



**ITI LIMITED**

**R&D**

**BENGALURU PLANT**

**DOORAVANINAGAR**

**BENGALURU-560016**

**DEVELOPMENT OF DIGITAL  
MOBILE RADIO (DMR) SYSTEM  
ITI Limited, Bangalore-560016**

**Tender Reference:**

**R031H0056**

**Dated: 13.09.2021**

**REQUEST FOR PROPOSAL**  
**ITI LIMITED**

**INVITATION OF BIDS FOR DEVELOPMENT**  
**OF DIGITAL MOBILE RADIO FOR R&D, ITI**  
**LIMITED, BANGALORE**

**IMPORTANT INFORMATION**

e-Tender for DEVELOPMENT OF DIGITAL MOBILE RADIO (DMR)  
SYSTEM for R&D, ITI Limited, Bengaluru - reg.

**IMPORTANT INFORMATION**

Sl.No	Items	Description
1	Scope of work	DEVELOPMENT OF DIGITAL MOBILE RADIO (DMR) SYSTEM for R&D, ITI Limited, Bengaluru
2	Tender Reference	<b>Ro31H0056</b> Dated: Dated: 13.09.2021
3	Cost of bid documents	Rs.1500/- Online Payable in favour of “ITI Limited, Bangalore”
4	Date of uploading of Tender Document on website/ Portal	13 SEPTEMBER, 2021
5	Last Date & Time for upload/ submission of bid	27 <sup>th</sup> SEPTEMBER, 2021 @1600 HRS
7.	Date of opening of technical bid	28 <sup>th</sup> SEPTEMBER, 2021 @1000HRS
8	Date of opening of financial bid	Will be communicated to technically successful bidders
9.	Bid Security (Earnest Money Deposit)	Rs. 30, 00, 000/- (Rupees Thirty Lakhs only) accepted in the form of online Payment

10	Performance Bank Guarantee from successful Bidder	PBG - 3% of PO Value to be submitted in the form of Bank Guarantee from any of the Nationalised Banks in favour of ITI Limited, Bengaluru. Performance Bank Guarantee should remain valid till completion of ToT & warranty period
11.	<p><b>FORMING PART OF BID DOCUMENT</b></p> <p>I. Bidders/firms who fulfil the requirements as mentioned in this tender document shall be eligible to apply.</p> <p>II. The bid can only be considered for evaluation after online remittance of EMD in ITI Limited, Bengaluru. In case of non-receipt of EMD bid will be rejected.</p> <p>III. On tender opening date, the bidders can login and see the bid opening process.</p> <p>IV. Bidder can upload documents in the form of PDF format only</p>	
	<p>V. Bidder must ensure to quote rate of each item in BOQ.</p> <p>VI. If any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as "0" (ZERO).</p> <p>VII. The eligibility documents shall be opened first for technical bid on due date and time as mentioned above. Financial bid (BOQ) of Bidders/firms who qualified in technical evaluation will be opened on a later date.</p> <p>VIII. EMD will not be applicable MSME enterprise &amp; valid certificate to be uploaded</p>	

12.	<b>LIST OF <u>MANDATORY</u> DOCUMENTS TO BE SCANNED AND UPLOADED WITHIN THE PERIOD OF BID SUBMISSION: -</b> <ol style="list-style-type: none"> <li>1 Company Profile along with last three years audited Financial Results</li> <li>2 Copy of receipt for deposition of original EMD / Cost of the tender document or copy of relevant documents for exemption.</li> <li>3 Duly filled Technical Bid Proforma</li> <li>4 Income Tax Assessment Completion Certificates for last three financial years duly certified by a Chartered Accountant/ Statutory Auditor.</li> <li>5 Copy of PAN card</li> <li>6 Certificate of Registration for GST</li> <li>7 Copy of work orders present and past contracts with their contact details</li> <li>8 Performance certificates from Past and Present clients for 3 contracts of similar works</li> <li>9 Certificates from your Statutory Auditor regarding Average volume Sales/Turnover of business during each of the last 3 financial years</li> </ol>	
13.	Place of opening of bids	<b>ITI Limited, Bengaluru Plant</b>
14.	Address for communication	<b>Materials Manager – R&amp;D, Bangalore Plant, ITI Limited Bangalore-560016</b>
15	Bank Details	Name : M/s ITI Limited Account No: 36429021133 IFSC Code: SBIN0001438 MICR Code: 560002016 Address: ITI Township, Doorvani Nagar PO, Bangalore-16

**Note: In the case of non-submission of the Mandatory documents, the Bid would be rejected.**

**For any clarification / queries related to uploading in e-Tender Portal, kindly contact our e-tender partner Mr. Dhanraj (Antares) email:[ghanraj.p@antaressystems.com](mailto:ghanraj.p@antaressystems.com); MOB: 9686115308**

**TABLE OF CONTENT**

<b>ANNEXURE NO</b>	<b>CONTENT</b>	<b>PAGE NO</b>
1	SPECIFICATION OF DMR SYSYTEM	6
2	Eligibility Criteria of Technology Partners	25
3	Milestones & corresponding Payment Terms	28
4	Transfer of Technology (ToT) & Deliverables	30
5	INTEGRITY PACT	33
6	PERFORMANCE BANK GUARANTEE	42
7	No near Relative Certificate	43
8	Price Bid Format	44

## **Annexure - I**

### **SPECIFICATION OF DMR SYSTEM**

#### **Digital Mobile Radio (DMR):**

##### **Introduction:**

Digital Mobile Radio (DMR) device uses digital technology along with a time division approach to enable greater levels of efficiency and performance along with improved spectrum usage. DMR aims to provide an affordable, low-complexity digital standard to replace Analog Radio. DMR based VHF/UHF radios are used in many applications such as military communications, police, railways, public safety, traffic control, disaster management, industrial security and communications etc. The VHF/UHF radio can be used in direct-to-direct communication in Tier I, Tier II or in multi-site environment in Tier II, Tier III modes.

ITI Ltd. has experience in design and development of encryption devices for secure communication and has been developing varied range of products for Defence services.

ITI Ltd. looks forward to development of a Tier III DMR based full system to operate in the range of VHF/UHF frequencies. The developed Radio shall have complete user interface and the mechanical design to meet the needs of consumer applications.

The Digital Mobile Radio (DMR) consists of following sub-systems:

1. Hand Held DMR (With Keypad)
2. Hand Held DMR– Smart Phone (With Touch Screen)
3. Base Station
4. Repeater
5. Network Management System

#### **1. Hand Held DMR (With Keypad)**

The Handheld DMR is a low cost radio operating in three different bands namely VHF (136 to 174 MHz), UHF1 (400 to 470 MHz) and UHF2 (800 to 890 MHz). These are factory fixed frequencies and are operated in conventional Analog FM Mode and 4FSK digital mode complying with ETSI standards. The Radio can be broadly divided in to five sections:

- Antenna
- Transmit section
- Receive section
- Digital and Interface Section
- Battery Section

#### **2. Hand Held DMR– Smart Phone (With Touch Screen)**

This device is a high end DMR supporting SIM card, through which it can be connected to an open radio network. The SIM card supports the latest 3GPP standards – 4G as of now – and can be upgraded to later technologies. The smart phone provides additional connectivity options for the user in addition to the DMR technology. These include Wi-Fi, Bluetooth etc. Using these features the radio can be connected to an internet or local private network and exchange packetized voice, video or data within the network or outside the network based on the configuration.

Using Wi-Fi and Bluetooth, the radio can participate in a mesh network. The communications over the air is secured using SAG approved crypto proprietary algorithm.

### **3. Base Station UNIT**

The DMR Base Station mainly works as interface between two communication networks either wired or wireless. This works for trunking feature between different users. The Base Station has IP connectivity providing flexibility to connect to different network users / services via IP. The Base Station is broadly divided into five sections as listed

- Antenna System
- Channel Unit
- Transceiver Section
- Baseband Processing and Interfaces Section
- Power Supply Section

Base Station to be provided with additional provision of Vehicle mount.

### **4. DMR Repeater Specifications**

The Repeater mainly works for extension of communication from one DMR Radio to another DMR Radio which are beyond the existing group of network. Repeater to be provided with additional provision of Vehicle mount.

