GOVERNMENT OF INDIA
(Ministry of Home Affairs)
DIRECTORATE GENERAL
CENTRAL RESERVE POLICE FORCE
EAST BLOCK-7, SEC-1, R.K. PURAM, NEW DELHI-110066

Email:- comncell@crpf.gov.in Tele Fax:011-26107493

No. B.V-7/2018-19-C (TVCS) Dated, the 26 Sep'2018

To

1. DIG (Comn), ITBP
   Block No. 2, CGO Complex
   Lodhi Road, New Delhi-03
2. DIG (Comn), NSG
   Meharam Nagar
   Palam, New Delhi-37
3. DIG (Comn), SSB
   East Block-V, R.K Puram
   New- Delhi-66
4. AIG (Comn), CISF
   Block No. 13, CGO, Complex
   Lodhi Road, New Delhi-03
5. DIG (Prov), BSF
   Block No. 10, CGO Complex
   Lodhi Road, New Delhi-03
6. Liaison Office, Assam Rifle
   Room No-171, North Block, MHA
   New Delhi -01

Subject: QRs/TDs of Tactical Video Communication System.

Please find enclosed here with QRs and TDs in respect of Tactical Video Communication System as per Annexure-A & Annexure-B respectively duly approved by the competent authority for further necessary action.

Encl: (QRs & TDs of Tactical Video Communication System)

Vaibhav 26/9/18

{Vaibhav Srivastava, AC (UAV)}
For DIGP (Equipment)
Directorate General, CRPF

No. B.V-7/2018-19-C(TVCS) Dated, the Sep'2018

Copy to:-

SO(IT), MHA, North Block with request to host the QRs and TDs of Tactical Video Communication System on MHA website. Soft copy is being sent through email also.

{Vaibhav Srivastava, AC (UAV)}
For DIGP (Equipment)
Directorate General, CRPF

QRs of Tactical Video Communication System (Single Channel)		
SN	**Features & Technical Specification**	
1.	**Tactical Radio Transmitter**	
i.	Speed	Equipment must be capable to transmit a stable video quality at a minimum Vehicle Speed of 60 Km/h or better
ii.	Operational Band	Must support Band 300MHz (320–360MHz)(40 MHz band-spread to be customized between above specified range)
iii.	Spacing	Minimum 1 MHz or less
iv.	Modulation/ Constellation	COFDM/QPSK/16QAM@Ultra Narrowband and Narrow Band 64QAM @ DVB-T Band
v.	Channel Size	625 KHz/1.25 & 2.5 MHz in Narrow Band 6/7/8 MHz in DVB-T (Channel size should be 625 KHz or lower)
vi.	Guard interval	1/4, 1/8, 1/16, 1/32 "Selectable"
vii.	FEC	1/3, 2/3 @ Narrow band 5/6 , 7/8 @ DVB -T band
viii.	Encoding	Must support H.264 for high quality of video and super low data rate, suitable for transmitting SD video at very low channel bandwidth
ix.	Latency	60ms or better
x.	Resolution	720 x 576 50Hz Standard Definition
xi.	Video Input	25 (FPS) Phase Alternating Line 30(FPS) National Television Systems Committee
xii.	Management	The Offered product must have an option to be centrally connected with EMS or BMS software. All the deployed equipment on ground should be capable to get registered with command and control center on intranet and controlled and monitored from a command and control center Available data rate 2 Mbps or better (As optional item).
xiii.	Encryption / Decryption	AES 128/256 bits Encryption
xiv.	Backup	Transmitter and Receiver must have minimum operating time of 4 Hours.

