GOVERNMENT OF INDIA
MINISTRY OF HOME AFFAIRS
DIRECTORATE OF COORDINATION
POLICE WIRELESS
NEW DELHI

NATIONAL COMMUNICATION STANDARD 2020

FOR STATES/UTs POLICE

S-12011/1/(NCS)/2020-CDN

FOREWORD

We are privileged to present and state that the "**National Communication Standard"** has been released by Hon'ble Home Minister during the Heads of PPDR Conference, 2020.

Indian subcontinent has vivid terrains which throws typical challenges in communication. Some States have well developed Police Communication System in place, whereas other States are lagging behind in this respect. The Ministry of Home Affairs felt the need for formulation of the National Standards for Communication needs of State Police including Wireless Communication, to compare the level of advancement made in Police Communication by all States/UTs and to bring uniformity in adoption of state of the art technology available. Directorate of Coordination Police Wireless (DCPW), being the nodal agency for coordinating various Police Communication matters in the country, entrusted with the responsibility to standardize the Police Communication requirements of the States/UTs.

In this respect, an effort has been made for the first time to standardize the Communication Requirements of State/UT Police, encompassing all administrative units ranging from Police Headquarters level to beat / outposts.

This standard will help to promote awareness amongst all the Police Communication Organizations to synergize, upgrade and modernize not only their communication but also it will be instrumental in catapulting the industries concerned with the Digital and Make in India initiative (already in place) and also will ensure that the companies prove their worth internationally.

We wish this endeavour towards effective implementation and upgradation of communication technology will be successful to usher in the streamlined and synergised Police Communication across the country very soon.

PREFACE

Communication plays an important role in public safety, rescue & relief operations during law & order problems, in emergency / exigencies in a country like India which is in high seismic zone. The effectiveness and efficiency of public protection and law enforcement depends on a robust and reliable communication networks. Currently, Indian Law enforcement and Disaster Relief agencies maintain their own captive network and have VHF/UHF Radios for short distance communication, Satellite/HF for long distance communication and for broadband applications rely on commercial telecommunication networks. In future, large deployments of Machine-to-Machine (M2M) communication, Internet of Things (IoT) etc. will have a significant impact on PPDR operations and emergency rescue operations.

There are many verticals which need dedicated communication network such as Law Enforcement, Emergency Response, Security & Defence, Utility, Coal Mines / Gas Offshore, Transport etc.

The National Communication Standard has been framed for two verticals i.e., Law enforcement and Emergency Response. Currently, the First Responders of State/UT and Disaster Relief Agencies rely largely on old analog systems for their communication in the field, which are primarily meant for voice communication.

As the urban population of India has increased, there has been a substantial increase in use of contemporary technology (mostly imported) but many times not suitable to the requirements and is cost intensive also. The system of Spectrum allocation is also complex and time consuming. There is a lack of indigenous manufacturers of hardware and firmware with heavy dependence on International Suppliers. The current system suffers from lack of interoperability, inefficient use of spectrum and higher recurring cost of deployment, maintenance as well as lack of synergy between various departments.

It has been noticed while interacting with the State Police at various fora, that there is no uniformity of standards of communication equipment and there is a lack of awareness in some of the State Police regarding the state of the art technologies available in this field. There is a lack of standardisation of the system and myriad systems, largely non-interoperable, operate in silos.

In order to bring uniformity in the adoption of communication equipment, the Communication Standard has been formulated to cater to the changes in communication, incorporate modern technology and make PPDR agencies aware of the right choices in communication technology adoption.

For the Radio system, primarily DMR Tier-II conventional and digital trunking technology like DMR Tier-III and APCO P25 systems need to be adopted, which are open standard technology to facilitate the interoperability among different makes and technology.

In addition, Digital HF Radio & POLNET VSAT is suggested for inter-district communication and inter-State coordination. Satellite phone, Satellite based telephony (VoIP & PSTN), Ku band broadcast system, Mesh Radio are also identified for the coastal, islands, thick forest, naxal affected and inaccessible areas, which have specific need and requirement.

The workshop equipment and Training aids are also standardised to strengthen the Police Communication Workshops and Training institute to improve the skills of the personnel and to make them capable of maintenance and repairs of the equipments during exigencies.

This document titled, "National Communication Standard" is now made available to all Police organizations in the country to bring uniformity among the users.

CONTENTS

National Communication Standard

1. Background

There is a need for formulation of the National Communication Standard for States/UTs Police and disaster response units, including Wireless Communication as per the direction of the Ministry of Home Affairs.

It has been noticed while interacting with the State Police at various fora, that there is no uniformity of standard of communication equipment and there is a lack of awareness amongst State Police organizations about the *state of the art* technologies available in the field of communication.

Some States still use Analog Radio, which is insecure and spectrum inefficient. Many North Eastern States / UTs use the VHF Analog Communication over Low Band (66-88 MHz.), which is susceptible to interferences from Transformers, LED Lights etc. Hence it needs to be upgraded to Digital High Band (136-174 MHz) Radio.