### **5. Network Management System**

The solution provides an Application Server Interface (ASI) that facilitates application developers to connect to the repeaters or master control server to provide various services to the end user. The Network Management system comprises of following:

- Dispatcher/Operator Console Voice Recording Service
- Location Services
- Display of Location Data

Some of the functionality provided using the application sever interface (ASI) at the control room are:

- Operator Console Application
- Over the Air Programming (OTAP)
- Text Message and Emails
- Call Recording
- Location Tracking
- Fleet Administration
- Voice Dispatch
- Job Ticketing
- Event Logging
- Telemetry
- Alarm & Lone Worker

## Detailed Technical Specifications of DMR System

### 1. Handheld DMR with Keypad Specifications

Sl No.	Parameters	Desired Specification	Compliance by the Vendor
1	Frequency Band	VHF & UHF	
2	Frequency Range	VHF 136-174 MHz UHF 400-470 MHz, 800-890MHz	
3	Type	Duplex/Half duplex	
4	TDMA	2- slot	
5	Type of modulation	4FSK, DMR ETSI- standards with capability of Analog channels	
6	Channel Spacing/Channel Separation	12.5/25 kHz	
7	No. Of contacts (individual/group call numbers)	1000 or better	
8	Channel Capacity/ No. of Channels	1000 or better	
9	Antenna Impedance	50 ohm	
10	VSWR	Better than 1.5	
11	Interoperability with minimum 2 vendors	Required	
12	Dimensions (H x W x D)	≤ Dimensions with Standard Battery (143 mm x 70 mm x 29 mm)	
13	Weight (with Antenna & Battery)	≤ 400 gram	
14	Emission	11K0F3E, 7K60FXE,7K60FXD, 7K60FXW	
15	Digital / Analog Battery Life, High Capacity Battery	2600mAh or better. Charge within 2-4 hrs with battery backup of 12 hrs	
16	Power Supply (Nominal)	Vendor to indicate	
<b>B</b>	<b>FEATURES:</b>		
1	Three operating modes - Analog conventional, digital conventional (DMR Tier II), and digital trunking (DMR Tier III)		
2	Simple Press to talk		
3	CTCSS ( Continuous Tone Coded Squelch System)		
4	Capable of VOX hand-free operation		
5	PTT ID Encode		
6	Automatic Number Identification (ANI)		
7	Site Roaming		



8	DMR Auto Slot Select, Dual Slot Direct Mode		
9	Wired connection or Over-the-air-programming (OTAP) to update configuration and software files. OTAP via DMR trunked networks		
10	End-to-end encryption, Including DES, ARC4, AES-256 or SAG Approved algorithm to be provided as per user requirement		
11	Digital Bit Scrambler		
12	Display (OLED) and Keypad		
13	Late Entry		
14	Group, emergency, priority and all-calls		
15	Text and status messaging, paging calls		
16	Remote Stun / Kill, Monitor, Check & Control		
17	Programmable emergency key, Emergency SOS/SIREN		
18	Man-down and lone worker alerts		
19	Battery Status and alert		
20	Scanning modes: priority, dual priority, zone, and background scan group editable		
21	Voice Announcement for Channel allotment and battery level		
22	Multi-constellation GNSS(IRNSS/GPS/GLONASS/BEIDOU)		
23	Bluetooth( Audio, Data, Permanent Discovery Mode, Indoor Location Tracking)		
24	Integrated WiFi		
25	IP Site Connect (Single and Multi Site)		
26	KFD(Key Fill Device) for quick and reliable encryption key programming : Hardware resource for encryption algorithm		
<b>C</b>	<b>TRANSMITTER:</b>		
1	4FSK Digital Modulation	12.5 kHz Data: 7K60F1D and 7K60FXD, 12.5 kHz Voice: 7K60F1E and 7K60FXE, Combination of 12.5 kHz Voice and Data: 7K60F1W	
2	Modulation Deviation	± 2.5 KHz at 12.5 KHz	
3	Digital Protocol	ETSI TS/DMR open standard	
4	Conducted/ Radiated Emissions (TIA603D)	-36 dBm < 1GHz, -30 dBm > 1GHz	
5	Adjacent Channel Power	60dB (12.5 kHz channel), 70dB (25 kHz channel)	
6	FM Hum and Noise	-34dB @ 12.5 KHz	
7	Frequency Stability	± 0.5 ppm	
8	Power output at antenna port	5 Watt programmable to 1 Watt	
9	Modulation Sensitivity	1 to 10 mV at 1 KHz at mic. Input for (+/-)1.5 KHz (for 12.5 KHz channel spacing) standard deviation	
10	Modulation Distortion	Less than 3% at 1 KHz reference for (+/-) 1.5 KHz (for 12.5 KHz channel spacing) standard deviation	

11	Modulation Fidelity / Audio Response	(+) 1, (-) 3dB for 6dB/Octave Pre-emphasis characteristic from 350Hz to 2700 Hz with 1 KHz as reference.	
12	Spurious emission	Better than 70dB	
13	Transmitter Output impedance	50Ω	
14	Frequency Generation	Frequency Synthesized Oscillator	
15	VSWR	Better than 1.5	
<b>D RECEIVER SPECIFICATIONS</b>			
1	Analog Sensitivity (12dB SINAD)	Better than 0.25 μV for 12dB SINAD.	
2	Digital Sensitivity (5% BER)	0.18 μV with BER<5%	
3	Intermodulation (TIA603D)	Better than 60 dB	
4	Adjacent Channel Selectivity, (TIA603A)-1T	Better than 60dB for 12.5 KHz channel separation	
5	Adjacent Channel Selectivity, (TIA603D)-2T	Better than 60dB for 12.5 KHz channel separation	
6	Spurious Rejection (TIA603D)	65 dB or better	
7	Hum and Noise	-34dB @ 12.5 KHz, -40 dB @ 25 KHz	
8	Squelch Sensitivity	0.18 μV	
<b>E AUDIO SPECIFICATIONS</b>			
1	Digital Vocoder Type	AMBE+2™	
2	Audio Response	+1,-3 dB	
3	Audio Output Power	500 mW at 4 Ω load	
4	Audio Distortion at Rated Audio	Less than 3% at 1 KHz reference for (+/-) 1.5 KHz (for 12.5 KHz channel spacing) standard deviation	
5	Hum and Noise	-34dB @ 12.5 KHz, -40 dB @ 25 KHz	
6	Conducted Spurious Emissions	Better than 70dB	
<b>F BLUETOOTH SPECIFICATIONS</b>			
1	Version	4.0	
2	Range	10 m	
3	Simultaneous Connections	1 x audio accessory and 1 x data device	
4	Permanent Discoverable Mode	Should Have	
<b>G GNSS SPECIFICATIONS</b>			

1	Constellation Support	IRNSS/GPS/AGPS/GLONASS/BEI DOU	
2	Time To First Fix, Cold Start	< 32s	
3	Time To First Fix, Hot Start	< 1.5 s	
4	Horizontal Accuracy	< 1.5m	
<b>H Wi-Fi SPECIFICATIONS</b>			
1	Integrated Wi-Fi and Standards Supported	IEEE 802.11b, 802.11g, 802.11n	
2	Security Protocol Supported	WPA, WPA-2, WEP	
3	Maximum Number of SSIDs	128	
<b>I ENVIRONMENTAL SPECIFICATIONS</b>			
1	Operating Temperature	MIL STD 810 C/DE/F/G Pro I & II	
2	Thermal Shock	MIL STD 810 C/DE/F/G Pro I & II	
3	Humidity	MIL STD 810 C/DE/F/G Pro I	
4	Dust and Water Intrusion	IP 68 or better	
5	Salt Fog	MIL STD 810 C/DE/F/G Pro I	
6	Shock test transit drop	MIL STD 810 C/DE/F/G Pro I & IV	
7	Vibration (Minimum integrity)/ Vibration Test	MIL STD 810 C/DE/F/G Pro I & II	
8	Sand dust blowing	MIL STD 810 C/DE/F/G Pro I & III	
9	Rain (blowing rain) Test	MIL STD 810 C/DE/F/G Pro I, II & III	
10	Solar radiation test	MIL STD 810 C/DE/F/G Pro I	
11	Packaging Test	MIL-STD 810D and E	
<b>K SECURITY</b>			
1	Programmable Security Module and SAG approved encryption algorithm as per user requirement	Yes	
2	Multi-Level Authentication	Yes	
3	Integrity Monitoring/ Authentication	Yes	
4	Secure boot	Yes	

