

No.IV-17017/13/06-Prov.I
Ministry of Home Affairs

New Delhi, Dated 18.07.2006

To

The DGs:
Assam Rifles/BSF/CISF/CRPF/ITBP/NSG/SSB/BPR&D.

Subject: Finalization of QRs/Specifications for Weaponry/Security
Equipments

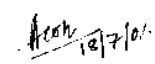
The Sub-Group constituted by MHA vide Office Memorandum No. IV.17017/18/2001-Prov.I dated 5-7-2002 for laying down QRs/specifications of various items/equipments has since submitted QRs in respect of the following item:-

(i) **DIGITAL RADIO TRUNKING SYSTEM TETRA
OPEN CHANNEL STANDARD**

2. These recommendations have been accepted by MHA. The QRs finalized by the Sub-Group and accepted by MHA in respect of the above equipment is enclosed herewith.

3. Henceforth, all the CPMFs should procure the above item required by them to meet their operational needs strictly as per the laid down QRs/specifications.

Yours faithfully,


(Alok Mukhopadhyay)
Under Secretary(Prov.I)

Copy to : DD(Procurement), MHA

Copy for information to:
1. PS to JS(PM), MHA
2. Dir(Prov), MHA

QRs OF DIGITAL RADIO TRUNKING SYSTEM TETRA OPEN CHANNEL STANDARD

CLAUSE NO.	DESCRIPTION
1.	SYSTEM OVERVIEW
1.1	INTRODUCTION: CRPF requires a digital radio trunk system for communication in Srinagar valley and its adjacent area. The system should cater communication between all the 5000 (approx.) users having handheld, mobile or desk top radios in location location. The system should also be able to connect existing HF/VHF, EPABX, BEST, Data network of CRPF (SELO) and POLNET.
1.2	FLEXIBILITY AND MIGRATION : a) Initially system should be launched in Srinagar and adjoining areas. b) Trunking system will then be extendable to all places in Kashmir valley such as i.e. Baramulla, Budgam, Anantnag and remote areas. c) In next phase the system should also be extendable to entire national highway between Jammu Srinagar and deployment in Jammu regions. d) Expansion in network mentioned above in (b) & (c) will be taken up separately and subsequently.
1.3	ADJACENT CHANNEL SPACING : THE PROPOSED 4 CHANNEL SYSTEM SHOULD SUPPORT 25 KHZ OPERATION.
1.4	INTEGRATED VOICE AND DATA CAPABILITY : The system must be fully equipped to support Integrated voice and data transmission on the trunked radio channels, through the same network and connectivity with the EPABX, dedicated hired Data line and V-SAT terminal.
1.5	MODE OF OPERATION: a) System should be capable to support digital encrypted voice communication for maximum security.
1.6	MULTI-SITE/CHANNEL OPERATION The system should be capable of up gradation and operation to multisites operation without major changes in the existing main hardware.
1.7	ACCESSIBILITY OF SUBSCRIBER RADIOS : Subscriber radios should be capable of accessing any one or many sites within the system.
1.8	TALK GROUP a) It should be possible to divide the talk groups into sub talk groups based on the operational requirements. The bidder shall specify the maximum levels of sub groups/hierarchy supported by the system. b) Any subscriber radio can be programmed to be a member of any talk group at any time. Bidders shall describe how this process will take place with full details. c) All subscriber radios shall be capable of being assigned with talk group address designators. d) In first phase trunking system have to cover areas up to coy level. The system should be capable of expanding in next phase to cover platoon level communication and further section level in the areas of deployment mentioned above i.e. in the first phase there will be about 1000 radios in next phase about 2000 and in final stage about 5000 in SNR city alone.
1.9	NUMBER OF UNIQUE INDIVIDUAL RADIO ID : a) The signaling language will permit the system to assign not less than 5,000 unique individual radio IDs (Identification). b) All subscriber radios must have the capability of being a member of any or all talk groups. Regardless of the talk group affiliation, the radio ID for a subscriber radio shall not change. Each subscriber radio will have its unique individual radio ID, independent of talk group and/or telephone interconnect capability.
1.10	SCHEMES OF MODULATION The modulation scheme for system should be as specified under the ETSI TETRA standard.

