F.No. P-63013/23/2013-Ord/BSF /MHA-Prov-I 27 /
Bharat Sarkar/Government of India
Griha Mantralaya/Ministry of Home Affairs
PM Division

26, Man Singh Road, Jaisalmer House
New Delhi, Dated 5ᵗʰFebruary, 2015

To,

DsG: AR (through LOAR), BSF, CISF, CRPF, ITBP, SSB, NSG & BPR&D.

Subject: QRs and Trial Directive for Multi Purpose Long Range Surveillance Camera.
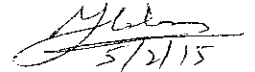
Sir(s),
The QRs and Trial Directives for Multi Purpose Long Range Surveillance Camera as per annexure have been accepted by the Competent Authority in MHA.

2.   The CAPFs concerned will be accountable for correctness of the QRs/Trial Directives

3.   Henceforth, all the CAPFs should procure the above item required by them strictly as per the laid down Technical Specifications/QRs.

Yours faithfully,

Encl: As above

(M.K. Chahar)
Under Secretary to the Govt of India
Tel: 23381278

Copy forwarded for necessary action to :-

The Section Officer (IT), MHA: It is requested to host the QRs and Trial Directives (soft copy attached) on the MHA website (under the page of Organizational Set up- Police Modernization Division- Qualitative Requirement under Surveillance Equipments.

(R.K. Soni)
Section Officer (Prov-I)
23386034

Copy to: DDG (Procurement), MHA.

DIRECTOR GENERAL BORDER SECURITY FORCE
(PROVISIONING DIRECTORATE (ORD SECTION)

The Sub-group of Technical Experts on Surveillance Equipments constituted by MHA vide their letter No. IV-24011/12/2011-Prov-I dated 13 Jun 2012, No. IV-24011/12/2011-Prov-I dated 28 Dec 2012 & UO No. IV-24011/12/2011-Prov-I- 350 dated 27 Jun 2013 held its meeting at BSF Headquarters on 01 Nov 2013, 30 Dec 2013 & 10 Feb 2014 to formulate the Qualitative Requirementof 'Multi Purpose Long Range Surveillance Camera'.

After detailed deliberations the referred Sub-group has finalized the QRs of 'Multi Purpose Long Range Surveillance Camerawhich are as under:-

QUALITATIVE REQUIREMENTS FOR MULTI PURPOSE LONG RANGE SURVEILLANCE CAMERA

S/NO		SPECIFICATION	
1.		**General Description**: A compact single housing, fully integrated day/night, lightweight multi-sensor Surveillance Camera capable of observing and measuring range to targets at 30 – 2,000m. The system should consist of the following:-	
	a)	Image Intensifier	
	b)	Day Camera	
	c)	Thermal Imager	
	d)	LaserRange Finder	
	e)	Digital Magnetic Compass	
	f)	Inclinometer	
	g)	GPS	
2.	**Physical Characteristics**		
	a)	Lightweight, portable to be carried by single operator	Weight of 4 Kg (max) with Battery
	b)	Quickly deployable	Start up time of 1 minute or less
	c)	Should be Hand Held and facility of mounting on Tripod	Non-magnetic telescopic tripod
	d)	Environmental Characteristics	
		i. Ruggedized	MIL STD 810G or better and IP-65
		ii. Operating Temperature	- 20°C to + 55 °C
		iii. Enclosure	Metal
3.	**Operational Characteristics**		
	a)	**Image Intensifier**	
		i. Image Intensifier	18 mm
		ii. Magnification	3x
		iii. Field of View	8°x 6°
		iv. Diopter Adjustment	-6 to +2
		v. IPD	54 to 72 mm
		vi. Highlight Sensor	Automatic shut-down at high ambient light levels

