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No. P-63013/07/2017-Mod-I/BSF 1221-30
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 2 July 2019

To,

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

Sub: **Forwarding of QRs and Trial Directives of OFC Based Intrusion Detection System (ZB DAS)**

Find enclosed herewith QRs and Trial Directives of **"OFC based intrusion detection system (ZB 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.
3. Comn & IT Dte Eqpt Section : W.r.t. your UO No. 1329 dated 17th May 2019.

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Directorate General Border Security Force
(Prov Dte: Mod Cell)

Expression of Interest

Dy. Inspector General (Ord)
HQ DG BSF, Prov Dte (Ord Sec)
Block No. 10, CGO Complex
Lodhi Road, New Delhi
(Tele/Fax No. 011-24367683)
Mail id: comdtord@bsf.nic.in

The Sub-group of technical experts on surveillance equipment constituted by MHA vide their letter No. IV-17017/18/2001-Prov-I dated 05 Jul 2002 held its meeting at BSF HQ on 15th May 2019 and 31st May 2019 to formulate the QRs of **OFC based Intrusion Detection system (ZB DAS)**.

After detailed deliberation the referred Sub-group of technical experts has formulated the QRs and TDs of **OFC based Intrusion Detection system (ZB DAS)** on 31st May 2019 which are as under:-

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

ZB-DAS: - Zone based distributed acoustic sensors are useful for the area where deployment is geographically distributed due to various reasons or under different level of operational control. The system is working on interferometer technology and analyses the variation of voltage level, phase etc. with previous reading. Normally 3 cores of a fibre cable are utilized for defining a zone or a physical patch with a coverage distance up to 250 mtr. One 12 core OFC cable will support maximum of 4 Zones with coverage up to 1 KM. The advantage of ZB-DAS over the DAS technology is that the equipment can be placed in the field at different locations and connected together in a centralized location through LAN. The added facility is that it provides an alert generation at the hardware unit where the sentry is placed and further sent the alert to the centralized location like C2 or at the independent system software. Where as in case of DAS generation of the alert at field level is not possible. The DAS will provide the alert only at a centralized location only.

Both the equipments are capable to detect the intrusion above and under the ground but the selection of technology should be wise as per the field requirement. The QR/TD of ZB-DAS for tunnel detection is as under: -

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
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 be 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% 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 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.
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.
	Operational Capability
13.	OFC based Intruder Detection System should be able to detect ground vibrations and activities like digging/tunneling.
14.	**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.**
15.	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.
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.	Total length of patch where system is to be deployed should be divided into various zones/segments and particular segment/zone of intrusion be distinctly identified at system software. Intrusion in any of the segment be depicted with different Colour (Green/Red). Green for normal and red for intrusion detection.
18.	System should be able to distinctly detect and generate alert on separate zones on simultaneous multiple intrusions. A strip of 5 meter with its centre passing over the alignment of OFC shall be marked on the ground any movement with steps within this strip will be considered as an alert activating stimulus.
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, enabling/disabling a particular segment/zone 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 layout available for a 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 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.
POWER 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

TECHNICAL LITERATURE:	
33.	Firm/bidder to submit following tech. literature- i) Training manual and user hand book. ii) Repair Manual.

(Ashok Kumar Sharma)
ADG (Log) BSF

(Rajnish Kumar), PSO (E)
BPR&D

(Surender Singh)DC
CRPF

(R K Meel), DC
CISF

(Pawan Kumar),Sqn Cdr
NSG

(Gagan Bhardwaj), AC
SIW, BSF

(SI/RM Subhash)
SIW, BSF

(Insp/Tele Thakar Ram)
ITBP

APPROVED/ ~~NOT APPROVED~~

(Rajni Kant Mishra) IPS
DIRECTOR GENERAL
BORDER SECURITY FORCE

TRIAL DIRECTIVES FOR SCOPE OF WORK, USER REQUIREMENTS AND TECHNICAL EVALUATION DOCUMENT (ZB 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 Directive	Marking Evaluation
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.**	Firm/bidder should give undertaking regarding the same	Qualifying only
2.	OFC should be of latest editions of standards like ITU-T, TIA, IEC, EIA, ASTM, BS, TEC & DOT (as applicable)	Firm/bidder should give undertaking regarding the same	Qualifying only
3.	The OFC should be as per ITU-T-G 652/655 or better specifications.12/24 core as per field requirement	Firm/bidder should give undertaking regarding the same	Qualifying only
4.	The OFC should be suitable for capturing vibrations (over ground/underground) with armored/other suitable variants in outer jacket.	Firm/bidder should give undertaking regarding the same	Qualifying only
5.	Length of CSTA (with ECCSA) underground burial type OFC per drum should be 2km±5% as per the field requirement	Firm /bidder should give undertaking/certificate regarding the same	Qualifying only

