INTERNAL SURVEILLANCE FOR DEPOTS

1. Thermal Camera for Depot

Item	Minimum Requirement Description
Make	
Model	
Sensor Format	Uncooled
Detector Type	VOx Micro bolometer
Camera Type	Multi Sensor
Thermal Resolution	640 x 480, 25 Hz
Streaming	Dual Stream, ONVIF Profile S
Spectral Band	8-13µ
Frame rate Hz/FPS	Full Frame – 25/30 Hz
Thermal Lens	Between 30(+/-5)mm (Wide) and 120(+/-20)mm (Tele) Continuous Optical 4X Zoom Lens providing wide 20(+/-4) to Tele 5(+/-1) Degree adjustable (HFOV)
Thermal Sensitivity	<=50 mK or better
Thermal Detection Range	Should detect an object of size 2.5m X 2.5m for minimum 5Km and Human for minimum 2Km
Visible Sensor Resolution	1/2.8" Full HD CMOS/CCD
Visual Sensor Lens	4.3mm to 129mm 30X optical zoom
Output Type	IP (ONVIF Compliant) and Analogue
Pan and Tilt	Pan: 360°; 0.2° to 60°/s or better, Tilt: +90° to -90° range; Minimum 30°/s
Preset Positions	64 Presets or more
Casing	IP-66, Heater and MIL-STD-810F
Operating conditions	Temp: -20° C to 55°C , Humidity: 90%
Standard	BIS Standard 13252 (Part 1):2010

FIRE FIGHTING SYSTEM FOR 1.1 TYPE ESH

1. Fire Hydrant System

The objective of remote water cannon spraying system is to fight fires with water and foam application by remote cannons, hand held nozzles in case of fires in Shed areas, surrounding areas including grass fires etc.

The system broadly consist of Fire water Hydrant line, Fire Water Storage of approx. 225 Kilolitre, AC motor driven Main pump set (End Suction Type, Capacity – 2000 GPM), Jockey pump set for pressurization with all required accessories including valves, special fittings, instrumentation, control panels, water hydrant pipeline network, remote water cannon of 500-1000-1500 gpm capacity, fire hydrant valves, hose cabinets, hoses, nozzles etc. and other components required to complete the system in all respects.

The System shall be semi-automatic in action and shall be laid by piping covering the entire area. The Hydrant System shall be kept pressurized at all times. The proposed Jockey Pump shall take care of the leakages of the system, pipe lines and valve glands.

The pressure in the hydrant pipe work shall be kept constant at 9 Kg/cm2. In the event of fire when any of the hydrant valve in the network is opened, the resultant fall in header pressure shall start the AC motor driven fire pump through pressure switches automatically.

However, shutting down of the pump set shall be manual except for the Jockey Pump which shall start and stop automatically through pressure switches. In addition to auto start arrangements, the main pump shall also have an over-riding manual starting facility by push bottom arrangement.

The piping for the hydrant system in the area shall be laid underground in soil 1 Metre deep or above ground. The pipe laid in soil shall be protected as specified.

The Fire hydrants shall be placed at a regular spacing of 30 m in the hydrant line. The following accessories are to be provided in each arm of the hydrant line.

2 No. Hydrant valves of 900 LPM with Stand Post.
2 Nos. RRL Hoses of size 63mm dia x15m long with ISI Mark Std as per IS:636 Type – B and standard 63mm Male and Female Instantaneous coupling at the end of Flexible Fire hose with ISI Marked
1 Nos. of Solid Jet Nozzle ISI Marked
1 No. of Spray Nozzle

Other than Hydrant valves, all the other accessories shall be kept inside an external mounted Fire Hose Box

2. Remote Control Monitor

The water cannon assembly along with motors, proximity sensors, Junction boxes, panel etc. shall be suitably installed at ground level in safe area on the fire hydrant line. The remote water cannon shall be operated remotely by a control panel. The cannon assembly is connected to pipeline through a motorized operated valve. Motorized operated valve can be operated through control panel. Motors connected to monitor shall control monitor

movements – Vertical, Horizontal, Nozzle and variable flow movements. End position Feedback signals for each movement is obtained on control panel.