5	Restricted Access	Yes	
<b>L</b>	<b>SOFTWARE</b>		
1	Operating System	Vendor to indicate	
<b>M</b>	<b>HARDWARE</b>		
1	Main Display	OLED	
2	Memory	Storage required to store up to 1000 messages and contacts	
3	User Interface	Simple and easy to use interface through alphanumeric keypad	
4	Physical Buttons	<ul style="list-style-type: none"> <li>• PTT Button</li> <li>• Emergency Button</li> <li>• Hi power / Low Power</li> <li>• Squelch ON/OFF</li> <li>• 3 Programmable Buttons</li> <li>• Power/Volume Knob</li> <li>• Display On/Off Button</li> <li>• 16-position Channel Selector</li> </ul>	
<b>N</b>	<b>Electrical Characteristics:</b>		
1	Current consumption during transmission of rated full power	Vendor to indicate	
2	Current consumption during receiving the signal with full volume condition	Vendor to indicate	
3	Ideal current	Vendor to indicate	
4	Duty cycle	Meets 95% rated capacity at 10:10:80 duty cycle	
5	Battery Capacity	2600mAh and will charge within 2-4 hrs with battery backup of 12 hrs.	
6	Battery backup	More than 20 Hrs. or better	

## **2. Smart Handheld DMR with Touch Screen Specifications**

<b>Sl. No</b>	<b>Parameters</b>	<b>Desired Specifications</b>	<b>Compliance by Vendor</b>
<b>A</b>	<b>GENERAL</b>		
1	Type	Duplex/Semi duplex	
2	Type of modulation	4FSK Digital Modulation DMR ETSI- standards with capability of Analog channels	
3	Frequency range	VHF 136-174 MHz UHF 400-470 MHz, 800-890MHz	
4	No. of channels	Up to 1000 Channels	
5	Channel separation	6.25 / 12.5 / 25 KHz	
<b>B</b>	<b>FEATURES:</b>		
1	Three operating modes - analog conventional, digital conventional (DMR Tier II), and digital trunking (DMR Tier III)		
2	Simple Press to talk		
3	CTCSS ( Continuous Tone Coded Squelch System)/ DCS(Digital coded system)		
4	Capable of VOX hand-free operation		
5	PTT ID Encode		
6	Automatic Number Identification (ANI)		
7	Site Roaming		
8	DMR Auto Slot Select, Dual Slot Direct Mode		
9	Wired connection or Over-the-air-programming (OTAP) to update configuration and software files. OTAP via DMR trunked networks		
10	End-to-end encryption, Including DES, ARC4, AES-256 or SAG Approved algorithm to be provided as per user requirement		
11	Digital Bit Scrambler		
12	Full duplex calls		
13	Late Entry		
14	Group, emergency, priority and all-calls		
15	Text and status messaging, paging calls		
16	Remote Stun / Kill, Monitor, Check & Control		
17	Programmable emergency key, Emergency SOS/SIREN		
18	Man-down and lone worker alerts		
19	Low battery alerts		
20	Scanning modes: priority, dual priority, zone, and background scan group editable		
21	Voice Announcement		
22	Multi-constellation GNSS(IRNSS/GPS/GLONASS/BEIDOU)		
23	Bluetooth( Audio, Data, Permanent Discovery Mode, Indoor Location Tracking)		

24	Integrated Wi-Fi		
25	IP Site Connect (Single and Multi Site)		
26	KFD(Key Fill Device) for quick and reliable encryption key programming : Hardware resource for encryption algorithm		
<b>C</b>	<b>Transmitter</b>		
1	Power output at antenna port	5 Watt programmable to 1 Watt	
2	Frequency stability	±0.5 PPM	
3	Frequency deviation	± 2.5KHz for set having channel separation of 12.5 KHz	
4	Digital protocol	ETSI TS/DMR open standard	
5	Vocoder type	AMBE+2	
6	Modulation Sensitivity	1 to 10 mV at 1 KHz at mic. Input for (+/-)1.5 KHz (for 12.5 KHz channel spacing) standard deviation	
7	Modulation Distortion	Less than 3% at 1 KHz reference for (+/-) 1.5 KHz (for 12.5 KHz channel spacing) standard deviation	
8	Modulation Fidelity	(+) 1, (-) 3dB for 6dB/Octave Pre-emphasis characteristic from 350Hz to 2700 Hz with 1 KHz as reference.	
9	Spurious emission	-70dB or better	
10	Transmitter Output impedance	50Ω	
11	Frequency Generation	Frequency Synthesized Oscillator	
12	VSWR	Better than 1.5	
13	Hum & Noise	- 34dB @ 12.5 KHz or better	
<b>D</b>	<b>Receiver</b>		
1	Sensitivity Analog Sensitivity Digital Sensitivity	Analog Mode-Better than 0.25 μV for 12dB SINAD. Digital Mode -0.18 μV with BER<5% or better	
2	Adjacent channel Selectivity	Better than 60dB for 12.5 KHz channel separation	
3	Spurious and image rejection	65 dB or better	
4	Audio Output	500 mW at 4 Ω load	
5	Audio distortion	Not more than 3%	
6	AF Response	Shall be between +1 dB & -3dB over the frequency range 300-2700 Hz	
7	Squelch Sensitivity	0.18 μV	
8	Hum & Noise	-34dB @ 12.5 KHz, -40 dB @ 25 KHz	

9	Inter-modulation rejection	Better than 60 dB	
<b>E</b>	<b>Electrical Characteristics:</b>		
1	Current consumption during transmission of rated full power	Vendor to indicate	
2	Current consumption during receiving the signal with full volume condition	Vendor to indicate	
3	Ideal current	Vendor to indicate	
4	Duty cycle	Meets 95% rated capacity at 10:10:80 duty cycle	
5	Battery Capacity	2600mAh and will charge within 2-4 hrs with battery backup more than 12 hrs.	
<b>F</b>	<b>Environmental specs</b>		
1	Low pressure Test	MIL STD 810 C/DE/F/G Pro I & II	
2	High Temperature	MIL STD 810 C/DE/F/G Pro I & II	
3	Low Temperature	MIL STD 810 C/DE/F/G Pro I & II	
4	Temperature shock steady state	MIL STD 810 C/DE/F/G Pro I & II	
5	Solar radiation test	MIL STD 810 C/DE/F/G Pro I	
6	Rain (blowing rain) Test	MIL STD 810 C/DE/F/G Pro I, II & III	
7	Humidity test	MIL STD 810 C/DE/F/G Pro I	
8	Salt fog Test	MIL STD 810 C/DE/F/G Pro I	
9	Sand dust blowing	MIL STD 810 C/DE/F/G Pro I & III	
10	Vibration (Minimum integrity)/Vibration Test	MIL STD 810 C/DE/F/G Pro I & II	
11	Shock test transit drop	BluMIL STD 810 C/DE/F/G Pro I & IV	
12	IP	IP 67 or better	
<b>G</b>	<b>Cellular Access</b>		
1	Standards Supported	3G/4G or better	
<b>F</b>	<b>Wi-Fi</b>		

1	Integrated Wi-Fi and Standards Supported	802.11a/b/g/n/ac/ax	
2	Frequency Range	2.4 GHz, 5 GHz	
3	Security	Supports WEP, WPA, WPA2, WPA3, Wi-Fi Enhanced Open	
<b>H Bluetooth</b>			
1	Standards Supported	Bluetooth 5.1	
2	Range	10m	
3	Number of Connections	Bluetooth Mesh (more than 10 in a mesh)	
<b>I GNSS Specifications</b>			
1	Time to First Fix (TTFF), Cold Start	< 32s	
2	Time to First Fix (TTFF), Hot Start	< 1.5 s	
3	Horizontal Accuracy	< 1.5	
<b>J LOCATION TRACKING</b>			
1	Built-in GNSS and AGPS	IRNSS/GPS/GLONASS/BEIDOU/GA LILEO	
2	Indoor Positioning	Yes	
<b>K AUDIO</b>			
1	Audio Output Power	500mW at 4 Ohms load	
2	Audio Response (EIA)	Shall be between +1 dB & -3dB over the frequency range 300-2700 Hz	
3	Hum and Noise	-34dB @ 12.5 KHz, -40 dB @ 25 KHz	
4	Conducted Spurious Emissions	Better than 70dB	
<b>L Video and Imaging</b>			
1	Supported Formats	H.263, H.264, MPEG-4 SP, VP8, JPEG (.jpg), GIF (.gif), PNG (.png), BMP (.bmp), WebP, (.webp) formats supported for playback, streaming, and recording	
2	Supported File type	3GPP (.3gp), MPEG-4 (.mp4), WebM (.webm), (.mkv)	
3	Resolution and streaming rate	1080p at 30 fps	
4	Camera	16 MP LED Flash 8x Zoom or better	
<b>M SECURITY</b>			