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CLAUSE NO.	DESCRIPTION
1.11	UPGRADATION/UPDATION The system & subscriber radio features and facilities should be software and hardware based and capable of upgrading without much changes.
1.12	The equipment/items of the proposed system should be based on ETSI (European Telecommunications standards institute) approved open TETRA standard.
2.1	SIGNALING CHANNEL CONCEPT : The signaling channel concept should be competent to ETSI TETRA standards .
2.2	CHANNEL ASSIGNMENT : a) A trunked system controller shall automatically assign all RF voice channels via a system priority protocol as described in Para below. b) Channel access time, assuming a channel is available, shall be less than 300 mill-seconds.
2.3	PRIORITY LEVELS : A minimum of 15 (fifteen) levels of priority shall be incorporated in the system to ensure timely processing of calls, including group call, individual calls as well as telephone calls. A system network management terminal (refer to section : System Network Manager Terminal) shall assign individual and group priority levels to all subscriber radios. The levels of priority are classified as follows. i) Pre-emptive Priority Call : Pre-emptive Priority Call shall be provided by the system. i) Emergency priority : This shall be the highest level of priority. Upon activation of the emergency button in digital radios, the next available voice channel shall be immediately assigned regardless of system loading. ii) Operation Priority :- This shall be 10 levels of priority to be assigned according to the requirements of the users.
2.4	OUT OF CONTACT INDICATION :- a) Whenever a subscriber radio leaves the coverage area of the signaling channel, an audible alert shall be sounded. This alert shall have distinct tone other than any other audible tones generated by the subscriber radio. This will enable the end user to determine that the radio unit is out of contact with the system. b) In addition to the audible alert , a visual indication of this condition is preferred to be displayed on the subscriber radios as LCD display.
2.5	QUEUING OF REQUEST FOR VOICE CHANNEL :- If the system becomes fully loaded (all available RF voice channels are assigned) the second and lower precedence level request for a voice channel will be placed in a queue. The queue will cause the system to assign voice channels (as they become available) according to the priority levels. Time and length of queuing to be programmable.
2.6	SYSTEM BUSY TONE : When the system is fully loaded and a subscriber radio requests for a voice channel by pressing the PTT, a distinct system busy tone shall sound on the radio, as long as the PTT button is depressed.

CLASS NO.	DESCRIPTION
3	CALL TYPES :
3.1	selective call : The trunked system shall permit any properly equipped subscriber radios to selectively call another radio, regardless of their talk group affiliations or locations within the wide-area system. Without involving other subscriber radio users in the system, this shall provide privacy to the parties involved in the private conversation. The two radios communicating in the selective call mode shall be capable of displaying the other radio ID on the radio display.
3.2	GROUP CALL : The system shall allow subscriber radios to be grouped into talk groups/subgroups. Under normal operation, group members will communicate with the static station as well as with other members in the same talk groups. The subscriber radio user shall be able to talk to other talk groups that are pre-programmed on the radio by manual selection on the radio. The proposed subscriber radios should receive and display the group ID of the transmitting radio.
3.3	COLLECTIVE CALL a) It shall be possible to group any combination of talk groups into a higher level group for purposes of multi talk group/collective calling. b) Collective calls can be configured to interrupt groups calls or wait until all group traffic has ceased before being processed. c) Subscriber radios shall respond to a collective call without requiring the subscriber radio users to change the talk group affiliation. Each collective call shall require only one (1) RF voice channel to conserve frequency resources.
3.4	DGNA (Dynamic Group Number Assignment) The System shall support DGNA.
3.5	EMERGENCY CALL The proposed system shall immediately allocate a voice channel on priority to the authorized digital radio subscriber even when all the channels are busy, by pressing a single button on the subscriber radio. The emergency channel assigned will remain with the radio subscriber for a preset period of time.
4	SYSTEM REQUIREMENT/TURN KEY PROJECT
4.1	i) The system should have one nodal site and 2 or 3 sub nodal sites to cover the required communication area. Nodal site should consist Tetra base station, System Network Management Terminal, Dispatcher unit, voice logger, gateways etc. The Tetra System should be TOIP and should support Distributed Architecture. Distributed Architecture for Fault Tolerance and High Resilience. The system should have the Distributed Call Processing and Database Architecture. The remote site should consists of Tetra base station and other accessories as may be necessary to provide reliable communication . The nodal site and sub nodal sites be linked with microwave or any other equally reliable medium. Bidder should propose the quantum of required equipment (hardware/software) after survey of the area ,i.e. the project will be awarded to bidder on turn key basis. ii) System Scalability: a) Each Radio Site should be scalable to 8 Base Stations b) For future enhancement, the Network should be scalable of supporting of up to 200 Sub - nodal Sites.