The scope covers the requirements regarding design, engineering, procurement, manufacturing, fabrication, assembly, testing, supply, erection, installation, commissioning of electric operated water cannon system to be used for firefighting. The scope shall include supply of UL listed or FM approved foam monitor along with electric operated remote mechanism (remote operated mechanism may or may not be UL listed or FM approved) to facilitate remote movement of the monitor, flameproof control panel, gate valve, fire hydrant line etc. Electric operated cannon is required of the following online variable discharge capacities:

(a) 1500 GPM (5700 LPM) adjustable to 1000 GPM (3800 LPM) & 500 GPM (1900 LPM) with the same single nozzle

The Electric operated Cannon shall be designed for mounting on stand posts or elevated platform /tower at fixed locations. The water cannon shall be capable to give discharge in the form of hollow jet and spray arrangement.

All the operation of the water cannon viz Horizontal movement, Vertical Movement, Jet/spray adjustment, variable discharge flow should be possible from Electric FLP Control panel, manually from Monitor (without use of power) and also from Central Command Centre (CCC) through CCTV system.

(b) Cannon Foam Induction

- Foam Induction System: Foam feeding shall be by a separate & single aqua powered foam controller. The induction system shall be UL listed or FM approved. The Foam controller should be capable of feeding foam concentrate from a horizontal distance of up-to 50 meters from the Monitor Nozzle. The inlet and outlet of foam controller shall be provided with standard 63-mm male and female instantaneous couplings as per IS: 903.

  The length of the foam pick up tube shall be 3-4 Meters. It should be possible to induct 3% foam for all the three flows, however, variation of +20% of the induction rate is permissible. Manual valve shall be provided at foam inductor to set foam induction as per 1500 GPM, 1000 GPM or 500 GPM water flows.

- Cannon: The cannon shall be able to discharge 1500 GPM, 1000 GPM and 500 GPM (depending upon adjustment at the Nozzle) at a pressure of 10.0Kg/CM2 (g) at the mating/mounting flange. The foam compound shall be AFFF/AR-AFFF.

  The nozzle shall produce foam with minimum foam expansion ratio 1:4. The pattern of the Water/foam jet nozzle shall be adjustable from straight to 140 degrees wide spray.

  The monitor shall have traversing mechanism to give 340 deg. In either direction in horizontal plane and +80 deg. & -15 deg. in vertical plane

through swivel joints operated by worm and worm wheel operated geared unit. There shall be separate hand wheels for horizontal and vertical movement of the monitor. The arrangement shall be such that monitor movements can be done by a single person. All the gear mechanisms shall be sealed by proper enclosure to avoid accumulation of dust on lubricated parts. Both the traversing mechanisms shall be self-locking type. The Swivel Joints shall have SS ball bearing with efficient sealing.

The monitor shall be online variable flow adjustment type and it should be possible to set either of the three flow rates easily and quickly at site by the operator online without stopping of the water / foam flow. The changeover of discharge flow shall be online and should be possible to be from FLP control panel from CCC and manually also.

There shall not be any flanged joint on the monitor body, except one at base flange. Other Joint between monitor body & nozzle shall be threaded type-A pressure gauge shall be fitted in the monitor body near inlet of nozzle. Pressure drop across the monitor should be less than 10 PSI.A drain connection with valve shall be provided near the base flange. The monitor shall be so designed as to resist the nozzle reaction forces during operation and shall be capable of being handled by one person. It should be possible to operate the monitor at 12 Kg/cm2 inlet pressure.

- Remote Control Mechanism. The electrically operated remote mechanism comprises of Geared motor assembly for horizontal, vertical, nozzle movements and variable flow arrangement. The remote accessory also comprises of two junction boxes (i.e. Control & Signal). One for controlling the electrical supply to the motors & other for connection to proximity sensors for obtaining the end position feedback signals. Main cables from control panel are terminated to the junction boxes (Control & Signal) & there on to the respective motors & proximity sensors with unarmored cables.

Remote operated water cannon with variable nozzle, is having following modes of operation: -

Remote Mode: Through electrical geared mechanism from the remotely installed control panel.

