



Republika ng Pilipinas  
**Lungsod Quezon**  
Tanggapan ng Tagapangasiwang Panlungsod



**TERMS OF REFERENCE**  
**NETWORK INFRASTRUCTURE OF PABX AND WIFI ACCESS FOR QUEZON CITY**  
**AMORANTO SPORTS COMPLEX**

**I. RATIONALE AND BACKGROUND**

The Quezon City Government under the present administration resolve to retain the best service of a Telecommunication Company for the purpose of ensuring effective management and administration of incoming, internal and outgoing calls taking advantage of state of the art technology.

**II. PROJECT OBJECTIVE**

To address the requirement of Quezon City Amoranto Sports Complex for an inbound customer solution with call transfer to different buildings, departments/offices and outside calls through the use of the latest version of IP PABX system.

A bill of materials and quantities or any equivalent document which may or may not be attached with these terms of reference shall simply serve as a guide to accomplish whatever is required for the full completion of this project. Any deficiency that may arise from the said attachment shall bear no effect to the required accomplishment of this Project Terms of Reference unless such discrepancy shall amount to more than 20 percent of the total project cost.

**III. SCOPE OF WORK**

1. Coordination meeting with project coordinator to secure working permits
2. Mobilization, site verification and delivery of materials & manpower with Licensed Engineer as the Project Manager.
3. Installation of PVC Pipes and fittings for the VOIP, Wi-Fi & Backbone Cabling works from distributed MDF & IDF's to distributed work station based proposed plan and diagram.
4. Installation of Hangers, Support, Boxes and fittings for the VOIP, Wi-Fi & Backbone Cabling works from distributed MDF & IDF's to distributed work station base on the proposed plan and diagram.
5. Installation of UTP cat6 cable for the VOIP & Wi-fi Cabling works from distributed MDF & IDF's to distributed work voice & Wi-Fi station based on the proposed plan and diagram.
6. Cable pulling of 1run 8core each OM3 Fiber Optic cable for the Backbone Cabling works from MDF to distributed IDF's based the proposed diagram.
7. Installation of 100 pairs Multipairs Telephone cable for the Tie Cabling works from MDF to distributed IDF-GF.
8. Installation of Network Cabinet, Cable Management Panel, Patch Panel, Patch Cord, Information Outlet, 110 Type Terminal Block, Optical Distribution Panel, Fiber optic Pigtail Connector, Fiber Optic Protection Sleeve, Fiber optic Patch Cord & Fiber Optic consumable kit.
9. Termination of UTP Cat6, Multipairs & Fiber Optic Cables for the VOIP, Wi-Fi & Backbone Cabling works based the proposed plans and single line diagram.

10. Tracing & Testing of UTP & Fiber Optic Cables.
11. Quezon City Amoranto Sports Complex site inspection
12. Submission of proposed premise installation plans
  - a. A detailed diagram of the QC-LGU network as it is expected upon project completion (to be submitted upon bid);
  - b. The outdoor equipment and its component cabling systems must be secure from environmental hazards such as weather, vehicular and human traffic;
  - c. All equipment and conduits shall be fully compatible with existing infrastructure and equipment;
  - d. The accompanying Electrical and Electronic and Data Network Plans requirements must be signed and sealed by a licensed Professional Electronics and Communications Engineer (PECE);
  - e. All cables (including power cables) are to be labeled on end-to-end, while labeling shall follow alphanumeric standard codes which shall be approved by the End-User, logged and supported with a separate diagram per building installation.
13. Approval of installation plans per building site from the corresponding ITDD officers.
14. Installation, configuration, testing and commissioning of equipment, devices, and signed-off by a licensed network engineer and attested by an assigned ITDD.
15. Submission of a copy of the cabling map, cabling plans and pertinent documents to the Engineering and City Planning Departments for future reference and necessary clearances.
16. Final testing and commissioning as attested by the contractor's Network Engineer, Professional Electrical Engineer and/or Professional Electronics and Communications Engineer, End-User, ITDD.

