



क्रमांक. / No. H-18026/1(TS&TD)/2016-CDN  
भारत सरकार / Government of India  
गृह मंत्रालय / Ministry of Home Affairs  
समन्वय निदेशालय / Directorate of Coordination  
(पुलिस बेतार) / Police Wireless



खंड संख्या 9/ Block No. 9,  
केन्द्रीय सरकार कार्यालय परिसर /CGO Complex,  
लोधी रोड, नई दिल्ली-3/Lodhi Road, New Delhi-3  
दिनांक / Dated 17<sup>th</sup> January 2018

Sub: - **Technical Specifications and Trial Directives of Digital Radios**

The Technical Specifications and Trial Directives of under mentioned Digital Radios have been finalised.

- A. **Digital VHF Conventional Radios**
- B. **DMR Tier-III Radio Trunking**
- C. **APCO 25 Phase-II Radio Trunking**
- D. **TETRA Radio Trunking**

2. MHA has approved that these specifications & trial directives may be used by State /UT Police and CAPFs for procurement of two way Digital Radios & Digital Radio Trunking networks as per applicable GFR or State Financial Rules.
3. Further, if required, due to any specific requirements, the Technical Specifications may be slightly modified by the user organisations with approval of Competent Authority.
4. The above mentioned technical specifications and trial directives are uploaded at DCPW website i.e. [www.dcpw.nic.in](http://www.dcpw.nic.in) under "Technical Specifications" tab.

(Rajesh Ekka)  
Deputy Director (CDN-I)  
Tele No.:- 011-24361767

To,

1. Director Generals CAPFs
2. Director Generals State / UT Police
3. Commissioner of Police Delhi, Mumbai, Kolkata & Chennai

Copy to:

CEO, Government e-Market (GeM), New Delhi: - with a request to kindly include the above items in GeM portal

**A. HANDHELD RADIO**

**QRS of DIGITAL CONVENTIONAL RADIO DMR Tier II**

1	<b>GENERAL</b>	<b>TRIAL DIRECTIVE</b>
1.1	Frequency Range (Organisation may specify)	VHF / UHF (Organisation may specify)
1.2	TDMA	2 - Slot
1.3	Channel Capacity	255 or more (Set with display ) 16 Channels (Set without display)
1.4	Channel Spacing	12.5KHz
1.5	Battery Capacity	Li-ion/Li-Poly rechargeable battery of capacity 2000 mAh or higher capacity. Complying applicable BIS Standard
1.6	Average battery duty cycle 5/5/90	Digital:10 hrs or more Analog:8 hrs or more
1.7	Frequency Stability	±1.5 PPM or better
1.8	Antenna Impedance	50Ω
1.9	Antenna	Helical Antenna
1.10	Weight	Less than 500 gms with battery
1.11	EMI/EMC	ETSI EN 301 489-1 & ETSI 301 489-5/
1.12	Air Interface Standards	Shall be open Standards DMR Tier-II
2	<b>TRANSMITTER</b>	
2.1	RF Power Output	VHF - 1 to 5 Watts (programmable) UHF - 1 to 4 Watts (programmable)
2.2	FM Emission	11K0F3E, 7K60FXE , 7K60FXD , 7K60FXW
2.3	Digital Modulation	4FSK
2.4	Modulation Limiting	±2.5KHz @ 12.5 KHz
2.5	FM Hum & Noise	-40 dB or better
2.6	Adjacent Channel Power	-60 dBc or better
2.7	Audio Response	+1,-3dB

Digital VHF Conventional Radio

2.8	Audio Distortion	Less than 3 %	User / DCPW to test
2.9	Digital Vocoder	AMBE +2	User / DCPW to test
2.10	Communication Security (Optional)	System should have in built encryption and should also have provision to support 3 <sup>rd</sup> Party Encryption.	User / DCPW to test
<b>3 RECEIVER</b>			
3.1	Sensitivity ( Analog)	0.30μV (12dB SINAD )or better	User / DCPW to test
3.2	Sensitivity ( digital)	0.30μV at 5% BER or better	User / DCPW to test
3.3	Adjacent Channel Selectivity	60dB or better	User / DCPW to test
3.4	Inter-modulation	70dB or better	OEM Certification supported by International Recognised Laboratory
3.5	Audio Output	Minimum 500 mW	User / DCPW to test
3.6	Audio Distortion	Less than 3 %	User / DCPW to test
<b>4 ENVIRONMENTAL</b>			
4.1	Operating Temperature	-30°C to +55°C	OEM Certification supported by International Recognised Laboratory
4.2	Storage Temperature	-40°C to +70°C	
4.3	Humidity	95% Max. at +40° C non-condensing	
4.4	Vibration	MIL-STD -810 F/G	
4.5	Shock & Drop	MIL-STD -810 F/G	
4.6	Water intrusion & Dust	MIL-STD -810 F/G or IP-67	
4.7	Salt	MIL-STD -810 F/G	
4.8	Rain	MIL-STD -810 F/G	
4.9	Low Pressure	MIL-STD -810 F/G	

**Feature wise Configuration:**

<b>5 ACCESSORIES</b>			
5.1	Battery charger		User / DCPW to test
5.1.1	Input voltage	230V±10%, 50Hz	User / DCPW to test
5.1.2	Output Voltage	As per battery pack (Information will be provided by OEM/ Vendor).	User / DCPW to test
5.1.3	Type of Battery Charger	Li-ion /Li-Poly	User / DCPW to test

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5.1.4	Protection	(1) Reverse polarity protection (2) Short circuit protection	User / DCPW to test
5.1.5	Indication	Visual indication for all modes of charging status	User / DCPW to test
5.1.6	Charging time	Standard chargers -- 6 to 14 Hrs Rapid Charger--1 to 3 Hrs	User / DCPW to test
5.1.7	No. of Charging Pocket	1/2/6 (vendor to quote accordingly )	User / DCPW to test
5.1.1	Hand free Kit (VOX unit with PTT) (optional).	The offered sets should be compatible with any one or more of the following variants 1. Bone Conduction 2. Ear Plug 3. Headphone, etc.	User / DCPW to test
5.1.2	Programming Kit	All necessary Software and Hardware required for programming of the set independently for lifelong support with regular updates.	User / DCPW to test
5.1.3	Literature	a) User manual with each radio sets should be provided free of cost in soft as well as hard copy. b) Technical repairing & maintenance manual, with complete block diagram, circuit layout, PCB layout, component & wiring diagram etc should be provided as per user's requirement in soft as well as hard copy.	User / DCPW to test
5.1.4	No. of Battery	Two lithium-Ion or Li-polymer batteries with each radio set.	User / DCPW to test
5.1.5	Case	One good quality case with belt clip & shoulder strap to house the Radio Sets in operation.	User / DCPW to test
6	<b>Configuration VH1 (without display)</b>		
6.1	Simple press to talk.		User / DCPW to test
6.2	Low battery alert.		User / DCPW to test
6.3	Continuous Tone Coded Squelch System (CTCSS)		User / DCPW to test
6.4	Mixed Mode Operation ( analog and digital)		User / DCPW to test

Digital VHF Conventional Radio

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7	<b>Configuration VH2 (with display)</b>		User / DCPW to test
7.1	All features of configuration VH1.		User / DCPW to test
7.2	Any one of 2-Tone/5-Tone/ DTMF signalling.		User / DCPW to test
7.3	Busy Channel Lockout.		User / DCPW to test
7.4	Selective call Decode / Encode.		User / DCPW to test
7.5	Capable of VOX hand free operation.		User / DCPW to test
7.6	PTT ID Encode.		User / DCPW to test
7.7	Channel Scanning with call quieting facility.		User / DCPW to test
7.8	Emergency SOS/SIREN		User / DCPW to test
7.9	Talk around Mode		User / DCPW to test
7.10	Automatic Number Identification (ANI)		User / DCPW to test
7.11	Text messages and predefined message (Optional with keypad)		User / DCPW to test
8	<b>Configuration VH3 (with GPS) -</b>		
8.1	All features of configuration of VH2.		User / DCPW to test
8.2	Should have built-in GPS feature with following specifications: i. Time to First Fix (TTFF) cold start : < 2minutes ii. Time to First Fix (TTFF) hot start : < 20seconds Horizontally accuracy : < 10 meters		User / DCPW to test

User Organisation may choose any of the above configurations.