13.3

NO	DESCRIPTION
4.2	SYSTEM NETWORK MANAGEMENT TERMINAL (SNMT) :
	a) The system proposed by the Bidder shall have the capability to access the functions and features via a system network management terminal.
	a) The proposed SNMT shall include, but not limited to, the following software features:
	b) Control Panel : It should display all the activities of the network. It can be managed by a trained person. He should be capable of monitoring all activities in the network. System should generate status reports automatically.
	i) Configuration Maintenance : Building-up, updation and day to day maintenance of subscriber data base.
	ii) Alarms : All major equipment failures must be displayed at the system network management terminal. These failures are, but not limited to repeater failures, link failures, site controller failure, telephone interconnect device failures and any audio processing equipment failures.
	iii) Subscriber Access Control (SAC) viz, limiting the subscriber radio to the types of call the user is authorized to initiate shall be programmed through the SNMT. These include selective calls, group calls, and collective calls and telephone interconnect calls.
	iv) Priority Access Channel : Upto 15 levels of priority must be available to either individuals, talk groups and telephone interconnect calls separately. It is assumed that emergency call has the highest priority level.
	v) Reports : The SNMT must be able to provide a series of reports giving the condition of the system, the configuration of options & capabilities, and the states of users. Bidder must give a brief summary of proposed system reporting capability.
	vi) Individual Subscriber Radio Disable: The SNMT shall be able to support disabling of an individual subscriber radio remotely.
4.3	BASE /REPEATER STATIONS EQUIPMENT :
	BASE /REPEATER SITE CONTROLLER :
	Each base /repeater site shall be equipped with a site controller to provide the necessary switching control and signaling functions to interact with the main system controller in dynamic allocation of channels to the requesting subscriber radios. The Tetra Site Controller should interact with up to 8 Base Station and each Tetra Radio site should have its own Base Site controller.
4.4	BASE STATION :
	The base station should be Digital signal capable.
	a) The base station shall be linked to the base site controller.
	b) There shall be at least one transmitter and receiver for each RF channel in the system. Each transmitter and receiver shall be capable of operating independently and simultaneously with any or all of the other repeaters in the system.
	c) The base stations shall be designed for continuous unattended 24 hours of operation. Loss of one RF channel must not affect the operation of the other channels.
	d) The base stations shall be capable of monitoring the integrity of its equipment. Automatic alarm reporting to the system controller and diagnostic aids for detecting and isolating problems shall be provided.
	e) The base station shall be housed in free standing in-door cabinets. A key lock shall be provided on the access door.
	Every base station shall come with a surge protection.
	The base station shall meet or exceed the following specifications :
	GENERAL :
	i) AC supply Voltage : 230 VAC \pm 10%, 50 Hz.
	ii) DC Supply Voltage : 24V DC or 48 V DC, negative ground
	iii) Frequency Generation : Synthesized
	iv) Modulation : $\pi/4$ DQPSK
	v) Temperature Range : -20 Degree C to +55 Degree C

