Communication Requirement for BK West Side 9 Story Building

Version 2.1

22-Dec-2016

SIGNALS
Maldives National Defence Force

1. Data Network

#	Description	QTY
1	24 Core Single Mode Fiber Cable (Interconnect existing 9 Story and new 9 Story Building)	01
2	24 Core Single Mode Fiber Cable (New 9 Story SIGNALS Entrance Facility to 1st Floor SIGNALS Telecommunication Room)	01
3	06 Core Single Mode Fiber Cable (Interconnect SIGNALS Entrance Facility to all other Floors Telecommunication Enclosure) 1st, 2nd, 4th, 6th, 8th and Terrace	08
4	Duct System between Existing 9 Story building and New 9 Story Building	01
5	24 Core Fiber Patch Panel (SC/PC Type)	06
6	06 Core Fiber Patch Panel (SC/PC Type)	08
7	48 Port RJ45 Cat6 Patch Panel (for each Telecommunication Enclosure at First and Eighth Floor)	04
8	24 Port RJ45 Cat6 Patch Panel (for each Telecommunication Enclosure at all other Floors)	05
9	Ubiquity UAP-AC-PRO Indoor Wireless Access Points	30
10	12U Rack with Ventilation and Lockable Door (600mmWidth x 600mmDepth x 501mmHeight) (2 x SIGNALS Entrance Facility and 1x Terrace Communication Room)	03
11	9U Rack with Ventilation and Lockable Door (600mmWidth x 600mmDepth x 635mmHeight) (2 x 1st Floor, 1 x 2nd Floor, 1x 4th Floor,1x 6th Floor and 2 x 8th Floor)	07
12	42U APC Net Shelter SX Rack with Ventilation and Lockable Door (600mmWidth x 1070mmDepth x 1991mmHeight) (First Floor SIGNALS Telecommunication Room)	2
13	48Port Layer2 Manageable Gigabit Switch with 4 SFP Ports (not Combo) and PoE+ Compatible (2 x 1st Floor Network Distribution and 1 x 1st Floor Telecommunication Room)	03
14	24Port Layer2 Manageable Gigabit Switch with 4 SPF Ports (not Combo) and PoE+ Compatible (GF, 2nd, 3rd, 4th, 5th, 6th, 7th, 2 x 8th and Terrace Network Distribution)	10
15	24 Port Gigabit SFP Layer 2 Managed Switch (fiber uplinks)	02
16	GBIC 10/100/1000 PHY Type: 1000Base-LX (LC/PC), Single-Mode, WDM, Simplex, Wavelength: RX1310nm/TX1550nm, Ringle Color: Yellow	20
17	GBIC 10/100/1000 PHY Type: 1000Base-LX (LC/PC) Single-Mode, WDM, Simplex, Wavelength: RX1550nm/TX1310nm, Ringle Color: Blue	20
18	6KVA Rack Mount UPS (First Floor SIGNALS Telecommunication Room)	02
19	3KVA Rack Mount UPS (SIGNALS Entrance Facility and Terrace Communication Room)	02
20	1KVA Rack Mount UPS (Telecommunication Enclosures at 1st, 2nd, 4th, 6th and 8th Floor)	07
21	Blade Server Chassis Solution with Servers *(refer 10.7 and 10.8 for detailed specification)*	2
22	NAS Storage 100TB *(refer 10.9 for detailed specification)*	1

Note:

