



**Acquisition**

viktorija.navikaite@ncia.nato.int

Telephone: +32 (02) 707 8210

Fax: +32 (02) 707 8770

NCIA/ACQ/ASG/16/875  
25 February 2016

**To:** Prospective Bidders  
**From:** The General Manager, NATO Communications and Information Agency (NCI Agency)

**Subject:** **AMENDMENT NO. 4 TO THE INVITATION FOR BID NO. IFB-CO-13733-BRASS-BGR**  
**PURCHASER ANSWERS TO CLARIFICATION REQUESTS**

**'Provide Broadcast, Maritime Rear Link And Ship-Shore Baseline Implementation South in Bulgaria (BRASS-BGR)'**

**References:** A- AC/4-2261 (1996 Edition)  
B- AC/4(PP)D/26580-ADD1, AC/4-DS(2012)0028  
C- AC/4(PP)D/26580-ADD2, AC/4-DS(2013)0022  
D- AC/4(PP)D/26580-ADD3, AC/4-DS(2015)0012  
E- NCIA/ACQ/ASG/2015/832, dated 20 February 2015  
F- NCIA/ACQ/ASG/2015/1607, dated 29 October 2015  
G- NCIA/ACQ/ASG/2015/1766, dated 1 December 2015  
H- NCIA/ACQ/ASG/2015/1843, dated 4 January 2016  
I- NCIA/ACQ/ASG/2016/845, dated 9 February 2016

**Prospective Bidders:**

1. At Reference (F) your firm was invited to participate in an *International Competitive Bid* for the provision of Broadcast, Maritime Rear Link (MRL) And Ship-Shore Baseline Implementation South in Bulgaria.
2. At Reference (G) the NCI Agency issued, through Amendment No. 1 to the IFB, the slides presented during the Bidders Conference held in Varna (Bulgaria) on 26 November 2015.
3. At Reference (H) the NCI Agency issued, through Amendment No. 2 to the IFB, the answers to the Clarification Requests received from Prospective Bidders (CRs A1-A4, T1-T88), and amended the subject IFB accordingly.
4. At Reference (I) the NCI Agency issued, through Amendment No. 3 to the IFB, the answers to the Clarification Requests received from Prospective Bidders (CRs A5-A6, T89-T182), and amended the subject IFB accordingly.

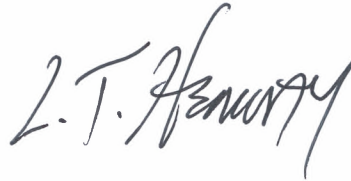


NATO Communications  
and Information Agency  
Agence OTAN d'information  
et de communication  
Avenue du Bourget 140  
1140 Brussels, Belgium  
www.ncia.nato.int

5. The purpose of this Amendment No. 4 to the IFB is to publish the answers to the Clarification Requests received from Prospective Bidders (Attachment (B), CRs T183-T226), and to amend the subject IFB accordingly.
6. As a direct or indirect result of the Clarification Requests, Book II Part IV Statement of Work Annex A (Attachment (C)) has been amended and is re-issued in its entirety. The changes have been marked in yellow.
7. With the exception of the revisions mentioned above, all other IFB documents remain unchanged from their last issued version.
8. In order to ensure that the Prospective Bidders have the sufficient time to revise their Bids accordingly, **THE BID CLOSING DATE IS HEREWITH EXTENDED BY FOURTEEN (14) CALENDAR DAYS AND IS NOW AS FOLLOWS: 15:00 HOURS (BRUSSELS TIME) ON 24 MARCH 2016.**
9. Bidders are reminded to treat classified material under subject IFB in accordance with the applicable Security regulations. When received by the Bidders, such classified material shall be under their responsibility and Bidders shall be responsible, in accordance with NATO and National Security regulations, for the proper handling, storage and control of this classified material, including any transmission to partners and sub-contractors. **Bidders are cautioned that any classified material cannot be transmitted through electronic transmission over the Internet nor published on the Internet.**
10. For companies which have not yet done so, you are kindly reminded to complete and return the **Acknowledgement of Receipt** form at Reference (F), informing the NCI Agency of your intention to bid/not to bid.
11. The NCI Agency sole Point of Contact (POC) for all information concerning this IFB is:

Ms Viktorija Navikaitė  
E-mail: viktorija.navikaite@ncia.nato.int  
Tel: +32 (2) 707 - 8210 / Fax: +32 (2) 707 – 8770  
NCI Agency  
Acquisition/ASG  
Avenue du Bourget 140  
B-1110 Brussels, Belgium

FOR THE GENERAL MANAGER:



L.T. Herway  
Chief of Contracts

Attachments:

- (A) Distribution List
- (B) Purchaser answers to the Clarification Requests (third release)
- (C) Electronic Soft Copy (PDF) of IFB-CO-13733-BRASS-BGR-AMD4 Book II  
Part IV Statement of Work Annex A



**Attachment A**  
**Distribution List for**  
**IFB-CO-13733-BRASS-BGR-AMD4**

**NOMINATED BIDDERS**

1 Each

**NATO Delegations** (Attn: Investment Adviser):

Belgium	1
Bulgaria	1
Canada	1
Czech Republic	1
Denmark	1
Estonia	1
Germany	1
Greece	1
Hungary	1
Iceland	1
Italy	1
Latvia	1
Lithuania	1
Luxembourg	1
Netherlands	1
Norway	1
Poland	1
Portugal	1
Romania	1
Slovakia	1
Slovenia	1
Spain	1
Turkey	1
The United Kingdom	1
The United States	1

**Belgian Ministry of Economic Affairs**

1

**Embassies in Brussels** (Attn: Commercial Attaché):

Bulgaria	1
Canada	1
Czech Republic	1
Denmark	1
Estonia	1
Germany	1
Greece	1
Hungary	1
Iceland	1
Italy	1
Latvia	1



Lithuania	1
Luxembourg	1
Netherlands	1
Norway	1
Poland	1
Portugal	1
Romania	1
Slovakia	1
Slovenia	1
Spain	1
Turkey	1
The United Kingdom	1
The United States	1

**Distribution for Information (Blind to Bidders):**

**NATO HQ**

NATO Office of Resources

Management and Implementation Branch – Attn: Deputy Branch Chief 1

Director, NATO HQ C3 Staff

Attn: Executive Co-ordinator 1

SACTREPEUR

Attn: Investment Assistant 1

SACEUREP

Attn: Investment Assistant 1

Strategic Commands

HQ SACT Attn: ACOS C4ISR 1

ACO AGSIO Attn: SPT CIS Director 1

**NCI Agency - Internal Distribution**

DACQ – Mr Peter Scaruppe (via Ms D. Cani) 1

CAB Secretary – Ms M.L. Le Bourlot 1

ACQ Chief of Contracts – Mr L.T. Herway 1

ACQ Principal Contracting Officer – Ms T. Pezzi 1

ACQ Senior Contracting Assistant – Ms V. Navikaitė 1

ACQ ILS – Mr C. Lucas 1

SStrat NLO – Mr C. Ulsh (via Mr E. Pecorella, Mr D. Harman) 1

Legal Adviser – Ms S. Rocchi (through Mr V. Roobaert) 1

FMU – Ms I. Nechelput 1

Service Strategy – Mr M. Davidson 1

DM – Mr E. Lesbaupin 1

NSII SL Chief – Mr T. Plachecki 1

NSII SL WMSA – Mr D. Kallgren 1

NSII SL Project Manager – Mr B. Ayvat 1

Registry 1

**NCI Agency - NATEXs**

All NATEXs (except Albania, Croatia, France) 1 Each

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
A.1	Book I Par. 2.15.2, 4.2.3 and 4.3.1a, Bidders' Conference Presentation related to Contractual matters	Could you please clarify the "conditioned" offers with an example?	Conditioning the Delivery Dates set by Prospective Contract SSS, imposing particular conditions to the pricing listed in the Bidding Sheets, Supplemental Agreements inconsistent with the terms of the Prospective Contract.	No
A.2	Book I Annex B-13	Can an entity (firm, company, professional expert etc) for the present IFB, to participate as a subcontractor with more than one bidders?	Yes, one entity may be identified as a subcontractor by multiple Prime Bidders.	No
A.3	SOW Annex-C	What if it results that the height of a DLOS mast is too low?	Engineering Changes after Contract Award will be dealt in accordance with the stipulations of the Contract General/Special Conditions.	No
A.4	Appendix 1 to Book II Part IV Annex-A	In the referred document is reported: "2.5. The design, production and installation of the antenna masts shall comply with following standards:	1. It is the Contractor's responsibility to verify and demonstrate, to the satisfaction of the Purchaser, that structures,	No

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
	Section 2	<p>2.5.1. EN ISO 1461 – Hot dip galvanized coatings on fabricated iron and steel articles;</p> <p>2.5.2. EN 10204 Metallic materials. Types of inspection documents</p> <p>2.5.3. EN 10025 – Hot rolled products of structural steels. General technical delivery conditions;</p> <p>2.5.4. EN ISO 14 713 (Part 1, 2 and 3) – Zinc coatings -- Guidelines and recommendations for the protection against corrosion of iron and steel in structures;</p> <p>2.5.5. EN 10210-1 – Hot finished structural hollow sections of non-alloy and fine grain steels;</p> <p>2.5.6. ISO 898 (part 1, 2 and 5) – Mechanical properties of fasteners made of carbon steel and alloy steel;</p> <p>2.5.7. ISO 5817 – Welding -- Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) -- Quality levels for imperfections;</p> <p>2.5.8. ISO 6520-1 – Welding and allied processes -- Classification of geometric imperfections in metallic materials -- Part 1: Fusion welding-“</p> <p>Taking in consideration that most of the antenna manufacturing are USA companies and most of the</p>	<p>equipment and/or systems can be designed, built and installed on the territory of HN even though they are designed, built and/or installed according to US and/or CANADA standards.</p> <p>2. If requirement 1. is met in accordance with HN local respective laws and regulations, USA and Canada standards could be accepted as a valid alternative to the EU Standards on the condition that:</p> <p>- USA and Canada standards stipulate requirements equivalent to or exceeding requirements stipulated in the EU standards. Verification and demonstration of this condition, to the satisfaction of the</p>	

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*												
		<p>primary products available in the market are compliant with the American and Canadian Standards , already and widely used in the NATO existing system, considering also that, despite all the efforts spent we have not been able to find a formal cross reference among the American and European standards, considering, finally, that the available literatures reports that the two standards American and European, in principle are fully compatible unless a few slight differences,</p> <p>Question:</p> <p>With respect to the following comparison table we ask, if the USA and Canada standards as mentioned in the table could be accepted as an valid alternative to the EU Standards?</p> <table border="1" data-bbox="590 997 1325 1399"> <thead> <tr> <th data-bbox="590 997 705 1105">REF</th> <th data-bbox="705 997 982 1105">DESCRIPTION</th> <th data-bbox="982 997 1098 1105">EU STDS</th> <th data-bbox="1098 997 1325 1105">USA SDTS</th> </tr> </thead> <tbody> <tr> <td data-bbox="590 1105 705 1295">2.5.1</td> <td data-bbox="705 1105 982 1295">Hot dip galvanized coatings on fabricated iron and steel articles;</td> <td data-bbox="982 1105 1098 1295">EN ISO 1461</td> <td data-bbox="1098 1105 1325 1295">ASTM A 123</td> </tr> <tr> <td data-bbox="590 1295 705 1399">2.5.2</td> <td data-bbox="705 1295 982 1399">Metallic materials. Types of</td> <td data-bbox="982 1295 1098 1399">EN 10204</td> <td data-bbox="1098 1295 1325 1399">ASTM A36 or CSA G40.21</td> </tr> </tbody> </table>	REF	DESCRIPTION	EU STDS	USA SDTS	2.5.1	Hot dip galvanized coatings on fabricated iron and steel articles;	EN ISO 1461	ASTM A 123	2.5.2	Metallic materials. Types of	EN 10204	ASTM A36 or CSA G40.21	<p>Purchaser, is sole responsibility of the Contractor;</p> <p>- All contractual requirements stipulated in the SOW are met although USA and CANADA standards are applied.</p> <p>3. NOTE: Please pay attention to BOOK II PART III (GEN.PROV.), paragraph 6 AUTHORISATION TO PERFORM/CONFORMANCE TO NATIONAL LAWS AND REGULATIONS, particularly sub-paragraph 6.2.</p>	
REF	DESCRIPTION	EU STDS	USA SDTS													
2.5.1	Hot dip galvanized coatings on fabricated iron and steel articles;	EN ISO 1461	ASTM A 123													
2.5.2	Metallic materials. Types of	EN 10204	ASTM A36 or CSA G40.21													