#### **IV. Technical Specifications**

##### **System Specifications (Unified Communication System)**

###### **A. IP-PBX Server – (1 System)**

- i. Must support single endpoint for voice.
- ii. Must have a system running on Linux platform, Asterisk for VoIP applications, and on an enterprise level solution.
- iii. Must be an appliance and hardware-based IP-PBX Server.
- iv. Must be scalable and optimized for enterprise scale organizations with up to 500 users. Default 30 users are free, beyond 30 users requires to purchase a perpetual license per user. Maximum user capacity is 500 users.
- v. Must have pre-loaded applications for voice, messaging, conferencing, and other voice related features.
- vi. Must support intelligent call routing, voice messaging, auto attendant/IVR for incoming calls.

vii. Must have the following telephony capacities:

<b>Maximum number of concurrent calls</b>	200 concurrent calls
<b>Built in storage</b>	250 Gb SSD
<b>Maximum number of users</b>	500 users (30 users are free, beyond 30 users license base)
<b>Maximum number of concurrent calls</b>	200 (g.711 SIP) 45 (PRI / BRI / FXS)
<b>Users (extensions)</b>	30-500 (license-based)
<b>Linux version</b>	Debian 11 or its equivalent benchmark
<b>SECURITY</b>	Intrusion protection software, firewall protection, password strength indicator, class-of-service, dialing rules, modern Linux tools
<b>Processor</b>	Quad core Cortex-A72 (ARM v8) 64-bit SoC, 1.5GHz or its equivalent benchmark
<b>USB</b>	2 X USB 3.0
<b>VIDEO</b>	2 x Micro-HDMI
<b>RAM</b>	2 GB
<b>Power supply</b>	5 VDC, 3A
<b>Voltage</b>	Switching, auto adjust 100/240 Volts, 50/60 Hz
<b>Power consumption</b>	Maximum 15 Watts
<b>Network</b>	1 x Ethernet port 1 Gbps 1 x Ethernet port 100 Mbps
<b>Maintenance and Support</b>	Monitor and keyboard support Software updates (under service agreement)

- viii. Must support multiple codec such as ulaw, alaw, slin, g726, gsm, g729, ilbc, 9723, g726aals, adpcm, lpc10, speex, g722, h264, h263p, h263, h261, opus, vp8, etc
- ix. Must provide security on the telephones units such as firewall functionalities and intrusion detection.
- x. Must be capable of both proprietary and non-proprietary softphones for both mobile and desktop platforms.

- **Basic Functions and Features**

Call Features	Security	Unified Communications	Call Center	Administration
Conference Calls	Authorization codes	Audio conferencing	Agent login/logout	Announcements
Auto-Redial/Camp on	Built-in firewall	Call recordings access	Barge	Backup & Restore
Boss/Secretary + Whitelist	Call encryption (SIP TLS, sRTP)	Corporate phone book	Call monitoring	Blacklist
Call back	Call Permission Management	Fax-to-email	ACD/Call queues	CLI Access (via GUI)
Call forward (busy, no answer, unconditional)	Intrusion detection and blocking	Fax from web	Call recording	Disaster Recovery
Call parking	Limiting or call blocking (outbound)	Instant messaging/chat	Caller Name Lookup	Dashboard
Call pickup	Password strength indicator	One number reach	CDR (Call Details Record)	IP phone provisioning
Call Transfer (blind, attended)	PIN-protected outbound calls	Multiple devices per user	Click-to-call	Email notifications
DISA (Direct Inward System Access)	User permission management	Personal call log	Chat	Extension roaming
DND (Do Not Disturb)	Secure password auto-generation	Personal extension settings	Conferencing (on-the-fly)	Extensions status management
Find me/Follow me	Time based restrictions	Presence	Customer account codes	Feature codes management
Caller ID (CLID)	Weak password report	Personal IVR (VMX Locator)	Hot-desking	Global search (within the NMS)

CDR (Call Details Record)	Authorization codes	Voicemail to e-mail	Hunting groups	High-availability (TwinStar)
Class of Service		Visual voicemail	Instant messaging/chat	Import & Export extensions
Conference Bridges		User portal: voicemail, fax, & recordings	IVR/Auto-attendants (Unlimited)	Language support
Corporate phone books			Listen to agent	Log file viewer
Direct Inward Dial Numbers (DIDs)			Pick-up groups	Music on hold
Inbound/Outbound fax support			Presence (agent status)	Network settings tool
Message Waiting Indicator (MWI)			Queue priorities	Night modes
Paging & Intercom			Queue VIP list	Notifications
Short-code dialing			Ring group strategies	PBX status reports
Speed Dial			Time-based routing	Pickup groups
Video calls			Visual switchboard	Pre-defined user roles
Voicemail			Whisper to agent	Remote administration
Voicemail-to-email			Call Center Reporting	Storage monitoring
Voicemail broadcast				System-wide speed dial
Wake-up Calls/Reminders				Time Conditions
Personal recording/notes				User-friendly Web interface
Direct trunk to trunk connection				User PIN code