1. Cat6 UTP Cable must be used for the Data Network Cabling within the Building.
2. RJ45 Cat6 Keystone Dual Face Plate Wall Outlet must be installed at the Network Dual Cable End Points.
3. RJ45 Cat6 Keystone Single Face Plate Wall Outlet must be installed at the Network Single Cable End Points.
4. Fiber Cable from existing 9 Story building to new 9 Story must be terminated to Ground Floor SIGNALS Entrance Facility near South Duct.
5. Fiber uplink cable from Ground Floor SIGNALS Entrance Facility to other floors must be terminated to 1st Floor (North and South Duct Telecommunication Enclosure), 2nd Floor, 4th Floor , 6th Floor South Duct Telecommunication Enclosures, Eight Floor (North and South Duct Telecommunication Enclosure) and terrace SIGNALS Communication Room.
6. All Cables at Ground floor must be terminated to SIGNALS Entrance Facility Room at ground floor near South Duct.
7. All the Network cables at First Floor within A to G must be terminated to South Duct Telecommunication Enclosure and within G to M to North Duct Telecommunication Enclosure.
8. Network Cables at 2nd & 3rd floor must be terminated to 2nd floor South Duct Telecommunication Enclosure
9. Network Cables at 4th & 5th floor must be terminated to 4th floor South Duct Telecommunication Enclosure
10. Network Cables at 6th & 7th floor must be terminated to 6th floor South Duct Telecommunication Enclosure
11. All the Network cables at Eighth Floor within A to G must be terminated to South Duct Telecommunication Enclosure and within G to M to North Duct Telecommunication Enclosure.
12. Network Cables at terrace must be terminated to terrace SIGNALS Communication Room
13. All network cables must be laid on Cable Tray, secured and properly labeled
14. Network Cables must NOT be in adjacent to any power cable. Network cables must be laid in separate cable tray from power lines and other cables.
15. All Network outlets installed at Ground Floor outside the building and at terrace must be waterproof

2. CCTV Network

#	Description	QTY
1	IP Indoor PoE Dome IR Cameras HD1080 3MP Auto Focus (including 2 Lifts) (25 Cameras Needed + 5 Spare Cameras)	30
2	IP Outdoor PoE Bullet IR Camera HD 1080 3MP Auto Focus (8 Cameras Needed + 4 Spare Cameras)	12
3	64 Channel NVR System	1
4	48TB Storage	1
5	4 Port Gigabit Switch PoE+	2

Note:

1. The cameras that need to be installed inside both the Elevators must be installed using Network Cables specially used for Cameras installed in Elevator.
2. All points marked with the CCTV symbol, the network point(s) must be installed 6” (six inches) bellow ceiling level.
3. All cables installed for CCTV must be labeled

3. Telephone Network

#	Description	QTY
1	200 Pair Telephone Underground Cable (interconnect Existing 9 Story and New 8 Story Building)	1
2	100 Pair Telephone Cable (Ground Floor SIGNALS Entrance Facility to 1st Floor SIGNALS Telecommunication Room)	1
3	50 Pair Telephone Cable (interconnect 1st and 8th Floor to the Main Cable)	5
4	20 pair Telephone Cable (Interconnect all other floors with the main Cable)	04
5	400 Pair Indoor Telephone Box with Krone	02
6	300 Pair Indoor Telephone Box with Krone	04
7	200 Pair Outdoor Telephone Box with Krone	02
8	100 Pair Outdoor Telephone Box with Krone	02
9	50 Pair Outdoor Telephone Box with Krone	05
10	IP Hybrid PABX System – Huawei eSpace U1960 Unified Gateway (1000 users, 36 FXO, 132 FXS). *Refer 10.10 for detailed specification*	01
11	IP Phone	25
12	Console Phone (Huawei IP Phone 7950)	02

Note:

1. Cat6 UTP Cable must be used for the Telephone Network Cabling within the Building.
2. RJ11 Cat3 Keystone Single Face Plate Wall Outlet must be installed at the Telephone End Points.
3. All telephone cables at ground floor must be terminated to SIGNALS Entrance Facility.
4. All the telephone cables at 1st Floor within A to G must be terminated to South Duct Telecommunication Enclosure and within G to M to North Duct Telecommunication Enclosure.
5. Telephone Cables at 2nd & 3rd floor must be terminated to 2nd floor South Duct Telecommunication Enclosure
6. Telephone Cables at 4th & 5th floor must be terminated to 4th floor South Duct Telecommunication Enclosure
7. Telephone Cables at 6th & 7th floor must be terminated to 6th floor South Duct Telecommunication Enclosure
8. All the telephone cables at 8th Floor within A to G must be terminated to South Duct Telecommunication Enclosure and within G to M to North Duct Telecommunication Enclosure.
9. Telephone Cables at terrace must be terminated to terrace SIGNALS Communication Room.
10. All telephone cables must be laid on Cable Tray, secured and properly labeled
16. Telephone Cables must NOT be in adjacent to any power cable. Telephone cables must be laid in separate cable tray from power lines and other cables.
11. All Telephone outlets installed at terrace must be waterproof