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NO.	DESCRIPTION
	TRANSMITTER :
	i) Frequency : 380 - 400 Mhz Band
	ii) RF Power output : minimum 25 W ± 0.5 db
	iii) Duty Cycle : Continuous
	iv) Output Impedance : 50 Ohm
	v) Frequency Stability : +/- 1.5 ppm or better
	vi) Type of Emission : 25K0G1E
	RECEIVER :
	i) Frequency : 380-400 Mhz band
	ii) Channel spacing : 25 KHz
	iii) Receiver sensitivity : Static sensitivity : less than 3% BER at -115 dbm or better Dynamic sensitivity : less than 2.5% BER at -106 dbm or better.
	iv) Frequency Stability : +/- 1.5 ppm or better
	v) Receiver diversity : Triple diversity receiver with high gain LNA
4.5	BASE /REPEATER STATION ANTENNA SYSTEM
	a) The System must be capable of supporting Triple Diversity Antenna. However each Radio Site will be initially equipped with single high gain omni directional antenna with duplexer.
	b) The base /repeater antennas shall have minimum 6 db gain or higher and provide the required coverage. VSWR should be less than 1.5.
	c) The antenna systems shall be connected via 7/8" LDF or larger transmission cable to the Transmitter/receiver multi coupler.
	d) The antenna systems shall be installed with proper lightning protection. All sites must have adequate grounding system.
	e) Tower Top Receiver pre-amplifier may be used to improve the hand held radios coverage range to make the system operational and workable.
	f) The antenna should be able to with stand up to 160 km/hrs. wind speed.
	g) Maximum input power to antenna is 500 W.
4.6	INTERCONNECTION AND GATEWAYS
	a) Telephony Gateway : The system should be able to connect the PSTN/Telephony network. The gateway shall support the following interfaces :
	i) For connection to analog telephony PBX and also for connectivity with digital PBXs.
	b) Analog HF Gateway : The system should be able to connect to existing legacy HF network and allow voice calls between two networks.
	c) Analog VHF Gateway : The system should be able to connect the existing legacy VHF networks and allow voice calls between two networks.
	d) Data Gateway : The system should be able to connect existing CRPF Intranet SELO and polnet.
4.7	SUBSCRIBER RADIOS-GENERAL
	a) The subscriber radio shall be capable of operating on all the designated channel frequencies of the system within the 380-400 Mhz band.
	b) The subscriber radios, when not engaged in communication, shall continuously monitor the signaling channel in accordance with the signaling channel concept.
	c) To initiate a call when the radio is on the monitor mode, the activation of the transmit control (PTT) shall initiate a request for a channel via the signaling channel. The request shall include the talk group ID to which the radio set is designated.
	d) The subscriber radios shall be able to perform the following tasks :
	i) Process call request in response to activation of the PTT switch
	ii) Encode and transmit inbound service request to system.
	iii) Automatic switching of RF channel.

807
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CLAUSE NO.	DESCRIPTION
	g) All subscriber radios shall come with minimum 12 character alphanumeric display. Following information shall be indicated in the display depending on the radio's mode of operation : i) The talk group ID during a talk group call.
	g) All subscriber radios shall be capable of being software programmed, via a radio programming software, either in the selected Bidder manufacturing facility, or at a buyer designated location. Pricing shall be provided for both programming options.
	h) Buyer prefers that subscriber radios does not require reprogramming if additional RF voice channels (frequencies) are added to the system at a later time to accommodate system expansion. This is to eliminate the logistical problem of having all subscriber radios being brought to a service shop for this function.
4.8	STATIC DESK TOP RADIO STATIONS :
	a) The static stations shall consist of a Desk Top digital Trans receiver set, power supply, interconnect cables, static high gain antenna system and other items necessary for a complete installation.
	b) The static stations shall be of solid state design with operation direct from 220V, 50Hz AC power source as well as from a 12 V DC source.
	c) All controls requires for operation and a desk microphone comes complete with a coil cord and a connector shall be provided. The required controls are as follows : i) On/Off switch ii) Volume control iii) Indicator to show that transmission is activated. iv) Full graphic color display
	d) The base station antenna provided by the Bidder shall meet the following minimum standards : i) Each static station shall be furnished with a least an omni-directional 3 db antenna and appropriate transmission line to make it operable in the proposed system ii) The static station antenna shall be capable of transmitting and receiving on the same antenna. iii) The VSWR measured at the input to the antenna over the specified bandwidth of the antenna shall be less than 1.5:1. iv) The Antenna should able to withstand 100 Km/hr. wind speed.
	e) The static station shall meet the following specifications:
	GENERAL i) AC supply voltage : 230 VAC±10% , 50 Hz ii) DC supply voltage : 12 VDC, Negative ground iii) Duty cycle(on AC supply) : 5/20/75% iv) Operating temp. range : -20 ° C to +55° C v) Modulation : Π/4 DQPSK
	TRANSMITTER : i) RF power output : Minimum 5 Watt ± 0.5db ii) Frequency range : 380-400 Mhz band iii) Frequency spread : 15 MHz or better iv) Frequency stability : +/-1.5 ppm or better v) Output impedance : 50 ohm
	RECEIVER i) Frequency range : 380-400 MHz band ii) Frequency Spread : 15 MHz iii) Frequency stability : +/- 0.00015% iv) Sensitivity : Static sensitivity : less than 5% BER at -112 dbm Dynamic Sensitivity : less than 5% BER at -103 dbm v) Channel spacing : 25 Khz vi) Selectivity : minimum -60 db vii) Audio output : Minimum 3 Watt