**B. Entry Level/Staff IP Phone (47)**

- 1000 local phonebook, caller ID, call hold, call transfer
- Capable of 2 SIP Lines
- 128x48 Dot-matrix display
- HD audio on speakerphone and handset
- Support EHS wireless headset
- Dual Fast ports, integrated PoE
- Stand with 2 adjustable angles of 45 and 50 degrees
- Compatible with major platforms: Asterisk, Broadsoft, 3CX, Metaswitch, Elastix, etc
- Support 6-party local conference
- Dual10/100/1000 Mbps network ports, integrated PoE

**C. 48-Ports with 4 SFP POE Slot(4) TL -SG3452P**

52-Port Gigabit L2+ Managed Switch with 48-Port PoE+

- 48x 10/100/1000 Mbps RJ45 Ports
  - 4x Gigabit SFP Slots
  - 1x RJ45 Console Port
  - 1x Micro-USB Console Port
  - Standard: 802.3at/af compliant
  - PoE+ Ports: 48 Ports, up to 30 W per port
  - Power Budget: 384 W
- Switching Capacity 104 Gbps  
Packet Forwarding Rate 77.4 Mpps  
MAC Address Table 16 K  
Packet Buffer Memory 12 Mbit  
Jumbo Frame 9 KB

**D. 16-Port POE with 2 SFP Slot(4)**

18-Port Gigabit Rackmount Switch with 16 PoE+

- 16× PoE+ gigabit RJ45 ports
- 2× gigabit non-PoE RJ45 ports
- 2× combo gigabit SFP slots
- Standard: 802.3at/802.3af compliant
- PoE Ports: Ports 1–16
- PoE Power Budget: 250 W

Switching Capacity 36 Gbps

Packet Forwarding Rate 26.78 Mbps

MAC Address Table 8K

Packet Buffer Memory 4.1 Mbit

**E. 8-Port with 2 SFP POE Slots(1)**

10-Port Gigabit Desktop Switch with 8-Port PoE+

8 PoE+ 10/100/1000Mbps RJ45 Ports

1 10/100/1000Mbps RJ45 Port

1 Gigabit SFP Slot

Standard: 802.3at/802.3af compliant

PoE Ports: Port1- Port 8

PoE Power Budget: 63W

Mac Address Table 4K

Jumbo Frame 16 KB

Switching Capacity 20 Gbps

Dimensions ( W x D x H ) 209 × 126 × 26 mm

**F. 8-Port Ports with 2 SFP POE Slots(1)**

8-Port Gigabit Desktop/Rackmount Switch with 8-Port PoE+

8 10/100/1000Mbps RJ45 Ports

AUTO Negotiation/AUTO MDI/MDIX

Mac Address Table 4K

Buffer Size 1.5Mbits

Jumbo Frame 16 KB

Switching Capacity 16Gbps

**G. SFP Transceiver Multi Mode (6)**

- Multi-mode, MiniGBIC, LC Interface, Up to 550m/275m Distance

**H. UPS 650VA (5)**

600va/360 watts with AVR Boost and Buck

Technology Type: Line Interactive

Product Line: Micropower series

Power Rating: 600 VA

Maximum Load: 360 watts

Output Voltage (max): 240 Volts

Sinewave Type: Simulated

IEC Outlets: 1

**I. UPS 1000VA (1)**

Input Voltage: 220VAC 60Hz 60/50Hz(Auto sensing)

Output Voltage: 220VAC 60Hz

Transfer Time: Typical 2-6ms, 10ms max

Battery: 12V 7Ah x 2pc

**J. UPS 1200VA (2)**

2000VA/1200W AVR Boost and Buck6 Power Outlets + 2 Bypass

Cold Start Function

Built-in self-diagnostic function

Compatible with generator, LED Panel, fastest charging capacity,

Auto charging at off mode

Auto restart function

NEMA 5-15 output

**K. Access Points (77)**

Ceiling Mount WiFi 6 Access Point

1× Gigabit Ethernet (RJ-45) Port (supports IEEE802.3at PoE and Passive PoE)

