No. P-63013/07/2017/Mod-I/BSF 2863-71
Government of India Ministry of Home Affairs
Directorate General Border Security Force
(Prov Dte: Mod Cell)
(Fax: 011-24367683)

Block No.10, CGO Complex,
Lodhi Road, New Delhi-03

Dated, the 12 Dec 2019

To,

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

Sub: **Forwarding of QRs and Trial Directives**

Find enclosed herewith QRs and Trial Directives of OFC Based Intrusion Detection System (DAS) as per appendix 'A' and 'B' duly finalized by Sub group of technical experts and approved by DG BSF for your information and necessary action please.

Encl : As above

(Satish Chandra Budakoti)
Dy. Inspector General (Prov)
FHQ BSF, New Delhi

Copy to :-

1. SO (IT), North Block MHA, New Delhi : You are requested to host the above QRs and TDs on MHA website please.

2. IT Cell FHQ BSF, New Delhi : You are requested to host the above QRs and TDs on BSF website please.

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DIRECTOR GENERAL BORDER SECURITY FORCE
PROVISIONING DIRECTORATE

Expression of Interest

DIG (Ord)
HQ DG BSF, Prov Dte (Ord Sec)
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The Sub group of Technical Experts on Surveillance Equipment constituted by MHA vide their letter No. IV 1017/18/2001-Prov-I dated 05th July 2002 held its meeting at BSF Headquarters on 14th Sep 2017, 05th Dec 2017, 16th Aug 2018, 15th May 2019, 08th August 2019 and 07th November 2019 to formulate the QRs of OFC Based Intruder & Tunnel Detection System.

SCOPE OF WORK, USER REQUIREMENTS AND TECHNICAL EVALUATION DOCUMENT (DAS)

DESCRIPTION OF QR/TD

OFC based sensors are basically distributed acoustic sensors for deployment on the ground or over the ground at fencing/concertina coils for intrusion detection at border area or for security of a campus area etc. These sensors are also useful for detecting tunnelling activity under the ground. The activity detection and the range of detection entirely depends on the pattern of deployment, depth of deployment of OFC, terrain conditions and calibrations etc. There are various technologies involved for detection of fibre based distributed acoustic sensors.

VARIANT DETAILS.

An optical sensor converts light rays into an electronic signal. The purpose of an optical sensor is to measure a physical quantity of light and, depending on the type of sensor, then translates it into a form that is readable by an integrated measuring device. In OFC based Intrusion Detection system the interrupt in any means in the OFC will translate in to an alert through the electronics.

The following are the variants of fibre optic sensing

A. DAS- (For deployment in long stretch)

B. ZB-DAS - (For deployment in short patches)

DAS: - Distributed acoustic sensors are working on the back scatter technology. The light beam backscatter from each particle min the OFC core due to impurities in the cladding material are stored and taken as reference. On the event of any vibrations in the OFC core due to vibration on the ground due to activities over and under the ground, any or all of the characteristics of backscattered light (Amplitude & phase etc.) are altered. Reference data is continuously compared with the backscattered data and any change is processed through machine intelligence (software) and alerts are generated. High grade processing is implemented in order to produce error free results.

The following are the major highlights of backscatter technology-

- Long range: A single controller can protect up to 80 km (50 miles) of sensor cable.

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- Event location; pinpointing of location of intrusion.
- Artificial intelligence (AI) analysis: maximises discrimination between intrusion and environmental nuisance sources including wind, rain, traffic, machinery and aircraft.
- Lower installation cost: There is no requirement for power or electronics in the field.
- Safety and reliability: intrinsic safety, immunity to EMI, RFI and lightning strikes.
- Integration: Software provides seamless connectivity to third party systems and equipments.

Even though these equipments are providing numerous advantages and features but useful for single line deployment which is always not possible as per our ground conditions and nature of deployment under different level of operational commands.