SN	Features & Technical Specification	
xv.	Power	Transmitter: 12VDC/ 3A **Rating as per vendor solution**
		Receiver: redundant power supply AC + DC Auto Failover without interruption AC: 230V, 50 Hz @ 3.5A DC; 12V @ 3.5A
xvi.	Battery Type	Rechargeable Battery(with primary protection, auto disconnect for overcharging)
xvii.	Operating Temperature	-10°C to 50°C
2)	**Transmitter**	
i.	Type	Man Pack
ii.	Transmit Power	500mW to 2W Adjustable
		Minimum 1 dB Step or better
iii.	Encoding	H.264 or better compression
iv.	Resolution	Standard Definition
v.	Video Inputs	Video inputs (SD/HD) Capability to stream one at time
vi.	Audio	Full duplex
vii.	Audio Modulation	Digital Modulation
viii.	Interface	HDMI, RS-232 &RCA-AV Input for Audio and Video, Audio Out interface and power
		No External management console should be required to configure the basic parameter of transmitter. Eg: Frequency, Channel Bandwidth, Modulation, TX-Power.
ix.	Status	1. Power: LED to indicate the equipment on/off status
		2. Status: LED to indicate working status of the equipment
3	**Transmitter Battery**	
i.	Battery Type	Rechargeable Battery
ii.	Voltage	14.8V minimum
iii.	Capacity	8000 mAh or better
iv.	Connector	3 Pin Weather proof, Vibration proof lock connector
v.	Weight	Not more than 1.5 Kg
vi.	Installation Type	To be fixed inside the harness of Transmitter

SN	Features & Technical Specification	
vii.	Indictor	LED indicator to show the strength of the battery
4	**Single Channel Tactical Receiver**	
i.	Type	1. Portable receiver 2. Receiver with diversity antenna for better reception 3. Suitcase type receiver (Pelican type casing)
ii.	Diversity	Receiver to be capable of connecting 2 x antennas for better reception
iii.	Video Type	SD/HD
iv.	Output	HDMI/SD/SDI
v.	RF Antenna port	2 X N-type port or suitable
vi.	Audio	NUFH or suitable
vii.	Control	Via USB or RS232
viii.	USB	1 x for Mouse
ix.	Ethernet	10/100 Mbps RJ45
x.	Interface	Video Out. Audio in 2 or more RF Port;1 x Ethernet;1 x Serial 1 x USB
xi.	RX Sensitivity	-92 dBm and -96 dBm @ with diversity or better
xii.	Format	25 FPS Phase Alternating Line 30 FPS National Television Systems Committee
xiii.	Amplitude	1~1.2Vp-p @75Ω
xiv.	Resolution	SD/HD
xv.	Recording	Must support simultaneous viewing and recording. Capacity of storage: minimum 16 GB Built-in memory
xvi.	Playback	Receiver must have a Built-in software to play back the recorded video
5	**Network Streaming**	
i.	Encoding	H.264 or better
ii.	Resolution	D1, CIF, QCIF
iii.	Frame rate	25 FPS PAL or 30 FPS NTSC
iv.	Network Interface	1. Receiver must be capable of simultaneously broadcast video over IP (Network) 2. Support H.264 encoding over IP 3. Receiver must be capable to configure video stream bandwidth from minimum 512Kbps to maximum available 4. Receiver must have a capability of recording the video over IP network. 5. Provision for minimum 02 no IP stream
v.	Control interface	For configuration Via console

SN	Features & Technical Specification	
vi	Weight	Must be portable and not more than 10 Kgs
6	**Software**	
i.	Type	The system must be software driven so that the application use as security or encryptions codes can configured and set at HQ Level, only an Authenticated person should be allowed to set the required changes.
ii.	Preset	The system must have a capability to configure preset the set options. This will help the user to change the configuration as per the on-ground scenario. It must be capable to have minimum 8 such preset menu where the configuration, frequency, Channel Bandwidth, encryption, transmit power, FEC, compression format, etc. are different for each preset.
iii.	Video quality	The System software must have a capability to adjust frame rate as per the available bandwidth, if the video quality is poor in full FR then the system software must be capable to manual reduce the Frame rate, to avoid the RF loss in real time video steaming
Iv	Mode	During a situation where the delay time is high software must be capable to manual change compression to H.264 for A/V digital compression. In lower data rate and delays acceptable transmission can be done.
7	**Receiver monitor**	
i.	Type	LED/LCD/TFT
ii.	Size	10" Inch or better
iii.	Input	AV1/AV2 and BNC
iv.	Aspect Ratio	4:3
v.	Resolution	640 x 480 or better.
vi.	Display color	16.2 million
8	**Hi-Gain Mobile Antenna (at TX Unit & RX Unit)**	
i.	Antenna Type	Omni directional antenna
ii.	Frequency Support	As per Transmitter Band
iii.	Bandwidth	8MHz