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION				NCI AGENCY ANSWER	STATUS*
			inspection documents				
		2.5.3	Hot rolled products of structural steels. General technical delivery conditions;	EN 10025	ASTM A36 or CSA G40.21		
		2.5.4	Zinc coatings -- Guidelines and recommendations for the protection against corrosion of iron and steel in structures;	EN ISO 14 713	ASTM A 123		
		2.5.5	Hot finished structural hollow sections of non-alloy and fine grain steels;	EN 10210 -1	Hot dipped galvanize per ASTM A 123		
		2.5.6	Mechanical properties of fasteners made of	ISO 898	ASTM A325, ASTM A307		

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION				NCI AGENCY ANSWER	STATUS*
			carbon steel and alloy steel;				
		2.5.7	Welding -- Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) -- Quality levels for imperfections;	ISO 5817	CSA W59-Steel, CSA W59.2 Aluminum		
		2.5.8	Welding and allied processes -- Classification of geometric imperfections in metallic materials - Part 1: Fusion welding	2.2.8 ISO 6520-1	CSA W59-Steel, CSA W59.2 Aluminum		
<b>A.5</b>	Book I Bidding Instructions 1.3.2	According to Book I Item 1.3.2 the Final System Acceptance should be completed in 16 months. However, the Schedule of Major Performance Milestones in various				This is the calculation method behind the project implementation duration:	Yes, IFB AMD3

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
	BOOK II PART I SECTION 2 -  SSS	documents such as SSS requires <u>64 weeks</u> which is approximately 5 weeks less than 6 months!  Please clarify!	1 month = 4 weeks  16 months = 16x4=64 weeks  However, for the avoidance of confusion, Book-I paragraph 1.3.2 will be modified as to read:  The Contractor shall achieve Final System Acceptance <b>within sixty four (64) weeks</b> after the Effective Date of Contract (EDC).	

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
A.6	AMD2- SSS  BOOK II PART I SECTION 2  CSP  10.10 Payment schedule	<p>The way the payments were planned in the project, the cash flow was not sufficient to run the project, which requires additional financing, and related costs to be added on top of the price of the bids.</p> <p>A typical finance plan for a Contractor is estimated as follows;</p> <p>EDC + 6w: 20% which is the advance payment of all hardware and software deliverables to the suppliers.</p> <p>EDC + 12w: 5% Site surveys, engineering, project management works,</p> <p>EDC + 44w: 50% after successful FAT, <u>all manufacturers and suppliers are paid in full</u> at this stage, in addition to that the project management, engineering teams costs adds up from the start of the project and site infrastructure costs (where it should be partially completed),</p> <p>EDC + 64w: 25% site installations, trainings, tests, documentation everything should be completed.</p> <p>The Purchaser and HN are kindly requested to consider a revised payment plan, which eliminates the additional finance cost of the project and in result, a lower price offer can be submitted by the Bidders!</p>	<p>The proposed payment plan is not acceptable.</p> <p>40% prior to delivery and installation is reasonable, also taking into account that there is only 12 weeks difference between FAT and SAT.</p> <p>Payment plan as included in IFB takes into account implementation risks, furthermore, the Bidders shall demonstrate in their price proposal that the corporation has sufficient financial resources to undertake the project and perform the contract or the ability to obtain them..</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.1	SOW Annex-C	Where will the main power supply be located in the ACMS?	The MPDB will be located in room 021.1 (see new drawing File: IFB AMD1_Figure-2 of Appendix 1 to SOW Annex-C)	Yes - IFB AMD2
T.2	SOW Annex-C	Can the Contractor use the current mast for DLOS antenna in ACMS and other sites?	No	No
T.3	SOW paragraph 3.4 and 3.5	Is it Contractor responsibility to make the wall penetrations for the cable to the DLOS antenna?	It is HN civil works contractor's responsibility Please see SOW paragraph 3.4.4.hh. DLOS radios shall be installed by the Contractor at the adjacent room unless self-contained DLOS radios are installed on the antenna mast.	No
T.4	SOW Annex-C	Is there line of sight between the three sites?	Yes, there is line of sight between the three sites with proper masts.	No
T.5	SOW Annex-C	Will the outdoor fuel storage tanks be removed in the ACMS?	Yes, they will be removed.	No

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.6	SOW Annex-C	If it requires, can HN provide to use a second room for BRASS equipment?	Yes, only for the black equipment	No
T.7	SOW Annex-C	<p>What is the dimension of the area for BRASS system in the Tx?</p> <p>There is a minor mismatch in the drawings in Annex C. The drawing says that there are 6 windows, but in reality there are 7.</p>	The revised set of drawings will be released in the updated version of SOW Annex C (File: IFB AMD1_Figure 4 of Appendix 1 to SOW Annex-C). Please disregard the number of the Windows at Figure 6 of Appendix-1 to SOW Annex-C.	Yes, IFB AMD2
T.8	SOW Annex-C	<p>What is the border of antenna field and Military area? There are just 2 drawings and one google picture which do not provide many details. Is there sufficient space?</p> <p>Please provide scaled drawings for antenna fields of Tx and Rx sites</p>	<p>The revised set of drawings will be released in the updated version of Annex C.</p> <p>Please see Revised Figure-3 (Tx site Antenna Field) and Figure 7 (Rx site Antenna Field) of Appendix-1 to SOW Annex-C</p>	Yes, IFB AMD2

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.9	SOW Annex-C	What is the height of the existing national HF radio antennas mast in Tx and Rx sites?	The height of the existing national HF radio antennas mast : - in Tx site – 40 m - in Rx site – 20 m	No
T.10	SOW Annex-C	Will old national DLOS antennas mast be removed from the transmitter site?	No, it will not be removed. An additional DLOS antenna mast shall be installed by the Contractor	No
T.11	SOW Annex-C	Will the dimensions of the room stay the same in ACMS?	No, a raised floor will be installed 40 cm above the concrete floor. It will be done for BRASS and Crypto rooms	No
T.12	SOW Annex-C	Will there be an equipment storage for all sites?  If so, what are the dimensions for storage rooms for ACMS, Tx and Rx sites	The storage will be provided to the equipment such as large volume antenna mast, there will be no storage available.  ACMS site.  There are two possible storage facilities:  The first one is situated 2 km from the ACMS site. It is a vehicle	Yes, IFB AMD2

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
			<p>cage with dimensions: height – 4m., width – 4m., and length – 18.7m. The entering check-point is 4.4 meters wide and 4.2 meters high.</p> <p>The second one is a room in ACMS site building. It's dimensions are: height – 2.8m., width –3 m. and length – 4.m. The front door is 1 m in width and 2 m in height.</p> <p>Tx site.</p> <p>There are two possible storage facilities:</p> <p>The first one is a room situated in TX site building. Its dimensions are: height – 3m, width – 6.2m and length – 13.2m. The front door is 1.6m in width and 2.2m in height.</p>	

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
			<p>The second one is an old mess-room situated 5-6 km from the transmitting site. Its dimensions are: height – 3.5m, width – 7.2m, and length – 23.2m. The front door is 1.6m in width and 2.2m in height. There are two stairs in front of the front door.</p> <p>Rx site.</p> <p>There is one possible storage facilities:</p> <p>It is an old mess-room situated 2 km from the receiving site. It's dimensions are: height – 3.5m, width – 7.2m and length – 23.2m. The front door is 1.6m in width and 2.2m in height. There are two stairs in front of the front door.</p>	

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
			<p>On all of the three sites it is possible large-scale spare parts to be stored outdoor.</p> <p>Each site is a military armed zone.</p>	
T.13	SOW Annex-C	Is a fibre connection possible between the sites?	No, it is not possible.	No
T.14	SOW Annex-C	Will Elevated concrete floor in the Crypto room in ACMS site be removed?	Yes, it will be removed	No
T.15	SOW Annex-C	Has the connectivity of three sites been tested?	Yes it was tested	No
T.16	SOW Annex-C	Will National Crypto be used for this project?	No, only NATO Crypto will be used for BRASS BGR project.	No
T.17	SOW Annex-C	Is it possible to add places where antennas will not be removed into the drawings?	Please see Revised Figure-3 and Figure 7 of Appendix-1 to SOW Annex-C	Yes IFB AMD2

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.18	SOW Annex-C	Will HN prepare access roads to Antennas in Rx and Tx sites? Such as 30 tones capacity cranes can ride to the rotatable antennas	Yes, it is HN's responsibility. Please see SOW paragraph 3.4.4.x.	No
T.19	Book II Part I Section 1 CLIN 5.1.11	What is the TEMPEST protection in SSS	TEMPEST protection covers the additional hardware required such as TEMPEST enclosures/racks and filters. Please see Book II Part IV (SOW) paragraphs 3.5.20; 4.5; 12.5.1.h as well as SOW Annex-A paragraphs 5.2.8.a; 6.5.3.h; 6.5.14; 6.7.10.d.ii; 6.10.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.20	Book II Part I Section 1 CLIN 5.1.11	Is it Contractor responsibility to design a TEMPEST room in the ACMS?	It is not the Contractor’s responsibility to design a TEMPEST room in the ACMS. TEMPEST requirements shall be met by using TEMPEST hardware and/or TEMPEST enclosures/racks. Contractor’s Tempest Responsibilities are clearly indicated in SOW paragraphs 3.5.20; 4.5; 12.5.1.h as well as SOW Annex-A paragraphs 5.2.8.a; 6.5.3.h; 6.5.14; 6.7.10.d.ii; 6.10.	No
T.21	SOW Annex-C Paragraph 2.1 Figure-2	Figure-2 shows ACMS Site/Rx site. Please clarify.	Relevant place in Figure 2 shall be as to read “ACMS Site”.	Yes IFB AMD2

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.22	-	Is there OTAM antenna in ACMS?	All BRASS Receiver related equipment (receivers, receiver antennas, etc...) shall be located in the Receiver site. ACMS will have only DLOS Antennas.	No
T.23	SOW paragraph 3.4 AND 3.5	Is fire extinguishing system HN responsibility?	Yes providing Fire Extinguishing System is HN's responsibility. Please see SOW paragraphs 3.4.2; 3.4.4.q; 3.4.4.mm	No
T.24	Sow Annex-C	Is it possible to have enhanced drawings of the sites and rooms?	Yes, figures 1,2,3, 4,7,8 in Appendix-1 to SOW Annex-C were revised and enhanced.	Yes, IFB AMD2
T.25	SOW Annex-C	Can the top of the building in the ACMS site be considered as an option for DLOS antenna? And are there any restrictions to do it (warranty)?	No, top of the building in ACMS site cannot be considered as an option for DLOS antenna.	No
T.26	SOW paragraph 3.4	Who should provide the trenching from the DLOS antenna to building?	HN's civil works contractor. Please see SOW paragraphs 3.4.2; 3.4.4.x; 12.5.1.o.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.27	SOW paragraph 3.5	Who is responsible for connection between mast tower and power supply?	It is Contractor's responsibility. Please see SOW paragraphs 3.5.12.	No
T.28	SOW Annex-A	What is the starting frequency for Rotatable Horizontal LOG-periodic (RLP) antenna?	The RLP antenna shall be designed for use 4-30 MHz	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

<p><b>T.29</b></p>	<p>SOW paragraph 3.4 and 3.5</p>	<p>Who will provide cabling in different rooms? Who will make the holes in the wall?</p>	<p>Book II Part II (Contract Special provisions Article 27: The Contractor shall be responsible for connecting, mounting, installing, integrating and cabling of the delivered equipment within the sites and at the interface with the National Defense Network (NDN) and at the interface with Power Supply System. The Contractor shall be responsible for connecting all the BRASS equipment with the requisite utility outlets.</p> <p>In addition, please also see SOW paragraphs 3.4.4.L; 3.4.4.kk; 3.5.13.a; 3.5.18 and 4.7.</p> <p>Host Nation’s Civil Work Contractor will make the wall penetrations. Please see SOW 3.4.4.hh and 3.4.4.ii.</p>	<p>No</p>
--------------------	----------------------------------	--	--	-----------