1	Programmable Security Module	Yes	
2	Root Detection	Yes	
3	Multi-Factor Authentication	Yes	
4	Integrity Monitoring/ Authentication	Yes	
5	Secure boot	Yes	
6	VPN	Yes (through open sources or 3rd party)	
7	Hardware resource for SAG Approved algorithm to be provided as per user requirement	Yes	
8	Restricted Access	Yes	
<b>N SOFTWARE</b>			
1	Operating System	Vendor to indicate (Linux, Android etc.)	
2	Application Framework	Vendor to indicate	
<b>O HARDWARE</b>			
1	Display	4-6inch colour OLED display, 480x800 pixels. Capacitive touch screen with Gorilla Glass Usable with gloves up to 4 mm thick. Resistant to false actuation from fresh or salt water, snow, dirt or grease	
2	Digital / Analog Battery Life,High Capacity Battery	2600mAh and will charge within 2-4 hrs.	
3	Dimensions (H x W x D)	≤ Dimensions with Standard Battery (143 mm x 70 mm x 29 mm)	
4	Weight	≤ 400 gram	
5	Power Supply (Nominal)	Vendor to indicate	
6	Sim card	Dual SIM: Nano SIM slot	
7	Memory	RAM+ Internal storage: 64 GB SD Card: up to 128GB or better	
8	User Interface	Customized interface	
9	Physical Buttons	<ul style="list-style-type: none"> <li>• PTT (Push to Talk) Button</li> <li>• Emergency Button</li> <li>• Hi power / Low Power</li> <li>• Squelch ON/OFF</li> <li>• 3 Programmable Buttons</li> <li>• Power/Volume Knob</li> <li>• Display On/Off Button</li> <li>• 16-position Channel Selector</li> </ul>	

### 3. Digital Mobile Radio (DMR) BASE STATION SPECIFICATIONS

Sl. No.	Parameters	Desired Specification	Compliance by the Vendor
<b>A. General</b>			
1	Frequency Band	VHF, UHF	
2	Frequency Range	VHF 136-174 MHz UHF 400-470 MHz, 800-890MHz	
3	Frequency increment/channel step	VHF: 2.5kHz/3.125kHz, UHF: 5kHz/6.25kHz	
4	External frequency reference	10MHz/12.8MHz (auto detect)	
5	Packet data DMR	½Rate, ¾Rate, Full rate, Single Slot	
6	Air interface standard DMR	ETSI TS 102 361-1,-2,-3,-4	
7	General design standard	ETSI TR 102 398 V1.4.1	
8	Technology	TDMA-two slot DMR Tier- III Radio trunking Protocol, ETSI standard	
9	Frequency Stability	+0.5 PPM or better	
10	Channel Spacing	12.5 kHz, 25 kHz	
11	Channel Capacity	1000	
12	Dimensions(H x W x D)	133 x 483 x 419 mm	
13	Weight	< 15 kg	
14	Emission marks	Analog – 11K0F3E (for 12.5 kHz modulation), Digital – 7k60FXD(data),7K60FXE(voice), 7K60F1W (voice and data) for 4FSK digital modulation	
15	Power Supply	Vendor to indicate	
16	Digital Vocoder	AMBE+2	
<b>B. FEATURES</b>			
1	Single platform for conventional and trunked systems		
2	Optional mountings for rack mount and wall mount installations		
3	Easily identifiable indications for transmit and receive in both TDMA slots		
4	Health and alarms are clear at a glance, with further information available via IP		
5	Network management software included		
6	AES Encryption 256 bit/SAG approved Encryption algorithm to be provided as per user requirement		
7	Integrated power supply		
8	100% duty cycle at full power		

9	IP connectivity for applications interface, configuration, monitoring, telephony and trunking support		
10	OLED display		
11	Keypad		
12	Status LEDs		
13	Programmable facilities connector		
<b>C.</b>	<b>TRANSMITTER</b>		
1	RF Output Power	1 to 50W (Programmable)	
2	FM Hum& Noise	-40dB or better	
3	Adjacent channel power	-60dBc or better	
4	Conducted Spurious Emissions	<-36dBm 30MHz to1GHz and <-30dBm 1GHz to 4GHz/12.75GHz	
5	Audio Distortion	3%	
6	Audio Response	+1, -3dB	
7	Modulation	4FSK	
8	Modulation Limiting	+/-2.5 at 12.5 kHz, +/-5.0 kHz at 25 kHz	
<b>D.</b>	<b>RECEIVER</b>		
1	Sensitivity (Analog)	0.30μV at 12 dB SINAD	
2	Sensitivity (Digital)	0.30μV at 5% BER	
3	Inter-modulation rejection	70dB	
4	Adjacent Channel selectivity	>65dB at 12.5 KHz	
5	Spurious Rejection	70 dB	
6	Hum and Noise	-40 dB	
7	Audio Response	+1/-2dB (0.3-2.55 kHz)	
8	Audio Distortion	3% at 4 W	
9	Blocking rejection >1MHz	100dB at 1%BER	
<b>E.</b>	<b>ENVIRONMENTAL</b>		
1	Operating Temperature	-30°C to +60°C	
2	Storage Temperature	-40°C to +70°C	
3	Humidity	95% Max at +40°C non-condensing	
4	Low pressure (Altitude15,000ft (4572m))	MIL STD 810G	
5	Vibration Test	MIL STD 810G	
6	Shock	MIL STD 810G	
<b>F</b>	<b>ANTENNA SYSTEM</b>		
1	Separate antenna system for Tx and Rx which shall include high gain antenna system. Minimum 10dBi or better for Tx (1+1) and Rx.		
2	Surge protecting device in RF cables		
<b>G</b>	<b>CHANNEL UNIT</b>		

1	Shall be modular/Expandable.	
2	Each channel should be configurable to traffic and control unit and vice-versa.	
<b>H</b>	<b>Air Interface Standards:</b> Shall be open standards DMR Tier- III	
<b>I</b>	<b>Base Station To Base Station And Master Station Control Interface:</b> For inter cell traffic communication with microwave, optical fibre or PSTN leased line independently	
<b>II</b>	Base station to be provided with the provision of Vehicle mount	

#### 4. DMR Repeater Specifications

Sl. No.	Parameters	Desired Specification	Compliance by the Vendor
<b>A</b>	<b>GENERAL</b>		
1	Type	DMR tier III VHF,UHF synthesized repeater	
2	Frequency Range	VHF 136-174 MHz UHF 400-470 MHz, 800-890MHz	
3	TDMA	Digital TDMA 2 – Slot	
4	Operating Mode	Dual standard (Digital & Analog)	
5	Operating selection	Fully automatic for Analog & Digital	
6	Channel capacity	64 or better	
7	Channel Spacing	12.5 / 25 kHz	
8	Operating voltage	12V DC, 230V AC $\pm 10\%$ , 50 Hz $\pm 1\%$ . Automatic switchover from AC to DC during mains failure.	
9	Frequency stability	+ / - 0.5PPM	
10	Interface	USB connector, Microphone, Speaker (integrated), Tx (N female), Rx (BNC female), 2 x Ethernet, DB25 Accessory Connector, External Reference (BNC Female)	
11	Antenna impedance	50 $\Omega$	
12	Duty cycle	100%	
13	Dimensions (H x W x D)	<133 x 483 x 419 mm	
12	Weight	Less than 15kg	
14	Display	Indicator for transmit & receive	
15	VSWR	Better than 1.5	
16	Protection	Reverse polarity, Load VSWR Protection	

17	Repeater to be provided with the provision of Vehicle mount.	
<b>B</b>	<b>TRANSMITTER</b>	
1	RF Power output	5 to 50 Watts (Programmable)
2	FM Emission	11KOF3E / 11KOF1E
3	Digital Modulation	4FSK
4	Modulation Limiting	$\pm 2.5\text{KHz}$ at 12.5 KHz Optional: $\pm 5\text{KHz}$ at 25 KHz
5	FM Hum & Noise	-40 dB or better
6	Adjacent channel power	-60 dBc or better
7	Audio Response	+1,-3db
8	Audio Distortion	less than 3%
<b>C</b>	<b>RECEIVER:</b>	
1	Sensitivity (Analog)	0.30 $\mu\text{V}$ (for 12dB SINAD)
2	Sensitivity (Digital)	0.30 $\mu\text{V}$ at 5% BER or better
3	Image rejection	65dB or better
4	Adjacent Channel Selectivity	60dB or better
5	Inter-modulation	70dB or better
6	Audio Distortion	less than 3%
<b>D</b>	<b>ENVIRONMENTAL</b>	
1	Operating Temperature	-30°C to +55°C
2	Storage Temperature	-40°C to +70°C
3	Humidity	95% Max at +40°C non-condensing