SN	Features & Technical Specification	
iv.	Gain	2.5 dBi
v.	VSWR	≤1.5
vi.	Impedance	50Ω
vii.	Polarization	Vertical
viii.	Max Power	50W
ix.	Connector	UHF Male
x.	Length	Depends on Frequency
9	**Hi-Gain Antenna (at both TX Unit & RX Unit)**	
i.	Antenna Type	Any suitable antenna
ii.	Frequency Support	As per Band
iii.	Bandwidth	Min 14MHz or better
iv.	Gain	4.5 dBi or better
v.	Vertical Beam width	15°
vi.	VSWR	≤1.5
vii.	Impedance	50Ω
viii.	Polarization	Vertical
ix.	Max Power	50W
x.	Connector	N-Type Female
xi.	Radome	Heavy duty fiber glass
xii.	Brackets	Steel mounting brackets
10	**Hi-Gain Antenna (at both TX Unit & RX Unit)**	
i.	Antenna Type	Directional or Yagi type
ii.	Frequency Support	As per Transmitter Band
iii.	Bandwidth	Min 15MHz or better
iv.	Gain	9 dBi or better
v.	Horizontal beam width	40°
vi.	Vertical Beam width	40°
vii.	F/B Ratio	≥16dB
viii.	VSWR	≤1.5
ix.	Impedance	50Ω
x.	Polarization	Vertical or Horizontal
xi.	Max Power	50W
xii.	Connector	N-Type Female with flying cable
xiii.	Length	Depends on Frequency
xiv.	Brackets	Steel mounting brackets
11	**AMPLIFIER**	
i.	Type	Amplifier for Receiver
ii.	Frequency	As per RX Band
iii.	Gain	19 dBi or better
iv.	Port	2 RF Ports, Antenna In & Out for Receiver

SN	Features & Technical Specification	
v.	Connector	N-Type Female
12	**Tactical Rugged Helmet / Shoulder Camera**	
	Military grade tough IP 68 rated Camera for tactical mission environment weight not more than 250 grams including battery with backup time 150 mins. Camera to be mounted on shoulder or Helmet therefore weight should not be heavier than 250 gm. The camera must be easy to operate, it must have a single button tactile control with vibration feedback so that solider has awareness of the camera operations on the move	
13	**Video**	
i.	1080p @ 60/30 FPS, 720p @ 120/60/30 FPS	
ii.	**Dual Capture:** The sensor must be able to take still photos while simultaneously recording video.	
iii.	**Video Format:** Mpeg 4 and H.264 codec	
iv.	**Video Image Ratio:** 16:9	
v.	**Image Quality: Full HD**	
vi.	**Field of View:** 120 degrees	
vii.	**Audio:** Stereo	
viii.	**White Balance:** Auto-adjust	
ix.	**Lens: The cable to be capable of rotating up to** 180 degree manually to record horizontal video from any position	
14	**Photo**	
i.	**Camera:** 12MP or better	
ii.	**Sensor:** CMOS	
iii.	**Image Ratio**: 4:3	
iv.	**File Format:** .JPG	
v.	**Field of View:** 120 degrees or better	
15	**Performance**	
i.	The Application is tactical, the camera supplied must be ruggedized and waterproof & Drop-proof the preferred minimum height for drop test must be 6 feet taking an average human height in consideration.	