4. CATV Network

#	Description	QTY
1	RG11 75 Ohm Cable (interconnect existing 9 Story and new 8 Story Building fro CATV)	1
2	RG6 75 Ohm Cable (interconnecting Main to Distribution Taps and for End Points at floors)	
3	Amplifier	2
4	35DB 8 Way Tap Outdoor with Direct Out (ground floor)	1
5	32DB 8 Way Tap Outdoor with Direct Out (1st floor)	1
6	29DB 8 Way Tap Outdoor with Direct Out (2nd floor)	1
7	26DB 8 Way Tap Outdoor with Direct Out (3rd floor)	1
8	23DB 8 Way Tap Outdoor with Direct Out (4th floor)	1
9	20DB 8 Way Tap Outdoor with Direct Out (5th floor)	1
10	17DB 8 Way Tap Outdoor with Direct Out (6th floor)	1
11	14DB 8 Way Tap Outdoor with Direct Out (7th floor)	1
12	14DB 8 Way Tap Outdoor with Direct Out (8th floor)	1
13	11DB 8 Way Tap-off Outdoor (terrace floor)	1

Note:

1. RG6 75 Ohm Cable must be used for the CATV Network Cabling within the Building.
2. RG6 F-Type Face Plate Wall Outlet must be installed at the CATV End Points.
3. All Coax cables at 1st Floor within A to G must be terminated to South Duct and within G to M to North Duct.
4. Coax Cables at 2nd and 3rd floor must be terminated to South Duct of 2nd Floor.
5. Coax Cables at 4th and 5th floor must be terminated to South Duct of 4th Floor.
6. Coax Cables at 6th and 7th floor must be terminated to South Duct of 6th Floor.
7. All Coax cables at 8th Floor within A to G must be terminated to South Duct and within G to M to North Duct.
8. Terrace CATV Cables must be terminated to SIGNALS Communication Room at terrace.
9. All CATV cables must be laid on Cable Tray, secured and properly labeled
10. CATV Cables must NOT be laid in adjacent to any power cable. CATV Cables must be laid in separate cable tray from power lines and other cables.
11. All Taps must be securely installed in the Cable Duct at each Floor
12. All CCTV outlets installed at terrace Floor must be waterproof

- **Network, Telephone & CATV Cable End Point Numbers in Each Floors**

	Network Dual Cable Points	Network Single Cable Points	Wireless AP Point	Telephone Point	CATV Point
Ground Floor	10	6	-	2	-
First Floor	51	-	3	48	-
Second Floor	6	-	4	4	4
Third Floor	6	-	4	4	4
Fourth Floor	6	-	4	4	4
Fifth Floor	6	-	4	4	4
Sixth Floor	6	-	3	4	4
Seventh Floor	9	2	3	7	6
Eighth Floor	19	14	4	36	5
Terrace Floor	6	-	1	4	4
Total	**125**	**22**	**30**	**117**	**35**

5. PA System

a) Ceiling speaker

- Full Range
- Max Power 60W
- Line Input 70/100, 4-16 ohm
- Frequency – Response 45Hz-20KH

b) Zone selected pre- amplifier.
c) Amplifiers.
d) Paging Microphone.

The Amplifier must be compatible to the above specification of speakers.

Zone selection detail and QTY

Zone	Speaker Placing	Speaker QTY
Zone - 1	Ground and Terrace Floor	8
Zone - 2	First Floor	11
Zone - 3	Second, Third and Fourth	33
Zone - 4	Fifth and Sixth	22
Zone - 5	Seventh Floor	17
Zone - 6	Eighth Floor	24
Zone - 7	Terrace	3

- All cable must be terminated to the SIGNALS Telecommunication Room at 1st Floor.
- The zone selection, cable distribution should be according to the table above.