Various States are not aware of their unused frequency spots. When they apply for License/NOC from WPC, DoT, for expansion/up-gradation of their communication network, WPC undertakes frequency reconciliation of allotments already made to concerned organizations they end up paying huge spectrum charges including late penal charges for unutilized frequency spots, it delays the expansion of their communication network as well. Hence, all States must audit their unutilized frequency spots annually.

All International Border States, Naxal affected States & Insurgency affected States, require secure communication with appropriate encryption. Other countries develop hardware and firmware with their own encryption standard for Radio equipment, which is specific to their country and Police requirements. Thus India needs to develop indigenous encryption algorithm for ensuring secure communication in the country.

During the meeting of the High Power Committee (HPC), to consider the State Action Plans under the scheme “Assistance to States for Modernisation of Police”, it has also been observed that there are no standards available, to compare the communication requirements projected by different State Police organisations.

These issues mentioned above have constrained State Police communication efficiency and to overcome them, a set up of an agreed National Communication Standard to be followed by all States / UTs, has been attempted here.

2. Summary of Existing Communication Systems

DCPW officers visited all States/UTs Police, studied their communication network and obtained the requisite data. It was found during the study that some states have good communication set-up, like Maharashtra has implemented a modern APCO Phase II Radio Trunking System in Mumbai and DMR Tier-II based VHF network with extended coverage through Repeaters over Microwave link, also, Bihar (inter-District) and Andaman & Nicobar Islands (inter-Island) have effective data communication over HF Network. Uttarakhand Police has done meticulous planning of VHF Network to cover inaccessible and far flung hilly areas, which are prone to natural disaster by identifying the locations from where communication can be established.

Based on the information these are the communication facilities, generally in use in most of the States / UTs.

• DG, PHQ and State Control Room • ADG / IG, Zone / Special Unit • DIG, Range / Special Unit	Long distance Communication - Telephone, FAX, Mobile, Video Conferencing, Email Messaging Terminal , RoIP, HF, POLNET (in some states like Bihar, J & K etc.), INMARSAT Phone Short Distance Communication – VHF/UHF (Analog / Digital), Radio Trunking in some of the cities. Secured Communication– As per Cipher policy
• SSP / SP, District Control Room	Telephone, FAX, Mobile, Video Conferencing, Email Messaging Terminal, RoIP, HF, POLNET, INMARSAT Phone & VHF (Analog / Digital). Secured Communication Mode – As per Cipher policy
• Sub-Divisional Stations	Telephone, Mobile, Email Messaging Terminal & VHF (Analog / Digital)
• Police Stations	Telephone, Mobile, Email Messaging Terminal & VHF (Analog / Digital)
• Check Post / Beat	VHF (Analog / Digital).

3. Factors to be considered for selection of Communication technology for different Administrative Units

In order to frame the National Standard for Communication in the country and to have uniformity in the equipment used by various States keeping in view the changing communication scenario as a whole by incorporation of modern technology and assessing future challenges of police forces, the following factors have been considered for selection of various communication technologies :

- Geographical & Environmental: India is a vast country with vivid terrain, specific challenges of communication due to natural obstructions like Hills, passing long coastline & Deserts, absorption of RF signals, dead zone like river with large catchment, RF signal penetration in built up area etc. Some states have communication challenges such as tropical factors, high altitudes, extreme temperatures etc., requiring MIL or specific equipment.

- Geopolitical : Many States have International border, naxal & insurgency problems where secure communication with appropriate encryption is a must.

- Size of Administrative unit : The coverage area is an important parameter for selection of communication technology.

- Population Density : Thickly populated areas pose higher challenges of both law and order and disaster responses. It requires heavy duty communication setup.

- Incidence of crime : Areas prone to high crime requires suitable technology with better response time and high availability to control the situation. There is a need for high performance connectivity and real time access to applications for prevention of crime in the area by integration of broadband radio and GIS application.

- Disaster propensity : Depending upon the frequency of occurrence of disaster and type of disaster, a robust, resilient, reliable and high availability communication network technology is required which ought to be a combination of satellite and terrestrial communication.

- Inaccessible Areas: The far flung areas, where no or limited means of communication are available, the communication technology is to be selected carefully to meet their bare minimum requirement with possible solution of suitable and appropriate communication equipment.

- Interoperability & Compatibility: The interoperability among the different OEM equipment based on the same open standard and backward compatibility are desirable.

- Power Supply : The availability of Power Supply is one of the deciding factors in selecting suitable technology especially in border areas and remote locations.