Remote Mode: Through Panel at Central Command Centre

Manual Mode: Through Hand wheels

- Integration with Central Command Centre: Through CCTV surveillance system, the water cannon shall be able to be operated from the CCC. All the required software for fire detection and remote operation from CCC shall be provided. Graphic Console with Pop–Up arrangement shall be

provided. Video Analytics for detection of FIRE and subsequent messages by Email / SMS shall be provided.

- Cannon Assembly Comprises of the following parts

Inlet base flange	:	Facilitates Installation on Hydrant line
Monitor Body	:	Facilitates water path
Swivel Bearings	:	Facilitates Horizontal & Vertical Rotation of monitor
Hand wheels	:	Facilitates Movement of Monitor in desired directions
Worm Shaft	:	Facilitates Motion Transmission
Nozzle	:	For discharge of desired flow rate
Pressure Gauge	:	Indicates pressure at nozzle inlet
Drain Valve	:	Draining of Residue Water from Monitor body
Springs	:	For Counter Balancing the eccentric load
Mounting Brackets & Hardware	:	Installation of Monitor and its accessories

- Material of Construction

Item/Part	Material of Construction
Nozzle	SS-304
Cannon / Monitor Body	SS-304
Flange	SS-304 (150LBS, ANSI B16.5 rating size 100 mm
Swivel Joints	SS-304
Worm	SS-304
Gear	SS-304
Spindle for worm	SS-304
Hand-wheel for Nozzle, horizontal/vertical movement	SS-304
Pick up tube	PVC tube reinforced with high tensile steel wire helix as per ASTM D1785 sch.80 (3-4 meter length)
Drain connection	SS-304
Drain valve	SS-304
Foam strainer	SS-304 (removable type)
Foam Inductor	SS-304

Foam Inductor Couplings	SS-304 (63 mm)
Nuts/bolts at Monitor	SS-304

- Approval

The Monitor, Foam Nozzle and Foam Induction device shall be UL listed or FM approved with following features:

(i)	Nozzle	: Non-Aspirating Nozzle
(ii)	Monitor Solution Flow	: Online variable flow of 1500 GPM, 1000 GPM & 500 GPM in single nozzle
(iii)	Operating Pressure	: 10 Bar
(iv)	Induction	: Foam Induction tube with three flow settings

- Remote Control System

Electric Panel: Remote Control System shall be provided for horizontal and vertical rotation of the cannon, Jet and spray movement of the monitor nozzle and changing of the variable flow of the monitor from flameproof control panel to be supplied along with the monitor. The remote control system shall be electrical.

Control Panel shall have minimum following indication and control functions for each monitor.

Push Button Control with indication	-	Up/down, right / left movements
Push button control with indication	-	Spray / jet
Push button control with indication	-	Variable flow (i.e. 500, 1000) 500 GPM
Push Button with indication on/off valve	-	Open /Close Isolation
Power On / Off	-	Indication Lamps

Control Panel shall be complete with motor starters consisting of required rating AC-3 motor duty switch, fuse, contactor and bimetal overload relay to suit motor rating, motor start / stop push button, selector switch, voltmeter etc. and suitable structural frame for mounting of the panel. The control panel shall be minimum Ex-n / Ex-e / Ex-d type in flameproof enclosure suitable for Zone -2, Gas group – IIA / IIB with GI sheet canopy. Weather protection for motor enclosure shall be minimum IP55.

Motor shall be minimum Ex-n / Ex-e / Ex-d type suitable for Zone – 2, Gas group IIA / IIB, temperature class: T3. Weather protection for motor enclosure shall be minimum IP55. All the motors shall comply with requirements described below.

Minimum conductor size for power cable for Control panel shall be 4 mm2 copper and all cables shall be 1100 V grade PVC insulated, PVC sheathed, armoured fire retardant type.

Power and Signal cable of 150 meters length for each motor shall be provided along with the supplies for connection between the monitor motors and control panel. Flameproof Junction Box, Signal cable of 150 meters length for motor operated isolation valve and common cable tray for above cables shall be supplied along with each monitor.

- Central Control Centre (CCC): In addition to the above FLP Control Panel the monitor shall be able to be operated from the Central Control Centre (CCC). The movement of the monitor shall be viewed by the help of CCTV system.