6. Access Control System

#	Details	Qty.
1	Finger print based biometric with smart card (Mifare) based Access Control System	7 doors
2	Smart Card (Mifare)	100 cards
3	Access Control Management System (Web based)	1

7. Telecommunication Room

#	Details	Qty.
1	Raised Floor (minimum height 12 inch)	
2	Adequate Fire suppression System	
3	Separate dedicated power panel (15kW maximum power consumption)	
4	Cooling (51000 BTU/hr)	
5	Alarm System – remote monitoring (power, cooling, fire, flood)	
6	Equipment Grounding	
7	Cable Trays	

8. Other Equipment

#	Details	Qty.
1	65 inch LED Display (Conference Hall)	02

9. Equipment Grounding

Items Required

#	Item	Details	Qty
1	Ground rod	6 Feet with clip and joint	6
2	Copper tape	1 Inch x 3 mm	200 Feet
3	Teflon	1 inch diameter , for isolation	5 feet
4	Screw	2 inch	100
5	Wall anchors	plastic	100
6	Bolt	5 mm , with nut, washer and spring washer	60
7	Ground cable	6 mm	300 feet
8	Lug	6 mm	30
9	Lug	4 mm	30

10. Detailed Specification

10.1. 12U Wall Mount Rack Features

- 2 Sets of adjustable mounting rails (adjusting in 1 Inch increments)
- Removable/lockable side panels
- Cage nut style mounting rails
- Top and Bottom removable cable slots
- Glass front door with built in lock
- Maximum Weight Capacity 150 Pounds

Specifications

- Depth – 620mm
- Width – 600mm
- Rail Width - 19 inch EIA Compliant
- Height – 635mm

Recommended options

- Fan assembly kit
- Racks Screws
- Cage nuts

10.2. Wall Mount Rack Features

- 2 Sets of adjustable mounting rails (adjusting in 1 Inch increments)
- Removable/lockable side panels
- Cage nut style mounting rails
- Top and Bottom removable cable slots
- Glass front door with built in lock
- Maximum Weight Capacity 150 Pounds

Specifications

- Depth – 620mm
- Width – 600mm
- Rail Width - 19 inch EIA Compliant
- Height – 501mm

Recommended options

- Fan assembly kit
- Racks Screws
- Cage nuts

10.3. 42U Wall Mount Rack Features

- Removable/lockable side panels
- Cage nut style mounting rails
- Top and Bottom removable cable slots
- Glass front door with built in lock

Specifications

- Depth – 1070mm
- Width – 600mm
- Rail Width - 19 inch EIA Compliant
- Height – 51991mm

Recommended options

- Fan assembly kit
- Racks Screws
- Cage nuts

10.4. Layer2 Gigabit Network Switch Specifications (48 Port and 24 Port)

Interface(s)	48 Gigabit Ethernet Ports (10/100/1000BASE-T) 24 Gigabit Ethernet Ports (10/100/1000BASE-T) 04 SFP Ports (10/100/1000BASE-T/SFP)
Performance	***Switching Capacity*** 136 Gbps (48 Ports Switch) 88 Gbps (24 port Switch) ***64-Byte Packet Forwarding Rate*** 101.9Mbps (48 Port Switch) 65.48Mbps (24 Port Switch) ***Packer Buffer Memory*** 2MB ***Flash Memory*** 32MB
Layer 2 Features	MAC Address Table: 16K Flow Control 802.3x Flow Control HOL Blocking Prevention Jumbo Frame up to 13K Bytes Spanning Tree Protocols 802.1D STP 802.1w RSTP 802.1s MSTP BPDU Filtering Root Restriction Loopback Detection 802.3ad Link Aggregation Max. 32 groups per device/8 Gigabit ports per group Port Mirroring One-to-One Many-to-One Flow-based RSPAN Mirroring ***L2 Multicasting*** IGMP Snooping IGMP v1/v2/v3 Snooping Supports 1024 IGMP groups Port/Host-based IGMP Snooping Fast Leave IGMP Snooping Querier Limited IP Multicast Up to 24 IGMP filtering profiles, 32 ranges per profile MLD Snooping MLD v1/v2 Snooping Support 1024 MLD Groups Host-based MLD MLD Snooping Querier Snooping Fast Leave