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.30	SOW paragraph 3.4	Who is responsible for civil works contractor performance?	<p>The contact point is NCI Agency, please consider that civil works can be fine-tuned after they are done, in order to address the requirements</p> <p>HN has contract with civil works contractor.</p>	No
T.31	SOW Annex-C	<p>a. How many existing national equipment will be used in transmitter room? What is the power for each?</p> <p>b. What are the Electromagnetic field and Local regulations in terms of pollution?</p> <p>c. What is the level of radiation in this room prior to installation?</p>	<p>a. There are 15 pcs old transmitters. Not more than 3 pcs of which simultaneously operates with transmission power of 1 kW each</p> <p>b, c : Electromagnetic feed measurements done inside and around radio hall, returned values meeting the requirements of hygiene standards BDS 17137 and BDS 1425-90.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.32	SOW Annex-C	SOW Annex C Figure 5 to Appendix-1 bubble drawing: please clarify what different signs mean.	Bubble drawings indicates trees, lines represent antenna cables etc.	No
T.33	SOW Annex-C	Will the material in transmitter building room no. 3 be removed from the room?	Yes, the material will be removed by the Host Nation from Room Nr. 3 in transmitter building.	No
T.34	SOW Annex-C	Will the antenna feeder lines be removed?	The feeders to the antennas that are removed will also be removed. The other feeders remain.	No
T.35	SOW Annex-C	Annex C drawing showing rhombic underground antenna (in red): will that antenna be removed?	Yes, it will be removed	No
T.36	SOW Annex-C	Can the DLOS rooms in ACMS, Tx and Rx sites be used for other equipment?	Yes, DLOS rooms in ACMS, Tx and Rx sites can be used for other BRASS equipment.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.37	--	At which phase the Contractor needs to submit a request to the Host Nation asking for the antennas size and location boundaries?	The Boundaries for the antennas are specified in the Tx and Rx site drawings. Bidders must propose antenna size and location in their bid.	No
T.38	SOW Annex-C	Can you specify the place for the entry point of cabling to the receiver room? Are the cabling/antenna feeder under the floor, the walls?	Contractor shall choose the entry point according to the location of antennas. Please also see Revised Figure 8 Appendix-1 to SOW Annex-C.  The entry point will be below the first floor.	Yes, IFB AMD2
T.39	SOW Annex-C	How many meters to the end of the compound in Rx site? The road is flat or goes up?	300Meters. The road is flat (it will be levelled by the HN)	No
T.40	SOW Annex-C	Where will the generator be located in receiver site?	Generator will be located in a different building, not in receiver building. Please see revised Figure 7 Appendix-1 to SOW Annex-C	Yes, IFB AMD2

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.41	Appendix 1 to Book II Part IV Annex-A Section 3	<p>At the point 3.4 is said:</p> <p>” The mast shall be constructed according to quality craftsmanship standards and shall be of a tubular construction.”</p> <p>Typically, the type of the construction is related to the design of the mast and it does not affect to the functionality of the antenna either for the radio electric and mechanical specifications.</p> <p>Is it accepted the mast construction in angular section instead of tubular section for what concern main structure of the mast and, eventually, in tubular section for what concerns braces of lattice tower masts?</p>	<p>The paragraph 3.4 of the Appendix-1 to Book II Part IV will be amended as to read: The mast shall be constructed according to quality craftsmanship standards <del>and shall be of a tubular construction</del></p>	Yes IFB AMD2

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.42	SOW Annex-C	What are the heights of the existing mast DLOS in ACMS, Rx site and Tx sites?	Height of the existing antenna masts: <b>ACMS:</b> - DLOS - 28m  <b>Tx site</b> - DLOS – 15m - HF - 40m.  <b>Rx site</b> - DLOS - 10 m. - HF – 20 m.	No
T.43	SOW Annex-C	Will the floor be raised in transmitter room?	Yes, the floor in transmitter room will be raised approximately 35-40com	No
T.44	SOW Annex-C	Who is responsible to dismantle the old antennas and mounting the new ones?	HN will dismantle the old antennas. Please see SOW 3.4.2 and 3.4.4.y. Contractor shall mount the new antennas. Please see SOW paragraph 3.5.10	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.45	SOW 12.5	Where will the wall penetrations be?	After the Contractor site survey the wall penetrations will be determined. Please see SOW paragraph 12.5.1.r.	No
T.46	SOW Annex-A 6.11.10.f.ii 6.14.2.b.ii	What will happen if the antenna field is not large enough to ensure 30 DB separation?	<p>Regarding SOW Annex-A 6.11.10.f.ii:</p> <p>If this is not technically possible, Bidder has to inform NCI through clarification requests. The Agency will make an assessment of whether NCI/HN must reduce the number of antennas, or NCI/HN will reduce the requirement for 30DB</p> <p>Regarding SOW Annex-A 6.14.2.b.ii:</p> <p>The requirement for 30 dB link margin for the DLOS remains.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.47	SOW Annex-C	Are there any receivers in the transmitter site apart from BRASS.	Yes, DLOS receivers	No
T.48	SOW Annex-A	Digital antenna matrix is used only for BRASS transmitters and antennas, or for existing equipment as well?	Digital antenna matrix is used only for BRASS.	No
T.49	SOW Annex-C	To which UPS will be anti-collision light be connected?	The anti-collision lights shall receive power from the BRASS dedicated MPDB provided by the Contractor.	No
T.50	SOW Annex-C	Who is responsible for UPS?	There are 2 types of UPS. HN is responsible in the prime power supply system, while the Contractor is responsible for BRASS rack UPSs.	No
T.51	SOW Annex-C	Where is the main power distribution board in the ACMS?	Main PDB is in the generator room, while the BRASS PDB will have to be placed by the contractor in the BRASS room.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.52	SOW 3.5	<p>a. Who is responsible to cut the trees in the transmitter and receiver antenna field?</p> <p>b. Who has a permission?</p> <p>c. How long does it take?</p>	<p>a. Contractor is responsible to cut the trees. Please see Book II Part II Articles 6.1; 30.1 as well as SOW Annex-A Appendix-1 Section 2.4.</p> <p>b. SOW Annex-A Appendix-1 Section 1.2 will be amended as follows:</p> <p>“Contractor is responsible for obtaining all military and Civil permissions for the installation and operation of antenna masts and all related installation activities <b>such as cutting the trees.</b></p> <p>c. The permission procedure could last about one month in accordance with the national legislation.</p>	Yes, IFB AMD2

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.53	SOW 3.4	Will the DPOL antenna be removed from transmitter antenna field?	Dipoles highlighted in red at Figure-5 Appendix-1 to SOW Annex-C will be removed.	No
T.54	SOW Annex-C	Direction of DPOL antenna shall be specified. In which direction should the DPOL antennas be pointed?	Antennas orientation shall be 2 each East, 2 each Southeast and 2 each south	Yes, IFB AMD2
T.55	-	Who is responsible to make DLOS calculation study?	Contractor is responsible to make DLOS calculation study. Please see SOW paragraphs 3.1; 3.5.8; 3.5.9; 3.5.10; 3.5.13 and 3.5.22	No
T.56	SOW Annex-C	Is there visibility between ACMS and transmitter antennas?	Yes	No
T.57	SOW 3.4	Who takes responsibility of the civil works responsibility?	HN will take responsibility for the civil works which will be completed before the system installation begins.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.58	SOW Annex-C	Is there a requirement for a specific routing of cables between DLOS, mast and building such as trenching or cable level?	HN will provide trenching as required for the ducting between DLOS antenna mast and the wall penetration into the room 16. There are no existing cables on/in the ground in this area.	No
T.59	SOW Annex-C	Was the frequency used for the test different from the requirement?	Yes. The frequency was different however, the test confirmed line of sight visibility.	No
T.60	SOW Annex-C	Where is the power supply located in the generator room in ACMS?	Outside of the building, downstairs. However, the civil works contractor will provide an adequate power feed to BRASS room. The contractor shall terminate this power feed in a BRASS distribution panel.  Please also see T-1.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.61	SOW Annex-C	How high is the building outside of the fences in the ACMS? And, how high is the existing tower?	<p>The existing building is not in the line of sight path toward the transmitter and receiver sites.</p> <p>A successful trial has been performed using mobile DLOS equipment positioned where a new antenna mast will be installed. The existing antenna mast is 28 meters.</p>	No
T.62	-	Will the BRASS room be tempested by Contractor?	<p>No, The zoning of the ACMS has been determined by the HN. Contractor shall therefore provide fully tempested (equipment, etc) installation.</p> <p>Please also see T-19 and T-20.</p>	No

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<p><b>T.63</b></p>	<p>Book II Part IV SOW Part 3.4.4.x  Appendix-1 Annex-A</p>	<p>a. NCIA/HN to confirm that the complete preparation of the antenna farms for BRASS and DLOS is under HN responsibility including the clearing of any vegetation (like trees and bush) and the ground levelling.</p> <p>b. NCIA/HN to confirm that paragraph 2.4 of Appendix-1 Annex-A shall not be considered.</p>	<p>a. Cutting trees and getting permissions to cut trees are Contractor’s responsibility. Complete preparation of BRASS and DLOS antenna farms (excluding cutting trees) are Host Nation’s responsibility. Please also see T-52</p> <p>b. Not confirmed. SOW Annex-A Appendix-1 paragraph 2.4 will be modified accordingly as to read: Execution of some of the site preparation works including cutting trees <del>bush and vegetation clearing, demolition works and rubble removal, ground levelling and compacting</del></p>	<p>Yes IFB AMD2</p>

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.64</b>	Book II Part IV SOW Par 3.4.4 (bb)	NCIA/HN to confirm that secured areas allocated to store all BRASS equipment will be located close to the installation areas and to provide the relevant limitations/dimensions.	Please see T-12	No
<b>T.65</b>	Book II Part IV SOW Paragraph 3.5.19	NCIA/HN to confirm that contractor is not responsible to run any power cable from BRASS electrical power distribution board to MPDP.	Not confirmed. Contractor is responsible to provide power cable as stipulated in SOW paragraph 3.5.13.a and 3.5.19	No
<b>T.66</b>		Do we actually require anti-collision lights?	Yes, anti-collision lights are required.	No
<b>T.67</b>	Book II Part IV Annex-B, Section I General paragraph 1.2	At the end of the paragraph, it says the following: The Contractor shall be fully responsible to rectify any deficiency found in the system that stems from the BICC software. Does it mean that the Contractor will be responsible for the deficiencies in the software due to the adaptation for this project, but not done previously in other projects.	Please see SOW annex-A paragraph 5.1.28	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.68</b>	Book II Part IV Annex-A Page 68 paragraph 6.14	<p>A new Digital Line of Sight Connectivity (DLOS) between sites shall be implemented by the Contractor. Can you confirm that DLOS exists between Tx and Rx sites?</p> <p>Can you confirm that crypto is not necessary for DLOS?</p> <p>Can you confirm that we are specifying about the frequency of work for this microwave link?</p>	<p>No, there is Analog LOS existing between Tx and Rx sites.</p> <p>It is confirmed that a separate crypto is not necessary for Digital Line of Sight. See also T-78</p> <p>Contractor shall choose the frequency band for the DLOS whereas the HN will obtain permission for specific frequencies.</p>	No
<b>T.69</b>	SOW Annex-C	Is it possible to add the places where antennas will not be removed into the drawings?	Please see revised Figure 3 Appendix-1 to SOW Annex-C	Yes, IFB AMD2

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

<p><b>T.70</b></p>	<p>Book II Part II</p>	<p>Number of ACMS UPS is 3; Tx UPS is 4; Rx UPS is 3 Can you please give the rationale for these quantities?</p>	<p>3 UPS are for ACMS MPS equipment (Book II Part II CLIN 5.1.9); 3 UPS are for ACMS RSC equipment (Book II Part II CLIN 5.3.7); 2 UPS are for TX RSC equipment (Book II Part II CLIN 6.2.4) 2 UPS are for Tx Radio equipment (Book II Part II CLIN 6.3.7) 1 UPS are for Rx RSC equipment (Book II Part II CLIN 7.2.3) 2 UPS are for Rx radio equipment (Book II Part II CLIN 7.3.6) SOW 3.5.16: The Contractor shall connect all BRASS equipment (except for the 5Kw transmitters) to BRASS dedicated UPS. Please also see SOW Annex-A 6.10.6</p>	<p>No</p>
--------------------	------------------------	--	--	-----------