Proposed installation of Various Sensors or any other technology integrated with the solution and Command & control centre as per user requirements and technical specifications broadly defined as per following paras: -

S/No.	Parameters
OFC:	
1.	OFC has to be laid underground ahead of and along the area (defined by the user at the time of indent) in linear/zigzag fashion. **The deployment pattern will be linear parallel alignment at suitable distance as per ground conditions with maximum distance being 5 mtr and depth of 01 mtr.**
2.	OFC should be of latest editions of standards like ITU-T, TIA, IEC, EIA, ASTM, BS, TEC & DOT (as applicable)
3.	The OFC should be as per ITU-T-G 652/655 or better specifications.12/24 core as per field requirement
4.	The OFC should suitable for capturing vibrations (over ground/underground) with armored/other suitable variants in outer jacket
5.	Length of CSTA (with ECCSA) underground burial type OFC per drum should be 2km±5%/4km±5% as per the field requirement
6.	OFC should be protected against damages from termite, rodent, fire, moisture and water over the lifetime of the cable.
7.	The outer surface of each completed cable shall be sequentially numbered with metric length markers spaced at regular intervals.
8.	Temperature for Installation & Operation should be -05° C to +60° C and for storage -25°C to +65° C.
9.	The cable shall have sufficient strength to withstand a maximum lad value 2700 Newton or 9.81W (where W = weight of 1 km cable in kg) whichever is higher.
10.	Minimum bending radius should be 20 X cable diameter. **If armored cable maximum diameter 13mm.**
11.	Maximum overall diameter of the cable should be 16 mm.
12.	The coatings shall be in various distinct colours in order to facilitate fiber identification. Fibers colours shall correspond to IEC publication 793-2 and 304. The colours should be readily identifiable and durable. The coating and the colour shall not react with surrounding jelly.

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OPERATIONAL CAPABILITY:	
13.	OFC based Intruder Detection System should be able to detect ground vibrations like digging/tunneling (Subject to qualifying norms of trial directives)
14	Should be able to be integrated with third party Command and Control Centre (C2) using SDK/API, to be shared for integration of system with third party C2.
15.	**System should be suitable to be connected with any PC/Laptop having RJ45 to work independently in case connectivity with C2 is not available. All information, alerts and indications be displayed on it. System should also be controlled from PC/Laptop.**
16.	Detection rate – 90% or better. **The OEM will provide threshold controlling mechanism through a knob, push button or software controlled system to minimize false alarm due to noise/unwanted system.**
17.	**Ability to distinctly identify simultaneous moving targets:** System should distinctly identify and measure distance between two targets moving simultaneously which are separated by 15 mtrs or less during multiple intrusion.
18.	System should be able to distinctly detect and generate alerts on separate zones basis so that exact area of intrusion can be identified.
19	Ability to use same OFC for communication and data transmission purpose using talk set i.e. multi-strand single mode OFC (12/24 Core)
20.	General parameters of system like sensitivity etc. should be indicated and controlled from system software.
JOINTING CLOSURES :	
21.	Cable joint box shall be kept on a Stainless Steel platform. The cable jointing pit shall enclose OFC jointing enclosure and OFC at every jointing pit shall be circular having internal diameter of 1200 mm & wall thickness of 50 mm and made of reinforced concrete with lifting lugs cast into the lids during construction itself **or any alternative by user.**
22.	Joint closures should be Dust tight (No dust ingress) IP-68 complied.
23.	Joint closures should be water resistant. IP-68 complied.
24.	Joint closures box should have the capability to bear the shock impact.
25.	Joint closures box have the capability to bear tension of 100 Kgs.
INSTALLATION PROCEDURE:	
26.	OFC installation should be done as per predefined lay out available for particular area to use minimum cable length.
CROSSING SECTION:	
27.	For water body crossing, suitable pole mounting with proper GI wire support to be provided. There should be provision for nullifying the overhead OFC from the sensor patch to avoid false alarm due to disturbances like wind/rain etc. or any other similar method.
MARKERS:	
28.	**OFC distance marker-** A 300 mm diameter metal plate shall be provided by the bidder. The metal plate should be at every 250 meters and at every crossing. The bidder shall suitably paint these metal plates for easy identification. **(To be defined by the user department at the time of indent)**
29.	**OFC Joint identification markers-** All jointing locations and blowing locations shall be marked with proper identification markers. Layout and drawing of the markers should be given by the bidder. **(To be defined by the user department at the time of indent)**
30.	**Electronic Markers and marker locator (Optional)** - Bidder shall provide electronic locating system suitable for field use to locate underground buried OFC jointing pit locations. The electronic marker to be buried underground along with