## 5. DMR Network Management System (NMS) Specifications

Sl. No	Parameters	Desired Specification/ Features	Compliance by the Vendor
1.	<p>Application Server Interface (ASI):</p> <p>It facilitates application developers to connect to the repeaters or master control server to provide various services to the end user.</p>	<p>The applications include:</p> <ul style="list-style-type: none"> <li>• Dispatch controller</li> <li>• Connectivity to pstn/pbx</li> <li>• Allows the operator to directly communicate with the repeaters and master control server.</li> <li>• monitor and troubleshoot, Operator Console Application</li> <li>• Over The Air Programming (OTAP)</li> <li>• Text Message and</li> </ul>	

		<p>Emails</p> <ul style="list-style-type: none"> <li>• Call Recording</li> <li>• Location Tracking</li> <li>• Fleet Administration</li> <li>• Voice Dispatch</li> <li>• Event Logging</li> <li>• Alarm &amp; Lone Worker</li> <li>• Job Ticketing</li> <li>• Telemetry</li> </ul>	
2.	<p>Dispatcher/Operator Console:</p> <p>Using the location information and monitoring the activity on the network, a dispatcher console application to be developed using application server interface (ASI). The operator at a console will have all the information at his/her finger tips and initiate and/or terminate activities on the network.</p>	<ul style="list-style-type: none"> <li>• Individual calls, group calls, all calls, broadcast calls, emergency calls and patched group calls.</li> <li>• Calls are initiated by selecting radio ID/People/talk-group(s) from the graphical display.</li> <li>• Data services like status, SDS and free form text messaging</li> <li>• Initiate/Terminate Radio/Repeater site wise Tracking. When tracking at the level of repeater all radios will be tracked.</li> <li>• Inform the location of the other radios to all or selected radios in the network</li> <li>• With the appropriate permissions, the operator can initiate Radio enable and disable, Stun, un-stun operations on a selected radio or group of radios.</li> </ul>	
3.	<p>VOICE RECORDING SERVICE:</p> <p>A Voice Recording server integrated with the system through application server interface (ASI) provided by the solution.</p>	<ul style="list-style-type: none"> <li>• Recording of all channels simultaneously at a single site.</li> <li>• In a multisite operational mode, recording of selective channels up to the capacity as dictated by the recording server capability and the IP</li> </ul>	

		<p>connection.</p> <ul style="list-style-type: none"> <li>• All call types can be recorded-</li> <li>• Group call within subscriber radios</li> <li>• Calls to and from Dispatch console and subscriber radios</li> <li>• Individual call recording with facility to disable this feature</li> <li>• Telephone call through telephone gateway</li> <li>• Calls through conventional analog FM gateway</li> <li>• Encrypted calls</li> <li>• Record with metadata - Date, time, duration, PTT ID, Group ID, etc.</li> <li>• Search and Browse the recorded sessions</li> <li>• By radio I/D, talk group, I/D, alias, date/Time</li> <li>• Replay the voice conversations on the searched results</li> <li>• Back-up and restore</li> <li>• Calls can be located and replay criteria etc.</li> <li>• Record with encryption</li> </ul>	
4.	<p><b>LOCATION SERVICES:</b></p> <p>The location service allows one to take (automatically triggered or manual) actions based on location. It allows monitoring of critical resources including people, vehicles and equipment.</p>	<p>The location information include:</p> <ul style="list-style-type: none"> <li>• Position from GPS</li> <li>• Radio status</li> <li>• Health or any sensor data associated with personnel and/or radio</li> <li>• By monitoring this data, worker safety can be increased and provide a better dispatching capability for field personnel. This ultimately results in shortened response time and benefit in terms of cost and other variables for the field management team.</li> <li>• Radio ID</li> </ul>	

		<p>The solution to include application server interface (ASI) that includes a detailed set of Location Services API and Location solutions that provides a complete view of each asset's location and status and facilitates/provides a real-time visibility of field operation. Using the ASI, the solution can be integrated with existing 3rd party vendor solutions or develop a new location server.</p>	
5.	<p><b>DISPLAY OF LOCATION DATA:</b></p> <p>The location data obtained from the master control server and/or trunking repeater in a single site mode, can be used to display on map using third party mapping tools such open street maps. The Location API from this solution can be integrated with maps API to display the position precisely and track and monitor the status of the asset.</p>	<p>The display provides the following information:</p> <ul style="list-style-type: none"> <li>• Display of the map with overlays at different scales of zoom-in and zoom-out. For faster performance, the maps can be stored locally and updated periodically or on-demand.</li> <li>• Display the selected attributes like roads, electrical poles, traffic, etc.</li> <li>• Change a view of the map – road view, terrain view, satellite image, etc.</li> <li>• Zoom-in,Zoom-out, centrication using a pre-set location, longitude/latitude, etc.</li> <li>• Pinning of assets</li> <li>• Update the display at regular intervals</li> <li>• Distinguishable display (like blinking, bold, colour coding) for special events like alarms, loner, etc.</li> </ul>	



**Annexure – II**  
**Eligibility Criteria of Technology Partners**

Compliance of each point should be provided by the bidder

<b>Sl. No.</b>	<b>Eligibility Criteria Parameters</b>	<b>Compliance by the Vendor</b>
1.	Technology partner should be an original design and development company of the proposed solution.	
2.	Technology partner shall be ready for Transfer of Technology (ToT), on exclusivity and royalty-free basis to ITI for design, development and manufacturing of all products of DMR system. Vendor shall not associate with any other company, directly or indirectly for sale of same product in the Indian market.	
3.	Technology partner should be a single legal registered entity and should have a local office in India.	
4.	Vendor must have minimum 30 employees of technical strength and should propose a project team along with a names technical leads/project manager likely to be assigned for this project.	
5.	Technology partner shall comply the technical specification and terms & conditions specified.	
6.	Technology partner should agree for providing any updates, software patches or additional requirements for different customers, free of cost within the warranty period of 02 years from the date of acceptance of development product by ITI.	
7.	Technology partner has to support ITI free of cost to get the product clearance during evaluation by the end customer as applicable.	
8.	Technology partner should agree to provide technical support in the field within the warranty period of 02 years from the date of acceptance of development product by ITI.	
9.	<p>Exemption for Startups :</p> <ol style="list-style-type: none"> <li>Only start-ups recognised under DPIIT are eligible and the recognition certificate must have the issued date before the RFP issue date.</li> <li>Start-up must be MSME registered as on the RFP issue date.</li> <li>Start-ups must be active &amp; minimum 1 year old. PF, TDS, etc. must be active as a proof that it is not a dormant or shell company.</li> <li>Must have more than 25 engineers working in the same field. Only permanent employees shall be counted excluding any contractual or external employees.</li> </ol>	

**Evaluation Criteria:**

Bidder will be selected based on the technical compliance for the development/ToT and deliverables for royalty-free models. Bidder should provide Technical solution/implementation and technical document as a part of bidding. After opening the technical bid, vendor shall give presentation on their solution/plan of implementation at ITI Ltd. Bangalore campus in physical mode. Demo of any one (either handset/repeater/base station) indigenous developed DMR product by the vendors, if available, along with schematics/source code will be advantageous. Commercial bid of only Technically suitable vendors are opened and lowest quoted vendor will be selected.

**Terms & Conditions for Digital Mobile Radio (DMR)**

Compliance to each point should be provided by the bidders.

<b>Sl. No.</b>	<b>Description</b>	<b>Compliance</b>
1.	The vendor should submit their company's profile along with last three years audited financial results.	
2.	Technical bid and financial bid should be submitted online e-Tender Portal.	
3.	Unpriced BoM should be attached along with the technical specification.	
4.	<b>NDA:</b> The software and hardware delivered will be the sole property of ITI Limited. A Non-Disclosure Agreement (NDA) to be signed in this regard by the successful bidder.	
5.	<b>Intellectual Property:</b> In case the vendor is implementing any of his Intellectual Property (IP) that he holds in the DMR project, then he should transfer royalty free rights for ITI to use this IP to all its customers directly or indirectly.	
6.	<b>ToT:</b> The vendor shall give full Transfer of Technology (ToT) for the quoted product of design, development and productionisation. All the deliverables shall be reusable, re-modifiable and re-compliable by ITI.	
7.	<b>Royalty Free Model:</b> Vendor shall not have any proprietary components with specific firmware and the ToT shall be totally royalty/license free so that after the ToT, ITI will be in a position to productionise the developed product. ITI will have full right to use this product and modify the design to suit different customers. Full design/ technology of this developed product will be owned by ITI and the vendor shall not disclose this design to any other customer at a later stage.	
8.	<b>Warranty:</b> Standard warranty shall be for 2 year (free of cost) from the date of completion of ToT. During warranty period vendor should also support to resolve all the issues observed during the fabrication of PCBs and assembly/	

	testing of the units at ITI premises and testing at ITI's customer sites.	
9.	<b>ATP:</b> Acceptance tests shall be conducted along with ITI officials at ITI premises as per mutually agreed ATP. Vendor shall carryout modification of all units (hardware/software) including documents to incorporate the changes observed during testing at any stage without any extra charge.	
10.	<b>ATP at site:</b> Vendor should agree to provide free of cost support during ITI's end customer evaluation/trials at site within the period of warranty. Any modification/up gradation required during customer's evaluation /acceptance test to be resolved by vendor at no additional cost.	
11.	<b>Technical support:</b> Technical support shall be extended to resolve the system integration problems in warranty period (free of cost) and on chargeable basis beyond warranty period. Vendor shall visit the ITI premises & end-user sites to resolve the DMR issues observed during warranty period.	
12.	<b>Schedule:</b> Total period of development & qualification testing shall be within 14 months from the PO date.	
13.	<b>Performance Bank Guarantee:</b> Vendor has to submit a Performance Bank Guarantee ( <b>PBG</b> ) of the value equivalent to 3% of total PO value (including taxes) within 15 days immediately after releasing Purchase Order. The validity of the PBG shall be till the completion of ToT and warranty period.	