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.71	SOW Annex-C	In SOW Annex-C; the site layouts have notes which asks for information including “radiation diagrams” Is HN or NCIA going to do isolation and coupling calculations as well as do antenna farm plans?	No, They are the Contractor’s responsibility. Please see SOW paragraphs 4.2.2.k.; 12.2.4.a; 13.7.9.c; as well as SOW Annex-A paragraph 6.11.10.b; 6.11.10.f.ii; 6.11.10.g; 6.12.4.k; Appendix-2 to SOW Annex-A paragraph 1.3 and 3.1  Book-I paragraph 4.4.9.b.xvii	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.72</b>	SOW Section 12	HN Civil Contract Works: If HN is responsible of antenna farm excavation and leveling, how this work will be scheduled to cover BRASS contractor’s requirements for the antennas to be implemented at Tx and Rx sites? Please explain the process and timeline of both contracts (HN local Contract and Contract of this IFB for BRASS BGR).	Please see SOW paragraph 12.5.1.o.  At Contract Award, the proposal provided by the successful Contractor will outline the requirement for excavation and levelling to be performed by the Host Nation. After receipt of the SPDP, the HN will have the details required for executing the civil works to be completed prior to start of implementation (just after Factory Acceptance Tests)	No
<b>T.73</b>	SOW Annex-C	Scaled drawings of Tx and Rx sites are needed for antenna farm design. It will be best if HN can mark the areas for antennas on the drawings.	Some of the drawings were revised in Appendix-1 to SOW Annex-C	Yes, IFB AMD2
<b>T.74</b>	SOW Annex-C	Autocad drawings of all the buildings at ACMS, Tx and Rx sites are required to design room layouts.	Autocad drawings shall be prepared by the Contractor. Please see SOW paragraph 13.12.3	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.75	Book II 6.11.7 HF transmitters d.x	According to reference standard ITU-R SIM 329-7, which category shall be considered for spurious limit value A/B or C?	With reference to Standard ITU-R SM.329-7, the spurious emission limits should be considered Category A. Moreover, the bidder is reminded that MIL STD 188 141 B also applies, namely its broadband and discrete spurious suppression requirements that the HF transmitters shall comply with	No

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.76	<p>* Book II Part IV (SOW) Page 20 - Item 3.4. Purchaser’s and Host Nations’ Responsibilities.</p> <p>* Book II Part IV (SOW) Page 110 - Item 13.1.5.a Technical Manuals</p>	<p>Considering the Purchaser’s and Host Nations’ Responsibilities table, we understand that “Providing and Building responsibility of BRASS dedicated HVAC and Fire Extinguisher System belongs to Host Nation. However the item 13.1.5. states that “The Contractor shall furnish BRASS BGR system user manuals and maintenance manuals ... Whenever in section 13, BRASS BGR system or BRASS BGR system/equipment is mentioned the definitions include BRASS BGR Supporting Systems, <b>provided by the Contractor</b>, such as SB and NB PSS, BRASS dedicated <b>HVAC and FES</b>, antenna masts, Aircraft Warning Lights, Lightning Protection, and Grounding.”</p> <p>Please clarify if the item 3.4 and 13.1.5 conflicts or not and that the providing and building responsibility of HVAC and FES systems belongs to HN.</p>	<p>SOW paragraph 13.1.5.a will be revised as to read: “.....Whenever in section 13, BRASS BGR system or BRASS BGR system/equipment is mentioned the definitions include BRASS BGR Supporting Systems, provided by the Contractor, such as <b>BRASS dedicated SB and NB PSS, BRASS dedicated HVAC and FES</b>, antenna masts, Aircraft Warning Lights, Lightning Protection, and Grounding”</p>	<p>Yes, IFB AMD2</p>

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.77</b>	Book II Part IV ANNEX-A Page 2 - Item 1.2.4.	<p>In Item 1.2.4 It is stated that “The Asparuhovo transmitter site is in an elevated position about 100m above the nearest inhabited areas. Contractor shall take necessary precautions to avoid risk of interference with other commercial, public safety or international users. In the event of unexpected interference being identified, corrective action shall be taken by the Contractor.”</p> <p>If unexpected interference is identified, is it possible to assign another place for building antenna or acceptable to decrease HF 5-kw output power?</p>	<p>If unexpected interference is identified, It is possible to assign another place in the antenna field by the Contractor for building antenna.</p> <p>Decrease of HF 5KW output power is not considered.</p>	No
<b>T.78</b>	* Book II Part IV ANNEX-A Page 23 - Figure 5: BRASS BGR Overview and System Architecture	<p>In figure 5 It is shown that the encryption of DLOS system is provided by commercial encryption.</p> <p>Please clarify this encryption is just for the communication of BRASS related network.</p>	<p>This encryption is only used for the point to point connection and is to be provided by the DLOS equipment.</p> <p>Please also see T-68</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.79	<p>* Book II Part IV ANNEX-A Page 28</p> <p>- Item 6.5.9.b.ii</p>	<p>In Item 6.5.9.b.ii: it is stated that “voice-communications sets to carry on internal operator-to-operator communication and external voice telephony.”</p> <p>Please clarify if these communication sets are the voice terminals of the Voice Management Sub System.</p> <p>If these are another communication sets, please provide the specs of the workstation communication sets.</p>	<p>Confirmed.</p> <p>Voice communications sets are voice terminals of the Voice Management Subsystem.</p>	No
T.80	<p>* Book II Part IV Annex A Page 1 Appendix-2</p> <p>- Item 1.1</p>	<p>In Item 1. 1 It is stated that “The BRASS BGR System shall be designed to operate with concurrent transmissions and receptions at any frequencies within the HF band 2 MHz to 30 MHz.”</p> <p>Most of the manufacturer produces RLP antenna with the frequency range 4-30 MHz.</p> <p>Is it acceptable to offer transmit RLP Antennas with a frequency range of 4-30 MHz.</p>	<p>Yes, 4-30 MHz for RLP antenna is acceptable</p>	No
T.81	<p>* Book II Part IV (SOW) Page 30</p> <p>- Item 3.5.8</p>	<p>In Item 3.5.8 it is stated that “The Contractor shall provide the required DLOS connectivity to provide connection between the ACMS, Tx and Rx sites as stipulated in SOW Annex-A”. However, this requirement is not shown in ACMS site CLIN List. Please clarify it.</p>	<p>This requirement shall be considered in CLIN 5.7.1 ACMS DLOS Base station.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.82</b>	Book II Part IV Paragraph 3.4 PFE Equipment List	What is meant/requested by this kind of “3 TADPOLE Cryptographic Devices” ?	TADPOLE Crypto Devices will be provided by the NCI to the Contractor for Ship-Shore and Maritime Rear Link (MRL) secure communications. Please see SOW 3.4.4.h; SOW Annex-A paragraph 6.6.14.b.iii; SOW Annex-B Appendix-2 Paragraphs 13.8; 14.8 and other relevant parts of the SOW Annex-A.	No
<b>T.83</b>	Book II Part I CLIN 5.7	Please clarify if the called point is related to PTFS or DLOS?	CLIN 5.7 is related to ACMS DLOS Connection	Yes, IFB AMD2
<b>T.84</b>	Book II Part 1 Section 1 SOW Ann A Sect. 5,6 and Annex B	In order to allow the bidder to make a correct evaluation of the economical effort to provide for items 8.11 and 8.14, would you provide to us the information about the number of function points for ACMS and RCS SW ?	The purchaser will deliver the available engineering documents (SDDs and DBDD) and manuals to the bidders upon request. Source code will be given to the Contractor.	No

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.85	Book II Part IV Annex –A point 6.11.10 -b.	For the transmitting antenna is required to foreseen an antenna farm including 2 additional antenna, for future enhancement.  Would you please clarify which antenna type are you expecting (between wide band dipole and RLP ?	Not only transmitter site but also receiver site needs two additional antenna locations for the future. Please see SOW 3.5.9.  Space for two additional RLP antenna locations shall be foreseen.	No
T.86	Book II Part IV Annex –A point 6.11.10 -g.	Please clarify that the antenna foundation for the 2 future antenna of future enhancement has not to be provided	Confirmed. With this BRASS BGR project, only the locations of the additional antennas will be determined. Antenna foundation will be provided with the future project, as stated in SOW Annex-A 6.11.10.g for Tx site and 6.12.4.k for Rx site.  Typo will be corrected at SOW Annex-A 6.12.4.k	Yes, IFB AMD2

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.87</b>	Book II Part IV Annex –A point 6.12.4 – k..	<p>For the receiving antenna is required to foreseen an antenna farm including 2 additional antenna, for future enhancement.</p> <p>a. Would you please clarify which antenna type are you expecting (between wide band dipole and RLP ?</p> <p>b. Please clarify that the antenna foundation for the 2 future antenna of future enhancement has not to be provided ?</p>	<p>a. Please see T-85</p> <p>b. Please see T-86.</p>	No
<b>T.88</b>	BOOK II PART IV ANNEX-A PAGE 53 point 6.11.2	<p>Based on the requirements, the transmit RLP Antennas should have a power handling capacity of 5 kW over the full frequency range of 2-30 MHz. According to our experience, antenna manufacturers do not offer RLPAs that operate over 2-30 MHz with full efficiency at the 5 kW power level. Since RLPAs are generally used to communicate over medium to long distances, for which operating frequencies are 4 MHz or higher, the frequency range of a fully efficient 5 kW RLPAs is typically 4-30 MHz. Question: Is it acceptable to offer transmit RLPAs that have a frequency range of 4-30 MHz?</p>	Yes, it is acceptable to offer transmit RLPAs that have a frequency range of 4-30 MHz	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.89	BOOK II PART IV ANNEX-A PAGE 56 Paragraph 6.11.8 a.i	<p>The paragraph 6.11.8 a.i says that “Cooling System for HF transmitters shall have Close circuit operations.” Most of the transmitter vendors advice that hot air shall be exhausted to outside of the building.</p> <p><b>Q:</b> Does the defined requirement mean that exhausting hot air will be connected to the intake air part of cooling unit via air ducts?</p>	<p>The exhausting hot air will not go outside but will be used by the A/C cooling unit.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.90	BOOK II PART IV ANNEX-A PAGE 56 Paragraph 6.11.8 b & 6.11.7.d	<p>The paragraph 6.11.8 b writes that - “ii. The cooling system shall be of heat-pump type, air/air reversible, with split unit installed on the walls.”, - “viii. The air flow shall be in ducts.” and “Figure 7: Equipment cooling example”,</p> <p>“The paragraph 6.11.7.d writes that - xxiii. Cooling: forced air”</p> <p>We understand that the cooling system will be consisted of two different sub cooling system one of which is split type cooling system, the other is forced air cooling system.</p> <p><b>Q.1:</b> Please clarify quantity of the required cooling system? <b>Q.2:</b> Please clarify providing responsibility of the above-mentioned cooling system?</p>	<p>1) There is no cooling system at the moment for the national equipment.</p> <p>According to the Initial design - one heat-pump type system, but it is up to Host Nation’s Designer to choose at a later stage.</p> <p>Please also see Appendix-2 to SOW Annex-C (draft SPDP prepared by NCI)-</p> <p>2) providing cooling system in transmitter room is the Host Nation’s responsibility</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.91	Book II Part IV (SOW) Page 30 Paragraph 3.5.7.	<p>The paragraph writes that “The Contractor shall establish and provide BRASS equipment power budget including power loads for HVAC and FES provided by the Host Nation. The power budget shall enable determination of the capacity of the SB PSS and NB PSS system for each site (ACMS, Tx and Rx). Equipment power interface requirements shall also be provided by the Contractor.”</p> <p><b>Q1:</b> During site survey, it was stated that the contractor responsibility is to provide only NB PSS for BRASS related Electronic equipment. Please clarify paragraph 3.5.7.</p> <p><b>Q2:</b> If providing NB PSS for BRASS related Electronic equipment is contractor responsibility, please provide HVAC and FES System power consumptions.</p>	<p>1): It is assumed that there is a misunderstanding at Bidder’s interpretation during the site survey. Contractor’s responsibilities are clearly stated in SOW paragraph 3.5.</p> <p>In addition, please see Book-I paragraph 1.5.9 and 1.5.10.</p> <p>2) Yes, providing NB PSS for BRASS related electronic equipment is Contractor’s responsibility.</p> <p>HVAC and FES system power consumptions are to be provided at a later stage upon Host Nation’s Designer solution.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.92	Book II Part IV (SOW) Page 20 Paragraph 3.4.2.	<p>The Paragraph writes that “The Purchaser will provide the following items obtained from HN, as Purchaser Furnished Equipment (PFE) and Purchaser Furnished Property (PFP) to the Contractor (Existing equipment on site, to be integrated and adapted by the Contractor as required in the SOW.)”</p> <p><b>Q.</b> Please provide the existing equipment list to be integrated and adapted to BRASS System.</p>	Please see PFE List in SOW paragraph 3.4.2 (pages 21 through 24)	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<p><b>T.93</b></p>	<p>Book II Part IV (SOW) Page 23 Paragraph 3.4.2. SOW ANNEX- C APP-2 Page 8 and Page 12</p>	<p>The table indicates that “Antenna Farms – Land excavation for BRASS And DLOS antennas / levelling/ trenching/ disposal is the responsibility of Host Nation. However in ANNEX-C APP-2 Page 8-12 it is stated that “The CIS Contractor will be responsible for Antenna field preparation (including levelling; cutting trees, bush and vegetation; removal of rubble, hazardous material; demolition works)” <b>Q.</b> Please clarify Host Nation and CIS contractor responsibility.</p>	<p>Host Nation’s responsibilities regarding this subject are clearly stated in the SOW paragraph 3.4 (For instance, 3.4.4.x; 3.4.4.y; 3.4.4.pp; 3.4.4.uu.)</p> <p>Contractor’s responsibilities regarding this subject are clearly stated in SOW paragraph 3.5 (for instance; 3.5.9; 3.5.10; 3.5.11; 3.5.12; 3.5.13; 3.5.22; 3.5.23; 3.5.26; 3.5.29 (3.5.29 will be added in AMD3)).</p> <p>Please also see SOW Annex-C paragraph 1.1.3.</p>	<p>No</p>