Based on the above factors, the technologies are suggested, for the different types of Administrative units as below :

a) Metro City

The technology in Metro city is defined considering the factors:

i) To cater to higher Police radio density in thickly populated area.

ii) For higher RF penetration in highly built up area, UHF 800 MHz. band is recommended.

iii) To handle higher crime rate, traffic management, crowd control, law & order problems, a robust Radio Trunking system is recommended. It will provide better capacity and coverage to the Network. However, the Trunking technology has to be carefully selected to meet their specific requirements in terms of capacity and coverage, since it involves Capex and Opex cost of the network.

iv) The detailed technology comparison for selection of Technology is given in **Annexure `A'**

v) The Radio Trunking System should preferably have inbuilt encryption. To begin with 256 Bit AES Encryption is OK. However, there is need to have an indigenous encryption Algorithm developed by Public sector with SAG grading carried out. This is required to ensure that Police communication is safe and secure.

vi) GPS / NavIC enabled Radios with GIS Digital map integration system is recommended for assessing the real time situation.

vii) Radio Dispatcher at every City's Control room is required to connect different Talk Groups in emergency situations and to connect and monitor calls of Field Radios. These must be integrated with the GPS / NavIC tracking software and should also be integrated at the Command and Control Centres.

b) Urban Conglomerates and Suburbs

The technology in Urban Conglomerates and Suburbs is defined considering the factors :

i) To cater to High to medium Police radio density.

ii) For medium RF penetration in medium built up area, VHF (136-174 MHz.) / UHF (400 MHz.) frequency band is recommended.

iii) To handle crime, traffic management, crowd control, law and order and disaster management, the robust Conventional Digital Radio VHF / UHF DMR Tier-II technology communication network is recommended. It will provide a better coverage requirement of the Network with Repeater sharing Microwave/IP site connectivity.

iv) The DMR Tier-II system should have inbuilt encryption. The 256 bit AES Encryption meets the requirement. However, there is need to have an Indigenous Encryption Algorithm developed by Public sector with SAG grading. This is required to ensure safety and security of Police communication.

v) GPS/NavIC enabled Radios with GIS Digital map integration is recommended for assessing the real time situation.

c) <u>Thick Forest, Hilly & Inaccessible Area</u>

The communication technology would be dependent upon :

i) To cater to thin Police radio density in large area with various shadow zones due to high hills and irregular terrain, VHF frequency band is recommended with the robust Conventional Digital Radio VHF DMR Tier-II network is recommended. It will provide better coverage requirement of the Network with Repeater sharing Microwave/IP site connectivity.

ii) Extreme cold at the high altitude demands stringent environmental operating norms for radio equipment.

iii) Those on international borders must have encryption enabled in the communication system.

iv) Areas prone to natural disasters should have First Responders Units, with HF communications, Satellite phone terminal (static and mobile), POLNET VSAT system is also recommended.

v) The units need self contained workshops and training centres. They needs to be Centre of Excellences for Emergency Communications such as Morse or Ham radio as well.

vi) There are terrains like river belt with large catchments, Mountainous area with no connectivity, where Satellite communication and use of HF sets, C and Ku band (Satellite) need to be brought in.

vii) Thick forest areas, for different set of problems, VHF communication system, HF communication system, Satellite phone terminal on C and Ku band, POLNET VSAT, Directional finder, Mesh Radio and Directional Antenna for border area is also recommended.

d) Coastal and Island Area

i) The Coastline communication till the continental Shelf needs repeater based VHF communication system, Satellite based communication system for patrolling in the sea.

ii) The Patrol parties in the High Sea would need various communication modes like HF with Half Loop Antenna and satellite phones.

iii) The Islands need self sufficiency of operation and maintenance during natural disasters and responses during terror attack or pirate attacks, hence HF Radio, Satellite phone terminals (static and mobile), POLNET VSAT are recommended with proper Encryption and MIL standard.

4. Inter State Communication

In order to facilitate coordination and flow of information between Ministry of Home Affairs with States/UTs, particularly with regard to national security, law and order issues and other security related issues, a robust, secure and reliable inter-state communication system is required. Hence POLNET VSAT communication, Ku band transmission system and data on Digital HF Radio are required.

The implementation should also ensure seamless communication from National Capital to State Headquarters, District Headquarters and to their Control Rooms. This requires VHF / UHF Trunked radio equipment in Metros, VHF DMR-II Conventional Equipment in other cities, be all part of the National Grid, keeping in view all the security standards of communication.

Further, other modes of communication viz. HF, Satellite, EPABX etc., should also have means of interconnectivity with the Radio equipment. This can be achieved by installing Radio over IP (RoIP) equipment (Fixed, vehicle transportable and manpack) as per requirement and feasibility. Also a network Integrator like Multi-Interface Radio Gateway Unit may be inducted for meshing of existing telecommunication infrastructure like 4G LTE, along with HF, VHF Conventional/Trunked, Satellite network, EPABX etc.

5. Future Project - *Need for 4G/5G Public Safety LTE based PPDR Broadband Network*

Each Public Protection and Disaster Relief (PPDR) agencies – Police Forces, SDRF, Fire Departments, Emergency Medical Services, Central Armed Police Forces and many others who are operating and maintaining their own individual narrowband networks, paying separate spectrum and license fees, which can support only voice communication and simple SMS messages and cannot support higher data rate multimedia applications. Because of the limitations of existing narrowband networks, all PPDR agencies will need to migrate to a broadband network for higher data rate multimedia applications, and which involves huge

one time migration cost. Cross-agency coordination and exchange of critical information is not possible without it.