	VLAN LAN Group Max. 4K VLAN Groups GVRP Max. 255 Dynamic VLAN Groups 802.1Q Tagged VLAN Port-based VLAN 802.1v Protocol VLAN Voice VLAN MAC-based VLAN ISM VLAN Asymmetric VLAN Private VLAN VLAN Trunking
Access Control List (ACL)	Supports up to 1.5K Ingress access rules ACL based on 802.1p Priority VLAN ID MAC Address Ether Type IPv4 Address DSCP Protocol Type TCP/UDP Port Number User-Defined Packet Content IPv6 Address IPv6 Flow Label IPv6 Traffic Class Time-based ACL CPU Interface Filtering
Security	SSH v2 SSL v1/v2/v3 (for WebGUI) Port Security Up to 64 MAC addresses per port/VLAN Broadcast/Multicast/Unicast Storm Control Traffic Segmentation D-Link Safeguard Engine NetBIOS/NetBEUI Filtering DHCP Server Screening ARP Spoofing Prevention BPDU Attack Protection

QoS (Quality of Service)	802.1p 8 queues per port Queue Handling Strict Priority Weighted Round Robin (WRR) Strict + WRR CoS based on Switch Port VLAN ID 802.1p Priority Queues MAC Address IPv4 Address DSCP Protocol Type TCP/UDP Port User-Defined Packet Content IPv6 Address IPv6 Traffic Class IPv6 Flow Label Supports following actions for flows Remark 802.1p Priority Tag Remark TOS/DSCP Tag Bandwidth Control Bandwidth Control Port-based (Ingress/Egress, Min. Granularity 64 Kbps) Flow-based (Ingress/Egress, Min. Granularity 64 Kbps)
Management	Web-based GUI (Supports IPv4) Command Line Interface (CLI) Telnet Server (Supports IPv4) Telnet Client (Supports IPv4) SSH Server (Supports IP44) TFTP Client(Supports IPv4) ZModem SNMP v1/v2c/v3 SNMP Traps System Log (Supports IPv4 Log Server) RMON v1 Supports 1,2,3,9 groups RMON v2 Supports ProbeConfig group LLDP BootP/DHCP Client DHCP Auto-Configuration DHCP Relay DHCP Relay Option 12 DHCP Relay Option 82 Flash File System Multiple Images Multiple Configurations CPU Monitoring Debug Command SNTP Password Recovery

	Password Encryption Trusted Host Microsoft® NLB (Network Load Balancing) Support
Power over Ethernet (PoE)	802.3af and 802.3at PoE+ Support
Warranty	Three (3) years Hardware Warranty and One (1) Year Service Warranty

10.5. Layer2 24 Port Gigabit SFP Network Switch Specifications

Interface(s)	24 1000Mbps SFP Slots 04 10/100/1000BASE-T RJ45 Ports 1 Console Port
Performance	***Switching Capacity*** 24Gbps ***64-Byte Packet Forwarding Rate*** 17.9Mbps
Layer 2 Features	Link Aggregation Control Protocol (LACP) 4K VLAN GVRP (GARP VLAN Registration Protocol) STP/RSTP/MSTP IGMP Snooping LLDP (LLDP-MED)
Quality of Service (QoS)	4 priority queues Support IEEE802.1P DSCP QoS Rate Limit
Security Strategies	IP-MAC-Port-VID Binding Access Control List (L2~L4 ACL) 8021x and RADIUS Authentication Support DoS defend Port Security SSL and SSH encryption
Management	Web-based GUI Command Line Interface SNMP V1/V2/V3 RMON (1,2,3,9 group) IP Clustering