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.94	<p>Contract General Provisions, Page 5, Paragraph, 5.1,</p> <p>Book II Part IV (SOW) Page 103 Paragraph 12.4.11.</p>	<p>The Paragraph 5.1 writes that “All written correspondence, reports, documentation and text of drawings delivered to the Purchaser by the Contractor shall be in the English language.</p> <p>The Paragraph 12.4.11 writes “Masts and equipment shall be supplied with all required homologation, certifications, operational and maintenance manuals both in English and Bulgarian languages.”</p> <p><b>Q.</b> Please clarify the English and Bulgarian language requirement for all documentation. Bulgarian language documents covers just for homologation and certification in order to get permission from Bulgarian Government Authorities or cover whole operational and maintenance documents</p>	<p>The documentation required in Bulgarian language is clearly stated in the SOW.</p> <p>For instance, please see SOW paragraphs 5.7.1; 12.1.3; 12.4.11; 12.4.12; 13.14.1 and other relevant IFB parts respectively.</p> <p>Article 29 will be modified at Contract Special Provisions to clarify the subject accordingly.</p> <p>In addition, following amendment will be done in SOW paragraph 13.14.1</p> <p><del>All deliverable documentation shall be provided in the English language.</del> Documentation affecting Safety Hazard and health protection matters shall be delivered in both English and HN language – Bulgarian</p>	<p>Yes, IFB AMD3</p>

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.95	BOOK II PART IV ANNEX-A PAGE 13 Paragraph 5.1.7.	<p>In this item it is stated that “The delivery of any COTS software shall include licenses, documentation and CD or DVD containing the software and any activation key required.</p> <p>a.Windows Server b.Windows Client c.Oracle d.Acrobat Reader e.Open Master f.Open master Agent g.VNC Client h.Microsoft Office Professional i.Winproject j.Development environment used for porting of the BICC software g. k. k.Open Agent Tool Kit l.EMS (Nms2K-xEMS Selex) m.RACALL n.McAfee Antivirus Client (Latest Version) o.McAfee Antivirus Server (Latest Version) p.ARQ Software q.X.400 Application (XOMAIL or other compatible X.400 solution. r.Gateways (X.400 software)” <b>Q.</b> All these software is not listed in CLIN list and it may not be needed in bidder solution. Please clarify the software list.</p>	<p>The list of the software shows the COTS products that are known to be compatible with the version 1.6 of the BICC software. It is confirmed that some may not be required in the bidder solution. For instance, RACALL and EMS.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.96	BOOK II PART IV ANNEX-A PAGE 32 Paragraph 6.5.14.e	<p>In this item it is stated that “Other peripheral devices such as MPS scanner, MPS Large Screen Display, MPS Tape Puncher Readers shall be complaint with relevant TEMPEST requirements.”</p> <p><b>Q.</b> There is no manufacturer for Tape Puncher Readers with TEMPEST certificated. In order to manage TEMPEST requirement for this equipment can we use a TEMPEST enclosure instead of TEMPEST Certificated Tape Puncher Reader?</p>	<p>Confirmed, Bidders can use a TEMPEST enclosure instead of TEMPEST Certificated Tape Puncher Reader.</p> <p>Please also see T.20</p>	No
T.97	BOOK II PART IV ANNEX-C PAGE 14	<p><b>Q:</b> Would you please provide border coordinates of the Rx site, Galata?</p>	<p>Host Nation cannot provide RX site boundaries coordinates.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.98	BOOK II PART IV ANNEX-C App 1, 7a7, Fig 7	<p>The possible area with dimensions 105m x 24m for RLP Antenna System and Wideband Horizontal Dipole &amp; DLOS antenna is deemed to be insufficient considering the antenna dimensions and required isolation between the BRASS antennas. We think the required total field should be about 60 000 m<sup>2</sup>.</p> <p><b>Q:</b> Please advise.</p>	<p>An updated scheme of Rx site was sent with IFB Amendment-2, containing the designated possible places for disposal of RLP Antenna System and Wideband Horizontal Dipole &amp; DLOS antenna. As most appropriate these have been given like an example, taking into account earth profile, vegetation of the area and existing buildings and antennas. The proposed areas exceed 60 000 m<sup>2</sup>. Nevertheless, there are also other possible options except for the proposed ones.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.99	BOOK II PART IV ANNEX-C page 8, Fig 3 & BOOK II PART IV ANNEX-C App 1, 7a5, Fig 5	<p>At the Tx antenna farm, the existing antenna system covers about 95 000 m<sup>2</sup> of the current 130 000 m<sup>2</sup>. Considering the antenna dimensions and required isolation between the BRASS and existing antennas, we do need a total of 130 000 m<sup>2</sup> for the BRASS system antennas. But we have currently 35 000 m<sup>2</sup>, which causes the antenna system operates inefficiently.</p> <p><b>Q:</b> Please advise.</p>	<p>An updated scheme of Tx site was sent with IFB Amendment-2, containing the designated possible places for disposal of RLP Antenna System and Wideband Horizontal Dipole &amp; DLOS antenna. As most appropriate these have been given like an example, taking into account earth profile, vegetation of the area and existing buildings and antennas. The proposed areas exceed 130 000 m<sup>2</sup>. Nevertheless, there are also other possible options except for the proposed ones.</p>	No

<p><b>T.100</b></p>	<p>IFB-CO-13733-BRASS-BGR_Bidding-sheets Paragraphs:  <ul style="list-style-type: none"> <li>▪ 5.1.9</li> <li>▪ 5.3.7</li> <li>▪ 6.2.4</li> <li>▪ 6.3.7</li> <li>▪ 7.2.3</li> </ul>                     7.3.6</p>	<p>Referred paragraphs of the Bidding Sheets require the following quantities of UPS to be provided:</p> <ul style="list-style-type: none"> <li>• ACMS : MPS= 3; RSC = 3</li> <li>• TX site: RSC=2; Radios=2</li> <li>• RX site: RSC=1; Radio=2</li> </ul> <p>Relating to these quantities we would like to ask you to please indicate :</p> <ol style="list-style-type: none"> <li>(1) The rationale for these quantities;</li> <li>(2) Whether it is possible to supply single UPS for each site and/or subsystem providing each one the necessary power for the respective BRASS-BGR equipment, instead of providing one UPS for each rack;</li> <li>(3) Whether it is required to provide separate UPS for RED equipment and for BLACK equipment.</li> </ol>	<p>(1) Please see T.70                      (2) Please also see T.50                      (3) Yes, it is required to provide separate UPS for RED equipment and BLACK equipment.</p> <p>As per SDIP 29-1. 3.1.1 (NU) RED/BLACK concept requires electrical and electronic circuits, components, and systems which handle classified unencrypted information (RED) be separated from those which handle encrypted or unclassified information (BLACK). Under this concept, RED and BLACK terminology is used to clarify and to differentiate between circuits, components, equipment, and systems. The terminology also differentiates between the physical areas in which they are contained</p>	<p>No</p>
---------------------	---	--	--	-----------

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
			Please also see BOOK II PART IV ANNEX-A Paragraph 5.2.8	
<b>T.101</b>	IFB-CO-13733-BRASS-BGR_Bidding-sheets CLIN 5.7	The title for CLIN 5.7 of the Bidding Sheets is “Precision Time and Frequency Standard Subsystem (PTFS)”.  However, it is our understanding that it refers to DLOS and for that reason (and comparing with similar paragraph for a different site) we would like to ask if the above CLIN 5.7 should be entitled “ACMS Site DLOS Connection”.	Please see T.83	No
<b>T.102</b>	BOOK II PART IV ANNEX-A, page 60, paragraph 6.11.10.f.ii	Please provide the real dimensions for the areas available for installation of the antennae fields both for the Asparuhovo TX and Galata RX sites.	For Tx site, please see SOW Annex-C (AMD2) Figure-3 to Appendix-1.  For Rx site, please see SOW Annex-C (AMD2) Figure-7 to Appendix-1.	No
<b>T.103</b>	BOOK II PART IV ANNEX C	Please indicate any limitations and / or restrictions to be considered regarding antennae farm installation.	The distance from existing buildings and antennas is 30 meters	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.104</b>	BOOK II PART IV ANNEX C 7a7-Figure-7 to App1 to SOW Annex C	7a7-Figure-7 to App1 to SOW Annex C presents a shadowed area with the legend “Possible area for RLP Antenna System Wideband Horizontal Dipole & DLOS antenna”. Taken into consideration the physical dimensions of the antennae types required in the tender and the dimensions presented in the referred figure for the shadowed area above mentioned, it is not possible to fit all the required antennae in such area. For this reason it is our understanding that the shadowed area presented in the referred figure (7a7-Figure-7 to App1 to SOW Annex C) is a possible area to be used for antennae farm installation but it is not the only area that can be used for such. We kindly ask you to please confirm our understanding and please indicate what areas of the Galata RX site can also be used for antennae installation.	Updated dimensions and layout of the possible placement for the different types of antennas for Rx site are sent with IFB Amendmen-2.  The proposed areas exceed 60 000 m <sup>2</sup> . There are other possible options for placement of the BRASS antennas except for the proposed ones.  Please also see Appendix-1 to SOW Annex-C (AMD2) Figure-3.	No
<b>T.105</b>	BOOK II PART IV ANNEX A, page 59, paragraph 6.11.10 a.	In BOOK II PART IV ANNEX A, page 59, paragraph 6.11.10 a. it is specified that RF cables shall comply with the same environmental requirements as specified in Annex-A Appendix-1.  However, in Annex-A Appendix-1 we cannot find any requirements for RF Cables. Please clarify.	SOW Annex-A Paragraph 6.11.10.a refers to SOW Annex-A Appendix-1 paragraph 3.5.  The requirements for RF cable is stated in SOW Annex-A paragraph 6.11.11	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.106</b>	BOOK II PART IV ANNEX A, page 65, paragraph 6.12.4 a.	<p>In BOOK II PART IV ANNEX A, page 65, paragraph 6.12.4 a. it is specified that RF cables shall comply with the same environmental requirements as specified in Annex-A Appendix-1.</p> <p>However, in Annex-A Appendix-1 we cannot find any requirements for RF Cables. Please clarify.</p>	<p>SOW Annex-A Paragraph 6.12.14.a refers to SOW Annex-A Appendix-1 paragraph 3.5.</p> <p>The requirements for RF cable is stated in SOW Annex-A paragraph 6.11.11</p>	No
<b>T.107</b>	BOOK II PART IV ANNEX A, page 61, paragraph 6.11.11 b.i.	<p>In BOOK II PART IV ANNEX A, page 61, paragraph 6.11.11 b.i. it is specified that RF cables on internal installations must be laid on metal ducts or vertical cable ladder. Please confirm whether ducts and / or vertical ladders are to be provided by the contractor or are PFE (provided by the HN).</p>	It shall be provided by the Contractor.	No