**Annexure – III**  
**Milestones & corresponding Payment Terms**

<b>Sl. No.</b>	<b>Description of Activities and payment in each Milestone</b>	<b>Compliance</b>
1.	<p><b>10% of Total PO value</b> after the finalisation and submission of</p> <p>a) Detailed requirement specification, b) Technical solution document covering block schematic of all functions, interfaces &amp; data transfer between modules/sub-modules c) PCB schematics and BoM d) Submission of documents including list of tools used for testing of DMR units and acceptance of the same by ITI.</p> <p><b>Timeline</b> : 30 days from the date of placement of the PO</p>	
2.	<p><b>20% of Total PO value</b> after the supply of fabricated and assembled PCB for Handheld DMR (with keypad), Base Station and Repeater. Also, basic test reports to be provided and acceptance of the same by ITI.</p> <p><b>Timeline</b> : 90 days from the date of placement of the PO</p>	
3.	<p><b>20% of Total PO value</b> after, the supply of 01 set DMR system, functional testing &amp; demonstration of all features along with internal test reports at ITI premises and acceptance of the same by ITI.</p> <p>DMR <b>one set</b> consist of :</p> <ul style="list-style-type: none"> <li>• Base Station : 02 Nos.</li> <li>• Repeater : 02 Nos.</li> <li>• Hand held (Keypad Version): 06 Nos.</li> <li>• NMS software: 01 No.</li> </ul> <p>The complete set should have the Provision of porting the NMS software. Vehicle mounts option to be provided for Base station and Repeater.</p> <p><b>Timeline</b> : 270 days from the date of placement of the PO</p>	
4.	<p><b>10% of Total PO value</b> after</p> <p>a) The Environment/EMI/EMC tests by vendor on 01 set DMR &amp; submission of certificates from accredited test labs for DMR units. Certification shall be in the name of ITI and the fees will be borne by ITI. b) Completion of testing under simulated field trial for DMR units and Acceptance by ITI and end customer. c) Fabricated and assembled PCB for Handheld Smart Radio (with touch screen).</p> <p><b>Timeline:</b> 310 days from the date of placement of the PO</p>	
5.	<b>20% of Total PO value</b> after	

	<p>a) The supply of <b>02 DMR sets</b></p> <p>b) Completion of ToT activities for DMR systems</p> <p><b>Timeline</b> : 370 days from the date of placement of the PO</p>	
6.	<p><b>10% of Total PO value</b> after</p> <p>a) The supply of <b>04 Handheld Smart Radio (with touch screen)</b></p> <p>b) The Environment/EMI/EMC tests by vendor &amp; submission of certificates from accredited test labs for Handheld Smart Radio (with touch screen). Certification shall be in the name of ITI and the fees for certification will be borne by ITI.</p> <p><b>Timeline:</b> 400 days from the date of placement of the PO</p>	
7.	<p><b>10% of Total PO value</b></p> <p>a) Submission of the product for Technical evaluation by the committee nominated by the Government / Competent Authorities. Vendor should provide technical assistance to complete the technical evaluation free of cost. Certificate of evaluation should be in the name of ITI and Certification fees will be borne by ITI.</p> <p>b) Technical assistance for any modification/up-gradation required to complete ATP at Customer's test bed shall be provided by the vendor. However the customer-site testing charges/logistics/travel expenses for the vendor's team to associate with ITI team shall be borne by ITI.</p> <p>c) Completion of ToT activities for Handheld Smart Radio (with touch screen) unit</p> <p><b>Timeline:</b> 430 days from the date of placement of the PO</p>	
8.	<p><b>LD:</b> Liquidated Damages will be 0.5% of <b>the corresponding milestone payment value</b> including taxes per week for the first 04 weeks and 0.7% of <b>the corresponding milestone payment value</b> per week thereafter subject to as maximum of 15% of <b>total PO value</b> for the delay in deliverables.</p>	
9.	<p>Pre-Integrity Pact shall be signed along with the commercial offer when asked to be submitted after the technical evaluation of offer.</p>	

**Annexure – IV**  
**Transfer of Technology (ToT) & Deliverables**

<b>Sl. No.</b>	<b>Description</b>	<b>Compliance</b>
1.	Vendor shall give the full Transfer of Technology (ToT) for the quoted product, for in-house production. All deliverables shall be re-usable, re-modifiable and re-compliable.	
2.	The Design Transfer (i.e. all Software and Hardware source files and design documents and all related documents including DLL Codes and libraries codes for manufacturing the DMR unit at ITI Limited) should be handed over to ITI Limited in both hard and soft copies, at the time of delivery without any additional cost.	
<b>3.</b>	<b>System Deliverables :</b>	
(a)	<p>03 sets of complete units (i.e. Final Version of Hardware, without any wire straps/pattern cuts in the PCBs, interconnecting hardware, cables etc. and Final Version of Software) as per the specification have to be delivered to ITI by vendor as mentioned in below list:</p> <ul style="list-style-type: none"> <li>i. Base station: 06 Nos.</li> <li>ii. Repeater: 06 Nos.</li> <li>iii. Hand held (Keypad Version): 18 Nos.</li> <li>iv. Handheld Smart Radio (with touch screen): 04 Nos.</li> <li>v. NMS software</li> </ul> <p>The complete system should be a functional unit meeting all the functional and performance requirements as per the Technical specifications.</p>	
(b)	Acceptance tests shall be conducted along with ITI officials at ITI premises ITI's Test-bed and at ITI's Customer as per mutually agreed ATP. Vendor shall carryout modification of all units (Hardware/Software) including documents to incorporate any changes observed during testing at any stage without any extra charge.	
(c)	In addition to the 03 sets of complete DMR systems and 04 Nos. of Handheld Smart Radio (with touch screen), the vendor shall provide <b>02 sets of BoM kitty</b> of the DMR system for the pilot production at ITI Ltd.	
(d)	One set of test Jig(s), test software etc. required for testing to be provided by the vendor along with the List of instruments.	
(e)	A detailed 'User Manual', 'Technical Manual' and 'Acceptance and Testing Manual' to be provided in hard & soft copy.	
<b>4.</b>	<b>Design Documents &amp; PCB Design deliverables :</b>	
(a)	High level Design document - (Which should include block diagram, Interface details, memory details, memory address & component level of information).	
(b)	Schematics design file-Vendor to indicate the	

	format/package of Schematic design file.	
(c)	PCB design file - Vendor to indicate the format/package of PCB design file	
(d)	Assembly Instruction - PCB assembly instruction.	
(e)	Gerber files - Gerber output file. Vendor to indicate the format/package of Gerber file	
(f)	Gerber files for PCB (RS274x format) for all layers, legend, markings, solder masks, etc. in soft copy.	
(g)	Gerber file for stencil and file for X-Y coordinates/orientation, for complete SMT assembly of components in soft copy.	
(h)	Bill of Materials – Hard and Soft copies in excel format which includes Part description, Part number with ordering detail, Vendor/Distributor information.	
<b>5.</b>	<b>Software deliverables :</b>	
(a)	Functional specification documents	
(b)	Detail Design documents and software Flow charts	
(c)	Applicable Middle-ware stacks - Patch Source code	
(d)	Source code for all modules	
(e)	Any other Software Module (found necessary for DMR unit) - Source code	
(f)	All Executable files required for loading on to DMR units	
(g)	All compiling and porting software files to be provided in the form of document	
6.	Test Results of all the modules in the standard format in Hard and Soft copies against the parameters called for in the Technical Specification should be provided-01 set.	
7.	List of Test and Measuring Instruments in Hard and Soft copies -01 set	
8.	A user document describing the precautions and procedures to be followed to put this module into service and operate to utilize its full capacity in Hard and Soft copies -01 set	
9.	Detailed process and procedure in Hard and Soft copies to port the add-on software at M/s. ITI Ltd.'s end.	
10.	Vendor shall provide Hands on Training for operation and Maintenance of the module to the Technicians/Engineers at M/s. ITI Ltd.'s premises that includes troubleshooting.	
11.	A detailed Bill of material covering Electrical and Mechanical Parts and Fixing Items. These shall be made available in Hard and Soft copy. The soft copy shall be in a format supporting the viewing as well as editing by AUTOCAD software – 01 set.	
12.	Detailed assembly drawings in hard and soft copy in A3 or A4 format suitable to view/edit in AUTOCAD.	
13.	Technical document for methods involved in manufacturing and assembly process in hard and soft copy.	
14.	Vendor conducts and provides test report of	