ORS of DIGITAL VHF CONVENTIONAL RADIO

B. MOBILE RADIO



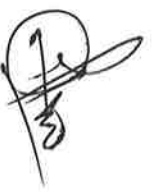
1	GENERAL		TRIAL DIRECTIVE
1.1	Frequency Range	VHF / UHF (Organisation may specify)	User / DCPW to test
1.2	TDMA	2 - Slot	User / DCPW to test
1.3	Channel Capacity	255 or more (Set with display)	User / DCPW to test
1.4	Channel Spacing	12.5KHz	User / DCPW to test
1.5	Operating Voltage	10.8 V to 15.6 VDC	User / DCPW to test
1.6	Protection	a) Reverse polarity protection b) Protection against high VSWR	User / DCPW to test
1.7	Frequency Stability	±1.5 PPM or better	User / DCPW to test
1.8	Antenna Impedance	50Ω	User / DCPW to test
1.9	Weight	Less than 2 kg	User / DCPW to test
1.10	EMI/EMC	ETSI EN 301 489-1 & ETSI 301 489-5/	OEM Certification supported by International Recognised Laboratory
1.11	Air Interface Standards	Shall be open Standards DMR Tier-II	OEM Certification supported by International Recognised Laboratory
2	<b>TRANSMITTER</b>		
2.1	RF Power Output	5 to 25 Watts or More (programmable)	User / DCPW to test
2.2	FM Emission	11K0F3E, 7K60FXE, 7K60FXD, 7K60FXW	User / DCPW to test
2.3	Digital Modulation	4FSK	User / DCPW to test
2.4	Modulation Limiting	±2.5KHz @ 12.5 KHz	User / DCPW to test
2.5	FM Hum & Noise	-40 dB or better	User / DCPW to test
2.6	Adjacent Channel Power	-60 dBc or better	User / DCPW to test
2.7	Audio Response	+1,-3dB	User / DCPW to test
2.8	Audio Distortion	Less than 3 %	User / DCPW to test
2.9	Digital Vocoder	AMBE +2	User / DCPW to test
2.10	Communication Security (Optional)	System should have in built encryption and should also have provision to support 3 <sup>rd</sup> Party Encryption.	User / DCPW to test

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5 RECEIVER			User / DCPW to test
3.1	Sensitivity (Analog)	0.30μV (12dB SINAD) or better	User / DCPW to test
3.2	Sensitivity (digital)	0.30μV at 5% BER or better	User / DCPW to test
3.3	Adjacent Channel Selectivity	60dB or better	OEM Certification supported by International Recognised Laboratory
3.4	Inter-modulation	70dB or better	User / DCPW to test
3.5	Audio Output	Minimum 3 W	User / DCPW to test
3.6	Audio Distortion	Less than 3 %	
<b>4 ENVIRONMENTAL</b>			OEM Certification supported by International Recognised Laboratory
4.1	Operating Temperature	-30°C to +55°C	
4.2	Storage Temperature	-40°C to +70°C	
4.3	Humidity	95% Max. at +40°C Non-condensing	
4.4	Vibration	MIL-STD-810 F/G	
4.5	Shock & Drop	MIL-STD-810 F/G	
4.6	Water intrusion & Dust	MIL-STD-810 F/G or IP-54	
4.7	Salt	MIL-STD-810 F/G	
4.8	Rain	MIL-STD-810 F/G	
4.9	Low Pressure	MIL-STD-810 F/G	

User Organisation may choose any of the above configurations.

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**QRS of DIGITAL VHF CONVENTIONAL RADIO**

**C. REPEATER**

<b>1</b>	<b>GENERAL</b>		<b>TRIAL DIRECTIVE</b>
1.1	Frequency Range	VHF / UHF (Organisation may specify)	User / DCPW to test
1.2	TDMA	2 - Slot	User / DCPW to test
1.3	Operating Mode	Dual standard ( Digital & Analog )	User / DCPW to test
1.4	Operating Selection	Fully automatic for Analog & Digital	User / DCPW to test
1.5	Channel Capacity	16 or more	User / DCPW to test
1.6	Channel Spacing	12.5 KHz	User / DCPW to test
1.7	Operating Voltage	11.25VDC and 230 VAC $\pm$ 10%, 50 Hz	User / DCPW to test
1.8	Frequency Stability	$\pm$ 1 PPM or better	User / DCPW to test
1.9	Interface	Ethernet port for IP connectivity	User / DCPW to test
1.10	Antenna Impedance	50 $\Omega$	User / DCPW to test
1.11	Duty Cycle	100 %	User / DCPW to test
1.12	Weight	Less than 15Kg	User / DCPW to test
1.13	Display	Indicator for Transmit & Receive	User / DCPW to test
1.14	VSWR	Better than 1.5	User / DCPW to test
1.15	Protection	Reverse polarity	User / DCPW to test
1.16	EMI/EMC	ETSI EN 301 489-1 & ETSI 301 489-5	OEM Certification supported by International Recognised Laboratory
1.17	Air Interface Standards	Shall be open Standards DMR Tier-II	OEM Certification supported by International Recognised Laboratory
<b>2.</b>	<b>TRANSMITTER</b>		
2.1	RF Power Output	25 to 50 Watts (programmable)	User / DCPW to test
2.2	FM Emission	11K0F3E, 7K60FXE, 7K60FX, 7K60FXW	User / DCPW to test
2.3	Digital Modulation	4FSK	User / DCPW to test
2.4	Modulation Limiting	$\pm$ 2.5 KHz @ 12.5 KHz	User / DCPW to test
2.5	FM Hum & Noise	-40 dB or better	User / DCPW to test
2.6	Adjacent Channel Power	-60 dBc or better	User / DCPW to test
2.7	Audio Response	+1, -3db	User / DCPW to test
2.8	Audio Distortion	Less than 3 %	User / DCPW to test
<b>3</b>	<b>RECEIVER</b>		

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3.1	Sensitivity ( Analog )	0.30 $\mu$ V ( 12dB SINAD ) or better	User / DCPW to test
3.2	Sensitivity ( Digital )	0.30 $\mu$ V at 5% BER or better	User / DCPW to test
3.3	Image Rejection	65dB or better	User / DCPW to test
3.4	Adjacent Channel Selectivity	60 dB or better	User / DCPW to test
3.5	Inter-modulation	70 dB or better	User / DCPW to test
3.6	Audio Distortion	Less than 3 %	User / DCPW to test
4	<b>ENVIRONMENTAL</b>		OEM Certification supported by International Recognised Laboratory
4.1	Operating Temperature	-30°C to +55°C	
4.2	Storage Temperature	-40°C to +70°C	
4.3	Humidity	95% Max. at +40° C non-condensing	
5	<b>Accessories:</b>		
5.1	Battery cable & Mounting fixtures	Should be supplied with Repeater	User / DCPW to test
5.2	Antenna	6 dB gain Omni Directional antenna with 45 meter RF Cable RG-217 for base station will be provided as per user's requirements.	User / DCPW to test
5.3	Programming kit	All necessary Software and Hardware required for programming of the set independently. Software must support latest Windows OS.	User / DCPW to test
5.4	Literature	i) Users manual with each radio sets should be provided free of cost in soft as well as hard copy. ii) Technical repairing & maintenance manual with complete block diagram in soft as well as hard copy.	User / DCPW to test

Note:-

1. The Technical Specifications & Trial Directives may be used for procurement as per the applicable GFR or State Financial Rules. Technical Specifications may slightly be modified by user organisations for specific requirement, if any, with the approval of competent authority.


2. User Organisations may ask the vendors for lifetime support for supplied Software updates / patches , Warranty and Spare support as per the need.

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3. If required, submitted OEM Certificates results may be verified from the available certified laboratories.


  
(Preeti Dangri)  
Deputy Superintendent of Police,  
Haryana Police

(R K Verma)  
Deputy Director,  
DCPW


  
(Amar Singh Meena)  
Assistant Commissioner of Police,  
Delhi Police

(Balkrishna Yadav)  
Deputy Commissioner of Police,  
Mumbai Police

  
(Rajesh Ekka)  
Deputy Director,  
DCPW

  
(D. Mukhopadhyay)  
Joint Director,  
DCPW

  
(P.R. Jha)  
Deputy Commandant,  
CRPF

  
(N.S.J. Lakshmi)  
Deputy Inspector General,  
Andhra Pradesh Police

  
(Devendra Singh)  
Additional Director,  
DCPW

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**QRs of RADIO TRUNKING SYSTEM - DMR Technology, Tier-III**

**A. BASE STATION UNIT (BSU) :**

SPECIFICATIONS		Trial Directives
S.I. No.	GENERAL	
1.1	Frequency Range 400 MHz Band OR 800 MHz Band	User/ DCPW to test
1.2	Duplex Spacing 10 MHz for 400 MHz Band 45 MHz for 800 MHz Band	User/ DCPW to test
1.3	Technology TDMA- two slot DMR Tier-III Radio Trunking Protocol, ETSI Standard	User/ DCPW to test
1.4	Frequency Stability ±0.5 PPM or better	User/ DCPW to test
1.5	Channel Spacing 12.5 KHz	User/ DCPW to test
1.6	Emission Analog - 11K0F3E Digital - 7K60FXE & 7K60FXD / 7K60FXW	User/ DCPW to test
1.7	Power Supply 230 V ± 10%, 50 Hz	User/ DCPW to test
1.8	Vocoder AMBE+2	User/ DCPW to test
<b>2</b>	<b>TRANSMITTER</b>	
2.1	Power 1 to 50W Or 50 to 100 W (User Selectable)	User/ DCPW to test
2.2	FM Hum & Noise -40 dB or better	User/ DCPW to test
2.3	Adjacent channel power -60 dBc or better	User/ DCPW to test
2.4	Audio Response +1, -3dB	User/ DCPW to test
2.5	Modulation 4FSK	User/ DCPW to test
	<b>RECEIVER</b>	
3.1	Sensitivity (Analog) 0.30 μV at 12db SINAD or better	User/ DCPW to test
3.2	Sensitivity ( Digital) 0.30μV at 5% BER or better	User/ DCPW to test
3.3	Inter-modulation rejection 70dB or better	OEM Certification supported by International Recognised Laboratory
3.4	Adjacent Channel Selectivity ≥ 65dB @ 12.5 KHz	User/ DCPW to test
<b>4</b>	<b>Antenna System</b>	
4.1	Separate antenna system for Tx and Rx which shall include High Gain antenna system	User/ DCPW to test








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	Minimum 10dB <sub>i</sub> or better for Tx (1+1) and Rx.	User/ DCPW to test
4.2	Surge protecting devices in RF cables	User/ DCPW to test
5	<b>CHANNEL UNIT:</b>	User/ DCPW to test
5.1	Shall be Modular/Expandable.	User/ DCPW to test
5.2	Each channel should be configurable to traffic and control unit and vice-versa.	OEM Certification supported by International Recognised Laboratory
6	<b>AIR INTERFACE STANDARDS:</b> Shall be open Standards DMR Tier-III	User/ DCPW to test
7	<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.	OEM Certification supported by International Recognised Laboratory
8	<b>ENVIRONMENTAL</b>	
8.1	Operating Temperature	
8.2	Storage Temperature	
8.3	Humidity	