If, we adopt 'One Nation One Integrated Broadband PPDR Communication Network' with dedicated Control over network resources hardened for mission critical communication, it will provide all PPDR agencies access to Networks and devices and will reduce operational and maintenance costs of networks and equipments and provide secure and resilient voice communication, integrated broadband data services, national coverage, high availability, end-to-end security, meet all users requirements and will cost less in the long run.

6. Cost vs Benefit of the Technology

The Communication technologies are being selected for different type of areas based on specific requirement of that area based on given factors for technology selection. The cost of technologies depends on different technological aspects to meet the requirement of the particular area. The coverage and capacity of the network is a vital factor in selecting the appropriate technology, to keep the network cost low. The detailed technology comparison for cost vs benefit of DMR Conventional, DMR Trunked, APCO phase II Trunked & TETRA Trunked technologies is given in **Annexure `B'**. The resilience and redundancy requirement of the network also affects the cost of network to meet the mission critical requirements of police. Further, in order to reduce the Capex and Opex cost of the radio equipment, thrust should be on adopting suitable low cost make in India, indigenous product, meeting the entire standard requirements specific to PPDR agencies.

7. Proposed Equipment

Based on the above factors, the communication system proposed for different types of administrative units viz. State Control Room, District Control Room, Sub-divisional Control Room, Police Station, Beat Police Station / Outpost, State dignitaries & senior civil officers, is given in **Annexure `C'**. In addition, Telecom services available from Telecom Service Providers (TSP) may also be utilized, wherever possible.

The standard Communication Equipment proposed for Special Purpose viz. Disaster Recovery, Riot Control, Tactical and Jungle warfare operations is given in **Annexure `D'**.

8. Equipment for Training Institutes

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With the induction of various types of radio sets using modern technologies in the Police services, it is imperative to train manpower to operate and maintain the communication system. The training facilities, therefore, have to be augmented for Research, Skill Building, Capacity Building, Self sufficiency. The training units need to use good training aids and high grade test instruments. Police Radio personnel will be needed to get trained on most modern equipment. The list of tools and equipment for training is given in **Annexure `E'**.

9. Equipment for Workshops

The Workshops of the Police Radio Organisations at various levels (State HQ, District HQ) should be self-sufficient and adequately equipped with suitable test measuring instruments and tools for the inspection/acceptance of newly procured radio equipment, maintenance and repairs of communications and related equipment. In addition, the provision of mobile workshops should also be established to address the immediate maintenance and repair needs of equipment deployed at remote and critical locations. The list of measuring instruments and tools required at various levels is given in **Annexure `F'**.

10. Scaling

The Scaling of network will depend upon specific requirement of Districts/States such as crime rate, sensitive area, riot proneness, population density, mega events held etc. Hence it is proposed that scaling will be left to the stake holders of different State/UT police.

11. Mandatory Testing & Certification of Telecommunication Equipment (MTCTE)

All guidelines / policies / rules of Government of India must be followed.

12. Revision

The technology and equipment proposed above is based on the user experience, technology availability and ITU's recommendations. However, the standards proposed above will be periodically revised / updated based on experience of stake holders and future technology requirements.

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Technology Comparison for selection of technology

S.No	Analysis Consideration	DMR conventional - TIER II	APCO PHASE 2 Trunked	TETRA Trunked	DMR Trunked- TIER III
1	Spectrum Efficiency	Yes	Yes	Yes	Yes
2	Grade of Service	Call blocking at peak periods	Call queuing during peak periods prevents call retries and message collision	Call queuing during peak periods prevents call retries and message collision	Call queuing during peak periods prevents call retries and message collision
3	Network Capacity and coverage	i) Voice - 2 channel ii) Data capacity - low data capacity iii) Coverage area - more	i) Voice - 2 channel ii) Data capacity - low data capacity iii) Coverage area - more	i) Voice - 4 channel ii) Data capacity - Highest data capacity iii) Coverage area - Less	i) Voice - 2 channel ii) Data capacity - low data capacity iii) Coverage area - more
4	Call setup Time	250 msec	250 msec	250 msec	250 msec
5	Network Architecture	Simple with less equipment	Complex with more equipment	Complex with more equipment	Complex with more equipment
6	Network Scalability	Allows for continued capacity expansion via additional channels and/or equipment	Trunking architecture allows for continued capacity expansion via additional channels	Trunking architecture allows for continued capacity expansion via additional channels	Trunking architecture allows for continued capacity expansion via additional channels
7	Network Encryption	Encryption capable	Encryption capable	Encryption capable	Encryption capable
8	Network Security	Digital systems allow stronger encryption and may have user authentication feature	Digital systems allow stronger encryption and may have user authentication feature	Digital systems allow stronger encryption and may have user authentication feature	Digital systems allow stronger encryption and may have user an feature
9	Network Robustness	Sites capable of functioning independently in the event of outage at another site Transceiver failures result in channel loss	Sites capable of functioning independently in the event of outage at another site Failure of a single traffic channel is usually unnoticeable by users except by increased delay in peak traffic periods	Sites capable of functioning independently in the event of outage at another site Failure of a single traffic channel is usually unnoticeable by users except by increased delay in peak traffic periods	Sites capable of functioning independently in the event of outage at another site Failure of a single traffic channel is usually unnoticeable by users except by increased delay in peak traffic periods