	Environmental and EMI/EMC test to meet the specified requirements at the unit level.	
15.	Individual PCB layer graphical data compatible with AUTOCAD software -01 set	
16	PCB drill data in the medium and format compatible with standard CNC machines – 01 Set	
17	Bare board testing (BBT) data on inspection of PCBs – 01 Set	
18.	A Hardware unit/programmer with the associated driver software to program the software controlled parts of the module. The driver shall be compatible to the latest version of the operating system. – 01 No.	
19	A licensed copy of the professional edition of the design software for design and development of the firmware of the module.	



**Annexure-V**  
**INTEGRITY PACT**

PURCHASE ORDER No.

THIS Integrity Pact is made on.....day of .....20 .

**BETWEEN:**

ITI Limited having its Registered & Corporate Office at ITI Bhavan, Dooravaninagar, Bangalore – 560 016 under the administrative control of Ministry of Communications, Government of India (hereinafter called the Principal), which term shall unless excluded by or is repugnant to the context, be deemed to include its Chairman & Managing Director, Directors, Officers or any of them specified by the Chairman & Managing Director in this behalf and shall also include its successors and assigns) ON THE ONE PART

**AND:**

..... represented by  
..... Chief Executive Officer (hereinafter called the Contractor(s), which term shall unless excluded by or is repugnant to the context be deemed to include its heirs, representatives, successors and assigns of the bidder/contract ON THE SECOND PART.

**Preamble**

WHEREAS the Principal intends to award, under laid down organizational procedures, contract for ..... of ITI Limited. The Principal, values full compliance with all relevant laws of the land, regulations, economic use of resources and of fairness/ transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal has appointed an Independent External Monitor (IEM), who will **monitor** the tender process and the execution of the contract for compliance with the principles as mentioned herein this agreement.

WHEREAS, to meet the purpose aforesaid, both the parties have agreed to enter into this Integrity Pact the terms and conditions of which shall also be read as integral part and parcel of the Tender Documents and contract between the parties.

**NOW THEREFORE, IN CONSIDERATION OF MUTUAL COVENANTS STIPULATED IN THIS PACT THE PARTIES HEREBY AGREE AS FOLLOWS AND THIS PACT WITNESSETH AS UNDER:**

**SECTION 1 – COMMITMENTS OF THE PRINCIPAL**

- 1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:
- a. No employee of the Principal, personally or through family members, will in connection with the tender for or the execution of the contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
  - b. The Principal will, during the tender process treat all bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all bidder(s) the same information and will not provide to any bidder(s) confidential/additional information through which the bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
  - c. The Principal will exclude from the process all known prejudiced persons.
- 1.2 If the Principal obtains information on the conduct of any of its employee, which is a criminal offence under IPC/PC Act or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can initiate disciplinary action as per its internal laid down Rules/ Regulations.

**SECTION 2 – COMMITMENTS OF THE BIDDER/CONTRACTOR**

2.1 The Bidder(s)/Contractor(s) commits himself to take all measures necessary to prevent corruption. He commits himself observe the following principles during the participation in the tender process and during the execution of the contract.

- a. The bidder(s)/contractor(s) will not, directly or through any other person or firm offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
- b. The bidder(s)/contractor(s) will not enter with other bidders/contractors into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- c. The bidder(s)/contractor(s) will not commit any offence under IPC/PC Act, further the bidder(s)/contractor(s) will not use improperly, for purposes of competition of personal gain, or pass onto others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- d. The Bidder(s)/Contractor(s) of foreign origin shall disclose the name and address of the agents/representatives in India, if any. Similarly, the Bidder(s)/Contractor(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any.
- e. The Bidder(s)/Contractor(s) will, when presenting the bid, disclose any and all payments made, are committed to or intend to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- f. The Bidder(s)/Contractor(s) will not bring any outside influence and Govt bodies directly or indirectly on the bidding process in furtherance to his bid.
- g. The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or to be an accessory to such offences.

### **SECTION 3 – DISQUALIFICATION FROM TENDER PROCESS & EXCLUSION FROM FUTURE CONTRACTS**

- 3.1 If the Bidder(s)/Contractor(s), during tender process or before the award of the contract or during execution has committed a transgression in violation of Section 2, above or in any other form such as to put his reliability or credibility in question the Principal is entitled to disqualify Bidder(s)/ Contractor(s) from the tender process.
- 3.2 If the Bidder(s)/Contractor(s), has committed a transgression through a violation of Section 2 of the above, such as to put his reliability or credibility into question, the Principal shall be entitled exclude including blacklisting for future tender/contract award process. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the Principal taking into consideration the full facts and circumstances of each case, particularly taking into account the number of transgression, the position of the transgressor within the company hierarchy of the Bidder(s)/Contractor(s) and the amount of the damage. The exclusion will be imposed for a period of minimum one year.
- 3.3 The Bidder(s)/Contractor(s) with its free consent and without any influence agrees and undertakes to respect and uphold the Principal's absolute right to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground including the lack of any hearing before the decision to resort to such exclusion is taken. The undertaking is given freely and after obtaining independent legal advice.
- 3.4 A transgression is considered to have occurred if the Principal after due consideration of the available evidence concludes that on the basis of facts available there are no material doubts.
- 3.5 The decision of the Principal to the effect that breach of the provisions of this Integrity Pact has been committed by the Bidder(s)/ Contractor(s) shall be final and binding on the Bidder(s)/ Contractor(s), however the Bidder(s)/ Contractor(s) can approach IEM(s) appointed for the purpose of this Pact.
- 3.6 On occurrence of any sanctions/ disqualifications etc arising out from violation of integrity pact Bidder(s)/ Contractor(s) shall not entitled for any compensation on this account.

- 3.7 subject to full satisfaction of the Principal, the exclusion of the Bidder(s)/ Contractor(s) could be revoked by the Principal if the Bidder(s)/ Contractor(s) can prove that he has restored/ recouped the damage caused by him and has installed a suitable corruption preventative system in his organization.

#### **SECTION 4 – PREVIOUS TRANSGRESSION**

- 4.1 The Bidder(s)/ Contractor(s) declares that no previous transgression occurred in the last 3 years immediately before signing of this Integrity Pact with any other company in any country conforming to the anti-corruption/ transparency International (TI) approach or with any other Public Sector Enterprises/ Undertaking in India of any Government Department in India that could justify his exclusion from the tender process.
- 4.2 If the Bidder(s)/ Contractor(s) makes incorrect statement on this subject, he can be disqualified from the tender process or action for his exclusion can be taken as mentioned under Section-3 of the above for transgressions of Section-2 of the above and shall be liable for compensation for damages as per Section- 5 of this Pact.

#### **SECTION 5 – COMPENSATION FOR DAMAGE**

- 5.1 If the Principal has disqualified the Bidder(s)/Contractor(s) from the tender process prior to the award according to Section 3 the Principal is entitled to forfeit the Earnest Money Deposit/Bid Security/ or demand and recover the damages equivalent to Earnest Money Deposit/Bid Security apart from any other legal that may have accrued to the Principal.
- 5.2 In addition to 5.1 above the Principal shall be entitled to take recourse to the relevant provision of the contract related to termination of Contract due to Contractor default. In such case, the Principal shall be entitled to forfeit the Performance Bank Guarantee of the Contractor or demand and recover liquidate and all damages as per the provisions of the contract agreement against termination.