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DMR Radio

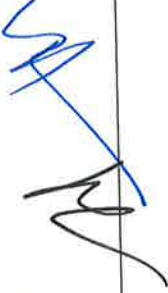

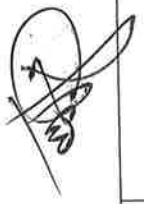
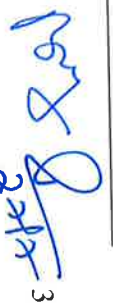
**2. QRS of RADIO TRUNKING SYSTEM - DMR Technology, Tier-III**

**B. MASTER CONTROL UNIT :**

**ESSENTIAL FEATURES:**

S.I. No.	SPECIFICATIONS	Trial Directives
1	<b>Switching System</b>	User/ DCPW to test
1.1	IP based switching equipment.	User/ DCPW to test
1.2	Shall be equipped with all necessary sub systems/ modules and one time licensed system software as required for whole life.	User/ DCPW to test
1.3	High availability failover mechanism to switch from primary to secondary switch/controller and vice-versa for hardware failure, software failure and network failure.	User/ DCPW to test
1.4	Data base shall be mirrored in both the site hot standby.	User/ DCPW to test
2	Minimum No. of Base Station supported - 10 nos.	User/ DCPW to test
3	Minimum No. of Carriers Station sites supported - 06 nos.	User/ DCPW to test
4	Network should support at least 250 Carriers	User/ DCPW to test
5	Minimum Radio terminal supported- 2000 which will include mobile/static/portable radio dispatchers and gateway etc.	User/ DCPW to test
6	Minimum No. of talk groups - 50	User/ DCPW to test
7	<b>Dispatch Console:</b> Minimum 2 Nos. Or more as per user requirement	User/ DCPW to test
7.1	<b>The Dispatcher Console shall be able to handle:</b> a) Individual calls, group calls, all calls, broadcast calls, emergency calls and patched group calls. b) Data services like status, SDS and free form text messaging c) Repeater site wise Tracking of Radio subscribers. d) Calls shall be initiated by selecting talk-group(s) from the graphical display The Dispatch console shall have Radio enable and disable/Stun-stun facility. e) The Dispatch console shall maintain call and activity log for audit. f) No call failure	

DMR Radio






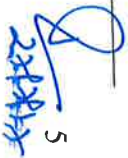
  
  
  


8	User/ DCPW to test
<b>Network Management Terminal (NMT)</b>	
8.1	<p>a) NMT shall work in closed captive Network environment and should have hot standby redundancy.</p> <p>b) NMT shall be equipped with all necessary sub-systems/ modules and installed with necessary licensed software.</p> <p>c) The NMT shall provide map of the equipment in the network, such as switch controllers, radio base stations, servers and work stations etc. in Trunked Radio System with status and alarm indication.</p> <p>d) NMT should display real time channel activity and store activity logging of system components.</p> <p>e) The NMT shall provide user friendly GUI to the NMS administrator and operators with pull-down menu, function keys, online help screens, windows, color pictures and statistical graphs for easy operation and interpretation of information.</p> <p>f) The call processing shall not be affected by failure of network management system/ terminal.</p>
8.2	<p><b>Fault management:</b> To monitor and to display the status and status history of a system component and should also perform diagnostics when needed</p> <p>User/ DCPW to test</p>
8.3	<p><b>Voice Call Type:</b> Group call, individual calls, emergency calls, Broadcast calls.</p> <p><b>Non Voice calls / data calls:</b></p> <ul style="list-style-type: none"> <li>a) Inhibit / Uninhibit</li> <li>b) Authentication registration</li> <li>c) Location information transfer</li> <li>d) Status, short data messages</li> <li>e) Packet data transfer facility for customized application</li> <li>f) Shall support AVLS</li> </ul> <p>User/DCPW to test</p>
8.3	<p><b>Scanning:</b> Shall support talk group scan, priority scan</p> <p>User/ DCPW to test</p>
8.4	<p><b>Late Entry:</b> Shall support to Group calls.</p> <p>User/ DCPW to test</p>
8.5	<p><b>Fault Tolerance:</b></p> <ul style="list-style-type: none"> <li>a) In case of failure in network, isolated site shall be switched to single site Trunking mode at that time.</li> <li>b) In case of Base Station failure, the user terminals should operate in Fail Soft Mode.</li> </ul> <p>User/ DCPW to test</p>

DMR Radio

8.6	<p><b>Subscriber Management Features:</b> Add/remove subscribers</p> <ul style="list-style-type: none"> <li>a) Add/remove multiple subscribers</li> <li>b) Customize call type permissions</li> <li>c) Add/remove multiple talk groups</li> <li>d) Add a broadcast call group</li> <li>e) Add a system call group</li> </ul>	User/ DCPW to test
8.7	<p><b>System Management Features:</b></p> <ul style="list-style-type: none"> <li>a) Transmission Trunking</li> <li>b) Subscriber unit registration/ de-registration</li> <li>c) Group call with late entry, talk group ID</li> <li>d) Broadcast group call, Unit-to-unit call</li> <li>e) Call queuing</li> <li>f) Status message, short message</li> <li>g) Priority talk group monitor and override</li> <li>h) Radio check, radio inhibit/sun-inhibit</li> <li>i) Roaming</li> <li>j) Group location restrictions</li> <li>k) Subscriber location / restrictions</li> </ul>	User/ DCPW to test
8.8	<b>Maintenance:</b> license for OS, application, recovery software and database backup features.	User/ DCPW to test
9	<b>Remote Killing:</b> Provision to kill or disable the Radio remotely.	User/ DCPW to test
10	<b>Accounting management:</b> The accounting management feature shall have the capability of tracking the activity of radio users on the system and allow the customer to produce reports about the traffic on the system.	User/ DCPW to test
11	<b>Performance management:</b> The performance feature shall have the capability to monitor, control and optimize the utilization of system resources.	User/ DCPW to test
12	<p><b>Security management:</b></p> <ul style="list-style-type: none"> <li>a) System should support multiple number of network management user accounts.</li> <li>b) Access rights to the various network management applications.</li> <li>c) Multiple levels of access rights to users for performing tasks with these applications.</li> </ul> <p>The security management feature shall have the capability of allowing the establishment of authorized log-on names and passwords to the NMS.</p>	User/ DCPW to test

DMR Radio

OPTIONAL FEATURE :-

10	<b>Voice Recording System:</b>	
10.1	<p><b>The Voice Recording System shall support:</b></p> <p>a) Minimum 16 Nos. of Channel and should be modularly expandable as per the user requirement</p> <p>b) Group call within subscriber radios</p> <p>c) Calls to and from Dispatch console and subscriber radios.</p> <p>d) Individual call recording with facility to disable this feature.</p> <p>e) Telephone call through telephone gateway</p> <p>f) Calls through conventional analog FM gateway with its metadata, ie Date, time, duration, PTT ID, Group ID, etc</p> <p>g) Provision to search records, replay the voice conversations, back-up and restore facility should to be built-in-suitable GUI, application shall be provided.</p> <p>h) Calls can be located and replay by radio I/D, talk group, I/D, Alias, date/ Time criteria etc</p> <p>i) Digital call recorder shall support Encryption.</p> <p>j) Data should be recorded in main site and other (fall back/Disaster recovery) site recorder simultaneously.</p> <p>k) The system should have minimum 100 TB of storage capacity and should be modularly expandable</p>	User/ DCPW to test
11	<b>AVLS : GIS INTERFACE FOR CALL-TAKING AND DISPATCHING</b>	User/ DCPW to test
11.1	<p>The AVLS System should be capable of providing the following basic features:</p> <p>Shall be capable of displaying a map with the geo-code at the centre of the map display window and at a predefined scale based on a predefined display screen rules.</p>	User/ DCPW to test
11.2	Shall be capable of locating and displaying geographical information using defined attribute type	User/ DCPW to test
11.3	<p><b>Map Query:</b> Shall undertakes a number of queries based upon specific map features to determine:</p> <p>a. Street/road and cross-street/road names.</p> <p>b. Co-ordinate positions.</p> <p>c. Address ranges.</p> <p>d. Database information associated with a graphic symbol.</p>	User/ DCPW to test
11.4	<b>Map Grid:</b> Shall be capable of continuously reporting one or more of the following grid references (to the Dispatcher's screen) as the Dispatcher moves the cursor: Latitude and longitude.	User/ DCPW to test

DMR Radio

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10	Resource symbols shall be able to be automatically placed on the map display at the location as reported from Automatic Vehicle Location. For the continuous streaming of coordinates, the system shall be able to continuously update the vehicle symbol as the coordinates are received from the Automatic Vehicle Location (AVL).	User/ DCPW to test
11.6	The incident and resource symbols should be able to be colour coded and have that colour automatically updated as the status-changes.	User/ DCPW to test
12	<b>Health Status:</b> Health Status of Remote radio should be available in NMS.	User/ DCPW to test

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DMR Radio

ORS of RADIO TRUNKING SYSTEM - DMR Technology, Tier-III

**C. DIGITAL HANDHELD RADIO :**

S.I. No.	SPECIFICATIONS	Trial Directives
<b>1</b>	<b>GENERAL</b>	
1.1	Frequency Range	User/ DCPW To Test
1.2	Duplex Spacing	User/ DCPW to test
1.3	TDMA	User/ DCPW to test
1.4	Operation Modes	User/ DCPW to test
1.7	Emission	User/ DCPW to test
1.5	Number of Channel	User/ DCPW to test
1.6	Channel Spacing	User/ DCPW to test
1.7	Number of contacts (individual / group call numbers)	User/ DCPW to test
1.8	Battery Capacity	User/ DCPW to test
1.9	Frequency Stability	User/ DCPW to test
1.10	Display	User/ DCPW to test
1.11	VSWR	User/ DCPW to test
1.12	Protection	User/ DCPW to test
1.13	Interoperability with minimum two vendors	User/ DCPW to test
<b>2</b>	<b>TRANSMITTER</b>	
2.1	RF Power Output	User/ DCPW to test
2.2	Digital Modulation	User/ DCPW to test
2.3	Modulation Deviation	User/ DCPW to test
2.4	FM Hum & Noise	User/ DCPW to test
2.5	Adjacent Channel Power	User/ DCPW to test

