TERMS OF REFERENCE

Procurement of DMR 800 MHz Digital Trunked Radio Systems (DTRS) under CEP 2020
(Supply, Delivery, Design, Installation, Programming, Testing, Training and Commissioning)
A. INTRODUCTION

In line with the desire of the Philippine National Police (PNP) through the Communications and Electronics Service (CES) to implement the Digital Communications System as reflected in the approved Communications System Strategic Plan (CSSP), another procurement of the aforementioned equipment was programmed to be funded under CEP 2020 in the amount of Sixteen Million Three Hundred Twenty Thousand Pesos (Php16,320,000.00). *(Pls. see Annex “1”)*

These Digital Trunking Radio Systems (DTRS) will be installed to enhance communications capabilities of the NCRPO as well as to meet the requirements of Communications Technology (CT) compliance relative to the PNP Performance Governance System (PGS). This will also form part of the direction towards the realization of the PNP Digital Transformation Roadmap which is embodied in the PNP ICT Masterplan (S.M.A.R.T. Policing).

B. DEFINITION OF TERMS

For purposes of this Terms of Reference, the following terms shall be understood as herein defined:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AVLS</td>
<td>Automatic Vehicle Location System</td>
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<tr>
<td>Carrier</td>
<td>Is a waveform (usually sinusoidal) that is modulated with an input signal</td>
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<td></td>
<td>for the purpose of conveying information</td>
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<tr>
<td>Conventional</td>
<td>Radio system that operates on fixed RF channels</td>
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<td>DGNA</td>
<td>Dynamic Group Number Assignment</td>
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<td>DMO</td>
<td>Direct Mode Operation</td>
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<td>DMR</td>
<td>Digital Mobile Radio is an open digital mobile radio standard defined in</td>
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<td></td>
<td>the European Telecommunications Standards Institute (ETSI) Standard</td>
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<tr>
<td>E2E</td>
<td>End-To-End Encryption is a system of communication where only the</td>
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<tr>
<td></td>
<td>communicating users can read the messages</td>
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<tr>
<td>ESN</td>
<td>Electronic Serial Number</td>
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<tr>
<td>IP</td>
<td>Internet Protocol</td>
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<tr>
<td>Lone Worker</td>
<td>Emergency alarm for an employee who performs an</td>
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<td></td>
<td>activity that is carried out in isolation from other workers without</td>
</tr>
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<td></td>
<td>close or direct supervision</td>
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</table>
MSO - Mobile Switching Office is responsible for intercommunication among the network elements in the system and providing services such as mobility management, authentication, dispatch, network management and intercommunication.

OTAP - Over the Air Programming

OTAR - Over the Air Rekeying

PPO - Provincial Police Office

PRO - Police Regional Office

Telemetry - Is an automated communications process by which data are collected at remote or inaccessible points and transmitted to receiving equipment for monitoring

TIER II - DMR standard for Conventional System

TIER III - DMR standard for Trunking System

Trunking - Radio system that uses a control channel to automatically direct radio traffic to available physical channel.

TSP - Telecommunications Service Provider

IOP - The DMR Interoperability Process

NMS - Network Management System

C. CONCEPT OF IMPLEMENTATION

1. The implementation of the DMR project shall be **highly available on street level coverage** using DMR portables operating in TIER III digital trunking mode within range of the installed DMR base station. The coverage will be dependent on the terrain, vegetations, man-made structures, and geographical conditions of the area.

2. The DMR project will have additional TIER III equipment installations in the following areas of NCR:
   
   a) TRS Site 1 – Parañaque Police Station, Parañaque City; and

   b) TRS Site 2 – Marikina Police Station, Marikina City; *(Pls see Annex “6”)*
c) All TIER III DMTrunking sites shall be scalable up to 32 carrier capacity.

3. Internet Protocol (IP) connectivity using Point-To-Point Microwave IP-Radio will be used to interconnect the DMR TIER III trunking sites to the existing MSO, NMS, Voice and Data Recording System, trunking dispatch system and unified dispatch system.

4. To save channel resource, the system shall not assign traffic channel of the base stations which do not have group call members. This function shall apply to all trunking base stations.

