on the actual assessed requirements plus the 20% spare capacities for future unforeseen installation.

The upgrading process shall be the gradual replacement of the various existing Private Branch Exchanges (PBXs) with the corresponding latest VoIP telephone system equipment, to be installed in the same sites where the existing PAXs are located.

Under this project, the following existing network nodes/PBXs shall be replaced:

<b>Node</b>	<b>Name</b>	<b>Location</b>	<b>Brand/Model</b>	<b>SW Ver.</b>
K100	Exchange A	CC - Brega	Siemens/Hicom 300 (392)	V3.5.9
K120	HiPath Exchange	CC - Brega	Siemens/HiPath 4000	V3.0
K101	Exchange B	Main Admin Bldg., Brega	Siemens/Hicom 300 (382)	V3.5.9
K102	Exchange C	New Admin Bldg., Brega	Siemens/Hicom 300 (392)	V3.5.9
K113	Exchange D	New Brega City, Brega	Siemens/Hicom 300 (382)	V3.5.9
K108	Zelten Exchange	Zelten Field	Siemens/Hicom 300 (382)	V3.5.9

The two (2) exchanges, Exchange A (for extensions) and HiPath Exchange (for trunk lines), shall be merge in to one (1) system having the combined functionality of both PBX.

Bidders shall have proven track records in the manufacturing and implementation of large scale PBX Network, including their fully accredited third-party distributors/ suppliers.

It is the Bidders' responsibility to conduct an actual Site Survey before submitting the bid proposal, in order to thoroughly assess the existing network equipment and all the related operating facilities, to determine and propose for the system components that require upgrading, and the additional works and materials needed to implement the terms of the project.

Each Bidder shall submit its bid proposal for evaluation and eventual qualification, which shall be generated based on the defined specifications and the result of the actual site survey.

The scope of work and material supply for the new system shall include, but not limited to the following:

1. **Controller** shall be redundant/duplicated in each of the upgraded locations, with both controllers working in Main/Hot-Standby modes of operation.
2. **Private Branch Exchange (PBX)** shall be complete with all the latest features configured to operate as a) component of the existing telephone network and b) standalone when network become unavailable.
3. **Endpoint Licenses** to register/activate extensions, IP endpoints, Unified Communication (UC) endpoints, ISDN lines and/or trunk/tie lines. The new system shall have license re-purposing or reallocation to maximize the use of available licenses.
4. **VoIP (H323/SIP) Gateway/Registrar** shall register IP endpoints and/or conversion of legacy endpoints to IP and vice-versa, with each gateway/registrar configured as fallback option for other locations during outages. At least a 20% spare endpoint license shall be provided for each location.
5. **E1-ISDN / Primary Rate Interface (PRI)** shall connect the new IP PBXs with the other remaining Legacy PBX within the QSIG-ISDN Telephone Network. Additional PRI connections shall interconnect the new PBXs together and serve as backup link when data network is unavailable.
6. **Foreign Exchange Office (FXO) Interface** shall connect POTS or analog trunk lines to the new PBX. The existing active POTS lines shall be connected to the new PBX.
7. **16-Port (SIM) GSM Gateway** (8-port per service provider) shall be installed as priority routes for GSM outgoing calls for two (2) new carrier groups (Libyana and Al Madar).
8. **4-Wire E&M** shall connect the new CC-Brega PBX to the Misurata Hicom 300 Exchange.
9. **E1-R2 Interface** (30-channel multiplexed digital line utilizing analog signal) shall connect the incoming/outgoing E1 lines from Benghazi to new CC-Brega PBX using Channel Associated Signaling (CAS).