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	OFC joints. The electronic markers shall be lightweight and shall have a passive tuned resonant circuit, enclosed and sealed within a casing. The marker locator shall be able to locate the electronic markers from a distance of 2m with the help of audio and visual signals. Each marker locator provided shall be complete with its set of accessories. The electronic markers shall be buried underground 30 mm above the lid of each jointing pits and shall not be in direct contact with any metallic body.
FIBRE TERMINATION CLOSURE:	
31.	FTC should be specified by the bidders. It may be wall-mounted, outdoor type powder-coated stainless steel .
POWER SOURCE:	
32.	System should operate on 90 -230 V AC, 50 Hz as well as on DC source (12V to 24V battery) in case AC mains not available. Suitable charging system should be provided for charging batteries.
TECHNICAL LITERATURE:	
33.	Firm/bidder to submit following tech. literature- i) Training manual and user hand book. ii) Repair Manual.

S S Chabbar, VSM
ADG (Log) BSF

(Dhananjay Mishra)
Comdt, SIW BSF

(M S Kanyal), DC
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(Insp/RM Manish Raj)
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(Insp/RO Apoorv Awasthi)
BSF

(V.G. Iyer) PSO (B&E)
BPR&D

Approved/~~Not approved~~

(Vivek Kumar Johri)
Director General
Border Security Force

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TRIAL DIRECTIVES FOR SCOPE OF WORK, USER REQUIREMENTS AND TECHNICAL EVALUATION DOCUMENT (DAS SYSTEM)

Propose installation of Various Sensors or any other technology integrated with the solution and Command & control centre as per user requirements and technical specifications broadly defined as per following paras: -

S.No.	Parameters	Trial procedure suggested for Board of Officers.	Result expected/desired.	Remarks
1.	OFC has to be laid underground ahead of and along the area (defined by the user at the time of indent) in linear/zigzag fashion. **The deployment pattern will be linear parallel alignment at suitable distance as per ground conditions with maximum distance being 5 mtr and depth of 01 mtr.**	Physically checked by the BOO.	OFC must be laid underground ahead of and along the area in linear/zigzag fashion. The deployment pattern must be linear parallel alignment at suitable distance as per ground conditions with maximum distance being 5 mtr and depth of 01 mtr.	
2.	OFC should be of latest editions of standards like ITU-T, TIA, IEC, EIA, ASTM, BS, TEC & DOT (as applicable)	Firm has to submit national/ International accredited lab certificate in respect of the same.	The certificate/reports must confirm the QRs Parameter.	
3.	The OFC should be as per ITU-T-G 652/655 or better specifications.12/24 core as per field requirement	Firm has to submit national/ International accredited lab certificate in respect of the same.	The certificate/reports must confirm the QRs Parameter.	
4.	The OFC should be suitable for capturing vibrations (over ground/underground) with	Physically checked by the BOO.	The OFC must be capturing vibrations (over ground/underground) with armored/other suitable variants in outer	