DMR Radio

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2.1	Audio Response	+1,-3dB	User/ DCPW to test
2.7	Digital Vocoder	AMBE +2	User/ DCPW to test
3	<b>RECEIVER</b>		User/ DCPW to test
3.1	Sensitivity ( Analog)	0.30µV (12dB SINAD )or better	User/ DCPW to test
3.2	Sensitivity ( digital)	0.30µV at 5% BER or better	User/ DCPW to test
3.3	Adjacent Chanel Selectivity	60dB or better at 12.5 KHz	User/ DCPW to test
3.4	Inter-modulation	70dB or better	OEM Certification supported by International Recognised Laboratory
3.5	Audio Output	Minimum 500m W	User/ DCPW to test
3.6	Audio Distortion	Less than 3%	User/ DCPW to test
4	<b>GPS</b>		User/ DCPW to test
4.1	Time to first fix cold Start	<2 Minutes	User/ DCPW to test
4.2	Time to first fix hot Start	< 20 Second	User/ DCPW to test
4.3	Horizontal accuracy	< 10 Meter	User/ DCPW to test
5	<b>ENVIRONMENTAL</b>		OEM Certification supported by International Recognised Laboratory
5.1	Operating Temperature	-30°Cto+55°C	
5.2	Storage Temperature	-40°Cto+70°C	
5.3	Humidity	95% Max. at +40° C non-condensing	
5.4	Vibration	MIL-STD -810 F/G	
5.5	Shock & Drop	MIL-STD -810 F/G	
5.6	Water intrusion & Dust	MIL-STD -810 F/G & IP-67	
5.7	Salt	MIL-STD -810 F/G	
5.8	Rain	MIL-STD -810 F/G	
5.9	Low Pressure	MIL-STD -810 F/G	

DMR Radio

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ACCESSORIES		
Battery Charger	230V + 10%, 50 Hz	User/ DCPW to test
Input Voltage	As per battery pack (Information will be provided by OEM / Vendor)	User/ DCPW to test
Output Voltage	Li-Ion / Li-poly	User/ DCPW to test
Type of Battery		User/ DCPW to test
Charger	1. Reverse Polarity Protection 2. Short Circuit Protection	User/ DCPW to test
Protection	Visual Indication for all modes of charging status	User/ DCPW to test
Indication	Standard Charger – 6 to 14 hrs Rapid Charger – 1 to 3 hrs	User/ DCPW to test
Charging Time	1 / 2 / 6 (Vendor to quote accordingly)	User/ DCPW to test
No. of charging pockets	The offered sets should be compatible with minimum any of the two or more variants	User/ DCPW to test
Hands free Kit (VOX unit with PTT) (Optional)	1. Bone Conduction 2. Ear Plug 3. Headphone, etc	User/ DCPW to test
Programming Kit	All necessary Software and Hardware required for programming of the set independently for lifelong support with regular updates.	User/ DCPW to test
Leather Case	One good quality leather case with belt clip and shoulder strap.	User/ DCPW to test
No. of Battery	Two Li-ion or Li-poly batteries with each radio sets.	User/ DCPW to test
Literature	a) User manual with each radio sets should be provided free of cost in soft as well as hard copy. b) Technical repairing manual, with complete block diagram, circuit layout, PCB layout, component & wiring diagram etc should be provided as per user's requirement in soft as well as hard copy.	User/ DCPW to test

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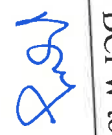
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2. QRs of RADIO TRUNKING SYSTEM - DMR Technology, Tier-III

**D. DIGITAL MOBILE RADIO :**

S.I. No.	SPECIFICATIONS	Trial Directives
<b>1</b>	<b>GENERAL</b>	
1.1	Frequency Range	User/ DCPW to test
1.2	Duplex Spacing	User/ DCPW to test
1.3	TDMA	User/ DCPW to test
1.4	Operation Modes	User/ DCPW to test
1.7	Emission	User/ DCPW to test
1.5	Number of Channel	User/ DCPW to test
1.6	Channel Spacing	User/ DCPW to test
1.7	Number of contacts (individual / group call numbers)	User/ DCPW to test
1.8	Operating Voltage	User/ DCPW to test
1.9	Frequency Stability	User/ DCPW to test
1.10	Display	User/ DCPW to test
1.11	VSWR	User/ DCPW to test
1.12	Protection	User/ DCPW to test
1.13	Interoperability with minimum two vendors	User/ DCPW to test
<b>2</b>	<b>TRANSMITTER</b>	
2.1	RF Power Output	User/ DCPW to test
2.2	Digital Modulation	User/ DCPW to test
2.3	Modulation Deviation	User/ DCPW to test
2.4	FM Hum & Noise	User/ DCPW to test
2.5	Adjacent Channel Power	User/ DCPW to test
2.6	Audio Response	User/ DCPW to test

DMR Radio






  
 11

2.7	Digital Vocoder	AMBE +2	User/ DCPW to test
<b>RECEIVER</b>			
3.1	Sensitivity ( Analog)	0.30µV (12dB SINAD )or better	User/ DCPW to test
3.2	Sensitivity ( digital)	0.30µV at 5% BER or better	User/ DCPW to test
3.3	Adjacent Channel Selectivity	60dB or better at 12.5 KHz	User/ DCPW to test
3.4	Inter-modulation	70dB or better	OEM Certification supported by International Recognised Laboratory
3.5	Audio Output	Minimum 3 W	User/ DCPW to test
3.6	Audio Distortion	Less than 3 %	User/ DCPW to test
4	<b>GPS</b>		User/ DCPW to test
4.1	Time to first fix cold Start	<2 Minutes	User/ DCPW to test
4.2	Time to first fix hot Start	< 20 Second	User/ DCPW to test
4.3	Horizontal accuracy	< 10 Meter	User/ DCPW to test
5	<b>ENVIRONMENTAL</b>		OEM Certification supported by International Recognised Laboratory
5.1	Operating Temperature	-30°Cto+55°C	
5.2	Storage Temperature	-40°Cto+70°C	
5.3	Humidity	95% Max. at +40° C non-condensing	
5.4	Vibration	MIL-STD-810 F/G	
5.5	Shock & Drop	MIL-STD-810 F/G	
5.6	Water intrusion & Dust	MIL-STD-810 F/G & IP54	
5.7	Salt	MIL-STD-810 F/G	
5.8	Rain	MIL-STD-810 F/G	
5.9	Low Pressure	MIL-STD-810 F/G	


Note:-


- The Technical Specifications & Trial Directives may be used for procurement as per the applicable GFR or State Financial Rules. Technical Specifications may slightly be modified by user organisations for specific requirement, if any, with the approval of competent authority.


DMR Radio


2. User Organisations may ask the vendors for lifetime support for supplied Software updates / patches , Warranty and Spare support as per the need.

3. If required, submitted OEM Certificates results may be verified from the available certified laboratories.


  
(Pren Dangi)  
Deputy Superintendent of  
Police,  
Haryana Police


  
(Amar Singh Meena)  
Assistant Commissioner of  
Police,  
Delhi Police


  
(Rajesh Ekka)  
Deputy Director,  
DCPW

  
(P R Jha)  
Deputy Commandant,  
CRPF

  
(RK Verma)  
Deputy Director,  
DCPW

  
(Balkrishna Yadav)  
Deputy Commissioner of Police,  
Mumbai Police

  
(D. Mukhopadhyay)  
Joint Director,  
DCPW

  
(N S J Lakshmi)  
Deputy Inspector General,  
Andhra Pradesh Police

  
(Devendra Singh)  
Additional Director,  
DCPW

**QRS of RADIO TRUNKING SYSTEM – APCO PHASE-II Technology**

**A. BASE STATION UNIT (BSU) :**

SPECIFICATIONS		Trial Directives
S.I. No.	GENERAL	
1.1	Frequency Range	User/ DCPW to test
1.2	Duplex Spacing	User/ DCPW to test
1.3	Technology	User/ DCPW to test
1.4	Frequency Stability	User/ DCPW to test
1.5	Channel Spacing	User/ DCPW to test
1.6	Emission	User/ DCPW to test
1.7	Power Supply	User/ DCPW to test
1.8	Vocoder	User/ DCPW to test
<b>2</b>	<b>TRANSMITTER</b>	
2.1	Power	User/ DCPW to test
2.2	FM Hum & Noise	User/ DCPW to test
2.3	Adjacent channel power	User/ DCPW to test
2.4	Audio Response	User/ DCPW to test
2.5	Modulation	User/ DCPW to test
<b>3</b>	<b>RECEIVER</b>	
3.1	Sensitivity (Analog)	User/ DCPW to test
3.2	Sensitivity ( Digital)	User/ DCPW to test
3.3	Inter-modulation rejection	OEM Certification supported by International Recognised Laboratory
3.4	Adjacent Channel Selectivity	User/ DCPW to test
<b>4</b>	<b>Antenna System</b>	