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NO.	DESCRIPTION
4.9	MOBILE RADIO
	a) The mobile radios shall be of dash mount type consisting of a radio transceiver set, interconnect cables and other items necessary for a complete installation. All mounting hardware shall be furnished.
	b) The mobile radio shall be of solid state design with operation direct from the vehicle battery of 12.0 VDC negative ground.
	c) All controls required for operation and a palm type microphone shall be provided. The microphone shall have a high impact resistant plastic housing, a coil cord and a connector.
	d) The required controls are as follows : i) ON/OFF switch. ii) Multi group and talk group select switch. iii) Volume control iv) Indicator to show that transmission is activated v) Full graphic color display
	e) The mobile radio antenna provided by the Bidder shall meet the following minimum standards : i) An antenna shall be furnished with each mobile radio. The antenna shall have gain of 3 db with respect to quarter wave dipole and high quality rust and corrosion free finish. ii) The mobile antenna shall be capable of transmitting and receiving on the same antenna. iii) The VSWR measured at the input to the antenna over the specified bandwidth of the antenna shall be less than 1.5:1.
	f) The antenna and its mounting should be rugged enough to withstand the 100 kms/hour wind speed, shocks and vibrations for the vehicle speed of 100 kms/hr.
	g) The mobile shall meet the following specs.
	GENERAL i) DC supply voltage : 12.0 V Negative Ground ii) Modulation : $\pi/4$ DQPSK iii) Operating Temp. : -20 ° C to +55° C iv) Channel spacing : 25 KHz v) Frequency generation : Synthesized
	TRANSMITTER : i) RF output power : minimum 5 Watt \pm 0.5db ii) Frequency range : 380-400 MHz Band iii) Frequency spread : 15 MHz or better iv) Frequency Stability +/- 1.5 ppm or better v) output IMPEDANCE : 50 ohm
	RECEIVER : i) Frequency range : 380-400 MHz band ii) Frequency spread : 15 MHz or better iii) Frequency Stability : +/- 1.5 ppm or better iv) Sensitivity : Static sensitivity: less than 5% BER at -112 dbm or better Dynamic Sensitivity : less than 5% BER at -103 dbm or better v) Channel spacing : 25 KHz vi) Selectivity : minimum -60 db vii) Audio output : Minimum 3 Watt

13.3

ITEM NO.	DESCRIPTION
4.10	<p>PORTABLE RADIO (HAND HELD)</p> <p>a) The hand held radios shall be small, self-contained, two-way radio unit with a rechargeable battery. It should be light and small enough to fit in the palm of a person for easy operation. The dimensions & the weight should be mentioned by the bidder with high capacity battery.</p> <p>b) The hand held radios shall operate from a self contained, single rechargeable nickel-cadmium/nickel metal hydride/Li-ion battery. The battery shall be capable of providing an operational duty cycle of 5% transmit, 5% receive and 90% standby for 8 hours of continuous use.</p> <p>c) All hand held radios shall be furnished with a rubber coated flexible whip antenna and belt clip. The antenna connector shall be easily attachable to hand held radio unit.</p> <p>d) Bidder shall supply battery chargers that meet the following requirements and specifications:</p> <ul style="list-style-type: none"> i) The charger unit shall be compatible with the type of battery offered. ii) The charger shall operate from a 220V/50Hz AC power source. iii) The "Charging" and "Ready" indicators must be provided for each charger. Preferably, an indicator shall be used to indicate the "Charging" state and another indicator when charging is completed. iv) The charger shall be capable for charging the hand held radios battery alone or with the complete hand held radio unit. The radio unit shall be capable of monitoring calls while being charged. <p>f) The hand held radio shall meet the following specifications :</p> <p>GENERAL</p> <ul style="list-style-type: none"> i) DC Supply Voltage : 7 to 12 V (To be specified by the supplier) ii) Duty Cycle : 5% Transmit, 5% Receive, 90% standby iii) Battery Life : minimum 8 hrs (for duty cycle 5:5:90) iv) Frequency Generation : Synthesized v) Modulation : $\pi/4$ DQPSK vi) Operating Temperature range : -20 ° C to +55° C <p>TRANSMITTER</p> <ul style="list-style-type: none"> viii) RF output power : minimum 1 Watt \pm 0.5db ix) Frequency range : 380-400 MHz Band x) Frequency spread : 25 MHz or better xi) Frequency Stability : \pm1.5 ppm or better xii) output IMPEDANCE : 50 ohm <p>RECEIVER :</p> <ul style="list-style-type: none"> iv) Frequency range : 380-400 MHz band v) Frequency spread : 15 MHz or better vi) Frequency Stability : +/- 1.5 ppm or better iv) Sensitivity : Static sensitivity: less than 5% BER at - 112 dbm or better Dynamic Sensitivity: less than 5% BER at - 103 dbm or better v) Channel spacing : 25 KHz xiii) Selectivity : minimum -60 db xiv) Audio output : Minimum 500 mW
5	<p>RADIO PROGRAMMING KIT</p> <p>a) The Bidder shall include in his proposal all necessary radio programming software and hardware packages that are needed for the purpose of operational using the trunked radio system offered including but not limited to the following :</p>