#### **SECTION 6 – EQUAL TREATMENT OF ALL BIDDERS/CONTRACTORS**

- 6.1 The Principal will enter into Integrity Pact on all identical terms with all bidders and contractors for identical cases.
- 6.2 The Bidder(s)/Contractor(s) undertakes to get this Pact signed by its sub-contractor(s)/sub-vendor(s)/associate(s), if any, and to submit the same to the Principal along with the tender document/contract before signing the contract. The Bidder(s)/Contractor(s) shall be responsible for any violation(s) of the provisions laid down in the Integrity Pact Agreement by any of its sub-contractors/sub-vendors/associates.
- 6.3 The Principal will disqualify from the tender process all bidders who do not sign this Integrity Pact or violate its provisions.

#### **SECTION 7 – CRIMINAL CHARGES AGAINST VIOLATING BIDDER(S)/ CONTRACTOR(S)**

- 7.1 If the Principal receives any information of conduct of a Bidder(s)/Contractor(s) or sub-contractor/sub-vendor/associates of the Bidder(s)/Contractor(s) which constitutes corruption or if the Principal has substantive suspicion in this regard, the Principal will inform the same to the Chief Vigilance Officer of the Principal for appropriate action.

#### **SECTION 8 – INDEPENDENT EXTERNAL MONITOR(S)**

- 8.1 The Principal appoints competent and credible Independent External Monitor(s) for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this pact.
- 8.2 The Monitor is not subject to any instructions by the representatives of the parties and performs his functions neutrally and independently. He will report to the Chairman and Managing Director of the Principal.
- 8.3 The Bidder(s)/Contractor(s) accepts that the Monitor has the right to access without restriction to all product documentation of the Principal including that provided by the Bidder(s)/Contractor(s). The Bidder(s)/Contractor(s) will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The Monitor is under contractual obligation to treat the information and documents Bidder(s)/Contractor(s) with confidentiality.

- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the project provided such meeting could have an impact on the contractual relations between the Principal and the Bidder(s)/Contractor(s). As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in specific manner, refrain from action or tolerate action.
- 8.5 The Monitor will submit a written report to the Chairman & Managing Director of the Principal within a reasonable time from the date of reference or intimation to him by the principal and, should the occasion arise, submit proposals for correcting problematic situations.
- 8.6 If the Monitor has reported to the Chairman & Managing Director of the Principal a substantiated suspicion of an offence under relevant IPC/PC Act, and the Chairman & Managing Director of the Principal has not, within the reasonable time taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.
- 8.7 The word '**Monitor**' would include both singular and plural.
- 8.8 Details of the Independent External Monitor *appointed* by the Principal at present is furnished below: -

Shri Javeed Ahmad IPS (Retd)  
M-1101, Shalimar Gallant Apartment  
Vigyanpuri Mahanagar  
Lucknow – 226 006

Any changes to the same as required / desired by statutory authorities is applicable.

## **SECTION 9 – FACILITATION OF INVESTIGATION**

- 9.1 In case of any allegation of violation of any provisions of this Pact or payment of commission, the Principal or its agencies shall be entitled to examine all the documents including the Books of Accounts of the Bidder(s)/Contractor(s) and the Bidder(s)/Contractor(s) shall provide necessary information and documents in English and shall extend all help to the Principal for the purpose of verification of the documents.

## **SECTION 10 – LAW AND JURISDICTION**

- 10.1 The Pact is subject to the Law as applicable in Indian Territory. The place of performance and jurisdiction shall be the seat of the Principal.
- 10.2 The actions stipulated in this Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

## **SECTION 11 – PACT DURATION**

- 11.1 This Pact begins when both the parties have legally signed it. It expires after 12 months on completion of the warranty/guarantee period of the project / work awarded, to the fullest satisfaction of the Principal.
- 11.2 If the Bidder(s)/Contractor(s) is unsuccessful, the Pact will automatically become invalid after three months on evidence of failure on the part of the Bidder(s)/Contractor(s).
- 11.3 If any claim is lodged/made during the validity of the Pact, the same shall be binding and continue to be valid despite the lapse of the Pact unless it is discharged/determined by the Chairman and Managing Director of the Principal.

## **SECTION 12 – OTHER PROVISIONS**

- 12.1 This pact is subject to Indian Law, place of performance and jurisdiction is the Registered & Corporate Office of the Principal at Bengaluru.
- 12.2 Changes and supplements as well as termination notices need to be made in writing by both the parties. Side agreements have not been made.
- 12.3 If the Bidder(s)/Contractor(s) or a partnership, the pact must be signed by all consortium members and partners.



12.4 Should one or several provisions of this pact turn out to be invalid, the remainder of this pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

12.5 Any disputes/ difference arising between the parties with regard to term of this Pact, any action taken by the Principal in accordance with this Pact or interpretation thereof shall not be subject to any Arbitration.

12.5 The action stipulates in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

In witness whereof the parties have signed and executed this Pact at the place and date first done mentioned in the presence of the witnesses:

For PRINCIPAL

For BIDDER(S)/CONTRACTOR(S)

.....  
(Name & Designation) (Name & Designation)

Witness

Witness

1) ..... 1).....

2) ..... 2).....

## **Annexure-VI**

### **PERFORMANCE BANK GUARANTEE**

In consideration of ITI Limited, Dooravaninagar, Bangalore 560016 (hereinafter called as the Company) we.....Bank executed this performance Guarantee Bond as surety to the cost of.....Supplies by .....situated at.....(hereinafter called as the Supplier) as per the purchase order No.....dtd..... of the Company

1. At the instance of....., the supplier we ..... Bank hereby undertake to pay to ITI Limited, Bangalore - 16 an amount not exceeding.....if the machine supplied by the Company fails to perform to the satisfaction of the Company upto.....or before the expiry of this guarantee, or within the agreed period whichever is earlier.

2. We .....Bank agrees to pay for the value of the rejected materials upto a limit of .....and interest thereon from the date of notice till the date of payment at % per annum without any demur, merely on a demand notice from the Company stating that the Company has suffered loss due to non-performance of instrument..... supplied by the supplier. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee.

3. We undertake to pay to the Company any money as demanded notwithstanding any dispute or disputes raised by the supplier in any suit or proceedings pending before any court or tribunal relating thereto out liability under this guarantee being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the supplier shall have no claim against us for making such payment.

4. We.....Bank, further agree with the Company that the Company shall have the fullest liberty without our consent and without affecting in any manner, our obligation hereunder to vary there any of the terms and conditions of the said agreement or to extend time of performance by the said supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Company against the supplier and to forbear or enforce of the terms and conditions relating to the said purchase order and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said supplier or for any forbearance act or omission on the part of the Company or any indulgence by the Company to the supplier or by any such manner or thing whatsoever, which, under the law relating to sureties would, but for this provision, have effect of so relieving us.

5. This guarantee will not be discharged due to the change in the constitution of the bank or their supplier.

6. We.....Bank, further agree that the guarantee herein contained shall remain in force till ..... We.....Bank, undertake not to revoke this guarantee during its currency except with the previous consent of the Company by writing.

Dated the .....day.....

Witnesses For Bank

1.

2.

**Annexure-VII**  
**No near Relative Certificate**

Date:

To,  
MATERIALS MANAGER  
R&D PURCHASE, BANGALORE PLANT  
ITI LIMITED  
BANGALORE - 560016

**Sub: No near relative certificate**

**Tender Reference No:** R031H0056

**Name of Tender/Work:** DEVELOPMENT OF DIGITAL MOBILE RADIO (DMR) SYSTEM for R&D, ITI Limited, Bengaluru

Dear Sir,

1. I/We have downloaded/obtained the tender document(s) for the above mentioned Tender/Work from the website(s) namely: <https://tenderwizard.com/ITILIMITED> or [www.itiltd.in](http://www.itiltd.in) as per your advertisement given in the above-mentioned website(s)
2. I/We do hereby declare that we are not relative of any Director of ITI Limited or any of his relative is a partner
3. In our firm, there is no Partner who is director of ITI Limited or any of his relative is a partner
4. We declare that none of our relative is working / worked as an "EMPLOYEE" in ITI Limited across nation
5. We declare that none of our family relative or business relative from any another source, not participating this advertisement
6. I/We have not engaged any person(s) of doubtful antecedent and if any such person (s) found by management I/We am/are agreeing for punishment as deemed fit by management

Yours Faithfully,

(Signature of the Bidder with Official Seal)

## **Annexure-VIII**

### **Price Bid Format**

S.No	Name of Items	Measurement	QUANTITY	Rate (in figure)	Amount inclusive of all Taxes	REMARKS
		Unit				
1	DEVELOPMENT OF DIGITAL MOBILE RADIO (DMR) SYSTEM	NO's	1			
TOTAL AMOUNT (Rs)						