6.	OFC should be protected against damages from termite, rodent, fire, moisture and water over the lifetime of the cable.	Firm/bidder should give undertaking/certificate regarding the same	Qualifying only
7.	The outer surface of each completed cable shall be subsequently numbered with metric length markers spaced at regular intervals.	Firm/bidder should give undertaking/certificate regarding the same	Qualifying only
8.	Temperature for Installation & Operation should be -5° C to +60° C and for storage -25°C to +65° C.	Firm/bidder should submit certificate from any Govt. approved lab/NABL/ILAC/OEM	Qualifying only
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/bidder should submit certificate from any Govt. approved lab/NABL/ILAC/OEM	Qualifying only
10.	Minimum bending radius should be 20 X cable diameter. **If armored cable maximum diameter 13mm.**	Firm/bidder should submit certificate from any Govt. approved lab/NABL/ILAC/OEM	Qualifying only
11.	Maximum overall diameter of the cable should be 16 mm.	To be checked by BOO/ OEM certificate to be submitted by the firm/bidder.	Qualifying only
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.	Undertaking / Certificate to be given by the firm/bidder.	Qualifying only

OPERATIONAL CAPABILITY:

13. OFC based Intruder Detection System should be able to detect ground vibrations and activities like digging/tunneling.

Sensor efficiency

S/No.	Type of exercise	Maximum Marks	Marks scored
(1)	(2)	(3)	(4)
a)	Moving	10	
b)	Crawling	10	
c)	Digging	10	
d)	Cattle movement	10	
A) Grand Total		40	
B) 50% of the grand total		20	

Note:- Zero score in any of those exercises will amount to disqualify of the sensor.

ii) Passing average is 50% of the total of the maximum marks.

System be physically checked by simulating various conditions mentioned in left side of the para as mentioned below: -

a. Person to start moving from a distance of 05 mtr @ 4Km/h towards sensor and note the distance from where detection starts and check variation in intensity at every mtr.

Display unit/ C2 to give graphical representation of human detection, as well as audio and visual alarm.

Scoring System of detection:-

(a) At the distance of 05 mtr and above from mid point of the sensor strip – 10 Marks

(b) At the distance from 04 to 05 mtr from mid point of the sensor strip – 08 Marks

(c) At the distance from 03 to 04 mtr from mid point of the sensor strip – 06 Marks

(d) At the distance from 02 to 03 mtr from mid point of the sensor strip – 04 Marks

(e) At the distance from 01 to 02 mtr from mid point of the sensor strip – 02 Marks

(f) At the distance less than 01 mtr from mid point of the sensor strip – 00 Marks

		b. Person to move in crawling position from a distance of 05 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 a distance of 05 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 05 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.	**Scoring System of detection**:- **(a)** At the distance of 05 mtr and above from mid point of the sensor strip – 10 Marks **(b)** At the distance from 04 to 05 mtr from mid point of the sensor strip – 08 Marks **(c)** At the distance from 03 to 04 mtr from mid point of the sensor strip – 06 Marks **(d)** At the distance from 02 to 03 mtr from mid point of the sensor strip – 04 Marks **(e)** At the distance from 01 to 02 mtr from mid point of the sensor strip – 02 Marks **(f)** At the distance less than 01 mtr from mid point of the sensor strip – 00 Marks

14.	**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.**	Boo to check by 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	Qualifying only
15.	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.	Qualifying only
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.	Sensors be physically checked by simulating various targets or digging work for 20 times. Sensor should have high detection rate. Failure rate should not be more than 10 % of total intrusion. System should detect activities minimum 03 mtrs from the sensor.	3 or more than 3 missed detections - disqualified 2 miss -detection – 5 marks 1 miss-detection – 7 marks No miss- detection - 10 marks
17.	Total length of patch where system is to be deployed should be divided into various zones/segments and particular segment/zone of intrusion be distinctly identified at system software. Intrusion in any of the segment be depicted with different Colour (Green/Red). Green for normal and red for intrusion detection.	Check the feature by moving different targets in different zones simultaneously. At C2, alert in each zone should be shown distinctly.	Qualifying only

18.	System should be able to distinctly detect and generate alert on separate zones on simultaneous multiple intrusions. A strip of 5 meter with its centre passing over the alignment of OFC shall be marked on the ground any movement with steps within this strip will be considered as an alert activating stimulus.	Check the feature by moving different targets at different zones simultaneously. Alert in each zone should be shown distinctly at control unit.	Qualifying only
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.	Qualifying only
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.	Qualifying only
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.**	An undertaking in this regard is to be submitted by the firm/bidder.	Qualifying only

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.	Qualifying only
23.	Joint closures should be water resistant. IP-68 complied.	Firm/bidder should submit certificate from any Govt. approved lab/NABL/ILAC/OEM.	Qualifying only
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.	Qualifying only
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.	Qualifying only
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.	Qualifying only
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	Firm/bidder should submit undertaking in this regard.	Qualifying only
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.	Qualifying only

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.	Qualifying only
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 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.	Firm should submit undertaking/certificate in this regard. A sample should also be submitted and to be checked by the BOO.	Qualifying only
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 specified by the bidder and sample to be checked by the BOO. Firm has also to submit undertaking in this regard.	Qualifying only

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. Operational life of battery should be checked by connecting the system on battery for minimum 10 hrs.	Operation on AC mains- qualifying only. Operation life on DC- For 8 hrs. – 8 marks For every additional hour- 1 marks (max 10 marks)
TECHNICAL LITERATURE:			
33.	Firm/bidder to submit following tech. literature- i) Training manual and user hand book. ii) Repair Manual.		

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ADG (Log) BSF

(Rajnish Kumar), PSO (E)
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(SI/RM Subhash)
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