- Performance: With pressure of 10 Kg/cm^2 (g) at base flange and Nozzle at 30 to 35 deg. from horizontal the Monitor shall be capable of giving following performance:

(i)	Flow: 1500 GPM -	Horizontal Foam Throw -70 meters (minimum); Horizontal Water Throw 75 meters(minimum).
(ii)	Flow: 1000 GPM -	Horizontal Foam Throw - 64 meters (minimum); Horizontal Water Throw-70 meters (minimum).
(iii)	Flow: 500 GPM -	Horizontal Foam Throw-45 meters (minimum); Horizontal Water Throw 50 meters (minimum).

Throw to be calculated on the basis of arithmetic average of throws (measured from monitor base flange to approximate centre of the footprint) in downwind & upwind directions at prevailing wind speed at the time of performance test.

- Workmanship and Finish: All the parts shall have good workmanship and finish. All burrs and sharp edges shall be removed. Passages for foam/water shall have smooth finish.

- Painting and Marking.: All external surfaces shall be properly shot blasted & provided with two coats of primer followed by two coats of final paint finish of 50 micron.

The water cannon shall be kept near to the sheds and hence special blast proof treatment should be provided on the cannon such that in case of any explosive the same is able to withstand the impact. The said painting shall also be corrosion proof and leak proof, thus enhancing the life cycle of the water cannon. Vendors / Bidders to submit technical details of the said painting / coating.

- Site Work: Erection, installation and commissioning of the monitor at site shall be in the scope of the contractor.

- Information/Documents required from bidder

(i) During bid submission:

- Details and drawings of the offered foam cum water monitor with bill of material of monitor & accessories. Details & Drawings shall be in line with UL listing or FM approval document of the vendor.

- Performance details like.

  - Projectile curves of both water and foam streams showing horizontal & vertical throw for foam and water at Nozzle angle of 30 degree from horizontal plane.

  - Foot print (shape, size, area) of both streams at landing zone.

- K-factor of the nozzle with supporting calculations.

- Pressure drop across the monitor.

- Vendor to give details of the proposed foam induction system and schematic sketch of the monitor with Foam induction and foam source along with the technical bid.

- Valid certificates of UL Listing or FM approval of offered manually operated foam-cum water monitor, foam nozzle and foam induction mechanism.

- CMRI/DGMS/CCOE approval for flame proof enclosures for motors & panel.

- Proven Track Record of the offered or higher capacity variable flow (minimum two flow) monitor as per tender specification along with site activities.

- General arrangement Plan (GAP) incorporating the stipulated inspection and testing requirements.

(ii) At the Time of delivery:

- As built drawings of monitor assembly.
- Electrical circuit diagrams for junction boxes & remote panel. Cable termination details & cable schedule.
- Installation procedure.
- All inspection and testing records.
- Operating and instruction manual.
- Testing and maintenance procedure/manual.

(c) Specification for Motor

- Codes and Standards: The Motor and their components shall comply with the latest editions of relevant standard issued by BIS (Bureau of Indian Standards). In case of imported motors standards of the country of origin shall be applicable, if these standards are equivalent or stringent than the applicable Indian Standards. The motor shall also conform to the provisions of Indian Electricity Rules and other regulation currently in force in the country. In case, Indian standards are not applicable or not covering any part, the standards issued by IEC /BS /VED/IEEE /NEMA or equivalent agency shall be applicable. In case of any contradiction between various referred standards/ specifications / Data sheets and statutory regulations the following order shall be govern.
  - Statutory Regulation
  - Data Sheet
  - Job specification
  - This specification
  - Code and standards
- Operating Conditions
  - Ambient Conditions: Motor shall be suitable for operating satisfactorily in humid and corrosive atmosphere found in refineries, petrochemical plants. Service condition shall be as specified in the motor data sheet. If not specifically mentioned therein, a design ambient temperature of 45º C and an altitude not exceeding 1000M above mean sea level shall be taken in to consideration.
  - Frequency and Voltage: Unless otherwise agreed motor shall be designed for operation at rated output under the following conditions:

- The terminal voltage differing from its rated value by not more than ± 6 % or
- The frequency differing from its rated value by not more than ± 3 % or

➢ Starting

- Unless otherwise specified, motor shall be designed for on-line starting with suitable protection.
- Motor shall be designed for reacceleration under full load after a momentary loss of voltage with residual voltage being 100 % and is in phase opposition to the applied voltage.
- Unless otherwise specified, all motors shall be suitable for starting under specified load conditions with 75% of the rated voltage at the motor terminals.