10	Interoperability	Multi organizational interoperability is limited over the air interface by the use of the same modulation type, mode, channelization, and encryption type and key.	Multi organizational interoperability is limited over the air interface by the use of the same modulation type, mode, channelization, and encryption type and key.	Multi organizational interoperability is limited over the air interface by the use of the same modulation type, mode, channelization, and encryption type and key	Multi organizational interoperability is limited over the air interface by the use of the same modulation type, mode, channelization, and encryption type and key
11	Technology Evolution	Conventional used in smaller systems with smaller user bases and few frequencies - Digitalization - Increased set of user features - Strong encryption	Trunked used in larger systems where larger pools of frequencies allow for full realization of trunking advantages supporting more users per frequency - Digitalization - Increased set of user features - Strong encryption	Trunked used in larger systems where larger pools of frequencies allow for full realization of trunking advantages supporting more users per frequency - Digitalization - Increased set of user features - Strong encryption	Trunked used in larger systems where larger pools of frequencies allow for full realization of trunking advantages supporting more users per frequency - Digitalization - Increased set of user features - Strong encryption
12	Policy Impact	Encouraged to use Digital conventional system	Trunking is encouraged to use for spectrum efficiency and better resource management	Trunking is encouraged to use for spectrum efficiency and better resource management	Trunking is encouraged to use for spectrum efficiency and better resource management
13	Compatibility with legacy systems	compatible	Compatible with interfaces	Compatible with interfaces	Compatible with interfaces
14	Required user Discipline	Conventional systems require a significant amount of user discipline to make a call	Users on trunked systems do not have to monitor the system for an available channel to make a call	Users on trunked systems do not have to monitor the system for an available channel to make a call	Users on trunked systems do not have to monitor the system for an available channel to make a call
15	Network Management	Manual	Automated	Automated	Automated
16	Network operator training	Less training required	More training required for operator	More training required for operator	More training required for operator
17	Modulation	4FSK	DQPSK and HCPM	π/4 DQPSK	4FSK
18	Vocoder	AMBE+2	AMBE+2	ACELP	AMBE+2

Technology Comparison for Cost Benefit Analysis

S.No.	Feature	DMR conventional	APCO Phase2 trunked	TETRA TRUNKED	DMR Trunked
1	Access Method	TDMA (Low battery consumption and less equipment)	TDMA (Low battery consumption and less equipment)	TDMA (Low battery consumption and less equipment)	TDMA (Low battery consumption and less equipment)
2	Ease of Migration from analog to Digital	Smooth migration Supports backward compatibility with legacy 12.5 Khz analog channel	Difficult Migration possible through Interface	Difficult Migration possible through Interface	Smooth Migration Supports backward compatibility with legacy 12.5 Khz analog Channel
3	Voice	2 logical channels	2 logical channels	4 logical channel	2 logical channels
4	Data	Low data throughput	Low data throughput	High data throughput	Low data throughput
5	Capacity	Small number of users double the capacity when replaced from analog network	Large number of users	Large Number of users	Large number of users
6	Coverage Area	High	High	Low	High
7	Spectral efficiency of 6.25 Khz per channel	Yes	Yes	Yes	Yes
8	Capital Expenditure (CAPEX)	Low	High	Higher	High
9	Operational Expenditure (OPEX)	Low	High	Higher	High
10	Open Standard	Yes	Yes	Yes	Yes

Proposed Technology for covering different types of Administrative Units

Annexure -` C'