ii.	**Drop** resistance to 2m (while in use, due to an accident or jerk, if the camera drops, it should not break)
iii.	**Dust Protection**: IP68 (camera working in outdoor environment therefore protection required.
iv.	**Operating Temperature Range**: -10° C to 50° C
v.	**Charging**: The offered charger must to capable to charge the drained batteries max 90mins
vi.	**Battery Operation time: minimum** 160 minute
vii.	**Dual battery:** The offered camera must have dual options must be capable to operate with 2 x CR123A battery and Lithium-Ion battery, anyone can be connected as required. **(in case Li-ion goes faulty, CR 123A is available off the shelf therefore the camera should also support an off the shelf battery)**
16	**Physical Features**
i.	**Weight:** 250 grams or less with Li-Ion rechargeable battery
ii.	**Dimensions:** 52mm x 42mm x 88mm (W x H x D) as the camera is to be mounted on the helmet or shoulder, so the mentioned dimension are the max size accepted and smaller cameras are preferred.
iii.	**Audio**: 32kHz – 48kHz depending on video setting or whatever best available combination
iv.	**USB**: micro 2.0 to recharge battery and download video to computer
v.	**Memory**: Micro SD (micro SD card sold separately) storage capacity up to 64 GB.
vi.	**HDMI**: Micro HDMI
vii.	**Wireless**: 2.4GHz 802.11b/g/n
viii.	**Orientation Sensor:** Yes built in Gyro Sensor. (The Camera should provide stable image while in motion)
17	**Settings**
i.	**Orientation:** it must have a capability to adjust video recording orientation. Normal, Upside Down or Auto Adjust. Auto adjust will automatically detect which direction is up using the internal Gyro Sensor when you start a recording or take a photo and record correctly in that orientation.

SN	Features & Technical Specification
ii.	**Loop Record:** Choose the length of your loop recording. This is it length of video saved from the point you stop the recording backwards. Never run out of space on your micro SD card. Allow you to continuously record video and overwrite older footage. Then when something happens you want to keep just stop the recording and your selected period of time is saved.
iii.	**Power Save:** It increases battery life by dimming the display screen and putting the camera in sleep mode after extended period of inactivity.
iv.	**Date/Time Stamp:** Record the date and time of video and images directly onto footage for additional metadata.
18	**Streaming**
	The camera should be capable to stream live video using Wi-Fi and also must be capable to further stream the video using the existing network

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Approved/~~Not Approved~~

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DG, CRPF

Trial Directive of Tactical Video Communication System (Single Channel)

SN	Features & Technical Specification		Trial Directives
1.	**Tactical Radio Transmitter**		
i.	Speed	Equipment must be capable to transmit a stable video quality at a minimum Vehicle Speed of 60 Km/h or better	Board will check practically.
ii.	Operational Band	Must support Band 300MHz (320 –360 MHz)(40 MHz band-spread to be customized between above specified range)	Firm will produce OEM Certificate.
iii.	Spacing	Minimum 1 MHz or less	Board will check practically.
iv.	Modulation/ Constellation	COFDM/QPSK/16QAM@Ultra Narrowband and Narrow Band 64QAM @ DVB-T Band	Firm will produce OEM Certificate.
v.	Channel Size	625 KHz/1.25 & 2.5 MHz in Narrow Band 6/7/8 MHz in DVB-T (Channel size should be 625 KHz or lower)	Board will check practically and firm will produce OEM Certificate.
vi.	Guard interval	1/4, 1/8, 1/16, 1/32 " Selectable"	Board will check practically.
vii.	FEC	1/3, 2/3 @ Narrow band 5/6 , 7/8 @ DVB -T band	Firm will produce OEM Certificate.
viii.	Encoding	Must support H.264 for high quality of video and super low data rate, suitable for transmitting SD video at very low channel bandwidth	Firm will produce OEM Certificate.
ix.	Latency	60ms or better	Board will check practically.
x.	Resolution	720 x 576 50Hz Standard Definition	Board will check practically.
xi.	Video Input	25 (FPS) Phase Alternating Line 30(FPS) National Television Systems Committee	Firm will produce OEM Certificate.