	armored/other suitable variants in outer jacket.		jacket.	
5.	Length of CSTA (with ECCSA) underground burial type OFC per drum should be 2km±5%/4km±5% as per the field requirement	Firm /bidder should give undertaking/certificate regarding the same	The certificate must confirm the QRs Parameter.	
6.	OFC should be protected against damages from termite, rodent, fire, moisture and water over the lifetime of the cable.	Firm has to submit national/ International accredited lab certificate in respect of the same.	The certificate/reports must confirm the QRs Parameter.	
7.	The outer surface of each completed cable shall be subsequently numbered with metric length markers spaced at regular intervals.	Physically checked by the BOO.	The outer surface of each completed cable must be subsequently numbered with metric length markers spaced at regular intervals.	
8.	Temperature for Installation & Operation should be -5° C to +60° C and for storage -25°C to +65° C.	Firm has to submit national/ International accredited lab certificate in respect of the same	The certificate/reports must confirm the QRs Parameter.	
9.	The cable shall have sufficient strength to withstand a maximum lad value 2700 Newton or 9.81W (where W = weight of 1 km cable in kg) whichever is higher.	Firm has to submit certificate from any Govt approved lab/NABL/ILAC.	The certificate/reports must confirm the QRs Parameter	
10.	Minimum bending radius should be 20 X cable diameter. **If armored cable maximum diameter 13mm.**	Firm has to submit certificate from any Govt. approved lab/NABL/ILAC.	The certificate/reports must confirm the QRs Parameter.	
11.	Maximum overall diameter of the	Physically checked by the BOO.	Maximum overall diameter of the cable must be 16 mm.	

	cable should be 16 mm.			
12.	The coatings shall be in various distinct colours in order to facilitate fiber identification. Fibers colours shall correspond to IEC publication 793-2 and 304. The colours should be readily identifiable and durable. The coating and the colour shall not react with surrounding jelly.	Physically checked by the BOO also Certificate to be given by the firm.	The coatings must be in various distinct colours in order to facilitate fiber identification. Fibers colours must correspond to IEC publication 793-2 and 304. The colours must be readily identifiable and durable. The coating and the colour shall not react with surrounding jelly.	
OPERATIONAL CAPABILITY:				
	OFC based Intruder Detection System should be able to detect ground vibrations like digging/tunneling. A) Moving person 05 mtr. B) Crawling man 05 mtr. C) Digging a trench 05 mtr.	Physically checked by the BOO simulating various conditions mentioned in left side of the para as mentioned below: - a. Person to start moving from a distance of 06 mtr @ 4Km/h towards sensor and note the distance from where detection starts.. Display unit/ C2 to give graphical representation of human detection, as well as audio and visual alarm. b. Person to move in crawling position from a distance of 06 mtrs at speed of 1.5 Km/hr. Display unit/ C2 to give graphical representation of detection, as well as generate audio and visual alert. c. Start digging a trench / tunnel at		

	D) Cattle movement 05 mtr	a distance of 06 mtrs from the sensors. Display unit/ C2 to generate audio and visual alert and also give graphical representation of detection. d. Cattle (Cow, Buffalo, Bull, OX, Horse) to move in normal speed from a distance of 06 mtrs towards deployed sensor. Display unit/ C2 to generate alert audio and visual alert. Display unit/ C2 to give graphical representation of animal detection, without alarm.		
14.	Should be able to be integrated with third party Command and Control Centre (C2) using SDK/API, to be shared for integration of system with third party C2.	If C2 is available, system to be checked by integrating with C2 by BOO. In case C2 is not available, the firm/bidder have to submit undertaking/certificate in this regard.	System must be able to be integrated with third party Command and Control Centre (C2) using SDK/API, to be shared for integration of system with third party C2.	
15.	System should be suitable to be connected with any PC/Laptop having RJ45 to work independently in case connectivity with C2 is not available. All information, alerts and indications be displayed on it. System should also be controlled from PC/Laptop.	Physically check by BOO connecting the system with any PC/Laptop. All alerts, indications and displays should be available on connected laptop and system should also be controlled from PC/Laptop. Firm will provide software with license during evaluation and submit undertaking to provide software with license during supply.	System must be suitable to be connected with any PC/Laptop having RJ45 to work independently in case connectivity with C2 is not available. All information, alerts and indications must be displayed on it. System must also be controlled from PC/Laptop.	
16.	Detection rate – 90% or better. The OEM will provide threshold controlling mechanism through a knob, push button or software	Sensors are physically checked by simulating various targets or digging work for 20 times. Sensor should have high detection rate. Failure rate	Detection rate must be 90% or better. The OEM must provide threshold controlling mechanism through a knob, push button or software controlled	