10. **Foreign Exchange Subscriber (FXS)** Interface shall connect all analog telephone extensions to the new PBX in each of the locations. FXS interfaces shall be compatible with the existing units.
11. **IP Phones / Extensions** shall replace all digital phones; shall be PoE and with Ethernet patch cable for network connections; with built-in LAN port for connection of existing terminals/workstations.
12. **Attendant Consoles (ACs)** shall be installed in the PBX at CC-Brega for incoming calls and directory assistance. Two (2) groups of three (3) ACs shall be considered, with one group dedicated to industrial subscribers and the other for residential subscribers, with common attendant code assigned to both group for automatic routing of calls from both groups. Another AC shall be provided as international call assistance which shall also act as traffic overflow route for either of the groups.
13. **Network Switches** shall be PoE capable to connect all PBX equipment and gateways to the exchange network, either through single-mode fiber optic cables (10G) or OTN/SDH system (100M) between sites.
14. **Shelter, Cabinets & Racks** shall house and secure all indoor installed system equipment. Brand new containers shall be provided for CC-Brega and Zelten, fully equipped with air-conditioning units, equipment cabinets, power supplies and other required facilities/accessories.  
All indoor equipment shall be fitted in standard 19” racks, fixed inside the floor-mounted cabinet with sufficient height, and with front & back hinged doors, for easy access during maintenance.
15. **Power System** with sufficient capacity to supply the required power in each location; Redundant 48VDC rectifier/charger with capacity to power the entire system and charge the backup batteries.  
**Solar Power** shall be considered in CC-Brega and Zelten Field as the new system main power source.  
The existing power systems in the various sites shall be assessed to increase the existing power ratings to include the 20% extra load allocation allowance for future installation.  
Power supply requirement computation for each site shall be submitted for approval.
16. **Main Distribution Frame (MDF) / Intermediate Distribution Frame (IDF)** in each system location shall cross connect the FXS/FXO interfaces and the outside cables going to the subscribers/POTS and other connections required for the new systems. Insulation Displacement Connections (IDC) type shall be provided for the cross connection of interfaces.
17. The new PBXs shall generate Call Detail Records (CDR) within their node and providing this data to the **Call Accounting System**. The existing Call Accounting System shall be integrated of the new PBXs.
18. **Network Management Terminal (NMT)** shall be supplied in CC-Brega for centralized management of the systems and subscribers; Administration, Configuration and Maintenance of the system software.

**Mobile NMT** for on-site maintenance activities shall be supplied.

19. **Automated Attendant (AA) / Interactive Voice Response System (IVRS)** shall be an integral part of the new system. Integration of the existing IVRS with the new PBX including shall be considered. Voicemail boxes for a small number of extensions shall be a built-in component of the new PBX.
20. **Unified Communication (UC)** platform for synchronous communication requirements shall be an integral component of the new system. All licenses shall be permanent. Cloud licenses are not acceptable.
21. **PBX Integrated Mobile Exchange** for mobile communication in the fields shall be an integral part of the PBX network, either through IP or ISDN (Trunked) for direct communication with PBX. TETRA solutions is not acceptable; CDMA/GSM-based solutions are preferable.
22. **Training** shall be considered as component of the project to include the following:
  - **COMPANY** designated two (2) Libyan Engineers as project representatives shall attend and participate in the system/network engineering and procurement stages of the project.
  - As part of the technology transfer, **Operation** and **Maintenance** training courses to be participated by at least six (6) Libyan Engineers shall be conducted abroad in manufacturers' premises. On-site training shall also be conducted at **COMPANY** site.
23. **Technical Support/Service Personnel** shall be provided to be directly responsible for the routine maintenance, troubleshooting & repair works whenever newly installed system encounters technical problem within the duration of the guarantee period.

**OPTIONAL CONSIDERATION:**

- Other equipment, facilities, accessories and functionalities not properly defined in this document but necessary to result in a complete efficient upgraded VoIP telephone system shall be considered in the proposal with the technical details to be provided, for **COMPANY** consideration.
- Alternative components and solutions to any specified requirement that may be found conflicting shall be proposed with technical justifications, for **COMPANY** consideration.
- Attached herein are documents for the Bidders' reference for easy understanding of the requirements:
  - Drawing/SK-01: Existing and Upgraded Configuration Layouts
  - Pre-Qualification Survey Form