APCO-II Radios

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4.1	Separate antenna system for Tx and Rx which shall include High Gain antenna system Minimum 10dBi or better for Tx (1+1) and Rx.	User/ DCPW to test
4.2	Surge protecting devices in RF cables	User/ DCPW to test
5	<b>CHANNEL UNIT:</b>	
5.1	Shall be Modular/Expandable.	User/ DCPW to test
5.2	Each channel should be configurable to traffic and control unit and vice-versa.	User/ DCPW to test
6	<b>AIR INTERFACE STANDARDS:</b> Shall be open Standards APCCO P25 Phase-II	OEM Certification supported by International Recognised Laboratory
7	<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.	User/ DCPW to test
8	<b>ENVIRONMENTAL</b>	
8.1	Operating Temperature	OEM Certification supported by International Recognised Laboratory
8.2	Storage Temperature	
8.3	Humidity	

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APCO-II Radios

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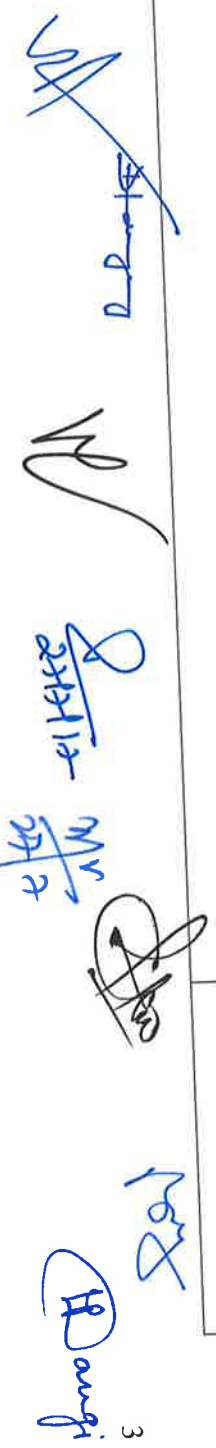
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**B. MASTER CONTROL UNIT :**

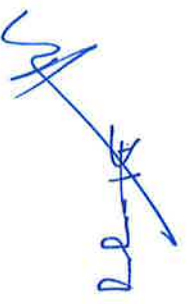
**ESSENTIAL FEATURES:**

S.I. No.	SPECIFICATIONS	Trial Directives
1	<b>Switching System</b>	User/ DCPW to test
1.1	IP based switching equipment.	User/ DCPW to test
1.2	Shall be equipped with all necessary sub systems/ modules and one time licensed system software as required for whole life.	User/ DCPW to test
1.3	High availability failover mechanism to switch from primary to secondary switch/controller and vice-versa for hardware failure, software failure and network failure.	User/ DCPW to test
1.4	Data base shall be mirrored in both the hot standby.	User/ DCPW to test
2	Minimum No. of Base Station supported - 10 nos.	User/ DCPW to test
3	Minimum No. of Carriers Station sites supported –06 nos.	User/ DCPW to test
4	Network should support at least 250 Carriers	User/ DCPW to test
5	Minimum Radio terminal supported-- 2000 which will include mobile/static/portable radio dispatchers and gateway etc	User/ DCPW to test
6	Minimum No. of talk groups – 50	User/ DCPW to test
7	<b>Dispatcher Console:</b> Minimum 2 Nos. Or more as per user requirement	User/ DCPW to test
7.1	<b>The Dispatcher Console shall be able to handle:</b> a) Individual calls, group calls, all calls, broadcast calls, emergency calls and patched group calls. b) Data services like status, SDS and free form text messaging c) Repeater site wise Tracking of Radio subscribers. d) Calls shall be initiated by selecting talk-group(s) from the graphical display The Dispatch console shall have Radio enable and disable/Stun-stun facility. e) The Dispatch console shall maintain call and activity log for audit. f) No call failure	

APCO-II Radios


  
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8	<b>Network Management Terminal (NMT)</b>	User/ DCPW to test
8.1	<p>a) NMT shall work in closed captive Network environment and should have hot standby redundancy.</p> <p>b) NMT shall be equipped with all necessary sub-systems/ modules and installed with necessary licensed software.</p> <p>c) The NMT shall provide map of the equipment in the network, such as switch controllers, radio base stations, servers and work stations etc. in Trunked Radio System with status and alarm indication.</p> <p>d) NMT should display real time channel activity and store activity logging of system components.</p> <p>e) The NMT shall provide user friendly GUI to the NMS administrator and operators with pull-down menu, function keys, online help screens, windows, color pictures and statistical graphs for easy operation and interpretation of information.</p> <p>f) The call processing shall not be affected by failure of network management system/terminal.</p>	User/ DCPW to test
8.2	<p><b>Fault management:</b> To monitor and to display the status and status history of a system component and should also perform diagnostics when needed</p>	User/ DCPW to test
8.3	<p><b>Voice Call Type:</b> Group call, individual calls, emergency calls, Broadcast calls.</p> <p><b>Non Voice calls / data calls:</b></p> <ul style="list-style-type: none"> <li>a) Inhibit / uninhibit</li> <li>b) Authentication registration</li> <li>c) Location information transfer</li> <li>d) Status, short data messages</li> <li>e) Packet data transfer facility for customized application</li> <li>f) Shall support AVLS</li> </ul>	User/ DCPW to test
8.3	<b>Scanning:</b> Shall support talk group scan, priority scan	User/ DCPW to test
8.4	<b>Late Entry:</b> Shall support to Group calls.	User/ DCPW to test
8.5	<p><b>Fault Tolerance:</b></p> <ul style="list-style-type: none"> <li>a) In case of failure in network, isolated site shall be switched to single site Trunking mode at that time</li> <li>b) In case of Base Station failure, the user terminals should operate in Fail Soft Mode.</li> </ul>	User/ DCPW to test















8.6	<p><b>Subscriber Management Features:</b></p> <p>Add/remove subscribers</p> <ol style="list-style-type: none"> <li>Add/remove multiple subscribers</li> <li>Customize call type permissions</li> <li>Add/remove multiple talk groups</li> <li>Add a broadcast call group</li> <li>Add a system call group</li> </ol>	User/ DCPW to test
8.7	<p><b>System Management Features:</b></p> <ol style="list-style-type: none"> <li>Transmission Trunking</li> <li>Subscriber unit registration/ de-registration</li> <li>Group call with late entry, talk group ID</li> <li>Broadcast group call, Unit-to-unit call</li> <li>Call queuing</li> <li>Status message, short message</li> <li>Priority talk group monitor and override</li> <li>Radio check, radio inhibit/sun-inhibit</li> <li>Roaming</li> <li>Group location restrictions</li> <li>Subscriber location / restrictions</li> </ol>	User/ DCPW to test
8.8	<p><b>Maintenance:</b> license for OS, application, recovery software and database backup features.</p>	User/ DCPW to test
9	<p><b>Remote Killing:</b> Provision to kill or disable the Radio remotely.</p>	User/ DCPW to test
10	<p><b>Accounting management:</b> The accounting management feature shall have the capability of tracking the activity of radio users on the system and allow the customer to produce reports about the traffic on the system.</p>	User/ DCPW to test
11	<p><b>Performance management:</b> The performance feature shall have the capability to monitor, control and optimize the utilization of system resources.</p>	User/ DCPW to test
12	<p><b>Security management:</b></p> <ol style="list-style-type: none"> <li>System should support multiple number of network management user accounts.</li> <li>Access rights to the various network management applications.</li> <li>Multiple levels of access rights to users for performing tasks with these applications.</li> </ol> <p>The security management feature shall have the capability of allowing the establishment of authorized log-on names and passwords to the NMS.</p>	User/ DCPW to test

**OPTIONAL FEATURES:**

10	<b>Voice Recording System:</b>	<b>Trial Directives</b>
10.1	<p><b>The Voice Recording System shall support:</b></p> <ul style="list-style-type: none"> <li>a) <b>Minimum 16 Nos. of Channel and should be modularly expandable as per the user requirement</b></li> <li>b) Group call within subscriber radios</li> <li>c) Calls to and from Dispatch console and subscriber radios.</li> <li>d) Individual call recording with facility to disable this feature.</li> <li>e) Telephone call through telephone gateway</li> <li>f) Calls through conventional analog FM gateway with its metadata, ie Date, time, duration, PTT ID, Group ID, etc</li> <li>g) Provision to search records, replay the voice conversations, back-up and restore facility should to be built-in-suitable GUI, application shall be provided.</li> <li>h) Calls can be located and replay by radio I/D, talk group, I/D, Alias, date/ Time criteria etc</li> <li>i) Digital call recorder shall support Encryption.</li> <li>j) Data should be recorded in main site and other (fall back/Disaster recovery) site recorder simultaneously.</li> <li>k) The system should have minimum 100 TB of storage capacity and should be modularly expandable</li> </ul>	User/ DCPW to test
11	<p><b>AVLS : GIS INTERFACE FOR CALL-TAKING AND DISPATCHING</b></p> <p>The AVLS System should be capable of providing the following basic features:</p>	User/ DCPW to test
11.1	<p>Shall be capable of displaying a map with the geo-code at the centre of the map display window and at a predefined scale based on a predefined display screen rules.</p>	User/ DCPW to test
11.2	<p>Shall be capable of locating and displaying geographical information using defined attribute type</p>	User/ DCPW to test
11.3	<p><b>Map Query:</b> Shall undertake a number of queries based upon specific map features to determine:</p> <ul style="list-style-type: none"> <li>a. Street/road and cross-street/road names.</li> <li>b. Co-ordinate positions.</li> <li>c. Address ranges.</li> <li>d. Database information associated with a graphic symbol.</li> </ul>	User/ DCPW to test
11.4	<p><b>Map Grid:</b> Shall be capable of continuously reporting one or more of the following grid references (to the Dispatcher's screen) as the Dispatcher moves the cursor: Latitude and longitude.</p>	User/ DCPW to test
11.5	<p>Resource symbols shall be able to be automatically placed on the map display at the location as reported from Automatic Vehicle Location. For the continuous streaming of coordinates, the system shall be able to continuously update the vehicle symbol as the coordinates are received</p>	User/ DCPW to test

APCO-II Radios

	from the Automatic Vehicle Location (AVL).	User/ DCPW to test
11.6	The incident and resource symbols should be able to be colour coded and have that colour automatically updated as the status-changes.	User/ DCPW to test
12	<b>Health Status:</b> Health Status of Remote radio should be available in NMS.	