5. The DMR system shall support seamless handover of terminal units to overlapping TIER III Trunking base stations including to existing TIER III Trunking base stations. The voice communication shall be continuous and seamless handover process both for transmitting and receiving users.

6. Roaming between IP connected new TIER III base stations and IP connected TIER II repeater sites shall be supported for selected authorized terminals by using the existing IP based inter-system gateway. This means that a police officer from the Tier III base stations and IP connected TIER II repeater sites can bring a DMR handheld to NCRPO, be able to contact and be contacted by his home PRO and vice versa. Group calls, Individual calls, Group message, Individual message shall be possible between these interconnected TIER III and TIER II sites.

7. The implementation of the DMR System as programmed in the CEP 2020 shall utilize a Digital Radio System for Trunking, which is DMR technology pursuant to the approved NAPOLCOM Resolution No. 2016-803 technical specifications (Pis see Annex “2”) entitled: “Prescribing the Specifications for the Digital Trunked Radio System (DTRS) for DMR Standard”.

8. Data communications capability shall be provided by this implementation of the DMR system. Radios shall be capable of sending keyword queries to verify any alarm associated to the subject which is integrated to PNP’s SMS Query or check for vehicle. Reply to queries shall support up to 500 characters.

D. DMR COMMUNICATION SYSTEM REQUIREMENTS

The DMR project shall have basic components and features based on the approved NAPOLCOM technical specifications through Resolution Number 2016-803. The terminologies may vary from each brand, however, said basic
components and features as stated in the aforementioned specifications must be delivered.

All Base Stations shall be fully operational and compatible to the existing DMR System but not limited to the following:

1. DMR System Components
   a) Trunking Base Station (4 carriers x 2 sets)
      a.1) Compliant to NAPOLCOM Resolution No. 2016-803;
      a.2) With 4 carrier (8 logical channels);
      a.3) Support power supply backup. The backup will support the power of all the channel units, base station controller unit and fan unit;
      a.4) With site controller hot-standby redundancy;
      a.5) Automatic Fallback to single (stand alone) trunking base station operation if the connection to the central switch (MSO) is lost;
      a.6) Automatic fallback to Conventional Repeater Mode if site controllers are all down;
      a.7) Support external alarm to be supervised by NMS;
      a.8) Support 3-way diversity receiver for wide coverage area;
      a.9) Support the Equipment Serial Number (ESN) check to avoid unauthorized radio users;
      a.10) Support the End to End (E2E) encryption;
      a.11) Support the multiple secondary control channel for faster registration of big number of users;
      a.12) Shall be connected for full integration to the current DMR system which includes MSO, NMS, Voice and Data Recording System, Trunking Dispatch System, Tier II Repeater System, and the existing IP-Based gateway system;
a.13) Interconnection shall be established by IP connectivity using the Console Subsystem Interface and not via audio input/output/PTT pin outs of the radio terminal or repeater;

a.14) Enable interconnected Digital Trunked Radio System and Digital Conventional System establish encrypted Group Call, Group Message, Individual Call and Individual Message; and

a.15) Can be interoperated by the existing Unified Dispatch System that dispatches radios from all trunking MSOs and IP connected Conventional Networks and shall support the following features:

a.15.1) Call Features
   a.15.1.1) Individual call;
   a.15.1.2) Group call;
   a.15.1.3) Multiple Group Crosspatch;
   a.15.1.4) Stun/Revive/Kill;
   a.15.1.5) Voice monitor;
   a.15.1.6) Ambience Listening; and
   a.15.1.7) Voice recording.

a.15.2) Data Features
   a.15.2.1) Individual message; and
   a.15.2.2) Group message.

a.15.3) Advanced Vehicle Location System supporting Google map and Open Street Map
   a.15.3.1) Map-based Individual call;
   a.15.3.2) GPS Polling & Positioning;
   a.15.3.3) Real-time tracking; and
   a.15.3.4) Geofencing.

b) Engineering Requirement for Trunking sites
   b.1) The antenna cable feeder lines must be properly harnessed with appropriate cable clips; (Pls see Annex “3”)
b.2) Outdoor Cabinet with appropriate cooling system or Radio Room Shelter with 2 units 1.0HP Aircon, Inverter Type; (Pls see Annex “3”)

b.3) Cable tray;

b.4) Outdoor generator with foundation, 5KVA Set with Automatic Transfer Switch;

b.5) UPS with backup battery power system support for 8 hours with at least 100AH rated capacity per cell;

b.6) Grounding system as specified in the latest Philippine Electrical Code Edition; and

b.7) Lightning protection system.