## Pre-Qualification Survey Form

Project. No. : CE18-011  
Effect Date :  
Issue No. : 01  
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Item	Criteria	Details		
<b>I. COMPANY PROFILE</b>				
A	Company Name:			
B	Company Address (Main):			
C	Other Address/es (List all branches that might have future involvement in the project, one way or another.)			
D	Company Represented (if authorized distributor)			
E	Previous Project/s with Similar Scope (List all that applies)			
F	Brand / Model of Proposed System			
G	SW/HW Versions			
<b>II. TECHNICAL</b>				
<b>H Main Processing Unit</b>				
1	Redundant, in Active/Hot-Standby Operation	YES	NO	
2	Distributed System with One (1) Master and Multiple Slave PBX (where Slave nodes are capable of stand-alone operations in the event of Master outage)	YES	NO	
3	Multi-node networked system via IP or ISDN (QSIG) with Open-Numbering System	YES	NO	
<b>I Licensing</b>				
1	Port Licenses	YES	NO	
2	Analog Trunk Licenses	YES	NO	
3	Digital Trunk Licenses	YES	NO	
4	DSP Licenses	YES	NO	
5	Unified Communication Licenses	YES	NO	
6	Multi-purpose Licenses	YES	NO	
7	Other Licenses (list all that is required)	YES	NO	



## Pre-Qualification Survey Form

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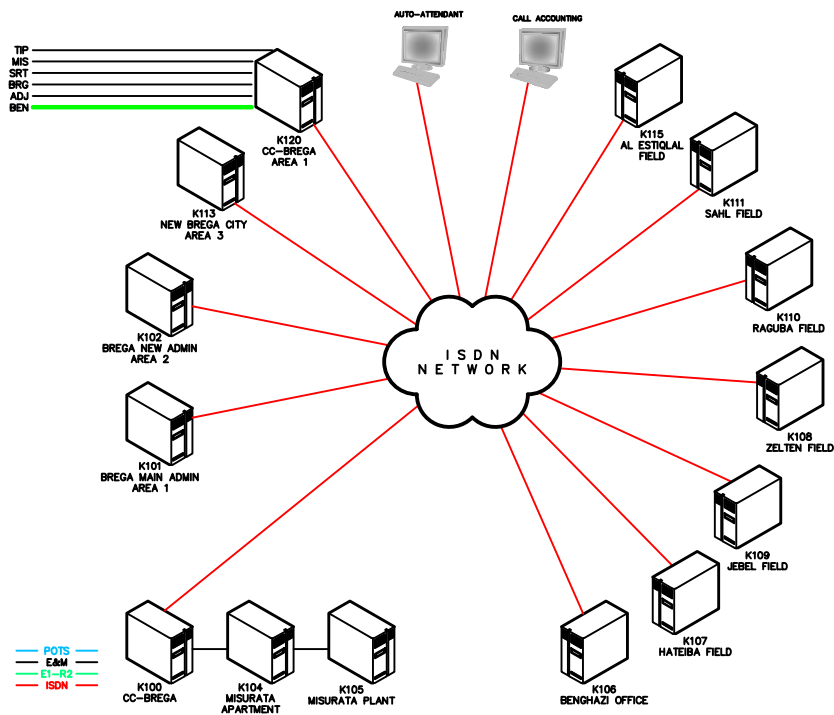
Item	Criteria	Details		
<b>J</b>	<b>Voice over IP</b>			
1	Supported Standard Protocol			
	a. H323	YES	NO	
	b. SIP	YES	NO	
2	Audio Codecs (list all supported codecs)	YES	NO	
3	Voice Compression (list all supported voice compression protocols)	YES	NO	
<b>K</b>	<b>Endpoints</b>			
1	IP Phone	YES	NO	
2	Video Phone	YES	NO	
3	Attendant Console	YES	NO	
4	Softphone	YES	NO	
5	Mobile Client	YES	NO	
6	Other Clients (list all that applies)	YES	NO	
<b>L</b>	<b>PBX Ports and Gateways (Specify additional hardware required, if any)</b>			
1	Analog Extensions / FXS	YES	NO	
2	Digital Extensions (specify each type)	YES	NO	
3	Analog Trunklines (a/b) / FXO	YES	NO	
4	Legacy TDM Trunklines (E1-R2)	YES	NO	
5	Legacy Tie Lines (E&M)	YES	NO	
6	E1-ISDN (list all supported protocols)	YES	NO	
7	SIM (GSM) Gateway	YES	NO	
<b>M</b>	<b>Compulsory Features</b>			
1	Call Forwarding/Call Diversion	YES	NO	
2	Call Pickup (Group & Direct)	YES	NO	
3	Boss/Secretary Group	YES	NO	
4	Hunting Group / Group Call	YES	NO	
5	Multi-Party Conference (min. 8-party)	YES	NO	
6	Call Transfer (Trunk-to-Extension & Trunk-to-Trunk)	YES	NO	
7	Call Waiting / Second Call	YES	NO	