		vii.	Resolution	64 – 75 lp/mm
		viii.	SNR	22 or better
		ix.	Human Identification Range	250m or better
	b)	**Day Camera**		
		i.	Type	Colour CCD
		ii.	Resolution	2 Mega pixel or better
		iii.	Field of View	9° x 6° (max)
		iv.	Optical Zoom	10x continuous zoom
		v.	Human Identification Range	250m or better
	c)	**Thermal Imager**		
		i.	Band	8 to 12μm
		ii.	Optical Zoom	10x continuous zoom
		iii.	Resolution	384 x 288 or better
		iv.	Field of View	9° x 6°(max)
		v.	Human Identification Range	250m or better
		vi.	Human Recognition Range	700m or better
		vii.	Human Detection Range	1,500m or better
	d)	**Laser Range Finder**		
		i.	Type	Class 1 eye safe
		ii.	Range	30m to 2,000m
		iii.	Accuracy	± 5m or better
		iv.	Measuring Rate	1Hz
	e)	**Digital Magnetic Compass and Inclinometer**		
		i.	Angular Range Azimuth	360°
		ii.	Angular Range Elevation	±40° or higher
		iii.	Accuracy	1° in both directions
	f)	**GPS:** Should have an integrated GPS, which should be able to provide Longitude, Latitude and Altitude information.		
	g)	**Data Processing**		
		i.	Target Azimuth	Display Target Azimuth
		ii.	TargetRange	DisplayRange to the Target in meters
		iii.	Target Grid	Display MGRS(Indian)
		iv.	Target co-ordinates	Display Latitude, Longitude and Altitude of the Target
	h)	**Image Processing**		
		i.	Image Stabilization	Software based image stabilization.
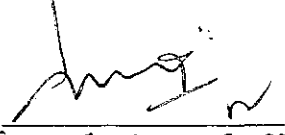
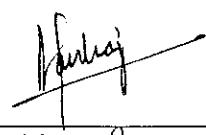|					
		ii.	Metadata Overlay		Target specific information displayed to the user while observing the target.
		iii.	Sensor Fusion		
			a.	Should be able to display real-time feed from individual sensors (image intensifier, day camera and thermal imager)	

			b.	Should be able to display real-time digital pixel fused feed from combination of sensors
				   I. Image intensifier + thermal imager
				   II. day camera + thermal imager	

		iv.	Adaptive Contrast Enhancement Mode		User selectable mode for enabling / disabling adaptive contrast enhancement
	i)	**Storage**			
		Removable SD Card of minimum 64 GB capacity for storage of images, videos along with metadata to be provided.			
	j)	**External Interface**			
		i.	Video		Analog I/O
		ii.	Data and Control		RS-232, USB
4.	**Battery and Electrical**				
		i.	Battery Type		Rechargeable Li-ion / Li-ion polymer
		ii.	Battery Endurance		6 hours or greater
		iii.	Battery Charger		90VAC – 250VAC 50Hz
		iv.	Spares		Two spare batteries
5.	**NLOS COFDM WIRELESS TRANSMITTER:** The equipment should be provided with wireless video transmitter.				
	a)	Frequency Band			300MHz to 450MHz or 1.65MHz to 2.5MHz
	b)	Modulation			16 QAM, QPSK, BPSK
	c)	Weight			300grams (max)
	d)	RF Output Power			100mW
	e)	Frequency Tuning Step			250KHz
	f)	Coding			AES 128
	g)	Data Interface			RS232
	h)	Range NLOS			300m (min)
	i)	Range LOS			700m (min)
6.	Video Receiver				To have video out port as well as display.
		i.	LED Video Display		7" (minimum)
		ii.	Line Standard		PAL
		iii.	Coding		MPEG-4
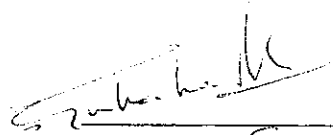
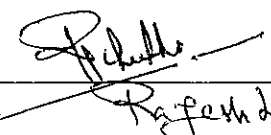|			
	iv.	Frame Rate	Selectable from 1f/s to 25f/s
	v.	Latency	1s (max)
7.	**Portability and Storage:** The equipment to be provided in suitable rugged case for durability and ease of carriage.		
8.	**Literature:** Operating and Technical literature for each discrete components of system should be in English language		
9.	**Training:** In situ training of users for three day on operation, maintenance, fault finding and user level repairs.		

B. C JOSHI, DIG
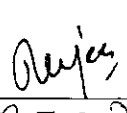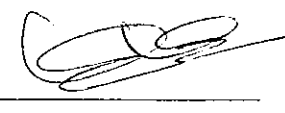SICW BSF

COL. A. CHATURVEDI,
GIC (TSG), NSG

RAJESH EKKA,
2Y DIR, DCPW

GURBACHAN SINGH
SSC(C), BPR&D
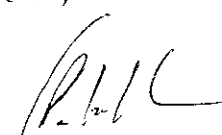
ABHIRAM PANKAJ,
2C, CRPF

Rajesh Luther
AC ITBP
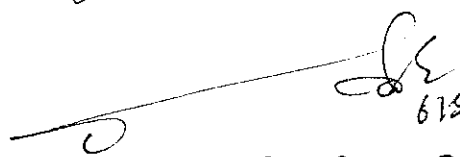
R. K KUMBHARE
AC(T), SSB