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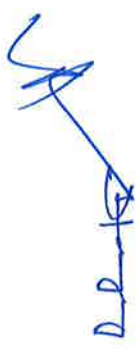





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**QRS of RADIO TRUNKING SYSTEM – APCO PHASE-II Technology**

**C. DIGITAL HANDHELD RADIO :**

S.I. No.	SPECIFICATIONS		Trial Directives
1	<b>GENERAL</b>		User/ DCPW to test
1.1	Frequency Range	400 MHz Band OR 800 MHz Band	User/ DCPW to test
1.2	Duplex Spacing	10 MHz for 400 MHz Band 45 MHz for 800 MHz Band	User/ DCPW to test User/ DCPW to test
1.3	TDMA	2 – Slot	User/ DCPW to test
1.4	Operation Modes	APCO P25 Phase II	User/ DCPW to test
1.5	Emission	9K80D7W.	User/ DCPW to test
1.6	Number of Channel	1000 or better	User/ DCPW to test
1.7	Channel Spacing	12.5 KHz	
1.8	Number of contacts (individual / group call numbers)	1000 or better	User/ DCPW to test
1.9	Battery Capacity	Li-ion/Li-Poly rechargeable battery of capacity 2000 mAh or higher capacity. Bidder to specify the specific voltage	User/ DCPW to test
1.10	Frequency Stability	±1.5 PPM or better	User/ DCPW to test
1.11	Display	Alphanumeric	User/ DCPW to test
1.12	VSWR	Better than 1.5	User/ DCPW to test
1.13	Protection	Reverse Polarity and High VSWR	User/ DCPW to test
1.14	Interoperability with minimum two vendors	IOP Certification from Technical Working Group (TWG) of the APCO Association	User/ DCPW to test
<b>2</b>	<b>TRANSMITTER</b>		
2.1	RF Power Output	4W for 400 MHz Band (programmable) 3W for 800 MHz Band (programmable)	User/ DCPW to test
2.2	Digital Modulation	Inbound : HCPM (TDMA) Outbound : HDQPSK (TDMA)	User/ DCPW to test
2.3	FM Hum & Noise	-40 dB or better at 12.5 KHz	User/ DCPW to test
2.4	Adjacent Channel Power	-60 dBc or better at 12.5 KHz	User/ DCPW to test

APCO-II Radios

2.5	Audio Response	+1,-3dB	User/ DCPW to test
2.6	Digital Vocoder	AMBE +2 (Dual Rate)	User/ DCPW to test
<b>3</b>	<b>RECEIVER</b>		
3.1	Sensitivity ( Analog)	0.30 $\mu$ V (12dB SINAD )or better	User/ DCPW to test
3.2	Sensitivity ( digital)	0.30 $\mu$ V at 5% BER or better	User/ DCPW to test
3.3	Adjacent Channel Selectivity	60dB or better at 12.5 KHz	User/ DCPW to test
3.4	Inter-modulation	70dB or better	OEM Certification supported by International Recognised Laboratory
3.5	Audio Output	Minimum 500m W	User/ DCPW to test
3.6	Audio Distortion	Less than 3%	User/ DCPW to test
<b>4</b>	<b>GPS</b>		
4.1	Time to first fix cold Start	<2 Minutes	User/ DCPW to test
4.2	Time to first fix hot Start	< 20 Second	User/ DCPW to test
4.3	Horizontal accuracy	< 10 Meter	User/ DCPW to test
<b>5</b>	<b>ENVIRONMENTAL</b>		
5.1	Operating Temperature	-30°Cto+55°C	OEM Certification supported by International Recognised Laboratory
5.2	Storage Temperature	-40°Cto+70°C	
5.3	Humidity	95% Max. at +20° C non-condensing	
5.4	Vibration	MIL-STD -810 F/G	
5.5	Shock & Drop	MIL-STD -810 F/G	
5.6	Water intrusion & Dust	MIL-STD -810 F/G & IP-67	
5.7	Salt	MIL-STD -810 F/G	
5.8	Rain	MIL-STD -810 F/G	
5.9	Low Pressure	MIL-STD -810 F/G	

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ACCESSORIES		
<b>Battery Charger</b>	230V + 10%, 50 Hz	User/ DCPW to test
<b>Input Voltage</b>	As per battery pack (Information will be provided by OEM / Vendor)	User/ DCPW to test
<b>Output Voltage</b>	Li-Ion / Li-poly	User/ DCPW to test
<b>Type of Battery Charger Protection</b>	1. Reverse Polarity Protection 2. Short Circuit Protection	User/ DCPW to test
<b>Indication</b>	Visual Indication for all modes of charging status	User/ DCPW to test
<b>Charging Time</b>	Standard Charger – 6 to 14 hrs Rapid Charger – 1 to 3 hrs	User/ DCPW to test
<b>No. of charging pockets</b>	1 / 2 / 6 (Vendor to quote accordingly)	User/ DCPW to test
<b>Hands free Kit (VOX unit with PTT)(Optional)</b>	The offered sets should be compatible with minimum any of the two or more variants 1. Bone Conduction 2. Ear Plug 3. Headphone, etc	User/ DCPW to test
<b>Programming Kit</b>	All necessary Software and Hardware required for programming of the set independently for lifelong support with regular updates. One good quality leather case with belt clip and shoulder strap.	User/ DCPW to test
<b>Leather Case</b>	Two Li-ion or Li-poly batteries with each radio sets.	User/ DCPW to test
<b>No. of Battery</b>	a) User manual with each radio sets should be provided free of cost in soft as well as hard copy. b) Technical repairing manual, with complete block diagram, circuit layout, PCB layout, component & wiring diagram etc should be provided as per user's requirement in soft as well as hard copy.	User/ DCPW to test
<b>Literature</b>		User/ DCPW to test









**ORs of RADIO TRUNKING SYSTEM – APCO PHASE-II Technology**

**D. DIGITAL MOBILE RADIO :**

S.I. No.	SPECIFICATIONS	Trial Directives
<b>1</b>	<b>GENERAL</b>	
1.1	Frequency Range	User/ DCPW to test
1.2	Duplex Spacing	User/ DCPW to test
1.3	TDMA	User/ DCPW to test
1.4	Operation Modes	User/ DCPW to test
1.7	Emission	User/ DCPW to test
1.5	Number of Channel	User/ DCPW to test
1.6	Channel Spacing	User/ DCPW to test
1.7	Number of contacts (individual / group call numbers)	User/ DCPW to test
1.8	Operating Voltage	User/ DCPW to test
1.9	Frequency Stability	User/ DCPW to test
1.10	Display	User/ DCPW to test
1.11	VSWR	User/ DCPW to test
1.12	Protection	User/ DCPW to test
1.13	Interoperability with minimum two vendors	User/ DCPW to test
<b>2</b>	<b>TRANSMITTER</b>	
2.1	RF Power Output	User/ DCPW to test
2.2	Digital Modulation	User/ DCPW to test
2.3	FM Hum & Noise	User/ DCPW to test
2.4	Adjacent Channel Power	User/ DCPW to test
2.5	Audio Response	User/ DCPW to test
2.6	Digital Vocoder	User/ DCPW to test

APCO-II Radios

<b>3</b>	<b>RECEIVER</b>		
	Sensitivity ( Analog)	0.30μV (12dB SINAD )or better	User/ DCPW to test
3.2	Sensitivity ( Digital)	0.30μV at 5% BER or better	User/ DCPW to test
3.3	Adjacent Channel Selectivity	60dB or better at 12.5 KHz	User/ DCPW to test
3.4	Inter-modulation	70dB or better	OEM Certification supported by International Recognised Laboratory
3.5	Audio Output	Minimum 3 W	User/ DCPW to test
3.6	Audio Distortion	Less than 3%	User/ DCPW to test
<b>4</b>	<b>GPS</b>		
4.1	Time to first fix cold Start	<2 Minutes	User/ DCPW to test
4.2	Time to first fix hot Start	< 20 Second	User/ DCPW to test
4.3	Horizontal accuracy	< 10 Meter	User/ DCPW to test
<b>5</b>	<b>ENVIRONMENTAL</b>		
5.1	Operating Temperature	-30°Cto+55°C	OEM Certification supported by International Recognised Laboratory
5.2	Storage Temperature	-40°Cto+70°C	
5.3	Humidity	95% Max. at +20° C non-condensing	
5.4	Vibration	MIL-STD -810 F/G	
5.5	Shock & Drop	MIL-STD -810 F/G	
5.6	Water intrusion & Dust	MIL-STD -810 F/G & IP-54	
5.7	Salt	MIL-STD -810 F/G	
5.8	Rain	MIL-STD -810 F/G	
5.9	Low Pressure	MIL-STD -810 F/G	

Note:-

1. The Technical Specifications & Trial Directives may be used for procurement as per the applicable GFR or State Financial Rules.


Technical Specifications may slightly be modified by user organisations for specific requirement, if any, with the approval of competent


authority.

APCO-II Radios


2. User Organisations may ask the vendors for lifetime support for supplied Software updates / patches , Warranty and Spare support as per the need.