➢ Performance

- Motor shall be rated for intermittent duty cycle (S3), unless otherwise specified.
- Unless otherwise specified, the starting current (as % rated current) shall not exceed 600% subject to tolerance.
- In particular cases, when the starting with reduced voltage is specified, care shall be taken such that the design values of torque meet the load requirement while at the same time complying to starting conditions mentioned above in S.No.4.

➢ Construction

- Insulation: Unless otherwise specified the motor shall be with Class 'B' insulation as a minimum. In case of motor with class 'F' insulation the permissible temperature rise above the specified ambient temperature shall be limited to those specified in the applicable Indian Standard for class 'B' insulation.

  In case of motors driving equipment with pulsating loads, special care shall be taken for the joints of rotor bars and end rings to avoid premature failure due to induced fatigue stress.

- Terminal Box and Cable entries. The terminal box shall be suitable enough to facilitate easy connection of the cables. The terminal box shall be with necessary clearances, creepage distances between live parts and between live parts to earth considering air insulation and without any compound filling.

  The terminal box shall be provided with cable lugs and entries for suitable cable glands corresponding to the size of the specified cable. Nickel plated brass (or aluminium if specifically required),

double compression type cable glands/ flame proof cable gland shall be supplied along with the motors for the specific cable size.
Equipment and accessories shall conform to the hazardous area classification and the environmental conditions as specified.
The terminal box shall be capable to withstand internal short circuit conditions without danger to personnel or plant.
Appropriate phase markings as per IS shall be provided inside the terminal box. The marking shall be non-removable and indelible.

FIRE DETECTION SYSTEM FOR WP SHED

1. Fire Alarm System

Item	Minimum Requirement Description
Make	
Model	
Loop	1 expandable to 10
Detectors	159 per loop
Addressable monitor/control modules	160 per loop

Primary Input Power:	AMPS-24: 110-120 VAC, 50/60 Hz, 4.5 A maximum. AMPS-24E: 240 VAC, 50/60 Hz, 2.25 A maximum
DC Output:	Main 24 VDC: Up to 5.0 A Aux 24 VDC: Up to 5.0 A 5 VDC: Up to 0.15 A.
Temperature and humidity ranges	0 – 49°C/32 – 120°F and at a relative humidity 93% ± 2% RH (noncondensing) at 32°C ± 2°C (90°F ± 3°F).
Approvals	UL Listed: S635. ULC Listed: S635. MEA: 232-06-E. Fire Dept. of New York: COA#6114. CSFM: 7165-0028:0224 (Commercial). FM Approved. FM6320 Approved. Class 6320 for Gas Detection.
Standards	UL 864 (Fire). UL 1076 (Burglary). UL 2572 (Mass Notification Systems). (NFS2-3030 version 20 or higher) LOCAL (Automatic, Manual, Waterflow and Sprinkler Supervisory). AUXILIARY (Automatic, Manual and Waterflow) (requires TM-4) BIS 2008 or ISO Certification
Weight	0.16kg
Operating Temperature	-20 °C to +60 °C
Relative Humidity (non-condensing)	0% to 95%
IP Rating	IP24D
Operating Voltage	17-28V DC
Environmental Specifications	IP65

IR-UV Fire sensor	
Spectral Response	3600-L-LB: UV: 0.185 - 0.260 micron IR: 2.5 - 3.0 micron 3600-L4-L4B: UV:0.185 - 0.260 micron IR: 4.4 - 4.6 micron
Response Time	Typically 5 seconds. High speed 150 msec response to saturated signal