<p><b>T.108</b></p>	<p>BOOK II PART IV ANNEX A, page 61, paragraph 6.11.11 b.ii.</p>	<p>In BOOK II PART IV ANNEX A, page 61, paragraph 6.11.11 b.ii. it is specified that RF cables on external installations must be laid in cable duct trenches, routed through pipes if flexible, or laid in pipes if rigid.</p> <p>It is our understanding that ducts are to be performed by HN. Please confirm this understanding and provide clarification on who has the responsibility of providing and installing the pipes inside the trenches. Is that a HN responsibility as well? And the sealing of the half pipes with mortar is also a HN responsibility?</p>	<p>Bidder’s understanding is NOT confirmed.</p> <p>Please see T-26 and T-58. HN’s responsibilities where to provide trenching and ducting are clearly stated in T.26 and T.58</p> <p>In addition, following remarks <b>will be added</b> to SOW 3.4.4.x:</p> <p><b>HN is responsible only for excavation of cable duct trenches for RF cables and power cables of the rotational antennae and the navigation lights.</b></p> <p>However, installing pipes inside the trenches and the sealing of the half pipes with mortar is CIS Contractor’s responsibility.</p> <p>Regarding Contractor’s civil works responsibilities Following phrase will be</p>	<p>Yes, IFB AMD3</p>
---------------------	--	--	---	----------------------

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

			<p>added to SOW as paragraph 3.5.29:</p> <p>Installing pipes inside the trenches and the sealing of the half pipes with mortar is CIS Contractor’s responsibility.</p> <p>The contractor shall execute all other works in accordance with the national legislation, namely <i>Law on Spatial Planning, Ordinance 17/03.06.2005 on the rules for construction of cable and telecommunications networks and their facilities for RF cable ducting</i> (leveling, finishing works and trenching safety measures, ducting and splicing, installing of RF cables, soil filling and marking of the duct trenches, etc. (by the Minister of Transport, Information Technology</p>	
--	--	--	--	--

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
			and Communications and Minister of Regional Development and Public Works)	
T.109	BOOK II PART IV ANNEX-A PAGE 32, Paragraph 6.6.1.c.iv.	<p>In BOOK II PART IV ANNEX-A PAGE 32, Paragraph 6.6.1.c.iv. it is indicated that Audio Switches are one of the CISS Switching Subsystem components. In paragraphs 6.6.8 through 6.6.15 are presented the requirements for several CISS Subsystems components. However we were not able to find a description for Audio Switches component neither the respective requirements in paragraph 6.6.</p> <p>Please clarify and provide description and requirements for Audio Switches as components of CISS Switching Subsystem, its connectivity and type and quantities of interfaces.</p>	Please see BOOK II PART IV ANNEX-A PAGE 54, Paragraph 6.11.6	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.110	BOOK II PART IV ANNEX-A PAGE 32, Paragraph 6.6.1.d.iii.	<p>In BOOK II PART IV ANNEX-A PAGE 32, Paragraph 6.6.1.d.iii. it is indicated that Radio Frequency Modems are one of the CISS Communication Subsystem components. In paragraphs 6.6.8 through 6.6.15 are presented the requirements for several CISS Subsystems components. However we were not able to find a description for Radio Frequency Modems component neither the respective requirements in paragraph 6.6.v</p> <p>Please clarify and provide description and requirements for Radio Frequency Modems as components of CISS Communication Subsystem.</p>	Please see SOW Annex-A paragraph 6.11.5.	No
T.111	BOOK II PART IV ANNEX-A PAGE 32, Paragraph 6.6.1.d.iv.	<p>In BOOK II PART IV ANNEX-A PAGE 32, Paragraph 6.6.1.d.iv. it is indicated that Voice RF modems are one of the CISS Communication Subsystem components. In paragraphs 6.6.8 through 6.6.15 are presented the requirements for several CISS Subsystems components. However we were not able to find a description for Voice RF modems component neither the respective requirements in paragraph 6.6.</p> <p>Please clarify and provide description and requirements for Voice RF modems as components of CISS Communication Subsystem.</p>	<p>Voice modems for RF channels shall comply with STANAG 4197.</p> <p>Please also see SOW Annex-A 6.11.1.e</p>	No

<p><b>T.112</b></p>	<p>IFB-CO-13733-BRASS-BGR_Bidding-sheets CLIN 5.2.5 and BOOK II PART IV ANNEX-A, Paragraph 6.6.</p>	<p>In IFB-CO-13733-BRASS-BGR_Bidding-sheets CLIN 5.2.5 it is required to provide 1 (one) Multiplexer (Intersite). This item is inserted as a CISS component. However we cannot find any reference to this item in BOOK II PART IV ANNEX-A, Paragraph 6.6. where CISS components are listed, described and respective requirements are presented.</p> <p>Please clarify and provide description and requirements for Multiplexer (Intersite) as components of CISS, its connectivity and type and quantities of interfaces.</p>	<p>SOW Annex-A 6.6.1.d (CISS Communication Subsystem) will be amended as follows:</p> <p>v. <b>Multiplexer (intersite)</b></p> <p>A new paragraph (6.6.16) <b>will be added</b> to the SOW Annex-A.</p> <p><b>6.6.16: Multiplexer (intersite)</b></p> <p>a. <b>The multiplexer shall be able to provide intersite transport concurrently for at least 8 simultaneous full-duplex serial communications circuits each at rates up to 19.2 kbps with low jitter and delay commensurate with VoIP requirements.</b></p> <p>b. <b>The multiplexer shall be provided with a LAN interface to be controlled from RSC via the RSC LAN. The parameters to be controlled shall be;</b></p>	<p>Yes, IFB AMD3</p>
---------------------	---	--	---	----------------------

			<p>master, slave configuration, internal-external clock; line activation/deactivation, rate and polarity of each interface, automatic self-diagnosis tests.</p> <p>c. In addition to above capacities, the multiplexer shall provide extra capacity to serve to two additional communication lines that will be established by a future BRASS Enhancement 1 (BREITA) Project.</p> <p>Please also see SOW Annex-A paragraph 6.6.11 (Definition of black switch).</p> <p>Bidders can propose their own design/solution as long as all contractual functional and technical requirements are met.</p>	
--	--	--	--	--

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.113</b>	IFB-CO-13733-BRASS-BGR_Bidding-sheets CLIN 5.2.5 and BOOK II PART IV ANNEX-A, Paragraph 6.6.	<p>In IFB-CO-13733-BRASS-BGR_Bidding-sheets CLIN 5.2.5 it is required to provide 1 (one) Multiplexer (Intersite). It is our understanding that this component would require a corresponding component at TX site and also at RX site. However neither in the set of CLINs for the TX site nor in the set of CLINs for the RX site, we were able to find the corresponding ACMS Multiplexer (Intersite).</p> <p>Please clarify and provide rational, its connectivity and type and quantities of interfaces.</p>	Black Switch in Rx and Tx sites shall provide Multiplexer capability and requirements.	No
<b>T.114</b>	BOOK II PART IV ANNEX-A PAGE 42, Paragraph 6.7.5.e.	<p>In BOOK II PART IV ANNEX-A PAGE 42, Paragraph 6.7.5.e. it is requested to provide 1 (one) isolator (MPS-RSC). Please provide the functionality and requirements for such component.</p>	Please see SOW Annex-A 5.2.5.a.iii; 6.1 (Figure-5); 6.6.15.b; 6.6.15.c; 6.6.15.e; 6.7.3; 6.7.4; 6.7.10;	No
<b>T.115</b>	BOOK II PART IV ANNEX-A PAGE 42, Paragraph 6.7.5.g.ii	<p>In BOOK II PART IV ANNEX-A PAGE 42, Paragraph 6.7.5.g.ii it is request 1 (one) large screen display for RSC at ACMS. It is our understanding that this LSD must be equal (same requirements) as for the LSD for MPS. Please confirm this understanding or, otherwise, provide requirements for this RSC component.</p>	Confirmed the Bidder's understanding. Requirements for two LSDs (LSDs for MPS and RSC) shall have the same.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.116</b>	BOOK II PART IV ANNEX-A PAGE 49, Paragraph 6.8.14.a.	In BOOK II PART IV ANNEX-A PAGE 49, Paragraph 6.8.14.a. it is presented the general requirements for the Recorders to be provided for VMSS. It is our understanding that only voice communications established with the four (4) Human Machine voice interfaces, one per operator, are to be recorded.  Please confirm this understanding.	Confirmed the Bidder's understanding.  Voice communications established with the four (4) Human Machine voice interfaces, one per operator, are to be recorded	No
<b>T.117</b>	BOOK II PART IV ANNEX-A PAGE 49, Paragraph 6.8.14.a.	In BOOK II PART IV ANNEX-A PAGE 49, Paragraph 6.8.14.a. it is presented the general requirements for the Recorders to be provided for VMSS. Please indicate the capacity for such recorders, specifying the period for which recording data must be kept available for on line retrieval.	~48h to cover one 24h shift and give time to offload the recording data to another media.	No
<b>T.118</b>	BOOK II PART IV ANNEX-A PAGE 50, Paragraph 6.9.1.e.	In BOOK II PART IV ANNEX-A PAGE 50, Paragraph 6.9.1.e. it is requested one Isolator for PTFS. Please provide specifications and requirements for this component.	The requirement for the PTFS isolator is to avoid compromising emissions from MPS when connecting PTFS subsystem to the red site of the BRASS system.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.119</b>	IFB-CO-13733-BRASS-BGR_Bidding-sheets CLIN 5.5.4	In IFB-CO-13733-BRASS-BGR_Bidding-sheets CLIN 5.5.4 it is requested the supply of 3 Isolator for PTFS. Please indicate the rational for this quantity and where should these 3 isolators be used (connecting PTFS to which other components from which subsystems).	The quantity in the Bidding Sheet <b>CLIN 5.5.4</b> will be amended as to read <b>"1"</b>  PTFS can/should be placed on Black side (e.g., GPS receiver or atomic clock); Isolator required to connect PTFS to red side. Black/Red sides of system are only at ACMS, therefore only one required.	Yes, IFB AMD3
<b>T.120</b>	BOOK II PART IV ANNEX-A PAGE 51, paragraph 6.10.6 and IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 5.1.9, 5.3.7, 6.2.4, 6.3.7, 7.2.3 and 7.3.6	In BOOK II PART IV ANNEX-A PAGE 51, paragraph 6.10.6 it is requested the provision and installation of BRASS dedicated NB PSS at the ACMS, Tx and Rx sites to protect sensitive units and devices. It is our understanding that a UPS system shall be considered for each site. However, by reading the several CLINs of IFB-CO-13733-BRASS-BGR_Bidding-sheets it seems that what is required is the provision and installation of several independent UPSs one for each rack providing back up power for the equipment installed in the same rack.  Please clarify and provide guidance and rational for the UPS system required.	The bidder is free to propose alternate UPS system solution in which all BRASS equipment as stated in SOW 3.5.16 is considered and as long as all contractual requirements are met.  Please also see T-100.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.121	<p>BOOK II PART IV ANNEX-A PAGE 51, paragraph 6.10.6,</p> <p>Book II Part IV Annex C Page 5, paragraph 2.5.8,</p> <p>Book II Part IV Annex C Page 8, paragraph 3.2.1,</p> <p>Book II Part IV Annex C Page 15, paragraph 4.2.1</p>	<p>In BOOK II PART IV ANNEX-A PAGE 51, paragraph 6.10.6 it is requested the provision and installation of BRASS dedicated NB PSS at the ACMS, Tx and Rx sites to protect sensitive units and devices.</p> <p>However:</p> <p>(1) In Book II Part IV Annex C Page 5, paragraph 2.5.8 it is stated that UPS for the ACMS site will be provided by HN;</p> <p>(2) In Book II Part IV Annex C Page 8 paragraph 3.2.1 it is stated that Uninterruptable Power Supply for Tx Site will be provided as Purchaser Furnished Equipment (PFE) and Purchaser Furnished Property (PFP) to the Contractor;</p> <p>(3) In Book II Part IV Annex C Page 15 paragraph 4.2.1 it is stated that Uninterruptable Power Supply for Rx Site will be provided as Purchaser Furnished Equipment (PFE) and Purchaser Furnished Property (PFP) to the Contractor.</p> <p>It is our understanding that there is a conflict between the contents of the above referred paragraphs. Please clarify.</p>	<p>There is no conflict. Please see T.50</p> <p>Contractor is responsible for providing UPS for BRASS dedicated equipment and HN is responsible for providing UPS for National equipment and facility.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.122	BOOK II PART IV ANNEX-A PAGE 51, paragraph 6.10.6.c. and BOOK II PART IV ANNEX-A PAGE 52, paragraph 6.10.6.h.iv.	<p>In BOOK II PART IV ANNEX-A PAGE 51, paragraph 6.10.6.c. it is required that UPS provides a minimum of fifteen (15) minutes backup power in case the Prime Power Supply System fails.</p> <p>However, in BOOK II PART IV ANNEX-A PAGE 52, paragraph 6.10.6.h.iv. it is required UPS to have an operating time with max load not less than 30 min.</p> <p>It is our understanding that these 2 requirements are not coherent. Please clarify.</p>	<p>SOW Annex-A paragraph 6.10.6.c <b>will be amended</b> as to read:</p> <p>UPS shall provide <b>no less than 30 (thirty) minutes</b> <del>a minimum of fifteen (15) minutes</del> backup power in case the Prime Power Supply System fails.</p> <p><b>Additionally, UPS is required to operate at maximum load for no less than 30 minutes.</b></p>	Yes, IFB AMD3