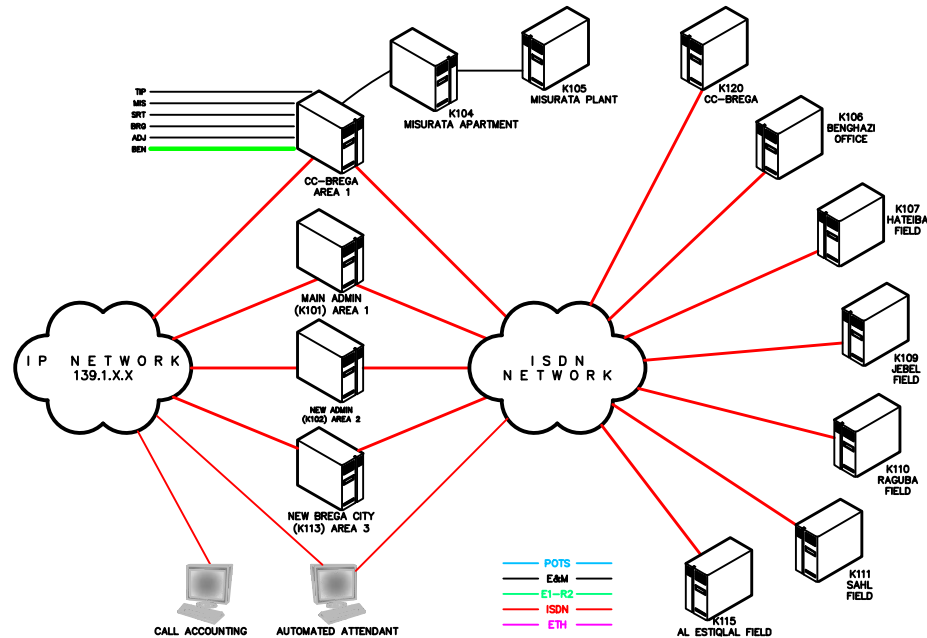
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Item	Criteria	Details		
8	Callback	YES	NO	
9	Hotline	YES	NO	
10	Malicious Call Tracing	YES	NO	
11	Call Detail Recording	YES	NO	
12	Message Waiting Indication	YES	NO	
13	Caller Line Identification (CLID)	YES	NO	
14	Multi-Company Configuration with Internal Traffic Restrictions	YES	NO	
15	Multi-Carrier Group with Least Cost Routing	YES	NO	
16	Toll Code & Class-of-Service Restrictions	YES	NO	
III. ATTACHMENTS				
Attach all relevant supporting documents and data sheets.				



TELEPHONE EXCHANGE NETWORK  
EXISTING CONFIGURATION BLOCK LAYOUT



TELEPHONE EXCHANGE NETWORK  
UPGRADE CONFIGURATION BLOCK LAYOUT

LEGEND:

NO.	DATE	BY	DESCRIPTION	CHK'D	APP'D	CONT.
A	07/08/22	C/ENG	ISSUED FOR REVIEW			
<b>SIRTE OIL COMPANY</b>						
DRAWN BY		CHECKED BY		SCALE: NTS		
MAINT. DEPT.		DATE COMPLETED				
OPNG. DEPT.		ENG. DEPT.				
THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION OR FOR ORDERING MATERIALS, PARTS, EQUIPMENT, AND SUPPLIES.				COPYING DATE		
TELEPHONE EXCHANGE NETWORK BREGA & FIELDS						
UPGRADE OF EXISTING TELEPHONE EXCHANGE NETWORK						
EXISTING AND UPGRADE NETWORK CONFIGURATION LAYOUTS						
PROJECT NUMBER	INDEX	DRAWING NUMBER	SEQUENCE	REV.		
CE18-011		SK-01	0			

END FILE IN.

NO CHANGES TO ORIGINAL DRAWING