INSPR(E) RAJEEV DAHIYA
CIIF

Sitesh (Tired twaa
SIW BSF)

SI/RM RAJPAL SINGH
FH& BSF

APPROVED/ NOT APPROVED

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DIRECTOR GENERAL
BORDER SECURITY FORCE

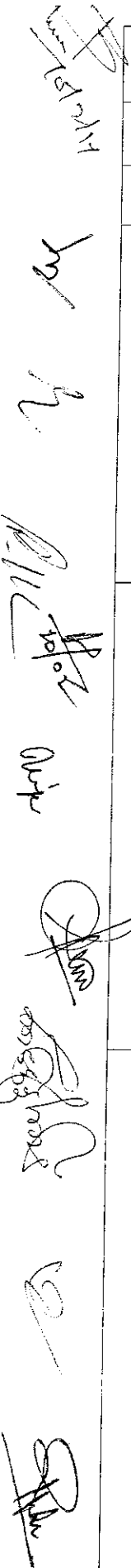# TRIAL DIRECTIVES OF MULTI PURPOSE LONG RANGE SURVEILLANCE CAMERA

Appendix-'B'

S.No		SPECIFICATION		TRIAL DIRECTIVES
1.		**General Description:** A compact single housing, fully integrated day/night, lightweight multi-sensor Surveillance Camera capable of observing and measuring range to targets at 30 – 2,000m. The system should consist of the following:-	-	
	a)	Image Intensifier		To be checked physically by BOO
	b)	Day Camera		To be checked physically by BOO
	c)	Thermal Imager		To be checked physically by BOO
	d)	Laser/Range Finder		To be checked physically by BOO
	e)	Digital Magnetic Compass		To be checked physically by BOO
	f)	Inclinometer		To be checked physically by BOO
	g)	GPS		To be checked physically by BOO
2.		**Physical Characteristics**		
	a)	Lightweight, portable to be carried by single operator	Weight of 4 Kg (max) with Battery	Check physically with the help of weighing machine. The unit should be kept on the scale with hand strap or neck strap and the optical lens covers for II tube, LRF, Day camera and Thermal Imager.
	b)	Quickly deployable	Start up time of 1 minute or less	Check physically using the stop watch.
	c)	Should be Hand Held and facility of mounting on Tripod	Non-magnetic telescopic tripod	To be checked physically by BOO
	d)	Environmental Characteristics		
		i. Ruggedized	MIL STD 810G or better and IP-65	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
		ii. Operating Temperature	- 20°C to + 55 °C	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
		iii. Enclosure	Metal	To be checked physically by BOO

3. Operational Characteristics

a) Image Intensifier

i.	Image Intensifier	18mm	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
ii.	Magnification	3x	Verify the 3x magnification by measuring the field of view of the device using Collimators in SIW BSF or similar lab. The fov in 3x mode should be < 2.6°x 2°.
iii.	Field of View	8° x 6°	Measure the Field of View in 1x mode using collimators in SIW BSF or similar lab.
iv.	Diopter Adjustment	-6 to +2	To be checked physically by BOO
v.	IPD	54 to 72mm	Measure the min and max distance between the two eye pieces using vernier caliber. Min and max should be within the specified limits
vi.	Highlight Sensor	Automatic shut-down at high ambient light levels	Device should be able to shut down automatically when exposed to high ambient light. Turn on the II tube in day light and verify that the output of II shuts down after a specific duration. Recheck by starting the system in dark to see that system has not got damaged.
vii.	Resolution	64 – 75 lp/mm	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
viii.	SNR	22 or better	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
ix.	Human Identification Range	250m or better	Keep a jawan with INSAS weapon at 250m distance line of sight from the device. Observer should be able to identify him at the given range (moving or stationary), he should in ideal conditions should be able to differentiate between a civilian and a jawan. Note: Test the identification range at the same

digital/optical zoom across all vendors.