<p><b>T.123</b></p>	<p>BOOK II PART IV ANNEX-A PAGE 52, paragraph 6.11.1.f. and IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 6.1.4, 6.1.5 and 6.1.6</p>	<p>In BOOK II PART IV ANNEX-A PAGE 52, paragraph 6.11.1.f. it is requested the provision and installation of 1 (one) Data Switch and 1 (one) Black Switch while in IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 6.1.4, 6.1.5 and 6.1.6 it is requested the provision and installation of 1 (one) Data Switch, 1 (one) Analog switch for remote sites and 1 (one) Black Switch. Please clarify the following:</p> <ul style="list-style-type: none"> <li>(1) The discrepancy between the 2 documents since the Bidding-sheets refer an Analog switch for remote sites that is not mentioned in BOOK II PART IV ANNEX-A PAGE 52, paragraph 6.11.1.f;</li> <li>(2) The rational for having the 3 components indicated in IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 6.1.4, 6.1.5 and 6.1.6 instead of having the corresponding functionality provided by the single Black Switch (as seems to be the case at ACMS). Using the 3 components referred in IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 6.1.4, 6.1.5 and 6.1.6 would mean to have 2 consecutive levels of switching. Please indicate in such condition what would be the type of interface between Black Switch and Data Switch and Analog Switch;</li> <li>(3) Please clarify connectivity and type and quantities of interfaces for each of the referred components.</li> </ul>	<p>(1) SOW Annex-A 6.11.1.f <b>will be amended</b> as follows: one (1) Digital Black switch, <b>one (1) Analog switch</b>, <del>and</del> data switch as well as one (1) audio switch.</p> <p>(2)and (3): Bidders can propose different solution that can handle all relevant hardware/system in one unit as long as Bidder’s solution meets contractual requirements. If bidders prefer to propose different switching units as stated in the IFB; As bidders may freely choose to embed protocol transcoding or interface conversion between the Switches (e.g., in the manner of a serial-over-IP terminal</p>	<p>Yes, IFB AMD3</p>
---------------------	--	---	---	----------------------

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
			<p>concentrator for local-area-networks) to meet Contractual requirements, the exact number and nature of physical interfaces to the switch will depend on the bidder's own design. Consequently, the bidder would do well to develop and present in their bid the required number of input and output circuits for the Switches as well as their type and characteristics using SOW information and requirements provided.</p>	
<p><b>T.124</b></p>	<p>BOOK II PART IV ANNEX-A PAGE 54, paragraph 6.11.7 d.vi.</p>	<p>In BOOK II PART IV ANNEX-A PAGE 54, paragraph 6.11.7 d.vi. it is requested that HF transmitters have the capability of providing "<i>Output RF power: 5kW PWP and mean</i>". Please clarify if it was meant to be 5kW PEP instead of 5kW PWP and clarify if 5kW are to be PEP or mean.</p>	<p>SOW Annex-A paragraph 6.11.7.d.vi will be amended as to read:  Output RF power: 5kW <b>PEP.</b></p>	<p>Yes IFB/AMD3</p>

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.125	<p>BOOK II PART IV ANNEX-A PAGE 62 paragraph 6.11.12-a.i., ii., iv. and vi.</p> <p>BOOK II PART IV ANNEX-A PAGE 66, paragraph 6.12.4.k.</p> <p>Book II Part IV Annex C Page 9, paragraph 3.2.7 and 4.2.7</p>	<p>In BOOK II PART IV ANNEX-A PAGE 62 paragraph 6.11.12-a.i., ii., iv. and vi. It is required that Contractor shall prepare the area for HF antenna installation (Tx and Rx), shall excavate up to 35cm the area intended for the laying of the ground plane and verify the flatness, shall put in place a layer of dry rubble on the levelled area and shall put in place a layer of at least 10cm of mixed quarry.</p> <p>In BOOK II PART IV ANNEX-A PAGE 66, paragraph 6.12.4.k. It is required that the Contractor shall design and implement suitable antenna mast foundation works (including relevant earth works) required for the installation of new antenna mast for BRASS and DLOS systems.</p> <p>However, in Book II Part IV Annex C Page 9, paragraph 3.2.7 and 4.2.7 it is stated that HN will provide as PFE the following: <i>“Antenna Farm / Land excavation for BRASS and DLOS antennas / levelling/trenching/ disposal.”</i></p> <p>It is our understanding that there is incoherence between the contents of the above listed paragraphs. Please clarify on who will effectively be the responsible for such civil works related with antenna farm preparation.</p>	<p>Please see T.108 and SOW 3.5.29</p>	<p>Yes, IFB AMD3</p>

<p><b>T.126</b></p>	<p>BOOK II PART IV ANNEX-A PAGE 64, paragraph 6.12.1.d. and IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 7.1.1, 7.1.4 and 7.1.5</p>	<p>In BOOK II PART IV ANNEX-A PAGE 64, paragraph 6.12.1.d. it is requested the provision and installation of 1 (one) Data Switch and 2 (two) Black Switch while in IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 7.1.1, 7.1.4 and 7.1.5 it is requested the provision and installation of 1 (one) Data Switch, 1 (one) Analog switch for remote sites and 2 (two) Black Switch. Please clarify the following:</p> <ol style="list-style-type: none"> <li>(1) The discrepancy between the 2 documents since the Bidding-sheets refer an Analog switch for remote site that is not mentioned in BOOK II PART IV ANNEX-A PAGE 64, paragraph 6.12.1.d;</li> <li>(2) The rational for having the 3 components indicated in IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 7.1.1, 7.1.4 and 7.1.5 instead of having the corresponding functionality provided by the single Black Switch (as seems to be the case at ACMS). Using the 3 components referred in IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 7.1.1, 7.1.4 and 7.1.5 would mean to have 2 consecutive levels of switching. Please indicate in such condition what would be the type of interface between Black Switch and Data Switch and Analog Switch;</li> <li>(3) The rational for requiring for Rx Site 2 (two) black switches instead of only 1 (one) as it is the case for both Tx Site and ACMS;</li> <li>(4) Connectivity and type and quantities of interfaces for each of the referred components;</li> </ol>	<p>1) SOW Annex-A 6.12.1.d (Receiver site) will be amended as follows:</p> <p><b>one (1) Black switches</b> (with digital and analog interfaces), <b>one (1) Analog switch, one (1) audio switch</b> and one (1) data switch.</p> <p>SSS/Bidding Sheet CLIN 7.1.1 (Rx site BRASS CISS) will be amended as follows:</p> <p>Black Switch (with digital and Analog Interfaces) <b>Qty:1</b></p> <p>(2), (3) and (4): Bidders can propose different switching solution as long as Bidder’s solution meets all other contractual functional and technical requirements.</p> <p>As bidders may freely choose to embed protocol transcoding or interface</p>	<p>Yes, IFB AMD3</p>
---------------------	--	---	---	----------------------

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
			<p>conversion between the Switches (e.g., in the manner of a serial-over-IP terminal concentrator for local-area-networks) to meet Contractual requirements, the exact number and nature of physical interfaces to the switch will depend on the bidder's own design. Consequently, the bidder would do well to develop and present in their bid the required number of input and output circuits for the Switches as well as their type and characteristics using SOW information and requirements provided.</p>	