Sensitive Range	1 sq. ft. (0.1 sq. m) n-heptane pan fire from 50 ft. (15 m)
Field of View	100o Horizontal, 95o Vertical
Temperature Range	Operating: -67oF to 167oF (-55oC to 75oC) Operating Option: -67oF to 185oF (-55oC to 85oC) Storage: -67oF to 187oF (-55oC to 85oC)
Humidity	Up to 95% non-condensing (withstands up to 100% RH for short periods)
Heated Options	To eliminate condensation and icing on the window
Electrical Specifications	Operating Voltage: 24 VDC nominal (18-32 VDC) Power Consumption: Standby: Max. 90 mA (110 mA with heated window) Alarm: Max. 130 mA (160 mA with heated window) Cable Entries: 2 x ¾" - 14 NPT conduits or 2 x M25 x 1.5 mm ISO Wiring: 12 - 22 AWG (2.5 mm2 - 0.3mm 2) Electrical Input Protection: According to MIL-STD-1275B Electromagnetic Compatibility: EMI/RFI protected to EN61326-3 and EN61000-6-3 Electrical Interface: The detector includes twelve (12) terminals with five (5) wiring options (factory set)

Outputs	Relays: • Alarm, Fault, and Auxiliary • SPST volt-free contacts rated 5A at 30 VDC or 250 VAC 4-20 mA (stepped) • Sink (source opton) configuration • Fault: 0 + 1 mA • Warning: 16 mA +/- 5% • BIT Fault: 2 mA +/- 10% • Alarm: 20 mA +/- 5% • Normal: 4 mA +/- 10% • Resistance Loop: 100-600 ohms HART Protocol: Optional HART communication on the 0-20 mA analog current (FSK) – used for maintenance, configuration changes and asset management, available in mA source output wiring options RS-485: RS-485 MODBUS compatible communication link that can be used in computer control installations
Approvals	Hazardous Area • ATEX &IECEx Ex II 2 GD Ex de IIB + H2 T5 (-55o to 75oC) Ex de IIB + H2 T4 (-55o to 85oC) Ex tD A21 IP66/X7 T 95oC Ex tD A21 IP66/X7 T 105oC • FM/CSA Class I Div. 1, Groups, B, C & D Class II/III Div. 1, Groups E, F & G Performance • EN54-10 (LPCB) • FM-3260 (FM) • • DNV Marine Approval Reliability • IEC61508 – SIL-2 (TUV) • PDO Approval: Petroleum Development Oman Certificate of Registration • ISO 9001:2008: Registered Quality System

COMMUNICATION SYSTEM

1. Line Exchange 200 Line

Item	Minimum Requirement Description
General Requirement	IPPBX (Hardware & Software) shall be provided in high availability configuration.
Technology	The system should support IP or SIP as well as TDM. The TDM can be supported through an external Gateway.
Interface	Should be compatible with all telecom interfaces or Telecom Service providers
Type Of Interfaces	It should compatible with ISDN PRI, Analogy trunks, H.323 trunk, SIP trunk. It should also provide facility to integrate with GSM, Radio devices.
Type of Extension Support	Analogy, Digital, IP, SIP (3rd party SIP phone), IP Phone
Expansion of Extensions	IP Telephone extensions should be expanded based on quantities of data switch ports available.
System Design	The IP PBX should be modular, expandable, embedded IP server-gateway/server based architecture, having Unix or Linux or equivalent operating system software based platform. The system shall have hot standby/Active-Active arrangement so that it should continue to operate in case of failure or maintenance of main processor or power supply or interfacing card or CPU etc. The system should support IP or SIP as well as TDM. The TDM can be supported through an external Gateway.
Conferencing	Conference bridge that can manage multiple calls (min 5) simultaneous conferees.
ACD And CTI Support	Support for ACD Call Centre with CTI and advance call routing
Call Center Communication Support	Support Standard SIP based IP Platform, Session Initiation Protocol over an MPLS or Multiple Label Switching Protocol for connectivity of call center to other call center communications,
Outbound Calling Support	The system shall allow outbound calling from the IP Phones.
General Requirement	The system shall support local announcements and music on hold.