10.6. Ubiquity UAP-AC-PRO Indoor Access Point

This brand and Model is recommended to be used as the Wireless Access Point

10.7. Blade Chassis Specification

Max No. of Blades	Should support minimum 8 half-height server blades or 4 full height blade servers
No. of Interconnect Modules supported	Minimum of 4 interconnect modules must be supported
Types of Blade System interconnect modules supported	Ethernet; Fiber Channel; Fibre Channel over Ethernet (FCoE); iSCSI; Serial Attached SCSI (SAS)
Interconnect Modules Required	No. of Interconnects required x 2
	10G Ethernet Downlinks for all Blade Severs
	Minimum 8 x 10G Uplink , should support FC,FCOE and Ethernet
No. of Power Supplies	Fully loaded Power Supplies (for the proposed Chassis)
No. of Fans	Fully loaded fans (for the proposed Chassis)
Administration Management Modules \ Chassis Management Controllers	Redundant Administration Management Modules \ Chassis Management Controllers
	Allows Single secure interface for inventory, configuration, monitoring, and alerting for the chassis and all components
	Integrated access to all blades server
	Provides access to all interconnect modules
	Real-Time Power/Thermal Monitoring and Management
Scalable	Allowing resources to be pooled and shared across multiple enclosures.
	And also management and network interconnects should extend scalability beyond a single enclosure.
Management software	Comprehensive Management software for all modules on the enclosure and blade servers
KVM	Integrated KVM Module
Additional Accessories to connect existing SAN and LAN infrastructure	Four (4) 8Gb Short Wave Fibre Channel SFP+ 1 Pack Four (4) 5M Multi-mode OM3 50/125um LC/LC 8Gb FC and 10GbE Laser-enhanced Cable 1 Pk Four (4) 3M 10G SFP+ SFP+ 10Gbps Direct Attached SFP+Copper Cable Ten (10) 5M LC to LC Fiber Cable Four(4) 10Gb Short Wave iSCSI SFP+ 4-pack Transceiver 10G Eight(8) 10G Ethernet SFP Modules
Warranty	Parts: 03 Year(s); Service: 03 Year(s); On-Site: 03 Year(s)

10.8. Blade Server Specification

Processor	Two (x2) Intel® Xeon Six-Core v3 3.0 GHz 20M Cache, 8.0GT/s Max Mem 2133MHz
No. of DIMM slot	Twelve (12) DIMM slots
Maximum Memory upgradable	Support Up to 192 GB (12 x 16 GB) RDIMMs (Dual Rank)
Memory	64GB (4x16GB RDIMM 2133MT/s, Dual Rank. X4 Data Width)
Raid Controller	Raid Controller with Raid Levels 0,1 (1 or 2 HDDs, SATA/SAS SSD)
Internal Drive Support	Two (2) hot-plug small form factor (SFF) drive bays – Should support SAS, SATA, and SSD hot-plug hard drives
Hard Drives:	Two (2) 600GB 6G SAS 10K rpm SFF (2.5-inch) Hot Plug Hard Drive
Network Controller	Integrated Dual Port 10Gb Network Adapter, Daughter cards if required as per interconnects supplied
Form Factor	Half-Height
Supported Operating Systems and Virtualization Software	MS Windows, RHEL, SLES, VMware, and Citrix XenServer
Operating System to be Installed	Genuine Microsoft Windows Server® 2012 R2 Standard 64Bit
Warranty	Parts: 3 Year(s); Service: 3 Year(s) On-Site: 3 Year(s)

10.9. NAS Storage Specification

- Two (2) 10GbE connectivity with one dedicated management port accessible through chassis management controller (CMC)
- Redundant Hot-Swappable controllers (2GB Cache to flash per controller)
- Redundant network path with internal fabric wiring
- Storage of 100TB Raw Capacity Hard Disk 15K SAS.
- SAN should have rich features including;
    - Thin Provisioning
    - Advanced Application aware snapshot for VMWare, MS SQL Server, Share Point and Exchange
    - Replication including Sync and A Sync replication,
- Should be able to add storage space non-disruptively
- Scale at least 500TB

- Support for Volume copy and cloning (if any additional license is required for these features, please mention in proposal.
- Parts: 3 Year(s); Service: 3 Year(s) On-Site: 3 Year(s) Warranty