201
13.3


CLAUSE NO.	DESCRIPTION
	i) Programming kit for base /repeater -The programming kit shall include all the necessary hardware accessories required for backups. All operating systems software, third party software and tools shall be included in the software kit.
	ii) Programming kit for static radios =Radio programming software =Radio hardware interface unit =Power supply for radio hardware interface unit =PC to radio hardware interface to radio cable =Other accessories for complete programming
	iii) Programming kit for Mobile radios =Radio programming software =Radio hardware interface unit =Power supply for radio hardware interface unit =PC to radio hardware interface cable =Radio hardware interface to radio cable =Other accessories for complete programming
	iv) Programming kit for portable (hand held) radios =Radio programming software =Radio hardware interface unit =Power supply for radio hardware interface unit =PC to radio hardware interface cable =Radio hardware interface to radio cable =Other accessories for complete programming
	b) The successful bidder shall work with the buyer to set up the radio grouping programming.
6	ONLINE UNINTERRUPTED POWER SUPPLIES
	a) UPS and battery system The bidder will carry out delivery, installation, testing and commissioning of uninterrupted power supply, its battery system and boost cum trickle charger related rack and panels. The bidder should ensure that the UPS is of adequate capacity to provide at least 6 hrs. of backup for the complete system. The bidder will submit detailed specifications and related engineering drawing and layout. On line uninterrupted power supplies (UPS) shall be provided with the system, including all associated batteries (Maintenance free), racks and all necessary equipment/items. The UPS should be hot standby for redundancy.
	b) The UPS systems, at the repeater sites, shall be able to provide a minimum of 6 hours of power backup to the system after the main AC power failure, so that the system can function as normal.
	c) The UPS shall supply power to the system automatically and immediately upon sensing the loss of main AC power source.
7	SPARE PARTS
	a) The bidder shall include the quotation of spare parts in the proposal.
	b) 10% spare parts shall be quoted to maintain minimum system downtime, as well as to ensure prompt and efficient back up service. Each proposed equipment site shall have a separate set of necessary spare modules/parts for the equipment at that site. Spare parts should be provided at least for 10 years after successful commissioning of equipment.
	c) Warranty The complete system and equipments should be under warranty for a period of at least three years after successful commissioning of the system.