General Requirement	The system shall be able to provide interface to ISDN PRI
Features	The system shall be able to provide following features like Basic Call Setup, Name and Number Support, Transit Counter, called or Calling or Busy or Connected Name and Number, Name Identification, Diversion (Call forwarding), Diversion (Call forwarding) with Reroute, Call transfer.
General Requirement	The system shall have inbuilt web-based software for administration and maintenance of the system. It shall provide the following features:
	▶ The software shall provide GUI based interface for configuration and management of the system.
	▶ The Software shall provide real-time information or alerts and reports regarding health status e.g. up or down status, performance & resource utilization statistics etc. of the system and its components.
	▶ The system shall maintain the accounting and authorization logs of the users accessing the components of the telephony system. The logs shall include information about users who have login into the system.
	▶ It shall be possible to schedule tasks. The tasks could be one or more operations that the user can specify to run at a predetermined date and time.
	▶ It shall provide reports about station alarms, trunk analysis, processor occupancy, system capacity etc.
	The system shall have inbuilt web-based software for administration and maintenance of the system. It shall provide the following features:
	▶ The software shall provide GUI based interface for configuration and management of the system.
	▶ The Software shall provide real-time information or alerts and reports regarding health status e.g. up or down status, performance & resource utilization statistics etc. of the system and its components.
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	▶ It shall be possible to schedule tasks. The tasks could be one or more operations that the user can specify to run at a predetermined date and time.
	▶ It shall provide reports about station alarms, trunk analysis, processor occupancy, system capacity etc.
	The IP PBX system should provide complete inbuilt encryption capabilities or features without any external firewall, with the ability to encrypt all traffic (media and call control signaling) between IP

	phones, soft phones, call controllers and all other associated endpoints via a strong encryption algorithm like IPSec or SRTP etc.
	The system shall provide features viz. silence suppression, comfort noise and voice activity detection.
	It shall provide some features as give below but not limited to these this list. It can be expand further based on requirement
	▶ Call forward all, Call forward while busy, Call forward if no answer
	▶ Call hold, Call Drop and retrieve
	▶ Call Waiting and Retrieve (with configurable audible alerting)
	▶ Call Join
	▶ Call status (state, duration, number)
	▶ Conference for atleast 5 parties
	▶ Missed call information on IP phone
	▶ Directory dial from phone
	▶ Hands-free, speakerphone
	▶ Last number redial
	▶ Malicious Call ID and Trace
	▶ Abbreviated Dial, Speed Dial
	The system should have IP address and connected to the network

	The system must support log services for both Internal and External commands and configuration history for at least 30 days

2. Radio Interoperability System

a. The interoperability gateway should offer multiples input channels for radio entry points.

b. The interoperability gateway should have ability to interface radios, computers, IP video feeds and smart phones within a common multi-user interface.

c. The interoperability gateway should be an independent node replication and does not require a centralized server or services to make, break or manage multi-node connections.

d. The interoperability gateway should have ability to break patches even when the systems are disconnected or loses network connection.

e. The interoperability gateway shall be assigned a unique server identification number.

f. The interoperability gateway shall support 26-pin voice and data interface ports for radio connections while offering remote radio control for select mobile radio models.

g. The interoperability gateway should have unlimited gateway scalability. The base system should have ability to add any number of input channels or IP connections.

h. The interoperability gateway should support an activity log with the ability to double-click on a transmission for instant recall.

i. The interoperability gateway shall support an unlimited number of simultaneous communications, cross connects, or patches based on the number of assets connected.

j. The interoperability gateway shall support the ability to create pre-set groups and radio configurations. When selected by the user, the gateway recreates the groups and radio configurations.

k. The interoperability gateway shall support the ability to interface to remote communications radios at towers using standard tone remote control ones with tone control hardware options.

l. The interoperability gateway shall support the ability to offer remote control tones that are user selectable. Controls will be user selectable by audio frequency, tone(s) duration, sequence of multi tones and tone level output. Remote control tones will be capable of outputting audio levels that will key the remote transmitter.

m. The interoperability gateway shall support the ability to support all conventional radios, HF, VHF, UHF, 700/800 MHz trunking, conventional and military radios.

n. The interoperability gateway shall support a simple to learn GUI with touch screen design.