	controlled system to minimize false alarm due to noise/unwanted system.	should not be more than 10 % of total intrusion. System should detect activities minimum 03 mtrs from the sensor.	system to minimize false alarm due to noise/unwanted system.	
17.	**Ability to distinctly identify simultaneous moving targets:** System should distinctly identify and measure distance between two targets moving simultaneously which are separated by 15 mtrs or less during multiple intrusion.	To be checked physically by the BOO. Two or more targets at a distance of 15 mtrs from each other be moved simultaneously to simulate intrusion. System should distinctly identify the targets and also measure distance between them. Further targets be moved at a distance of 10 mtr and 5 mtrs between each other and result be analyzed.	System must be distinctly identify and measure distance between two targets moving simultaneously which are separated by 15 mtrs or less during multiple intrusion.	
18.	System should be able to distinctly detect and generate alerts on separate zones basis so that exact area of intrusion can be identified.	Check the feature by moving targets at different places along the OFC. Area/point of intrusion should be clearly indicated at controller unit.	System must be able to distinctly detect and generate alerts on separate zones basis so that exact area of intrusion can be identified	
19.	Ability to use same OFC for communication and data transmission purpose using talk set i.e. multi-strand single mode OFC (12/24 Core)	To be checked physically by BOO. Same OFC which is used for intrusion detection should be able to transmit/receive data for communication purpose. In case this feature could not be checked, undertaking should be submitted by the firm/bidder.	Same OFC which is used for intrusion detection must be able to transmit/receive data for communication purpose.	
20	General parameters of system like sensitivity, enabling/disabling a particular segment/zone etc. should be indicated and controlled from system software.	To be checked physically by BOO. Each particular zone/segment should be indicated and be controlled/adjusted as per user requirement from the connected controller/PC.	Parameters of system like sensitivity, enabling/disabling a particular segment/zone etc. must be indicated and controlled from system software.	
JOINTING CLOSURES:				
21.	Cable joint box shall be kept on a Stainless Steel platform. The cable	To be checked physically by BOO. Firm also submit an undertaking in	Cable joint box must be kept on a Stainless Steel platform. The cable	

	jointing pit shall enclose OFC jointing enclosure and OFC at every jointing pit shall be circular having internal diameter of 1200 mm & wall thickness of 50 mm and made of reinforced concrete with lifting lugs cast into the lids during construction itself **or any alternative by user.**	this regard.	jointing pit must enclose OFC jointing enclosure and OFC at every jointing pit must be circular having internal diameter of 1200 mm & wall thickness of 50 mm and made of reinforced concrete with lifting lugs cast into the lids during construction.	
22.	Joint closures should be Dust tight (No dust ingress) IP-68 complied.	Firm/bidder should submit certificate from any Govt. approved lab/NABL/ILAC/OEM confirming IP 68 compliance.	Certificate must from any Govt. approved lab/NABL/ILAC/OEM confirming IP 68.	
23.	Joint closures should be water resistant. IP-68 complied.	Firm/bidder should submit certificate from any Govt. approved lab/NABL/ILAC/OEM.	Certificate must from any Govt. approved lab/NABL/ILAC/OEM confirming IP 68.	
24.	Joint closures box should have the capability to bear the shock impact.	Firm/bidder should submit certificate from any Govt. approved lab/NABL/ILAC/OEM.	Certificate must from any Govt. approved lab/NABL/ILAC/OEM confirming shock impact.	
25.	Joint closures box have the capability to bear tension of 100 Kgs.	Firm/bidder should submit certificate from any Govt. approved lab/NABL/ILAC/OEM.	Certificate must from any Govt. approved lab/NABL/ILAC/OEM	
INSTALLATION PROCEDURE				
26.	OFC installation should be done as per predefined layout available for a particular area to use minimum cable length.	Firm/bidder should submit undertaking in this regard.	Undertaking must be taken in this regard.	
CROSSING SECTION:				
27.	For water body crossing, suitable pole mounting with proper GI wire support to be provided. There	Firm/bidder should submit undertaking in this regard.	Undertaking must be taken in this regard	