b)	**Day Camera**		
i.	Type	Colour CCD	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
ii.	Resolution	2 Mega pixel or better	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
iii.	Field of View	9° x 6° (max)	To be checked physically by BOO in SIW BSF labusing collimators. During measurement the camera should operate in 1x default mode with no digital zoom. Also, calculate the fov using the detector dimensions and the focal length of the lens. Vendor should provide the min/max and default focal lengths of the lens used.
iv.	Optical Zoom	10x continuous zoom	Measure the minimum and maximum field of view of the camera using collimator in SIW BSF lab. Also calculate the fov using detector dimension and the min and max focal length of the lens. The ratio of the max and min fov should be 10X or more.
v.	Human Identification Range	250m or better	Keep a jawan with INSAS weapon at 250m distance, line of sight, from the device in day time in clear weather conditions. Observer should be able to identify him at the given range (moving or stationary), observer in ideal conditions should be able to differentiate between a civilian and a jawan.
c)	**Thermal Imager**		Note: Test the identification range at the same digital/optical zoom across all vendors.

i.	Band	8 to 12µm	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
ii.	Optical Zoom	1X continuous zoom	Measure the minimum and maximum field of view of the camera using collimator in SIW BSF lab. Also calculate the fov using detector dimension and the min and max focal length and F# of the lens. The ratio of the max and min fov should be 1X or more.
iii.	Resolution	384 x 288 or better	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
iv.	Field of View	9° x 6°(max)	To be checked physically by BOO in SIW BSF lab using collimators. During measurement the camera should operate in 1x default mode with no digital zoom. Also, calculate the fov using the detector dimensions and the focal length of the lens. Vendor should provide the min/max and default focal lengths of the lens used.
v.	Human Identification Range	250m or better	Keep a jawan with INSAS weapon at 250m distance, line of sight. Observer should be able to identify him at the given range (moving or stationary), observer in ideal conditions should be able to differentiate between a civilian and a jawan. **Note**: Test the Identification range at the same digital/optical zoom across all vendors.
vi.	Human Recognition Range	700m or better	Keep a jawan with INSAS weapon at 700m distance, line of sight. The soldier should move the weapon up and down. The soldier should also move left to right at the given distance. Observer should be able to recognize him at the given range (moving or stationary)
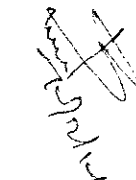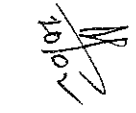
				Note: Test the recognition range at the same digital/optical zoom across all vendors.
vii.		Human Detection Range	1,500m or better	Keep a jawan with INSAS weapon at 1500m distance, line of sight. The soldier should also move left to right at the given distance. Observer should be able to detect the movement and presence of the jawan. Note: Test the detection range at the same digital/optical zoom across all vendors.
d)	**LaserRange Finder**			
	i.	Type	Class 1 eye safe	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
	ii.	Range	30m to 2,000m	To be checked physically by BOO. Keep a jawan at 2000m, the LRF should be able to return the given distance if fired.
	iii.	Accuracy	± 5m or better	To be checked physically by BOO
	iv.	Measuring Rate	1Hz	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
e)	**Digital Magnetic Compass and Inclinometer**			
	i.	Angular Range Azimuth	360°	Rotate the unit full 360° and note down the azimuth values returned by the system. Note down the values at every 30°, the azimuth values noted should not vary by more than 1°
	ii.	Angular Range Elevation	±40° or higher	Tilt the unit at 20°and at 40°rotate full 360°at each tilt position and note down the azimuth values returned by the system. Note down the values at every 30°azimuth position, the azimuth values noted should not vary by more than 1°
	iii.	Accuracy	1° in both directions	To be checked physically by BOO
f)		**GPS:** Should have an integrated GPS, which should be able to provide Longitude, Latitude and Altitude information.		To be checked physically by BOO
g)		**Data Processing**		