10.10. PABX System Specification

Model: Huawei eSpace U1960 Unified Gateway

Item	***Specification***
Hybrid exchange	Digital, Analog and SIP
Expansion (Modular)	Different types of modular boards (cards)
User Capacity (Total number of Terminals)	1000
Maximum FXS ports for analog users	192
Required FXS ports for analog users	132
Maximum FXO ports	**72**
Required FXO ports	**36**
Maximum E1/T1 ports	28
Maximum BRI ports	24
License	**1000 users**
Maximum SIP Users	1000
Required SIP Users	868
Terminals Supported	Analog phones, IP phones, video phones and soft clients
Maximum Number of Concurrent Online Sessions	420
Maximum Number of Concurrent Participants	360
Maximum Number of Concurrent IVR Connections	240
Maximum Number of Soft Console Groups	32
Maximum Number of Concurrent Online Calls Encrypted using SIP TLS	300
Trunk protocols	SS7, R2, PRI, QSIG, SIP, BRI
Codec	G.711a/μ, G.729a/b/ab, iLBC, and G.722/G.722.1/G.722.2
Conference capacity	A maximum of 360 conference participants which can be allocated to 120 conference halls (each hall can support up to 60 participants)
Built-in voice mail	30 channels concurrently Built-in 16G SD storage card
Power supply	AC: 100 V to 240 V, 50 Hz/60 Hz DC: –38.4 V to –60 V (typical value: –48 V) Redundancy: 1+1 backup
Power consumption	220 W (full configuration)
Dimensions (H x W x D)	Standard 19-inch 2 U subrack 86.1 mm x 442 mm x 310 mm
Weight	10 kg (full configuration)
Temperature	Storage temperature: –40℃ to +70℃ Long-term operating temperature: 0℃ to 45℃ Short-term operating temperature: –5℃ to +55℃
Relative humidity	5% to 95% (without condensation)
Dustproof	Less than 180 mg/m³ dust in the air (Dustproof measures should

	be taken in the work environment)
System Reliability	≥ 99.995%
Maintainability	Centralized/remote equipment management, log management, resource management, and alarm management

Modular Boards Required

Board Types	• Analog user interface board FXS • Analog user and analog trunk interface board (FXO and FXS) • BRI Trunk interface board • Media trunking unit • Main control board
Required Analog user interface board FXS with cable	3 boards * 32 users in each board (analog lines)
Required Analog user and analog trunk interface board (FXO and FXS) with cable	3 boards * 24 users in each board (analog lines) – (12 FXS and 12 FXO)
Required Media trunking unit	1 board
Required Main control board	1 board

Endpoints

Communication Protocol	SIPv2
Audio Format Standards	G.711a, G.711μ, G.729AB, G.722, iLBC, G.723.1, and G.726
Audio	Anti-Clipping (ACLP), Acoustic Echo Cancellation (AEC), Automatic Gain Control (AGC), Adaptive Jitter Buffer (AJB), Automatic Noise Reduction (ANR), Comfort Noise Generation (CNG), Hearing Aid Compatibility (HAC), Packet Loss Concealment (PLC), Voice Activity Detection (VAD), and sidetone cancellation
LCD	Display is required
Languages	English
Function Keys	Call Transfer key, Three-way Conference key, Speaker key, Headset key, Mute key, Call Holding key, Send key, Volume Control key
Call Features	Call holding, call transfer, call waiting, do not disturb, call forwarding, call muting, redial, call record, volume control, hotline, and auto answer
Power Adapter	Input 220v AC, 50 Hz to 60 Hz
Ethernet Port	2 port (10 Mbit/s to 100 Mbit/s) PoE support
Headset Port	RJ-9

Endpoint Console

Screen	5-inch display
Buttons	• Six line buttons • Five navigation buttons: Up/Down/Left/Right/OK • Four softkeys • Four fixed function buttons with LEDs: Speaker, Headset, Mute, and Call History • Five fixed function buttons without LEDs: Home, Message, Volume, Contact, and Call Forward
External ports	Two GE ports: 10/100/1000 Mbps adaptive and support for VLAN Configuration
	One handset port: RJ-9
	One handset port: RJ-9
USB2.0	One USB port for connecting to USB devices, such as a USB headset or USB flash drive (Ringtones, wallpapers, and contacts can be imported through the USB flash drive.)
Bluetooth	Embedded Bluetooth 2.1
PoE energy consumption class	Class 2
Power adapter	240 V AC
Protocols	TCP/IP, SIP, SDP, UDP, RTP, RTCP, DHCP, DNS, PPPoE, HTTP, HTTPS, SNTP, and XCAP
Audio codec	G.711a/G.711μ/G.729AB/G.722/ iLBC/ AAC-LD/G. 722.1/G.722.2/Opus
Call history	Up to 100 records each for dialed, received, and missed calls Missed call notification
Contacts	• Up to 1000 contacts • Contact import or export through the USB port or web page • Contact file in .csv or .vcf format
Languages	• Display: English • Input: English
Ringtone Selection	Default ringtones (ten ringtones), group ringtones, and customized ringtones
Local conference	• Six-party voice conference • Operations including adding, muting, and removing participants