	should be provision for nullifying the overhead OFC from the sensor patch to avoid false alarm due to disturbances like wind/rain etc. or any other similar method			
MARKERS:				
28.	**OFC distance marker-** A 300 mm diameter metal plate shall be provided by the bidder. The metal plate should be at every 250 meters and at every crossing. The bidder shall suitably paint these metal plates for easy identification. **(To be defined by the user department at the time of indent)**	Firm/bidder should submit undertaking in this regard.	Undertaking must be taken in this regard	
29.	**OFC Joint identification markers-** All jointing locations and blowing locations shall be marked with proper identification markers. Layout and drawing of the markers should be given by the bidder. **(To be defined by the user department at the time of indent)**	Firm/bidder should submit undertaking in this regard.	Undertaking must be taken in this regard	
30.	**Electronic Markers and marker locator (Optional-** Bidder shall provide electronic locating system suitable for field use to locate underground buried OFC jointing pit locations. The electronic	Firm should submit undertaking/certificate in this regard. A sample should also be submitted and to be checked by the BOO.	Undertaking/certificate must be taken in this regard.	

	marker to be buried underground along with OFC joints. The electronic markers shall be lightweight and shall have a passive tuned resonant circuit, enclosed and sealed within a casing. The marker locator shall be able to locate the electronic markers from a distance of 2m with the help of audio and visual signals. Each marker locator provided shall be complete with its set of accessories. The electronic markers shall be buried underground 30 mm above the lid of each jointing pits and shall not be in direct contact with any metallic body.			
FIBRE TERMINATION CLOSURE:				
31.	FTC should be specified by the bidders. It may be wall-mounted, outdoor type powder-coated stainless steel or any other suitable material.	To be checked physically by BOO Firm has also to submit undertaking in this regard.	FTC must be wall-mounted, outdoor type powder-coated stainless steel or any other suitable material. Undertaking must be taken in this regard.	
POWR SOURCE:				
32.	System should operate on 90V - 230 V AC, 50 Hz as well as on DC source (12V to 24 V battery) in case AC mains not available. Suitable charging system should be provided for charging batteries	To be checked physically by BOO. Operational life of battery should be checked by connecting the system on battery for minimum 10 hrs.	System must operate on 90V -230 V AC, 50 Hz as well as on DC source (12V to 24 V batteries) in case AC mains not available. Suitable charging system mustbe provided for charging batteries	

TECHNICAL LITERATURE:				
33.	Firm/bidder to submit following tech. literature- i) Training manual and user hand book. ii) Repair Manual.	An undertaking given by the firm in this regard.	An undertaking must be taken in this regard.	

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ADG (Log) BSF

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Comdt, SIW BSF

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BSF

(Rajan Jain), 2IC
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Assam Rifles

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(ASI/Comn Ram Kishor Swami)
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(Insp/RM Manish Raj)
SIW, BSF

(Insp/Tele Suresh Chandra)
ITBP

(Insp/RO Apoorv Awasthi)
BSF

(V.G.Iyer) PSO (B&E)
BPR&D

APPROVED/ ~~NOT APPROVED~~

(Vivek Kumar Johri) IPS
DIRECTOR GENERAL,
BORDER SECURITY FORCE