PHQ / State control Room (Zone / Range / Special unit (VVIP security, Special Armed Battalion, Railways, Courts, Intelligence, Prison, Fire Brigade, SDRF, Civil Defense, Medical emergency services, Metro Rail)	District control Room including Special Armed Battalion, Railways, Courts, Intelligence, Prison, Fire Brigade, Civil Defense, Medical Emergency Services Unit	Sub Divisional HQ / Control Room	Police Station	BEAT Police Station / Outpost	State Dignitaries	Senior Civil Officers
- 4G/5G Public Safety LTE based PPDR broad band network - Conventional Digital Radio VHF / UHF, Analog / Digital, DMR TIER II, using Repeaters with Microwave / IP site connectivity (as per requirement) - Radio Trunking Communication Network (Tetra/APCO P25 Phase-II/DMR Tier-III) (as per requirement) - GPS/NavIC based AVLS/APLS Mapped with GIS on Digital Map - HF Communication - POLNET Satellite VSAT Terminal - Satellite Phone - Satellite based Telephony (VoIP & PSTN) - Cipher Equipment for classified information (as per cipher policy) - RoIP (Radio over IP), - Network Integrator like Multi Interface Radio Gateway Unit - Telephone, FAX, Internet with broadband NIC, CUG network, - SWAN State wide Area Network Node, Broadband PSTN Interface, Broadband optical fibre Leased line interface - Integrated Command and control room at State or District Level - Video conferencing system - CCTV surveillance - Dial100/ ERSS112 - Voice Logger	- 4G/5G Public Safety LTE based PPDR broad band network - Conventional Digital Radio VHF / UHF, Analog / Digital, DMR TIER II, using Repeaters with Microwave / IP site connectivity (as per requirement) - Radio Trunking Communication Network (Tetra/APCO P25 Phase-II/DMR Tier-III) (as per requirement) - GPS/NavIC based AVLS/APLS Mapped with GIS on Digital Map - HF Communication - POLNET Satellite VSAT Terminal - Satellite Phone - Satellite based Telephony (VoIP & PSTN) - Cipher Equipment for classified information (as per cipher policy) - RoIP (Radio over IP), - Network Integrator like Multi Interface Radio Gateway Unit - Telephone, FAX, Internet with broadband NIC, CUG network, - SWAN State wide Area Network Node, Broadband PSTN Interface, Broadband optical fibre Leased line interface - Integrated Command and control room at State or District Level - Video conferencing system - CCTV surveillance - Dial100/ ERSS112 - Voice Logger	- 4G/5G Public Safety LTE based PPDR broad band network - Conventional Digital Radio VHF / UHF, Analog / Digital, DMR TIER II, using Repeaters with Microwave / IP site connectivity (as per requirement) - HF Communication (if remotely located) - POLNET Satellite VSAT Terminal (if remotely located) - Satellite Phone (if remotely located) - Satellite based Telephony (VoIP & PSTN) – if remotely located - Cipher Equipment for classified information (as per cipher policy) - Telephone, FAX, Internet with broadband NIC, CUG network - SWAN State wide Area Network Node, Broadband PSTN Interface, Broadband optical fibre Leased line interface - Integrated Command and control room at State or District Level - Video conferencing system - CCTV surveillance - Voice Logger	- 4G/5G Public Safety LTE based PPDR broad band network - Conventional Digital Radio VHF / UHF, Analog / Digital, DMR TIER II, - HF Communication (if remotely located) - POLNET Satellite VSAT Terminal (if remote or inaccessible) - Satellite Phone (if remotely located) - Satellite based Telephony (VoIP & PSTN) - Telephone, FAX, Internet with broadband NIC, CUG network, - SWAN State wide Area Network Node, Broadband PSTN Interface, Broadband optical fibre Leased line interface - CCTV surveillance	- Conventional Digital Radio VHF / UHF, Analog / Digital, DMR TIER II. - Radio Trunking Communication Network (Tetra/APCO P25 Phase-II/DMR Tier-III) (as per requirement) - POLNET Satellite VSAT Terminal (as per requirement) - POLNET Satellite VSAT Terminal - Satellite Phone (if remotely located)	- Conventional Digital Radio (secured), VHF / UHF DMR TIER I - Radio Trunking Communication Network (Tetra/APCO P25 Phase-II/DMR Tier III) - Telephone, FAX, Internet with broadband NIC, CUG network	- Conventional Digital Radio VHF / UHF DMR TIER II, - Radio Trunking Network (Tetra/APCO P25 Phase-II/DMR Tier III) - Telephone, FAX, Internet with broadband NIC, CUG network,

Proposed Standard Communication Equipment and Need for special Purpose & Operations

SL No.	Purpose	Proposed Scale of Equipment and other needs
1.	Disaster Recovery, Riot Control, Tactical and Jungle Warfare Operation	Well Equipped Communication Vehicle with Roof Top Solar Panel with following equipment- POLNET FLY AWAY VSAT Terminal with complete accessories including Video Conferencing facility Satellite Phone, GSAT-6 , Satellite based Telephony (VoIP & PSTN) Digital HF Man-pack with complete accessories Half Loop Antenna for HF Mini UAV with complete Accessories Digital VHF/UHF Mobile Radio with complete accessories Digital VHF/UHF Hand Held Radio with Hands free kit Wireless Mesh Radios Network Integrator like Multi interface Radio Gateway Unit Telescopic Aerial Mast Emergency Light Power Backup Gen set (of appropriate capacity) Spare batteries Portable Furniture for establishing control room Digital Repeaters Direction Finder Hand held Monitoring Receivers

Annexure `E'