Internal Omni Antenna

- 2.4 GHz: 2× 4 dBi
- 5 GHz: 2× 5 dBi

Wireless Standards IEEE 802.11ax/ac/n/g/b/a

Frequency 2.4 GHz and 5 GHz

Signal Rate • 5 GHz: Up to 1201 Mbps

- 2.4 GHz: Up to 574 Mbps

**L. Wi-Fi Controller (1)**

Hardware Controller

Centralized Management

- Up to 500 access points, 100 switches, and 100 routers\*
- Up to 15,000 clients

Cloud Access Yes

L3 Management Yes

Multi-site Management Yes

Management Features

- Automatic Device Discovery
- Batch Configuration
- Batch Firmware Upgrading
- Intelligent Network Monitoring
- Abnormal Event Warnings
- Unified Configuration
- Reboot Schedule
- Captive Portal Configuration

**M. Cabling & Roughing ins Materials for VOIP & Wi-Fi Cabling Works (Main Arena, Tennis Court and Swimming Pool)**

- UTP CAT6 Cables (48)
- CAT6 Patch Panel 24 Ports loaded (15)
- RJ45-RJ45 UTP CAT6 Patch Cord Cables (161)
- Information Outlet (60)
- Face Plate (60)
- RJ45 Connector with Rubber boot (95)
- Network Cabinet 42U 800mm x 1000mm (1)
- Network Cabinet 12U (6)
- Network Cabinet 18U (1)
- PDU 12 CO's (1)
- PDU 6CO's (7)
- Vertical Cable Management Panel 6 feet (2)
- Horizontal Cable Management Panel (27)
- 110 Type Terminal Block 100 pairs (2)
- 19" Blank Panel 2U (2)
- 100 pairs UTP Multipairs Cable (120)
- Fiber Optic Cable 8 core OM3 Outdoor type (700)
- Rackmount Optical Distribution Panel 24 Ports LC Loaded (2)
- Rackmount Optical Distribution Panel 12 Ports LC Loaded (2)
- Fiber Optic Pigtail Connector LC OM3 1M (48)
- Fiber Optic Patch Cord Duplex LC OM3 2M (12)
- Fiber Optic Protection Sleeve (48)
- Fiber Optic Consumable Kit (1)
- Roughing inn Materials (PVC Pipes, Hangers, Support, Boxes, Fittings, Construction Materials & Consumables (1)
- 1-year Warranty (1)

**N. Training – PABX user's training and contact center training**

**1. Training of Key QC LGU Personnel**

- The training of personnel who shall manage the installed facility shall have to be conducted on or before the initial equipment and facilities testing BEFORE the FINAL Testing and Commissioning
- Five (5) days training with minimum of six (6) hours per day or as maybe required by the QC LGU. The training venue shall have to be agreed by the attending parties as concurred by the contractor. On-site hands-on training shall be an integral component of the call center training
- Participants are to be attended by not less than fifty (50) personnel from Quezon City Amoranto Sports Complex and from ITDD, respectively but non-exclusive [personnel from other divisions/departments may join but shall be limited and with prior approval from the respective department heads and concurred by the End-User]

**2. Network Devices**

- **The Certified Network Engineer will conduct the commissioning of delivered devices that may include but not limited to:**
  - a. Power-up
  - b. Configuration
  - c. Network connectivity
  - d. Performance testing

**3. Electrical Systems**

- **The Electrical systems test reports must be evaluated and signed by a licensed Professional Electrical Engineer/Professional Electronics and Communications Engineer**

**V. APPROVED BUDGET FOR THE CONTRACT**

The Approved budget for the contract (ABC) amounts to Twenty Million Pesos Only (Php 20,000,000.00) VAT inclusive.

**VI. COST DERIVATION**

	<b>QTY</b>	<b>Unit Cost</b>	<b>TOTAL</b>
• IP-PBX Server – (1 System)	1		
• Entry Level/Staff IP Phone	47		
• 48-Ports with 4 SFP POE Slot TL -SG3452P	4		
• 16-Port POE with 2 SFP Slot	4		
• 8-Port with 2 SFP POE Slots	1		
• 8-Port Ports with 2 SFP POE Slots	1		
• SFP Transceiver Multi Mode	6		
• UPS 650VA	5		
• UPS 1000VA	1		
• UPS 1200VA	2		
• Access Points	77		
• Wi-Fi Controller	1		
• Cabling & Roughing ins Materials for VOIP & Wi-Fi Cabling Works	1		
• Training	<b>FREE</b>		
	<b>Total</b>		

**VII. TERMS OF PAYMENT:**

Full payment upon completion of the project and acceptance of the city.