2. Proposed DMR Network Diagram (Pls see Annex “4”)

3. IP Radio for the 2 new trunking base stations sites:
   a) The equipment shall support Internet Protocol (IP) connectivity;

   b) The equipment shall operate on a licensed, non-interfered set of frequencies 7GHz, 8GHz, 11GHz or 23Ghz;

   c) The equipment shall support 1+1 Hot standby protection for reliable operation;

   d) The equipment shall have a management port for managing, monitoring and control;

   e) Manageable through front panel display; and

   f) The equipment shall be equipped with redundant power supply units with load sharing capability that in the event of failure of one power unit, the equipment shall have continuous service.

E. ENGINEERING SERVICES

1. The winning bidder shall submit a Project Management Plan to include Work Breakdown Structure, its associated Gantt Chart, S-Curve, and PERT-CPM utilizing Project Management Software, ie. MS Project or Project Libre;

2. Site Survey for Trunking Base Station sites shall be conducted upon after the receipt of Notice To Proceed (NTP);
3. Design and Construction/Improvement of Digital Radio System Equipment Room or Outdoor Cabinet for Trunking Base Station sites with cooling system, electrical system, beacon light, lightning protection, grounding and bonding system for telecommunications (ANSI/TIA 607-B), busbar, and LED light; (Pls see Annex “2”)

4. Design and Construction/Improvement of Antenna Mast for Trunking Base Station sites (Up to 120ft Guyed Lattice Tower/Tripod Pole or Self Support Tower for PROs and project sites, and up to 60ft Guyed Monopole/SinglePole/Tripod Rooftop Pole for roof top sites). The actual tower height shall be designed based on the lot space, MOA, structure design, wind loading, government law (such space clearance nearby Airport area), reuse of existing tower based on structure analysis; (Pls see Annex “2”)

5. System design, frequency planning, and IP planning;

6. System integration, configuration and commisioning;

7. Fleet-map and programming templates;

8. Network optimization and site acceptance.

F. SCOPE OF WORK

The Scope of Work shall cover the procurement of DMR system, 800 MHz, which include supply and delivery, design, installation, programming, testing, training and commissioning.

Scope of work shall include, but not limited to, the following:

1. Supply and delivery of DMR System equipment, 800 MHz, initially to PNP Logistics Support Service warehouse at Bicutan, Taguig City for inspection/accounting prior to delivery and installation to project sites;

2. Design support and validation;

3. RF propagation, and Drive Test and Analysis for Trunking Sites;

4. Link budget calculations for IP radios;

5. RF path profiles for two-way and IP radio links;
6. Frequency management/allocation;

7. Network design and optimization;

8. Design of DMR System and IP Radio;

9. Design of Antenna system;

10. Assist in the documentation of compliance to the Radio Station License requirements from Special Radio Services Division of NTC;

11. Delivery of the supplied materials/equipment to project sites;

12. Installation, configuration, programming and commissioning of base station sites;

13. Programming of terminal radios (handheld, base and mobile) into the DMR base stations;

14. Acceptance testing;

15. Training of 10 PNP personnel (5 from RCEONCR, and 5 from NHQCES) to be conducted at NHQCES, Camp BGen Rafael T Crame, Quezon City, and to discuss the following topics and subjects:
   a. Installation Procedure;

   b. Commissioning Procedures;

   c. Operation Procedures; and

   d. Troubleshooting and Maintenance Procedures.