Equipment required for State Training Institute

Sl. No.	Proposed Equipment
1	Digital DMR Tier-II VHF Mobile/Static Set with complete accessories
2	Digital DMR Tier-II VHF Hand Held Set with complete accessories
3	Analog VHF Mobile/Static Set with complete accessories
4	Analog VHF Hand Held Set with complete accessories
5	UHF Wireless Mesh Radio with complete accessories
6	POLNET VSAT Terminal with complete accessories including data terminal
7	POLNET FLY AWAY VSAT Terminal with complete accessories including Video Conferencing facility
8	Satellite based Telephony (VoIP & PSTN)
9	Digital HF Static set with complete accessories including data terminal
10	Digital HF Man-pack with complete accessories
11	Half Loop Antenna for HF
12	Mini UAV with complete Accessories
13	Telescopic Aerial Mast
14	Digital Radio Communication Test (RCT) Set
15	Standard Signal Generator
16	Spectrum Analyzer
17	Handheld RF Analyzer
18	Quick Test Meter (QTM)
19	Frequency Deviation Meter
20	Through Line SWR Meter
21	Digital frequency counter
22	VHF RF Power Output Meter 0-50 Watt
23	RF Output Meter 25/100/500
24	AF Output Meter
25	Frequency Counter
26	Filed Strength Meter
27	Signal Tracer
28	Audio frequency Analyzer
29	Soldering/De-soldering Station
30	Battery Maintenance System (BMS)
31	Digital type Oscilloscope up to 1 GHz (for VHF/UHF)
32	Dual Trace Digital Oscilloscope wide range (for HF)
33	Digital Multi Meter
34	Dummy Load
35	Regulated Power Supply
36	RF connectors all type
37	PC/Laptop for programming
38	Splicing Machine
39	Standard Tool Kit Box
40	Table Lamp with magnifying glass
41	Eye glass (watch maker)
42	Distortion Meter
43	Noise Analyzer
44	LAN testing Kit
45	Other State Communication Equipment, which are being used in States / UTs may also be incorporated

Annexure `F'

Equipment required for State HQrs / District Workshop / Mobile Workshop

State HQrs Workshop	District Workshop	Mobile Workshop
- Digital Radio Communication Test (RCT)Set - Standard Signal Generator - Spectrum Analyzer - Spectrum & Vector Analyzer - Handheld RF Analyzer - Quick Test Meter (QTM) - Frequency Deviation Meter - Through Line SWR Meter - Digital frequency counter - VHF RF Power Output Meter 0-50 Watt - GNSS Signal Generator (GPS Simulator) - Insulation Tester - RF Output Meter 25/100/500 - AF Output Meter - Frequency Counter - Field Strength Meter - Signal Tracer - Cable & Antenna Analyzer - Audio frequency Analyzer - Soldering/De-soldering Station - Battery Maintenance System (BMS) - Digital type Oscilloscope up to 1 GHz (for VHF/UHF) - Dual Trace Digital Oscilloscope wide range (for HF) - Digital Multi Meter - Dummy Load - RF connectors all type - Faraday cage 81x6'x81 - Regulated Power Supply - Power Supply Tester - Line Impedance Stabilization network - Programming kits with software of wireless sets - PC/Laptop for programming - Splicing Machine - Standard Tool Kit Box - Table Lamp with magnifying glass - Eye glass (watch maker)	- Digital Radio Communication Test (RCT)Set - Quick Test Meter (QTM) - Digital frequency counter - VHF RF Power Output Meter 0-50 Watt - RF Output Meter 25/100/500 - AF Output Meter - Through Line SWR Meter - Frequency Counter - Field Strength Meter - Soldering/De-soldering Station - Battery Maintenance System (BMS) - Digital Multi Meter - Dummy Load - RF connectors all type - Regulated Power Supply - Power Supply Tester - Programming kits with software of wireless sets - PC/Laptop for programming - Splicing Machine - Standard Tool Kit Box - Table Lamp with magnifying glass - Eye glass (watch maker)	- Well equipped vehicle with adequate power back-up - VHF RF Power Output Meter 0-50 Watt - RF Output Meter 25/100/500 - AF Output Meter - Digital frequency counter - Through Line SWR Meter - Field Strength Meter - Laptop for programming - Soldering/De-soldering Station - Digital Multi Meter - Standard Tool Kit Box - Power Supply Tester - Programming kits with software of wireless sets

Methodology

There was a requirement for formulation of the National Standard for Communication needs of State Police including Wireless Communication as per the directions of Ministry of Home Affairs (MHA) vide ID Note No. 24021/4/2019-PM-I, dtd. 07.06.2019.

In order to formulate the National Standard for Communication needs of State Police, including Wireless Communication, teams of DCPW were constituted to study the existing communication network, suggest improvements and assist to develop State Action Plan for modernisation of state police communication. In addition, the teams were asked to collect information/ inputs for formulations of National Standards.The teams visited all the States/UTs except Jammu & Kashmir, Kerala & Lakshadweep Islands and studied the existing communication set up, as per the required benchmark and collected inputs in the prescribed questionnaire from July to September 2019.

A committee was constituted vide letter no. S-12011/1(MPF)/2013-CDN dtd. 03-09-2019 with members from various states to formulate the National Standards for Communication needs of State Police including wireless communication headed by Additional Director (HQ), DCPW with members from :

1) Andhra Pradesh (Coastal and Naxal affected)
2) Assam(Hilly and Thick Vegetation)
3) Chhattisgarh(Naxal affected and Thick Vegetation)
4) Maharashtra (Metro city, Coastal Area and Large City)
5) Uttarakhand (Hilly, Inaccessible area and Disaster prone)

After the teams submitted their study reports and filled up questionnaires a first meeting of the committee was held. The State representatives were requested to furnish inputs on following points:

i) Standards, if existing, regarding equipment at various levels/ control room / field formations.
ii) Connectivity at various levels of control room/ field formations required.
iii) Equipment required for Testing and repair facilities at Central Workshops and at District workshops.
iv) Communication, Testing & Measuring, Repair equipment and Tools for Training Institute.
v) Communication equipment for Special operations (including tactical and jungle warfare), Disaster Management and for other emergency needs.
vi) Proposed Technology for covering different types of Administrative Units such as Districts, Range / Division / Zones / Transport / Railways / Fire Brigade.