3. If required, submitted OEM Certificates results may be verified from the available certified Laboratories.


  
(Prem Dangi)  
Deputy Superintendent of Police,  
Haryana Police  
Deputy Director,  
DCPW

  
(Amar Singh Meena)  
Assistant Commissioner of Police,  
Delhi Police  
Deputy Commissioner of Police,  
Mumbai Police

  
(Devendra Singh)  
Additional Director,  
DCPW

  
(Rajesh Ekkat)  
Deputy Director,  
DCPW

  
(P R Jha)  
Deputy Commandant,  
CRPF  
  
(N S J Lakshmi)  
Deputy Inspector General,  
Andhra Pradesh Police

  
(D. Mukhopadhyay)  
Joint Director,  
DCPW

**ORs of RADIO TRUNKING SYSTEM - TETRA Technology**

**A. BASE STATION UNIT (BSU):**

SPECIFICATIONS		TRIAL DIRECTIVES
<b>S.I. No.</b>	<b>GENERAL</b>	
1.1	Frequency Range	User/ DCPW to test
1.2	Duplex Spacing	User/ DCPW to test
1.3	Technology	User/ DCPW to test
1.4	Frequency Stability	User/ DCPW to test
1.5	Channel Spacing	User/ DCPW to test
1.6	Emission	User/ DCPW to test
1.7	Power Supply	User/ DCPW to test
1.8	Vocoder	User/ DCPW to test
<b>2</b>	<b>TRANSMITTER</b>	
2.1	Power	User/ DCPW to test
2.2	FM Hum & Noise	User/ DCPW to test
2.3	Adjacent channel power	User/ DCPW to test
2.4	Audio Response	User/ DCPW to test
2.5	Modulation	User/ DCPW to test
<b>3</b>	<b>RECEIVER</b>	
3.1	Sensitivity (Analog)	User/ DCPW to test
3.2	Sensitivity ( Digital)	OEM Certification supported by International Recognised Laboratory
3.3	Inter-modulation rejection	User/ DCPW to test
3.4	Adjacent Channel Selectivity	User/ DCPW to test
<b>4</b>	<b>Antenna System</b>	
4.1	Separate antenna system for Tx and Rx which shall include High Gain antenna system Minimum 10dbi or better for Tx (1+1) and Rx..	User/ DCPW to test
4.2	Surge protecting devices in RF cables	User/ DCPW to test

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5	<b>CHANNEL UNIT:</b>	
5.1	Shall be Modular/Expandable.	User/ DCPW to test
5.2	Each channel should be configurable to traffic and control unit and vice-versa.	User/ DCPW to test
6	<b>AIR INTERFACE STANDARDS:</b> Shall be open Standards TETRA	OEM Certification supported by International Recognised Laboratory
7	<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.	User/ DCPW to test
8	<b>ENVIRONMENTAL</b>	OEM Certification supported by International Recognised Laboratory
8.1	Operating Temperature	
8.2	Storage Temperature	
8.3	Humidity	
8.4	Vibration, Shock, Water intrusion & Dust	

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**4 ORs of RADIO TRUNKING SYSTEM – TETRA Technology**

**B. MASTER CONTROL UNIT :**

**ESSENTIAL FEATURES:**

S.I. No.	SPECIFICATIONS	Trial Directives
1	<b>Switching System</b>	
1.1	IP based switching equipment.	User/ DCPW to test
1.2	Shall be equipped with all necessary sub systems/ modules and one time licensed system software as required for whole life.	User/ DCPW to test
1.3	High availability failover mechanism to switch from primary to secondary switch/controller and vice-versa for hardware failure, software failure and network failure.	User/ DCPW to test
1.4	Data base shall be mirrored in both the hot standby.	User/ DCPW to test
2	Minimum No. of Base Station supported - 10 nos.	User/ DCPW to test
3	Minimum No. of Carriers Station sites supported - 03 nos.	User/ DCPW to test
4	Network should support at least 125 Carriers	User/ DCPW to test
5	Minimum Radio terminal supported - 2000 which will include mobile/static/portable radio dispatchers and gateway etc	User/ DCPW to test
6	Minimum No. of talk groups – 50	User/ DCPW to test
7	Dispatcher Console: Minimum 2 Nos. Or more as per user requirement	
7.1	<p><b>The Dispatcher Console shall be able to handle:</b></p> <p>a) Individual calls, group calls, all calls, broadcast calls, emergency calls and patched group calls.</p> <p>b) Data services like status, SDS and free form text messaging</p> <p>c) Repeater site wise Tracking of Radio subscribers.</p> <p>d) Calls shall be initiated by selecting talk-group(s) from the graphical display</p> <p>The Dispatch console shall have Radio enable and disable/Stun-stun facility.</p> <p>e) The Dispatch console shall maintain call and activity log for audit</p> <p>f) No call failure</p>	User/ DCPW to test

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	<b>Network Management Terminal (NMT)</b>	
8.1	<p>a) <b>NMT shall work in closed captive Network environment and should have hot standby redundancy</b></p> <p>b) NMT shall be equipped with all necessary sub-systems/ modules and installed with necessary licensed software.</p> <p>c) The NMT shall provide map of the equipment in the network, such as switch controllers, radio base stations, servers and work stations etc. in Trunked Radio System with status and alarm indication.</p> <p>d) NMT should display real time channel activity and store activity logging of system components.</p> <p>e) The NMT shall provide user friendly GUI to the NMS administrator and operators with pull-down menu, function keys, online help screens, windows, color pictures and statistical graphs for easy operation and interpretation of information.</p> <p>f) The call processing shall not affected by failure of network management system/ terminal.</p>	User/ DCPW to test
8.2	<p><b>Fault management:</b> To monitor and to display the status and status history of a system component and should also perform diagnostics when needed</p>	User/ DCPW to test
8.3	<p><b>Voice Call Type:</b> Group call, individual calls, emergency calls, Broadcast calls.</p> <p><b>Non Voice calls / data calls:</b></p> <p>a) Inhibit / Uninhibit</p> <p>b) Authentication registration</p> <p>c) Location information transfer</p> <p>d) Status, short data messages</p> <p>e) Packet data transfer facility for customized application</p> <p>f) Shall support AVLS</p>	User/ DCPW to test
8.3	<b>Scanning:</b> Shall support talk group scan, priority scan	User/ DCPW to test
8.4	<b>Late Entry:</b> Shall support to Group calls.	User/ DCPW to test
8.5	<p><b>Fault Tolerance:</b></p> <p>a) In case of failure in network, isolated site shall be switched to single site Trunking mode at that time</p> <p>b) In case of Base Station failure, the user terminals should operate in Fail Soft Mode.</p>	User/ DCPW to test



8.5	<p><b>Subscriber Management Features:</b> Add/remove subscribers</p> <p>a) Add/remove multiple subscribers b) Customize call type permissions c) Add/remove multiple talk groups d) Add a broadcast call group e) Add a system call group</p>	User/ DCPW to test
8.7	<p><b>System Management Features:</b></p> <p>a) Transmission Trunking b) Subscriber unit registration/ de-registration c) Group call with late entry, talk group ID d) Broadcast group call, Unit-to-unit call e) Call queuing f) Status message, short message g) Priority talk group monitor and override h) Radio check, radio inhibit/sun-inhibit i) Roaming j) Group location restrictions k) Subscriber location / restrictions</p>	User/ DCPW to test
8.8	<b>Maintenance:</b> license for OS, application, recovery software and database backup features.	User/ DCPW to test
9	<b>Remote Killing:</b> Provision to kill or disable the Radio remotely.	User/ DCPW to test
10	<b>Accounting management:</b> The accounting management feature shall have the capability of tracking the activity of radio users on the system and allow the customer to produce reports about the traffic on the system.	User/ DCPW to test
11	<b>Performance management:</b> The performance feature shall have the capability to monitor, control and optimize the utilization of system resources.	User/ DCPW to test
12	<p><b>Security management:</b></p> <p>a) System should support multiple number of network management user accounts. b) Access rights to the various network management applications. c) Multiple levels of access rights to users for performing tasks with these applications.</p> <p>The security management feature shall have the capability of allowing the establishment of authorized log-on names and passwords to the NMS.</p>	User/ DCPW to test

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**OPTIONAL FEATURES:**

<b>10</b>	<b>Voice Recording System:</b>	
10.1	<b>The Voice Recording System shall support:</b> a) Minimum 16 Nos. of Channel and should be modularly expandable as per the user requirement b) Group call within subscriber radios c) Calls to and from Dispatch console and subscriber radios. d) Individual call recording with facility to disable this feature. e) Telephone call through telephone gateway f) Calls through conventional analog FM gateway with its metadata, ie Date, time, duration, PTT ID, Group ID, etc g) Provision to search records, replay the voice conversations, back-up and restore facility should to be built-in-suitable GUI, application shall be provided. h) Calls can be located and replay by radio I/D, talk group, I/D, Alias, date/ Time criteria etc i) Digital call recorder shall support Encryption. j) Data should be recorded in main site and other (fall back/Disaster recovery) site recorder simultaneously. a) The system should have minimum 100 TB of storage capacity and should be modularly expandable	User/ DCPW to test
11	<b>AVLS : GIS INTERFACE FOR CALL-TAKING AND DISPATCHING</b> The AVLS System should be capable of providing the following basic features:	User/ DCPW to test
11.1	Shall be capable of displaying a map with the geo-code at the centre of the map display window and at a predefined scale based on a predefined display screen rules.	User/ DCPW to test
11.2	Shall be capable of locating and displaying geographical information using defined attribute type	User/ DCPW to test
11.3	<b>Map Query:</b> Shall undertakes a number of queries based upon specific map features to determine: a. Street/road and cross-street/road names. b. Co-ordinate positions. c. Address ranges. d. Database information associated with a graphic symbol.	User/ DCPW to test
11.4	<b>Map Grid:</b> Shall be capable of continuously reporting one or more of the following grid references (to the Dispatcher's screen) as the Dispatcher moves the cursor: Latitude and longitude.	User/ DCPW to test
11.5	Resource symbols shall be able to be automatically placed on the map display at the location as	User/ DCPW to test

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	reported from Automatic Vehicle Location. For the continuous streaming of coordinates, the system shall be able to continuously update the vehicle symbol as the coordinates are received from the Automatic Vehicle Location (AVL).	
11.6	The incident and resource symbols should be able to be colour coded and have that colour automatically updated as the status-changes.	User/ DCPW to test
12	<b>Health Status:</b> Health Status of Remote radio should be available in NMS.	User/ DCPW to test

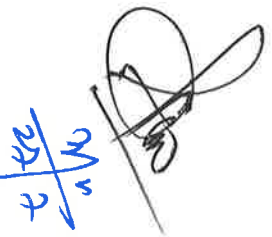
The above equipments may be procured as per GFR-2017.