o. The interoperability gateway shall support the ability to configure patches with simple to use cluster groups.

p. The interoperability gateway allows the user to create patches by selection of repeater tower locations or radio gateways.

q. The interoperability gateway offers the ability to configure a port via predefined software profiles.

r. The interoperability gateway shall support the ability to save all settings channel-by channel basis.

s. The interoperability gateway shall support the ability to configure channels on the fly with no impact to any other channels.

t. The system offers the ability to set up major user types including (1) System Administrator, (2) Dispatcher and (3) User. Users may be assigned rights and privileges regarding which functions maybe performed by the user.

u. The interoperability gateway shall support the ability to store and forward audio to account for delays within a trunking radio system.

v. The interoperability gateway shall support the ability to allow all channels (radio select chassis) to interface with the "ready" and "transmit" handshakes with trunking radios.

w. The interoperability gateway shall support the ability to interface with Nextel PTT radios. Remote users with Nextel PTT phones can communicate seamlessly with any gateway channel set up to network with the radio system.

x. The interoperability gateway offers full control from a remote client station with the ability to perform all system administrator or dispatcher functions from client stations.

y. The interoperability gateway shall support the ability to log-in multiple users within a shared workspace (optional computer ports). All users see elements created and affected by users within the system

z. The interoperability gateway shall support the ability to communicate via TCP/IP protocols.

aa. The interoperability gateway offers the ability for remote client stations to control all radio functions available from the connected radio front panel, e.g. frequency, power levels, channels, zones, scan, talk-around, etc. This capability is available assuming the radio has a computer control capability.

bb. The interoperability gateway shall support the ability to create "Dispatch Groups". The dispatcher can communicate with all radios, phones or computer terminals connected through the gateways by PTT a single on-screen element whereas all assets within the group remain operationally independent and do not hear cross connects. The members of the dispatch group may transmit to the dispatcher directly. Other members of the dispatch group may not listen to communications between the dispatcher and the individual members. The dispatcher function shall allow for frequency and transmit control of the radios.

cc. The interoperability gateway shall support the ability to establish "Private" connections between any gateway channels. Private connections act as nested groups and allow communications only between the gateway channels connected in private.

dd. The interoperability gateway shall support the ability to place radio entry points in both "Talk Groups" and "Private". When the gateway is connected in both modes, the operator may listen to both the normal Talk Group and the Private connection.

ee. The interoperability gateway shall support the ability for remote users to control or communicate with the radio subsystem server via TCP/IP wired network using RIOS client software. Remote users can perform all functions (i.e., make/break connections, start recording, etc.) as if they were physically located at the server.

ff. The interoperability gateway shall support the ability to select the priority of the "listen to" radio entry point. The priority may be changed in real time by the dispatcher with no impact on switch operations.

gg. The interoperability gateway shall support the ability to be connected using a remote IP connection, e.g., VPN using the Internet (with optional VPN set up and router).

hh. The interoperability gateway shall support the ability to be connected using an IP network to form a Radio Wide Area Network (RWAN). The RWAN will allow the user to select which gateways are allowed to participate in the radio wide area network. Selection of the gateways servers will be done simply by adding from a drop down list. Upon selecting the gateway assets to participate in the RWAN, the selected servers will appear in the shared RWAN "workspace".

ii. The interoperability gateway shall support the ability to display to RWAN sites in selectable colors indicating a RWAN gateway. Assets from that location will be color-coded once connected in the shared workspace.

jj. The interoperability gateway shall support the ability to control RWAN connections using site permission individual to each asset. Site permission shall include the ability to protect (1) patching right and (2) monitoring right from the remote gateway.

kk. The interoperability gateway shall support the ability to create "chat groups" by the selection of the computer station icon. Chat groups are defined as multiuser capable text messages with the gateway interface.

ll. The interoperability gateway shall support the ability to allow for the connection of a router (802.11x).

mm. The interoperability gateway shall support client software that can monitor in mono and stereo mode.

nn. The interoperability gateway shall support audio channels with individual volume controls.

oo. The interoperability gateway shall support the ability to communicate with P25 compliant radios.

3. Radio Set

The successful bidder has to consider specification and functionalities of in service radio sets.