A one day Workshop on finalization of National Communication Standards for State Police was held on 7th January, 2020, with members from States of Andhra Pradesh, Chhattisgarh, Uttarakhand, Maharashtra & Assam and other States of J & K, Telangana and Himachal Pradesh with other specialized departments viz. TEC, ISRO & DEAL DRDO, along with representatives from Industry. The draft was deliberated point by point and their inputs have been appropriately incorporated after due deliberation.

Questionnaire

Name of the State:

1. Sanctioned/Posted Strength of Police:
2. Sanctioned/Posted strength of Police – Communication:
3. Details of Existing Police Communication Network Coverage Diagram/Map:
4. Nos. of Cities with Radio Trunking System:
5. Details of Frequency Allocation and frequency used area wise:
6. Details of Communication set-up at following levels and their inter-level communication mode:
   i. DG, PHQ
   ii. ADG/IG, Zone/Special Unit
   iii. DIG, Range/Special Unit
   iv. SSP/SP, District
   v. Dy. SP, Sub-Division
   vi. SHO, Thana
   vii. Check-Post /Beat
7. The Communication Equipments in use:

S. No.	Equipment	Qty (Nos.)
1	HF Sets	
2	Repeaters	
3	VHF/ UHF (Analouge) H/Held	
4	VHF/ UHF (Analouge) Mobile	
5	VHF/ UHF (Digital) H/Held	
6	VHF/ UHF (Digital) Mobile	
7	Messaging Terminal	
8	Trunking – BTU	
9	Trunking – Handheld	
10	Trunking – Mobile	
11	VSAT / POLNET	
12	SAT-Phone	
13	Any other communication equipments	

8. Procurement of Communication equipment done in Last five years:

S. NO.	Year	Items	Central Share (Rs.)	State Share (Rs.)
1				
2				
3				
4				
5				

9. (i) Any constraints/difficulties faced while establishing communication networks for executing any special event/operation/project like extending Dial 100 facility, CCTV Surveillance, GPS/NavIC based monitoring etc., to last mile/inaccessible area:

   (ii) If same was/were overcome, details may also be shared:

10. (i) Whether any SOP is in place for handling Disaster/Calamity:

    (ii) Whether Communication equipment is identified / earmarked for use during any major Law and Order problem and disaster both natural and manmade.

11. Are there any plan to shift on 3GPP based LTE services for Broadband application in near future?

12. How classified communication is handled? Whether there is End-to-End Encryption for classified messages.

13. Training Institute/Institution details along with course conducted. Any training requirements/gaps in fulfilling the mandate.

14. Road Map for communication equipment/network for the Next five years

15. Constraints / any other information:

Benchmarking followed by each team during visit and study of States/UTs Communication Infrastructure

i. To study their communication network at State Police HQ, State Capital and communication accessibility at their one remote district for any shortcomings and to advise measures to improve the networks.

ii. To analyse their Road Map for communication equipment/network for the next five years and to provide guidance to improve the same.

iii. To see and suggest corrective measures to overcome constraints/difficulties if facing while establishing communication networks for any special event/operation/project.

iv. To collate their best practices evolved during establishment of communication networks for any special event/operation/project.

v. To see whether any SOP is in place for handling Disaster/Calamity and whether Communication equipment is identified / earmarked for use during any major Law and Order problem and disaster both natural and manmade.

vi. To enquire if they are planning to shift on 3GPP based LTE services for Broadband application in near future.

vii. To know how they are handling the classified communication and whether there is End-to-End Encryption for classified messages and to suggest for making communications more secure.

viii. To collect their details of Frequency Allocation and frequency used area wise and to advise regarding efficient usage of spectrum.

ix. Their Training Institute/Institution details along with course conducted and if they are having any training requirements/gaps in fulfilling the mandate.

x. Their expectations for formulation of National Standards for communication needs of State Police Forces including wireless communication.

xi. A questionnaire has been prepared on above lines and already shared with States/UTs and same needs to be get filled up from each State/UTs.

Framed by the Committee consisting of :

1. Shri. Devendra Singh Additional Director (HQ), DCPW	-	Chairman
2. Smt. N.S.J. Lakshmi DIG (C), Andhra Pradesh	-	Member
3. Sh. Shriram Mishra AIG (T), Chhattisgarh	-	Member
4. Shri. I.D. Kamble SP (Wireless), Maharashtra	-	Member
5. Sh. Jagat Ram SP (P/T) Uttarakhand	-	Member
6. Sh. Ashwani Narzari SP (Commn.) Assam	-	Member
7. Sh. Naresh Kumar Deputy Director	-	Member
8. Sh. V.S. Panwar Deputy Director, DCPW	-	Member
9. Sh. R.K. Singh Assistant Director, DCPW	-	Co-opted Member

Directorate of Coordination Police Wireless,

Ministry of Home Affairs

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