TETRA Radios

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**ORs of RADIO TRUNKING SYSTEM – TETRA Technology**

**C. DIGITAL HANDHELD RADIO :**

S.I. No.	SPECIFICATIONS		Trial Directives
<b>1</b>	<b>GENERAL</b>		
1.1	Frequency Range	400 MHz Band OR 800 MHz Band	User/ DCPW test
1.2	Duplex Spacing	10 MHz for 400 MHz Band 45 MHz for 800 MHz Band	User/ DCPW to test
1.3	TDMA	4 – Slot TETRA Standard	User/ DCPW to test
1.4	Operation Modes	TETRA Standard	User/ DCPW to test
1.7	Emission	21K0D1W	User/ DCPW to test
1.5	Number of Channel	1000 or better	User/ DCPW to test
1.6	Channel Spacing	25 KHz	User/ DCPW to test
1.7	Number of contacts (individual / group call numbers)	1000 or better	User/ DCPW to test
1.8	Battery Capacity	Li-ion/Li-Poly rechargeable battery of capacity 2000 mAh or higher capacity. Bidder to specify the specific voltage	User/ DCPW to test
1.9	Frequency Stability	±1.5 PPM or better	User/ DCPW to test
1.10	Display	Alphanumeric	User/ DCPW to test
1.11	VSWR	Better than 1.5	User/ DCPW to test
1.12	Protection	Reverse Polarity and High VSWR	User/ DCPW to test
1.13	Interoperability with minimum two vendors	IOP Certification from Technical Working Group (TWG) of the TETRA Association	User/ DCPW to test
<b>2</b>	<b>TRANSMITTER</b>		
2.1	RF Power Output	1 W or better	User/ DCPW to test
2.2	Digital Modulation	$\pi/4$ -QDPSK	User/ DCPW to test
2.4	FM Hum & Noise	-40 dB or better at 25 KHz	User/ DCPW to test
2.5	Adjacent Channel Power	-60 dBc or better at 25 KHz	User/ DCPW to test

TETRA Radios






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2.6	Audio Response	+1,-3dB	User/ DCPW to test
2.7	Digital Vocoder	ACELP	User/ DCPW to test
<b>3</b>	<b>RECEIVER</b>		
3.1	Sensitivity (Analog)	0.30µV (12dB SINAD) or better	User/ DCPW to test
3.2	Sensitivity (Digital)	0.30µV at 5% BER or better	User/ DCPW to test
3.3	Adjacent Channel Selectivity	60dB or better at 25 KHz	User/ DCPW to test
3.4	Inter-modulation	70dB or better	OEM Certification supported by International Recognised Laboratory
3.5	Audio Output	Minimum 500m W	User/ DCPW to test
3.6	Audio Distortion	Less than 3%	User/ DCPW to test
<b>4</b>	<b>GPS</b>		
4.1	Time to first fix cold Start	<2 Minutes	User/ DCPW to test
4.2	Time to first fix hot Start	< 20 Second	User/ DCPW to test
4.3	Horizontal accuracy	< 10 Meter	User/ DCPW to test
<b>5</b>	<b>ENVIRONMENTAL</b>		
5.1	Operating Temperature	-30°C to +55°C	OEM Certification supported by International Recognised Laboratory
5.2	Storage Temperature	-40°C to +70°C	
5.3	Humidity	95% Max. at +20° C non-condensing	
5.4	Vibration	MIL-STD-810 F/G	
5.5	Shock & Drop	MIL-STD-810 F/G	
5.6	Water intrusion & Dust	MIL-STD-810 F/G & IP-67	
5.7	Salt	MIL-STD-810 F/G	
5.8	Rain	MIL-STD-810 F/G	
5.9	Low Pressure	MIL-STD-810 F/G	

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ACCESSORIES		
<b>Battery Charger</b>		
Input Voltage	230V + 10%, 50 Hz	User/ DCPW to test
Output Voltage	As per battery pack (Information will be provided by OEM / Vendor)	User/ DCPW to test
Type of Battery Charger	Li-Ion / Li-poly	User/ DCPW to test
Protection	1. Reverse Polarity Protection 2. Short Circuit Protection	User/ DCPW to test
Indication	Visual Indication for all modes of charging status	User/ DCPW to test
Charging Time	Standard Charger – 6 to 14 hrs Rapid Charger – 1 to 3 hrs	User/ DCPW to test
No. of charging pockets	1 / 2 / 6 (Vendor to quote accordingly)	User/ DCPW to test
<b>Hands free Kit (VOX unit with PTT) (Optional)</b>	The offered sets should be compatible with minimum any of the two or more variants 1. Bone Conduction 2. Ear Plug 3. Headphone, etc	User/ DCPW to test
<b>Programming Kit</b>	All necessary Software and Hardware required for programming of the set independently for lifelong support with regular updates.	User/ DCPW to test
<b>Leather Case</b>	One good quality leather case with belt clip and shoulder strap.	User/ DCPW to test
<b>No. of Battery</b>	Two Li-ion or Li-poly batteries with each radio sets.	User/ DCPW to test
<b>Literature</b>	a) User manual with each radio sets should be provided free of cost in soft as well as hard copy. b) Technical repairing manual, with complete block diagram, circuit layout, PCB layout, component & wiring diagram etc should be provided as per user's requirement in soft as well as hard copy.	User/ DCPW to test

TETRA Radios






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ORs of RADIO TRUNKING SYSTEM – TETRA Technology

**D. DIGITAL MOBILE RADIO :**

Sl.No.	SPECIFICATIONS	Trial Directives
1	<b>GENERAL</b>	
1.1	Frequency Range	User/ DCPW to test
1.2	Duplex Spacing	User/ DCPW to test
1.3	TDMA	User/ DCPW to test
1.4	Operation Modes	User/ DCPW to test
1.7	Emission	User/ DCPW to test
1.5	Number of Channel	User/ DCPW to test
1.6	Channel Spacing	User/ DCPW to test
1.7	Number of contacts (individual / group call numbers)	User/ DCPW to test
1.8	Operating Voltage	User/ DCPW to test
1.9	Frequency Stability	User/ DCPW to test
1.10	Display	User/ DCPW to test
1.11	VSWR	User/ DCPW to test
1.12	Protection	User/ DCPW to test
1.13	Interoperability with minimum two vendors	User/ DCPW to test
<b>2</b>	<b>TRANSMITTER</b>	
2.1	RF Power Output	User/ DCPW to test
2.2	Digital Modulation	User/ DCPW to test
2.3	Modulation Deviation	User/ DCPW to test
2.4	FM Hum & Noise	User/ DCPW to test
2.5	Adjacent Channel Power	User/ DCPW to test
2.6	Audio Response	User/ DCPW to test
2.7	Digital Vocoder	User/ DCPW to test

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<b>3 RECEIVER</b>			
3.1	Sensitivity ( Analog)	0.30μV (12dB SINAD )or better	User/ DCPW to test
3.2	Sensitivity ( Digital)	0.30μV at 5% BER or better	User/ DCPW to test
3.3	Adjacent Channel Selectivity	60dB or better at 12.5 KHz	User/ DCPW to test
3.4	Inter-modulation	70dB or better	OEM Certification supported by International Recognised Laboratory
3.5	Audio Output	Minimum 3 W	User/ DCPW to test
3.6	Audio Distortion	Less than 3%	User/ DCPW to test
<b>4 GPS</b>			
4.1	Time to first fix cold Start	<2 Minutes	User/ DCPW to test
4.2	Time to first fix hot Start	< 20 Second	User/ DCPW to test
4.3	Horizontal accuracy	< 10 Meter	User/ DCPW to test
<b>5 ENVIRONMENTAL</b>			
5.1	Operating Temperature	-30°Cto+55°C	OEM Certification supported by International Recognised Laboratory
5.2	Storage Temperature	-40°Cto+70°C	
5.3	Humidity	95% Max. at +20° C non-condensing	
5.4	Vibration	MIL-STD -810 F/G	
5.5	Shock & Drop	MIL-STD -810 F/G	
5.6	Water intrusion & Dust	MIL-STD -810 F/G & IP-54	
5.7	Salt	MIL-STD -810 F/G	
5.8	Rain	MIL-STD -810 F/G	
5.9	Low Pressure	MIL-STD -810 F/G	

Note:-

1. The Technical Specifications & Trial Directives may be used for procurement as per the applicable GFR or State Financial Rules.


Technical Specifications may slightly be modified by user organisations for specific requirement, if any, with the approval of competent

authority.

TETRA Radios







27.07.2017



2. User Organisations may ask the vendors for lifetime support for supplied Software updates / patches , Warranty and Spare support as per the need.

3. If required, submitted OEM Certificates results may be verified from the available certified laboratories.

  
(Prem Dangri)  
Deputy Superintendent of Police,  
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Deputy Director,  
DCPW

  
(Amar Singh Meena)  
Assistant Commissioner of Police,  
Delhi Police

(Balkrishna Yadav)  
Deputy Commissioner of Police,  
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(Devendra Singh)  
Additional Director,  
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