G. TERMS AND CONDITIONS

Site-survey, system design, detailed engineering, manufacture/procurement and supply of all related goods and providing all related services including delivery, furnishing of materials, parts, labor, tool, equipment, system, test instruments, apparatus, all software permits/licenses/installers/installation procedures/admin passwords, and provision of other engineering services, assembly, installation, calibration, optimization, integration of equipment and software, testing, commissioning, test run, documentation, warranty, training, complete in all respect for implementation and completion of the project.
1. The supplier shall be responsible in the Ordering, Shipping, transport/shipping/freight insurance, Customs’ Clearance, release, transportation and delivery to all sites all equipment/system necessary for the project;

2. The supplier is responsible for site survey, site preparation, assist the PNP for the site permit and clearances to include Electronics Permit signed and sealed by PECE, insurance for the equipment as required during the installation, RF planning, antenna locations, cable routes, coverage, engineering, electrical works up to existing power distribution box/outlet of commercial power, civil works, rough-in works, grounding and bonding, and lightning protection system and all other installation necessary for the completion of the project in coordination with RCEONCR;

3. The supplier shall undertake the supply and delivery, design, installation, programming, testing and commissioning of all system components;

4. The supplier shall have all installation tools and materials, accessories, special tools, parts, etc. as required for proper installation and the successful completion of the DMR project. These shall include but not limited to, all connectors, inter-equipment cables, power supply cables and connectors, power distribution boxes, anchoring bolts, nuts, screws, washers, main distribution frames, junction boxes etc;

5. The supplier shall provide all necessary LAN components and devices, to include the configurations, settings, and programming of all DMR base stations and conventional repeaters to achieve a ready and capable IP-connected multisite DMR network thru available IP connectivity or TSP;

6. The supplier shall submit the proposed design of DMR equipment and radio room/outdoor cabinet/doghouse etc. for PNP’s approval. The supplier shall construct the DMR equipment room which shall be environmentally controlled to meet the cooling requirement for all equipment that shall be installed;

7. The supplier shall ensure that the installation of equipment shall be done in accordance with the local and international standards. All inter-bay, power supply and other cables shall be routed through cable trays in trunking sites. All through-wall openings, trenches etc. shall be properly sealed to prevent intrusion of rodents, insects and foreign materials;

8. The supplier shall ensure that all antenna entrances to the DMR equipment room for all remote sites shall be protected against lightning strikes;

9. The supplier shall provide planning, set-up and programming of the system;
10. The proposed trunking system must have IOP certificate from DMR association to ensure compliance to DMR Tier III interoperability with other terminal manufacturer;

11. The supplier shall ensure that the DMR system to be collocated at existing PNP MTRS is insulated from any interference both ways; and

12. The supplier shall submit the System Software Licenses, Documentations, System Maintenance Manuals, detail drawings including layouts, equipment interconnection diagrams, equipment and material list, manufacturers' descriptive and technical literature/catalogue/brochures and installation instructions and warranties;

H. REQUIREMENTS FOR BIDDERS

1. Latest income and business tax returns filed and paid through the BIR Electronic Filing and Payment System (eFPS);

2. Radio Dealer’s Permit issued by the National Telecommunications Commission (NTC);

3. Stamped and sealed certification from the manufacturer that the bidder is the authorized distributor/representative in the Philippines;

4. Certification from the bidder that it has at least five (5) local personnel qualified and trained to install, repair and maintain DMR system supported by a duly stamped and sealed training certificate from the manufacturer;

5. Written proof declaring (such as completed contract, purchase order, official receipt, etc.) that the bidder has at least five (5) years experience in the supply, installation, and commissioning of two-way radio communications system that is similar to the proposed radio system;

6. Certification that the equipment being offered is NTC type approved;

7. List of radio communications systems installed and or maintained within the last five (5) years of establishment of their company;

8. Certification from the bidder that it has an authorized service center;

9. The foreign manufacturer must submit a proof of local representative office in the Philippines;

10. Proof (contract, O.R, P.O., etc.) that the brand being offered has been in existence in the Philippine market for at least ten (10) years;
11. Contractor’s authenticated Philippine Contractors Accreditation Board (PCAB) License with Specialization on Communications Facilities (SCF). If Joint Venture (JV), at least one of the JV has contractor’s authenticated PCAB License with SCF;

12. Notarized certification from the manufacturer stating that the availability of spare parts for all proposed equipment shall be for a period of at least ten (10) years from the date of final acceptance;

13. Proposed Project Schedule and Methodology for PNP’s review and approval;

14. Brochure/Technical Data Sheet of the item being offered;

15. Notarized certificate ensuring that the equipment and all accessories to be supplied are brand new and original;

16. Manufacturer’s Authorization;

17. Service Manual - One (1) set of service manual for the procured DTRS during Post-Qualification and twenty (20) sets during the conduct of training, consisting of:
   a. Detailed Technical Manual for each type of equipment containing functional diagrams and description;
   b. Installation Procedure;
   c. Commissioning Procedures;
   d. Operation Procedures; and
   e. Troubleshooting and Maintenance Procedures.