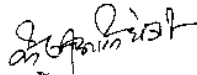
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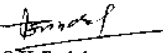
8	TEST EQUIPMENTS/TOOLS (optional) The bidder shall include in his proposal essential test and measuring instruments, repair/rework station necessary for proper upkeep, calibration and maintenance of the system.
9.0	SERVICES The proposing bidder shall design, supply, install, test and commission the proposed trunked radio system and will provide services for 10 years after installation.
9.1	INSTALLATION All equipments shall be installed by the successful bidder at the various proposed sites. The installation work shall be carried out under joint supervision between the purchaser and the bidder.
9.2	INSTALLATION WORK PLAN a) The successful bidder shall submit a preliminary installation work plan, installation test and procedures and installation schedule charts. b) The bidder shall then work together with the purchaser to finalize the work plan 30 days prior to commencement of installation.
9.3	EQUIPMENT SITE PREPARATION The successful bidder shall submit all equipment site information which should include but not limited to the following :- i) Equipment room floor plan and equipment layout. ii) Equipment floor loading iii) Electrical loading iv) Antenna installation drawings v) Tower and foundation drawings
9.4	SYSTEM ACCEPTANCE TEST a) On completion of the installation, the bidder shall conduct a system acceptance test. The bidder shall propose a detail system acceptance test plan which shall be jointly reviewed by a board of officers of CRPF and the bidder. b) The bidder shall provide the test equipment required during the system acceptance test period. The bidder shall repair or replace at no additional cost to the buyer should any of the proposed equipment are found faulty during the system acceptance test period.
10	USER OPERATIONAL TRAINING a) Training program for two week will be conducted at the user's location. b) Will be structured so as to train up to 20 (twenty) of the purchaser's supervisory and training personnel who will, in turn, train individual operators.
11	SYSTEM RELIABILITY
11.1	Purchaser is very concerned about the reliability of such an expensive system. This trunked radio system will affect a large number of users and cover a very large geographic area. The bidder must convince the purchaser that their proposed system is very reliable or has adequate reliability mechanisms included in its architecture/design portfolio etc.
11.2	BACKUP REDUNDANCY a) The proposed multi channel trunked radio system should have the capabilities to assign more than one as control channel. b) In the event that the active control channel fails the site controller should automatically assign other channel as the control channel without affecting the normal operation.
11.3	MULTIPLE VOICE CHANNELS a) RF voice channels shall be assigned as needed and no user is dependent on any given voice channel for communications, the failure of any one RF voice channel will not be apparent to the user. b) In the event of a RF voice channel failure, the controller shall not assign that particular repeater and will simply continue assigning the remaining voice channels. c) Separate repeaters may be quoted for each RF voice channel to achieve above reliability if necessary (optional).

801
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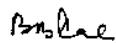
CLAUSE NO.	DESCRIPTION
11.4	BLOCKING OF UNAUTHORIZED ACCESS System should have sufficient provision to detect and block unauthorized access to the system. System should be bug proof/protected.
11.5	TRANSMITTER LOW POWER SHUTDOWN a) In addition to the receiver interference condition the site controller shall detect a loss, or decrease in repeater transmitter output power. If the output power of the transmitter falls below a certain threshold level, the site controller will know not to assign that channel. b) This threshold shall be set such that a channel will automatically be taken out of service when its output power drops to a level where communications become degraded.
11.6	SYSTEM FALLBACK MODE a) Only when the above multiple points redundancy fails, the site shall have a last mode to provide conventional communications via repeaters. Bidders shall describe how their system fallback mode works. b) In case of failure of site controller, the system shall provide conventional mode of operations. All the radios should be capable of providing DMO communication.
12	RF COMMUNICATIONS COVERAGE
12.1	COVERAGE REQUIREMENT AND COVERAGE RELIABILITY a) The system must provide radio coverage throughout identified ^{location} and adjacent areas for hand held as well as mobile radios. _{side}
13	EXPERIENCE Bidder should submit sufficient documents to prove experience of successful installation of digital radio trunking system in 380-400 MHz band and currently in operation within last five years.
14	ANNUAL MAINTENANCE CONTRACT : Annual maintenance contract should be provided at least for 5 years and Engineers should be associated right from implementation stage up to one year to ensure that that the system failure is not more than 5 minutes.
15	SOFTWARE : Entire software, keys, passwords etc. used in the system should be shared by the supplier with the buyer. Nothing should be secretly withheld so that the buyer can use or allow some other agency to improve, upgrade or expand the system at any time subsequently.

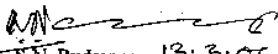

Kamallesh Deka
IG (COMN), BSF


K.C. Agnihotri
DD (EQPT), DCPW


S.K. Jindal
Scientist F, DRDO


Brig. M.K. Gupta 14 March
DIG(Comm), NSG


B.B. Lal 14/3/2006
DD(Tech), IB


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