**VIII. DELIVERY SCHEDULE**

Supply and delivery of the services must be 30 calendar days upon issuance of the Notice to Proceed.

**IX. GENERAL TERMS AND CONDITIONS (Service Provider Responsibilities)**

1. Provide services units and spare parts to replace any defective ones immediately after checked as malfunctioning (including telephone apparatus).
2. 24/7 emergency maintenance services.
3. 8 Hours standby maintenance technician.
4. Configuration, maintenance and system upgrades. There will be regular monthly preventive maintenance visits to be conducted by technical personnel during the contract with or without reported complaints by the QC Government.
5. Full warranty of the PABX System.
6. There will be regular monthly preventive maintenance visits to be conducted by technical personnel with or without reported complaints by the clients, along with the full warranty of the PABX System.

7. Immediate restoration of the operation if any problem arises on the system, otherwise, rebates shall be imposed by the City Government.
8. Supply and delivery of the services must be 30 calendar days upon receipt of Notice to Proceed or releasing of the Purchase Order/Resolution.
9. Bar all dialing access to IDD/NDD in the trunk line services.
10. Manpower Requirements: at least One (1) Project Manager, One (1) Structured Cabling Engineer, and Eight (8) Installer/Technician with the following requirements:

**Project Manager (1)**

Desired Skills and Experience:

- Bachelor's degree in Engineering
- At least 3-5 years successful electrical PM experience
- Prior experience in estimating
- Knowledgeable in ELV Systems (Structured Cabling).
- Excellent verbal and written communication
- Outstanding interpersonal skills

**Structured Cabling Engineer (1)**

- Candidate must possess at least Bachelor's/College Degree, Professional License (Passed Board/Bar/Professional License Exam) in Electrical or Electronics Engineering
- Preferably more than 5 Years Experienced Employee specialized in Engineering - Structured Cabling and PABX
- At least 3-5 years' experience with project Design and Estimate on Structured Cabling such as, Lan /Telephone System and other related to Auxiliary equipment
- Knowledgeable in MS Outlook, MS Office, MS Project and AutoCAD
- Confident decision-making skills and strong communication skills
- Must have Strong Analytical and Critical thinking skills

**Installer/Technician (8)**

- Below 12 months of Piping and cabling experience
  - Knowledge in PABX System Structured Cabling, Electrical and rough ins.
  - Basic cutting, painting, power tools.
11. The contractor should be an authorized distributor or dealer or partner of an equipment manufacturer of network devices that utilizes fiber-optic cables.
  12. The contractor shall have an ISO 9001-2015 with any certifying body for a minimum of 2 years.
  13. The contractor must have at least one (1) Certified Network Administrator or Engineer, duly certified by the manufacturer of the equipment being offered.
  14. The contractor must have at least one (1) Licensed Professional Electronics and Communications Engineer (PECE) who has been employed by the company for at least five (5) years.
  15. The contractor must have an available service engineer capable of responding to a service call within two to three (2-3) hours during office hours, at least for the duration of the warranty.

**X. PENALTIES FOR BREACH OF CONTRACT**

Failure to deliver the services according to the standards and requirements set by the City shall constitute an offence and shall subject the Contractor to penalties and/or liquidated damages pursuant to RA 9184 and its revised Implementing Rules and Regulations (IRR).

**XI. CANCELLATION OR TERMINATION OF CONTRACT**

The guidelines contained in RA 9184 and its revised IRR shall be followed in the termination of any service contract. In the event the City terminated the Contract due to default insolvency, or for cause, it may enter negotiated procurement pursuant to RA 9184 and its IRR.

Prepared by:

  
**ELENA LIWAYWAY Y. BASKIÑAS**  
*Acting, Administrative Officer*

Noted by:

  
**PAUL RENE S. PADILLA**  
*Head, QC IT Development Department*

  
**MICHAEL VICTOR N. ALIMURUNG**  
*City Administrator*