10.11. Required CCTV Camera Specification(s)

a) All cameras (Dome and Bullet) should possess day and night, inbuilt IR capability, low Light Capability or any other Technology that can see the complete darkness and should be galvanized.
b) All cameras clear object should be seen from 50m distance at day and night.
c) All cameras lens should be minimum 2.8mm - 12mm.
d) All cameras must have Auto Focus Capability.
e) All cameras should be HD1080 and 3 Megapixel or Higher resolutions at full frame rate.
f) Outdoor Bullet cameras should be Waterproof and IP66.
g) All cameras should be PoE (Power over Ethernet) powered.
h) All cameras should confirm and must be compatible to the **ONVIF** Standard (Open Network Video Interface Forum)
i) Three (03) Year Hardware Warranty and Two (02) Years' Service Warranty.

10.12. Network Video Recorder (NVR) & Storage

a) Recording software for digital recorder and any licensing of software required for use with the network video recorder (NVR) should be supplied with the NVR.
b) Remote connection capability and access to live view facility.
c) NVR and Storage should be rack mountable.
d) NVR or Storage should support RAID capable to prevent data loss in case of HDD failures. RAID configuration can be in either in RAID1 or RAID 5 or RAID 1+0. The recorder should be capable of Hot Swap when configured for RAID1 or RAID5 or RADI 1+0.
e) NVR and Storage should support Uninterrupted Power Supply (UPS) controlled via RS-232 or TCP/IP.
f) NVR or Storage should be able to support minimum 30 days of recording at 25fps for 64 Cameras.
g) NVR or storage should have at least of 48 TB raw unformatted Storage Capacity and expandable.
h) The recorder should be capable of exporting recorded files to various media such as CD-R/RW, DVD+/-R, USB memory (flash drives, USB hard disks)
i) NVR and Storage Should have minimum Dual Port Redundant Gigabit Network Interfaces Base RJ-45 Connections. TCP, UDP, ICMP, IGMP, SNMP, HTTP, NTP, Telnet, FTP
j) The recorder should support recording to Storage Devices.
k) The recorder should include support for Remote Configuration and Management Software, client software, allow users to remotely configure the unit, view live images, play back and search the desired recorded images.
l) The recorder should support a frame rate recording of minimum 25 fps (frames per second), without local or remote monitoring, and support up to 30 fps when using local monitoring/remote client access
m) NVR and Storage must have Auto Switching capable, Single Hot Swappable PSU and a Secondary Dual-Redundant Hot Swappable PSU Support.

10.13. RG11 Cable Standards

Conductor Material:	BC/CCS/CCA/TC/CU/CCAG
Type:	Coaxial Cable Outdoor
Conductor Type:	Solid
Certification:	CE, ISO, RoHS, UL
Jacket Material:	PVC/PE
Flooding Compound:	Jelly
Shielded:	Bonded Al Foil Tri Shielded
Braid Coverage:	Al Brading (60%/90%)
Specification:	CE, RoHS, ETL, UL

10.14. RG6 Cable Standards

Conductor Material:	BC/CCS/CCA/TC/CU/CCAG
Type:	Coaxial Cable Outdoor
Conductor Type:	Solid
Certification:	CE, ISO, RoHS, UL
Jacket Material:	PVC/PE
Flooding Compound:	Jelly
Shielded:	Bonded Al Foil Tri Shielded
Braid Coverage:	Al Brading (60%/90%)
Specification:	CE, RoHS, ETL, UL

10.15. SFP GBIC Fiber Card Features

Ringle Color:	Blue and Yellow
Material:	Metal
Data Rate:	1.25G
Wavelength:	1310nm/1550nm
Fiber Types:	Single Mode (SM)
Fiber Connector Type:	Single SC/LC
Transmission Mode:	Simplex
Transmission Distance:	3km/20km
Laser Type:	Long-wavelength DFB Laser diode
Operating Case Temperature:	Standard: 0~70°C; Industrial: -40~85°C
Compatible Brands:	MUST BE Compatible with the Network switch procured.

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