SN	Features & Technical Specification		Trial Directives
xii.	Management	The Offered product must have an option to be centrally connected with EMS or BMS software. All the deployed equipment on ground should be capable to get registered with command and control center on intranet and controlled and monitored from a command and control center Available data rate 2 Mbps or better (As optional item).	Board will check practically.
xiii.	Encryption / Decryption	AES 128/256 bits Encryption	Firm will produce OEM Certificate.
xiv.	Backup	Transmitter and Receiver must have minimum operating time of 4 Hours.	Board will check practically.
xv.	Power	Transmitter: 12VDC/ 3A Rating as per vendor solution	Board will check practically.
		Receiver: redundant power supply AC + DC Auto Failover without interruption AC: 230V, 50 Hz @ 3.5A DC; 12V @ 3.5A	Board will check practically.
xvi.	Battery Type	Rechargeable Battery(with primary protection, auto disconnect for overcharging)	Firm will submit OEM certificate for chemistry of battery
xvii.	Operating temp	-10°C to 50°C	Firm will submit certificate of any Govt. Lab or NABL or ILAC accredited laboratory or OEM certificate.
2	**Transmitter**		
i.	Type	Man Pack	Board will check practically.

SN	Features & Technical Specification		Trial Directives
ii.	Transmit Power	500mW to 2W Adjustable	Board will check practically.
		Minimum 1 dB Step or better	
iii.	Encoding	H.264 or better compression	Firm will submit OEM certificate
iv.	Resolution	Standard Definition	Firm will submit OEM certificate
v.	Video Inputs	Video inputs (SD/HD) Capability to stream one at time	Board will check practically and firm will submit OEM certificate
vi.	Audio	Full duplex	Board will check practically.
vii.	Audio Modulation	Digital Modulation	Firm will submit OEM certificate
viii.	Interface	HDMI, RS-232 &RCA-AV Input for Audio and Video, Audio Out interface and power	Board will check practically.
		No External management console should be required to configure the basic parameter of transmitter. Eg: Frequency, Channel Bandwidth, Modulation, TX-Power.	Board will check practically.
ix.	Status	1. Power: LED to indicate the equipment on/off status	Board will check practically.
		2.Status: LED to indicate working status of the equipment	Board will check practically.

S N	Features & Technical Specification		Trial Directives
3.	**Transmitter Battery**		
i.	Battery Type	Rechargeable Battery	Firm will submit OEM certificate for chemistry of battery.
ii.	Voltage	14.8V minimum	Board will check practically.
iii.	Capacity	8000 mAh or better	Board will check practically. Firm will submit OEM certificate
iv.	Connector	3 Pin Weather proof, Vibration proof lock connector	Board will check practically. Firm will submit OEM certificate
v.	Weight	Not more than 1.5 Kg	Board will check practically.
vi.	Installation Type	To be fixed inside the harness of Transmitter	Board will check practically.
vii.	Indictor	LED indicator to show the strength of the battery	Board will check practically.
4.	**Single Channel Tactical Receiver**		
i.	Type	1. Portable receiver 2. Receiver with diversity antenna for better reception 3. Suitcase type receiver (Pelican type casing)	Board will check practically.
ii.	Diversity	Receiver to be capable of connecting 2 x antennas for better reception	Board will check practically.
iii.	Video Type	SD/HD	Board will check practically. Firm will submit OEM certificate
iv.	Output	HDMI/SD/SDI	Board will check practically.
v.	RF Antenna Port	2 X N-type port or suitable	Board will check practically.
vi.	Audio	NUFH or suitable	Board will check practically.
vii.	Control	Via USB or RS232	Board will check practically.
viii.	USB	1 x for Mouse	Board will check practically.
ix.	Ethernet	10/100 Mbps RJ45	Board will check practically.
x.	Interface	Video Out. Audio in 2 or more RF Port;1 x Ethernet;1 x Serial 1 x USB	Board will check practically.