18. Program of Instruction (POI);

19. Certificate of Non-Disclosure for the Implementation of the project; and

20. IOP Certificate from DMR Association for the trunking system to ensure compliance to DMR Tier III interoperability with other terminal manufacturer.

I. GENERAL NOTES

1. It shall be the responsibility of the bidder/supplier to incorporate any incidental expenses deemed necessary to satisfy the best engineering standard and practices as well as the expenses during the functional testing prior to final acceptance.

2. The supplier must have full knowledge of the project, work and site condition, and have reviewed the project and bid documents, and thus warrants the
availability of the labor, works, and specialties of the system, parts and other materials needed to complete and commission the DMR project.

J. TESTING AND COMMISSIONING

1. The preliminary acceptance test of terminals shall be conducted in the PNP Logistic Support Service warehouse in accordance with the following testing procedures: (Pls. see Annex “5”)

   a) PNP MC No. DRD-2004-01 entitled, “Test and Evaluation (T & E) procedures for PNP Multi-trunked Radio System (MTRS) and Similar Equipment”; and

   b) Other tests not covered by para a) above shall be based on its functionality.

2. The final acceptance test shall be undertaken after preliminary acceptance test approval and all the equipment have been installed including commissioning, technical adjustment and alignment as may deem necessary.

L. INSPECTION

Delivery of all DTRS components shall be at the Logistics Support Service (LSS) Warehouse at Camp Bagong Diwa, Bicutan, Taguig City where it shall be inspected and accepted by the PNP National Headquarters Committee on Inspection and Acceptance (NCIA), while the engineering materials for the trunking sites shall be delivered at the Marikina City Police Station and Parañaque City Police Station.

M. DELIVERY AND COMPLETION PERIOD

Project delivery and installation shall be within 180 calendar days after issuance of Notice to Proceed (NTP). Completeness of the project shall include testing and commissioning.

N. WARRANTY/GUARANTEE

1. It is understood that all supplier’s employee’s or labor claims shall be for the exclusive account of the supplier.

2. The supplier guarantees that the supplies and services rendered shall turn out properly in conformity with good engineering practices and in accordance with the manufacturer’s manual procedures. The supplier guarantees that the DMR and sub-systems shall work in conformity and adaptability to the present technological advancement and must make available its technical expertise and support to the DTRS within the warranty period at no cost to the PNP.

3. The supplier shall repair, correct, or replace any defect during normal operational condition that may occur for a period of 36 months for the main
components and 12 months for the accessories from the date of Certificate of Final Acceptance Test.

4. During the warranty period, the supplier shall provide:
   a) Telephone Technical Support Service – PNP technical personnel to refer/consult through telephone concerning malfunction encountered on the DTRS and provide immediate solution to the problem;

   b) On-site Technical Support – the supplier upon receipt of service/trouble call shall provide On-Site Technical Support if necessary. The supplier shall respond to the trouble within 24-hours upon notification. While undergoing repair, a Service Unit must be provided to ensure uninterrupted system operation; and

   c) Personnel capable of troubleshooting and maintaining the DTRS including the required tools, maintenance spares, hardware, software, materials, etc. for the rectification of any problem.

Prepared by:
Technical Working Group on DMR Project (Phase 5 TRS)

PLTCOL BERNIEL P GOTO MAN
Chairman

PMAJ MARVIN C VINLUAN
Vice Chairman

PCPT MICHAEL V SELDA
Member

PCPT MELVIN B MATUNDAC
Member

Engr. Bernabe R Ballon
Member

PMAJ CRYSLER M BENEDICTO
Head Secretariat

PCPT ALEXANDER V ABUEL
Secretariat