i.	Target Azimuth	Display Target Azimuth	To be checked physically by BOO
ii.	TargetRange	DisplayRange to the Target in meters	To be checked physically by BOO
iii.	Target Grid	Display MGRS(Indian)	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
iv.	Target co-ordinates	Display Latitude, Longitude and Altitude of the Target	To be checked physically by BOO
h)	**Image Processing**		
i.	Image Stabilization	Software based image stabilization	Mount the unit on a tripod, connect the raw video output and stabilized video output to individual displays and give jitters in tilt or pan direction. Observe the difference between raw video and stabilized video, stabilized video should negate the motion and give stabilized output.
ii.	Metadata Overlay	Target specific information displayed to the user while observing the target.	To be checked physically by BOO
iii.	Sensor Fusion		
a.		Should be able to display real-time feed from individual sensors (image intensifier, day camera and thermal imager)	To be checked physically by BOO, verify all the individual video feeds can be simultaneously captured in real time.
b.		Should be able to display real-time digital pixel fused feed from combination of sensors. I. Image intensifier + thermal imager II. day camera + thermal imager	The sensor Fusion should be checked SIW BSF lab using fusion test software. Note: The fusion process should not be a simple image blending, picture in picture or overlay of the two images.
iv.	Adaptive Contrast Enhancement Mode	User selectable mode for enabling / disabling adaptive contrast enhancement	To be checked physically by BOO. Connect the device to a display and compare the video output by changing the scene drastically between very dark with no hot objects, sky, scene with a lot of humans.
i)	**Storage**		
		Removable SD Card of minimum 64 GB capacity for storage of images, videos along with metadata to be provided.	To be checked physically by BOO
j)	**External Interface**		
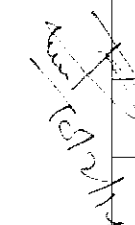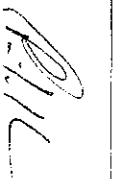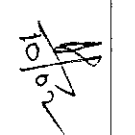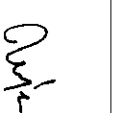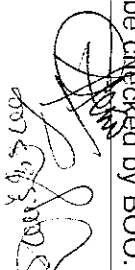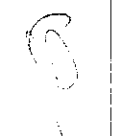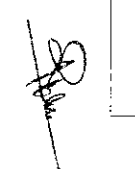
	i.	Video	Analog I/O	To be checked physically by BOO
	ii.	Data and Control	RS-232, USB	Connect the device to a computer and execute the software provided by the firm. The software should allow the user to control the device, control should at least feature – 1) Fire LRF 2) Read Target GPS 3) Read Source GPS 4) Display Video 5) Select Video output between (Day/I/R/II/Fused)
4.		**Battery and Electrical**		
	i.	Battery Type	Rechargeable Li-ion / Li-ion polymer	OEM Make , markings, serial number of the battery to be checked physically by BOO certificate regarding commercial availability of batteries in India to be produced by the firm.
	ii.	Battery Endurance	6 hours or greater	To be checked physically by BOO
	iii.	Battery Charger	90VAC – 250VAC 50Hz	To be checked physically by BOO
	iv.	Spares	Two spare batteries	To be checked physically by BOO
5.		**NLOS COFDM WIRELESS TRANSMITTER:** The equipment should be provided with wireless video transmitter.		
	a)	Frequency Band	300MHz to 450MHz or 1.65MHz to 2.5MHz	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
	b)	Modulation	16 QAM, QPSK, BPSK	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
	c)	Weight	300grams (max)	Check physically with the help of weighing machine.
	d)	RF Output Power	100mW	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
	e)	Frequency Tuning Step	250KHz	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.

f)	Coding	AES 128	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
g)	Data Interface	RS232	To be checked physically by BOO
h)	Range NLOS	300m (min)	To be checked physically by BOO
i)	Range LOS	700m (min)	To be checked physically by BOO
6.	Video Receiver		To be checked physically by BOO
i.	LED Video Display	7" (minimum)	To be checked physically by BOO
		To have video out port as well as display.	
ii.	Line Standard	PAL	Data sheet/ Specification sheet to be submitted by the OEM. Validity and authenticity of data sheets to be checked by BOO.
iii.	Coding	MPEG-4	To be checked physically by BOO
iv.	Frame Rate	Selectable from 1f/s to 25f/s	To be checked physically by BOO
v.	Latency	1s (max)	To be checked physically by BOO
7.	**Portability and Storage:** The equipment to be provided in suitable rugged case for durability and ease of carriage.		To be checked physically by BOO
8.	**Literature:** Operating and Technical literature for each discrete components of system should be in English language		To be checked physically by BOO
9.	**Training:** In situ training of users for three day on operation, maintenance, fault finding and user level repairs.		Certificate regarding training by the firm to be obtained.

GURBACHAN SINGH
SSC(E), BPR&D

ABHIRAM PAGKAJ
DC, CRPF

R. K KUMBHARE
AC(T), SSB

Col. A. CHATURVEDI
GTC (T&C), NSG

RAJESH EKKA
DY DIR, DCPW

RAJIV KANJIYA
Insp(E) RAJEEV KANJIYA
CISF

RAJPAL SINGH
SI(A), BSF

B. C JOSHI
SI(A), BSF

APPROVED / NOT APPROVED

Rajesh Jadhav
Dy DIR, ITBP

DIRECTOR GENERAL
BORDER SECURITY FORCE