S N	Features & Technical Specification		Trial Directives
xi.	RX Sensitivity	-92 dBm and -96 dBm @ with diversity or better	Board will check practically. Firm will submit OEM certificate
xii.	Format	25 FPS Phase Alternating Line 30 FPS National Television Systems Committee	Firm will submit OEM certificate
xiii.	Amplitude	1~1.2Vp-p @75Ω	Firm will submit OEM certificate
xiv.	Resolution	SD/HD	Firm will submit OEM certificate
xv.	Recording	Must support simultaneous viewing and recording. Capacity of storage: minimum 16 GB Built-in memory	Board will check practically.
xvi.	Playback	Receiver must have a Built-in software to play back the recorded video	Board will check practically.
5	**Network Streaming**		
i.	Encoding	H.264 or better	Firm will submit OEM certificate
ii.	Resolution	D1, CIF, QCIF	Firm will submit OEM certificate
iii.	Frame rate	25 FPS PAL or 30 FPS NTSC	Firm will submit OEM certificate
iv.	Network Interface	1. Receiver must be capable of simultaneously broadcast video over IP (Network) 2. Support H.264 encoding over IP 3. Receiver must be capable to configure video stream bandwidth from minimum 512Kbps to maximum available 4. Receiver must have a capability of recording the video over IP network. 5. Provision for minimum 02 no IP stream	Board will check practically. Firm will submit OEM certificate
v.	Control interface	For configuration Via console	Board will check practically.
vi.	Weight	Must be portable and not more than 10 Kgs	Board will check practically.

S N	Features & Technical Specification		Trial Directives
6	**Software**		
i.	Type	The system must be software driven so that the application use as security or encryptions codes can configured and set at HQ Level, only an Authenticated person should be allowed to set the required changes.	Board will check practically.
ii.	Preset	The system must have a capability to configure preset the set options. This will help the user to change the configuration as per the on-ground scenario. It must be capable to have minimum 8 such preset menu where the configuration, frequency, Channel Bandwidth, encryption, transmit power, FEC, compression format, etc. are different for each preset.	Board will check practically.
iii.	Video quality	The System software must have a capability to adjust frame rate as per the available bandwidth, if the video quality is poor in full FR then the system software must be capable to manual reduce the Frame rate, to avoid the RF loss in real time video steaming	Board will check practically and firm will submit OEM certificate.
iv.	Mode	During a situation where the delay time is high software must be capable to manual change compression to H.264 for A/V digital compression. In lower data rate and delays acceptable transmission can be done.	Board will check practically and firm will submit OEM certificate.

SN	Features & Technical Specification		Trial Directives
7	**Receiver monitor**		
i.	Type	LED/LCD/TFT	Board will check practically.
ii.	Size	10" Inch or better	Board will check practically.
iii.	Input	AV1/AV2 and BNC	Board will check practically. Firm will submit OEM certificate
iv.	Aspect Ratio	4:3	Firm will submit OEM certificate
v.	Resolution	640 x 480 or better.	Firm will submit OEM certificate
vi.	Display color	16.2 million	Firm will submit OEM certificate
8	**Hi-Gain Mobile Antenna (at TX Unit & RX Unit)**		
i.	Antenna Type	Omni directional antenna	Board will check practically.
ii.	Frequency Support	As per Transmitter Band	Board will check practically. Firm will submit OEM certificate
iii.	Bandwidth	8MHz	Firm will submit OEM certificate
iv.	Gain	2.5 dBi	Firm will submit OEM certificate
v.	VSWR	≤1.5	Firm will submit OEM certificate
vi.	Impedance	50Ω	Firm will submit OEM certificate
vii.	Polarization	Vertical	Firm will submit OEM certificate
viii.	Max Power	50W	Board will check practically.
ix.	Connector	UHF Male	Board will check practically.
x.	Length	Depends on Frequency	Board will check practically.
9	**Hi-Gain Antenna (at both TX Unit & RX Unit)**		
i.	Antenna Type	Any suitable antenna	Board will check practically.
ii.	Frequency Support	As per Band	Board will check practically. Firm will submit OEM certificate
iii.	Bandwidth	Min 14MHz or better	Board will check practically and firm will submit OEM certificate
iv.	Gain	4.5 dBi or better	Firm will submit OEM certificate
v.	Vertical Beam width	15°	Firm will submit OEM certificate
vi.	VSWR	≤1.5	Firm will submit OEM certificate
vii.	Impedance	50Ω	Firm will submit OEM certificate
viii.	Polarization	Vertical	Firm will submit OEM certificate
ix.	Max Power	50W	Board will check practically.

SN	Features & Technical Specification		Trial Directives
x.	Connector	N-Type Female	Board will check practically.
xi.	Radome	Heavy duty fiber glass	Board will check practically.
xii.	Brackets	Steel mounting brackets	Board will check practically.
10	**Hi-Gain Antenna (at TX Unit & RX Unit)**		
i.	Antenna Type	Directional or Yagi type	Board will check practically.
ii.	Frequency Support	As per Transmitter Band	Board will check practically
iii.	Bandwidth	Min 15MHz or better	Board will check practically. Firm will submit OEM certificate
iv.	Gain	9 dBi or better	Firm will submit OEM certificate
v.	Horizontal beam width	40°	Firm will submit OEM certificate
vi.	Vertical Beam width	40°	Firm will submit OEM certificate
vii.	F/B Ratio	≥16dB	Firm will submit OEM certificate
viii.	VSWR	≤1.5	Firm will submit OEM certificate
ix.	Impedance	50Ω	Firm will submit OEM certificate
x.	Polarization	Vertical or Horizontal	Firm will submit OEM certificate
xi.	Max Power	50W	Board will check practically
xii.	Connector	N-Type Female with flying cable	Board will check practically
xiii.	Length	Depends on Frequency	Board will check practically
xiv.	Brackets	Steel mounting brackets	Board will check practically
11	**AMPLIFIER**		
i	Type	Amplifier for Receiver	Board will check practically
ii	Frequency	As per RX Band	Board will check practically
iii	Gain	19 dBi or better	Firm will submit OEM certificate
iv	Port	2 RF Ports, Antenna In & Out for Receiver	Board will check practically
v	Connector	N-Type Female	Board will check practically

SN	Technical Specifications	Trial Directives
12	**Tactical Rugged Helmet / Shoulder Camera**	
i	Military grade tough IP 68 rated Camera for tactical mission environment weight not more than 250 grams including battery with backup time 150 mins. Camera to be mounted on shoulder or Helmet therefore weight should not be heavier than 250 gm. The camera must be easy to operate, it must have a single button tactile control with vibration feedback so that solider has awareness of the camera operations on the move	Firm will submit certificate of any Govt. Lab or NABL or ILAC accredited laboratory.
13	**Video**	
i	1080p @ 60/30 FPS, 720p @ 120/60/30 FPS	Board will check practically
ii	**Dual Capture:** The sensor must be able to take still photos while simultaneously recording video.	Board will check practically
iii	**Video Format:** Mpeg 4 and H.264 codec	Board will check practically. Firm will submit OEM certificate
iv	**Video Image Ratio:** 16:9	Board will check practically. Firm will submit OEM certificate
v	**Image Quality: Full HD**	Board will check practically. Firm will submit OEM certificate
vi	**Field of View:** 120 degrees	Firm will submit OEM certificate
vii	**Audio:** Stereo	Firm will submit OEM certificate
viii	**White Balance:** Auto-adjust	Board will check practically.
ix	**Lens: The cable to be capable of rotating up to** 180 degree manually to record horizontal video from any position	Board will check practically.

SN	Technical Specifications	Trial Directives
14	**Photo**	
i	**Camera:** 12MP or better	Board will check practically. Firm will submit OEM certificate.
ii	**Sensor:** CMOS	Firm will submit OEM certificate.
iii	**Image Ratio**: 4:3	Firm will submit OEM certificate.
iv	**File Format:** .JPG	Firm will submit OEM certificate.
v	**Field of View:** 120 degrees or better	Firm will submit OEM certificate.
15	**Performance**	
i	The Application is tactical, the camera supplied must be ruggedized and waterproof & Drop-proof the preferred minimum height for drop test must be 6 feet taking an average human height in consideration.	Firm will submit certificate of any Govt. Lab or NABL or ILAC accredited laboratory.
ii	**Drop** resistance to 2m (while in use, due to an accident or jerk, if the camera drops, it should not break)	Firm will submit certificate of any Govt. Lab or NABL or ILAC accredited laboratory.
iii	**Dust Protection**: IP68 (camera working in outdoor environment therefore protection required.	Firm will submit certificate of any Govt. Lab or NABL or ILAC accredited laboratory.
iv	**Operating Temperature Range**: -10° C to 50° C	Firm will submit OEM certificate.
v	**Charging**: The offered charger must to capable to charge the drained batteries max 90mins	Firm will submit OEM certificate.
vi	**Battery Operation time: minimum** 160 minutes	Board will check practically (1:1:8).

SN	Technical Specifications	Trial Directives
vii	**Dual battery:** The offered camera must have dual options must be capable to operate with 2 x CR123A battery and Lithium-Ion battery, anyone can be connected as required. **(in case Li-ion goes faulty, CR 123A is available off the shelf therefore the camera should also support an off the shelf battery)**	Board will check practically.
16	**Physical Features**	
i	**Weight:** 250 grams or less with rechargeable battery	Board will check practically.
ii	**Dimensions:** 52mm x 42mm x 88mm (W x H x D) as the camera is to be mounted on the helmet or shoulder, so the mentioned dimension are the max size accepted and smaller cameras are preferred.	Board will check practically.
Iii	**Audio**: 32kHz – 48kHz depending on video setting or whatever best available combination	Board will check practically.
iv	**USB**: micro 2.0 to recharge battery and download video to computer	Board will check practically.
V	**Memory**: Micro SD (micro SD card sold separately) storage capacity up to 64 GB.	Board will check practically.
vi	**HDMI**: Micro HDMI	Board will check practically.
vii	**Wireless**: 2.4GHz 802.11b/g/n	Firm will submit OEM certificate.
viii	**Orientation Sensor:** Yes built in Gyro Sensor. (The Camera should provide stable image while in motion)	Board will check practically and firm will submit OEM certificate.
17	**Settings**	
i	**Orientation:** it must have a capability to adjust video recording orientation. Normal, Upside Down or Auto Adjust. Auto adjust will automatically detect which direction is up using the internal Gyro Sensor when you start a recording or take a photo and record correctly in that orientation.	Board will check practically.
ii	**Loop Record:** Choose the length of your loop recording. This is it length of video saved from the point you stop the recording backwards. Never run out of space on your micro SD card. Allow you to continuously record video and overwrite older footage. Then when something happens you want to keep just stop the recording and your selected period of time is saved.	Board will check practically.

SN	Technical Specifications	Trial Directives
iii	**Power Save:** It increases battery life by dimming the display screen and putting the camera in sleep mode after extended period of inactivity.	Board will check practically.
iv	**Date/Time Stamp:** Record the date and time of video and images directly onto footage for additional metadata.	Board will check practically.
18	**Streaming**	
i	The camera should be capable to stream live video using Wi-Fi and also must be capable to further stream the video using the existing network	Board will check practically.

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