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.127</b>	IFB-CO-13733-BRASS-BGR_Bidding-sheets CLIN 5.	<p>In IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 5.1.9. and 5.3.7. its is requested to provide UPS in Racks respectively for MPS and RSC. However there are other components relevant to system operationally and capability of continuous operation in the event of a mains power failure that are not protected by UPS (CLINs 5,2. CISS, 5,4 VMSS, 5,5 PTFS, 5,6 BRASS BGR connectivity to NGCS and 5,7 DLOS).</p> <p>Please clarify and confirm that components for CLINs 5,2. CISS, 5,4 VMSS, 5,5 PTFS, 5,6 BRASS BGR connectivity to NGCS and 5,7 DLOS do not require backup power from UPS.</p>	Not confirmed. Please see SOW 3.5.16 and answer to T.120.	No
<b>T.128</b>	IFB-CO-13733-BRASS-BGR_Bidding-sheets CLIN 6.	<p>In IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 6.2.4. and 6.3.7. it is requested to provide UPS in Racks respectively for BRASS RSC and BRASS Radio HW. However there are other components relevant to system operationally and capability of continuous operation in the event of a mains power failure that are not protected by UPS (CLINs 6,1. BRASS CISS, 6,4 DLOS).</p> <p>Please clarify and confirm that components for CLINs 6,1. BRASS CISS, 6,4 DLOS do not require backup power from UPS.</p>	Not confirmed. Please see SOW 3.5.16 and answer to T120.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.129</b>	IFB-CO-13733-BRASS-BGR_Bidding-sheets CLIN 7.	<p>In IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 7.2.3. and 7.3.6. it is requested to provide UPS in Racks respectively for BRASS RSC and BRASS Radio HW. However there are other components relevant to system operationally and capability of continuous operation in the event of a mains power failure that are not protected by UPS (CLINs 7,1. BRASS CISS, 7,4 DLOS).</p> <p>Please clarify and confirm that components for CLINs 7,1. BRASS CISS, 7,4 DLOS do not require backup power from UPS.</p>	Not confirmed. Please see SOW 3.5.16 and answer to T120.	No
<b>T.130</b>	BOOK II PART IV ANNEX-A PAGE 59, paragraph 6.11.10	<p>Please indicate the required bandwidth for the following HF transmitting antennae:</p> <p>(1) Six (6) Wideband Horizontal Dipole Antennas; (2) Two (2) RLP Antennas</p>	<p>Dipole antennae shall have 2 – 30 MHz bandwidth</p> <p>RLP antennae shall have 4 – 30 MHz bandwidth.</p>	No
<b>T.131</b>	BOOK II PART IV ANNEX-A PAGE 65, paragraph 6.12.4	<p>Please indicate the required bandwidth for the following HF receiving antennae:</p> <p>(1) Three (3) Wideband Horizontal Dipole Antennas; (2) Two (2) RLP Antennas</p>	<p>See T.130. the system shall have a duplex capability.</p> <p>Dipole antennae shall have 2 – 30 MHz bandwidth</p> <p>RLP antennae shall have 4 – 30 MHz bandwidth.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.132	Book II Part III (SOW) 5.3.3	<p>It is stated that "BRASS BGR system components shall possess Product Certification Reports issued by authorised Evaluation and Certification Authorities".</p> <p>Please indicate for each of the following system components if this requirement applies or not:</p> <ul style="list-style-type: none"> <li>1 - MPS FEPs</li> <li>2 - ARQ Processor</li> <li>3 - X.400 Gateway</li> <li>4 - RSC Server and Workstations</li> <li>5 - RSC FEPs</li> <li>6 - VMSS components</li> <li>7 - Red Switch</li> </ul>	Please see BOOK II PART IV ANNEX-A , Paragraph 6.5.14	No
T.133	Book II Part III (SOW) 5.3.3	<p>Is the current version of the BICC Software 1.6 already certified?</p> <p>If so, will the respective Certification Reports delivered together with the BICC Software to the Contractor?</p>	<p>BICC software version 1.6 is not certified.</p> <p>There is no requirement for certification of the components.</p> <p>The requirement is for the accreditation of the whole system.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.134	IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 5.6.1 and 5.6.2	Please provide specifications and requirements for items under IFB-CO-13733-BRASS-BGR_Bidding-sheets CLINs 5.6.1 and 5.6.2, Red Routers and Black Routers respectively.	<p>It is up to the Bidders to propose the networking components of their proposed technical solution to meet the requirements of the SOW. Current NATO classified and unclassified IP networks are mainly based on Cisco equipment, however this is provided for informational purposes and shall not be deemed as a mandatory requirement.</p> <p>Please also note that the system will both connect to NATO and BGR (mixed NATO/National functionality).</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.135	Appendix-2 to Book II Part IV Annex A Page 1, paragraph 1.1	<p>It is defined that BRASS-SSSB-ROU system shall be designed to operate within the HF band 2 MHz to 30 MHz.</p> <p>If all antennae are to operate from 2 to 30 MHz all of them will have large dimensions, in particular the RLP. For that matter we would like to ask NCI Agency the following:</p> <p>(1) Is it possible for you to define the bandwidth for the antennae stating a large bandwidth for some of them and a reduced bandwidth for the others?</p> <p>(2) Is it acceptable to offer RLPAs that have a frequency range of 4-30 MHz?</p>	<p>(1) Please refer to the answer T.130 and T.131</p> <p>(2) Please see T.88; T.130 and T.131</p>	No
T.136	BOOK II PART IV ANNEX-A PAGE 66, paragraph 6.12.4.k.	<p>In BOOK II PART IV ANNEX-A PAGE 66, paragraph 6.12.4. (HF Receiving Antennas), subparagraph k. it is requested that: <i>“The antenna farms on Tx site will host the antennas of BRASS system as well as two additional antennas of future enhancement to BRASS (deployable land force support).”</i></p> <p>Please confirm if this requirement refers to Tx site or if it is required for Rx site to consider the location of 2 additional antennae for future projects.</p>	The requirement is for Tx and Rx sites. Please also see the second part of the answer to T.86	No

<p><b>T.137</b></p>	<p>BOOK II PART IV ANNEX-A PAGE 31, paragraph 6.5.14</p>	<p>In BOOK II PART IV ANNEX-A PAGE 31, paragraph 6.5.14 it is defined the Tempest Protection for MPS and CISS Red Hardware. It is our understanding that it is specified that some equipment will have to be installed inside TEMPEST cabinets and some other equipment is requested to meet relevant TEMPEST Level requirements.</p> <p>Will it be acceptable to provide TEMPEST protection for the room where MPS and CISS Red Hardware will be installed and to use COTS hardware (that is, without meeting TEMPEST Level Requirements at equipment level) instead of assuring TEMPEST protection using TEMPEST equipment (that may not be available from mainstream brand manufacturers as required in Appendix-3 to Book II Part IV Annex A).</p>	<p>No, Bidder’s proposal is not acceptable.</p> <p>According to the SOW Annex-A par. 6.5.3.h and 6.5.14 (all sub-paragraphs), TEMPEST protection of all MPS and NCISS red hardware is in addition to the TEMPEST protection of the cabinets where the MPS and CISS equipment will be installed. TEMPEST protection of the MPS and CISS equipment is the contractor’s responsibility and is a strict requirement, independent from the cabinets’ and rooms’ TEMPEST protection.</p> <p>The room’s TEMPEST protection is the responsibility of the HN and not of the contractor.</p> <p>Please also see T.19; T.20; T.62 and T.96.</p>	<p>No</p>
---------------------	--	--	--	-----------

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.138	SOW Annex-A 6.6.8.e	<p>Red/Black Switch</p> <p>6.6.8.e Red switch shall be able to handle at least 50 communication lines (This requirement applies to both the ACMS software and the red switch.). (page 324)</p> <p>What is the number of digital and analog communication lines that Red Switch can handle. Digital channels could not be used as analog channel so the exact number of digital and analog. channels must be defined. Please clarify</p>	<p>This is the subject to the Bidders' own implementation choices to meet the SOW requirements.</p> <p>The bidder shall do well to develop required number of input and output circuits for the Red Switch as well as their type and characteristics using SOW information and requirements provided but not limited to the Book II Part IV Annex A.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.139</b>	SOW Annex-A 6.5.11.c	<p>IP Crypto</p> <p>The required IP crypto and network devices shall be provided by the HN as an extension of NGCS tunnelled through National Defence Network (NDN) (Page 320)</p> <p>IP to serial converters are accepted as network devices that shall be provided by HN. Please clarify.</p>	<p>As stated in SOW Annex-A 6.5.11.c the contractor's responsibility is up to the red interface of the IP Crypto equipment and to make sure that the system delivered operates with the existing IP Crypto. The IP to serial converter will normally be installed between red interface of IP Crypto and BRASS MPS system</p>	No
<b>T.140</b>	SOW Annex-A 6.8.14.a	<p>Voice Recorder</p> <p>6.8.14.a The Voice Management Subsystem (VMSS) shall contain two recorders with possibilities to save all voice communications upon request. The Contractor shall provide appropriate recorder(s) to meet this requirement (Page 339)</p> <p>What is the capacity of the recorders? Which audio format used for recording? To listen saved voice communications which subsystems connected to these recorders? Please clarify.</p>	<p>Please see T.116 and T.117</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.141</b>		<p>Tx Voice RF Modem, Rx Voice Modem</p> <p>Please confirm that Tx and Rx Voice modem is actually terminal equipment providing secure voice and data communications with full key distribution and remote rekey capabilities</p>	<p>The voice modems are terminal equipment in a sense that they are used at points where data are inserted or derived, as distinct from equipment used only to relay a reconstituted signal. The security shall be achieved by voice crypto devices.</p>	No
<b>T.142</b>	SOW Annex-A 6.6.4	<p>ACMS-RX-TX DLOS Connection:</p> <p>6.6.4. The CISS shall consist of three components: one switching component installed in ACMS and two communications component, installed in Tx and Rx Sites, that shall be connected through the National Defence Network (NDN). (Page 323)</p> <p>Connection between ACMS-RX-TX designed via Radio Link. Please clarify.</p>	<p>National Defense Network (NDN) among ACMS, RX and Tx sites shall be implemented by the Contractor. Please see SOW Annex-A 6.14 and SSS (IFB AMD2) CLINs: 4.4; 4.5; 4.6; 5.7; 6.4; 7.4</p>	No

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.143	-	<p>Human Machine Interface (Voice Terminals)</p> <p>Under paragraph 6.8.9, there is a requirement for digital voice (built in vocoder) communication with crypto or plain selection via mechanical switch.</p> <p>Please clarify that Voice terminal equipment will also have analogue Audio output and input which will be crypted and en-crypted by using Tx and RX Voice Modems (Secure Voice Terminal equipment as T-141 above)</p>	<p>Please see BOOK II PART IV ANNEX-A , Paragraph 6.8.7 d.</p> <p>The encryption shall be managed by the voice crypto not the modems.</p> <p>The PFE voice cryptos provide analogue black-side interface in accordance with STANAG 4197.</p>	No
T.144	BOOK II PART IV ANNEX A 4.1.6, 5.2.2.c	Which document contains the national requirements adaptations to the PFE BICC SW ?	There is not national requirements adaptation for BRASS BGR system	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.145	BOOK II PART IV ANNEX A 5.1.8 ARQ SW Note 2	It is requested to modify a third party SW as ARQ from Selex to support full duplex functionality. It may implies the source code delivery for the third party that may be under CopyRighths. Should Contactor have to assume this possible extra costs?	The MDH ARQ software was presented in BOOK II PART IV ANNEX A 5.1.8 as COTS solution that is compatible with the BICC software version 1.6.  The Bidder is free to propose other compatible COTS solutions for the STANAG 5066 software.	No
T.146	BOOK II PART ANNEX A 5.2.3 and 5.2.5.a.vii	Should coverage analisys tools for MPS and RSC be available as part of PFE BICC SW package?	No, Coverage analysis tools are not available in PFE BICC SW package. The tools shall be delivered by the Contractor as COTS products.	No
T.147	BOOK II PART ANNEX A 6.5.10	Could you confirm if BICC SW adaptation to support SNMPv3 is a Contractor responsibility?	It is confirmed	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.148	BOOK II PART IV ANNEX A 6.5.6.d and 6.5.13.c	How many days as a minimum will be required as storage for message history at MPS: 31 or 60 days?	Minimum 60 days.  SOW Annex-A paragraph 6.5.6.d <b>will be amended</b> as follows:  “On-line storage of the traffic of the previous <b>60</b> days”	Yes/AMD3

<p><b>T.149</b></p>	<p>BOOK II PART IV ANNEX A 6.8.4 and 6.8.5</p>	<p>Local PABX is indicated as PFE in 6.8.4 and 6.8.5 but it is not listed in 3.4.2. Please clarify if Local PABX is PFE and in that case provide the model of that PABX and details of available interfaces to interconnect with voice channels to VMSS, and control to RSC and MPS.</p>	<p>The currently existing PABX is not a part of the PFE List, as in SOW 3.4.2.</p> <p>As according to the national legislation on protection of classified information it is not allowed existing PABX to be connected to subsystems of BRASS system.</p> <p>For achieving capabilities, as according to 6.8.4, 6.8.5 and 6.8.7 in SOW Annex-A, it is necessary that the Contractor provides an individual local PABX with a capacity up to 20 IP users /including a 20 port IP switch and 20 IP phone stations/. This PABX is not to be connected to existing phone network.</p> <p>Users of the new PABX are to be positioned in Marine operational center, located in the area of ACMS site.</p>	<p>No</p>
---------------------	--	--	---	-----------

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
			In this case the Contractor is to consider that the local PABX interfaces are to interconnect with voice channels to VMSS, and control to RSC and MPS.	
<b>T.150</b>	BOOK II PART IV ANNEX C SECTION 4 Figure 4	Could you confirm that Figure 4 on IFB AMD2 Book II Part IV Annex C Page 14 doesn't correspond with drawing on Figure 7 Appendix-1 to Book II Part IV Annex-C which is depicted Building 24 and 28 which is actually the RX installation site?	Updated scheme of Rx site delivered with IFB AMD2 gives clear information that equipment is going to be situated in building 24 on the Rx site. The diesel generator is to be situated in building 28.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.151	BOOK II PART IV ANNEX C SECTION 4	Can we assume that references to Backup generator system and UPS in points 4.3.2 and 4.3.3 are for RX site instead of TX site?. iteratively	<p>“Tx site” in SOW Annex-C paragraph 4.3.2 and 4.3.3 should be read as “Rx site”.</p> <p>Note to Bidders:</p> <p>This amendment will be reflected in the SOW Annex-C at the Contract Award unless there is any outstanding amendment requirement to be done in the SOW Annex-C until Bid Closing Date.</p>	Yes, IFB AMD3
T.152	SOW Annex-A 6.6.8.e;	The number of actually used communication channels were defined and the engineering design will be based on those figures. However, the capacity of the RED Switch was defined for 50 input channels. Please clarify the number of digital and analog channels out of 50.	Please see T.138	No
T.153	SOW Annex-A 6.5.11.c;	It is assumed that the IP Crypto’s output will be converted by IP to serial data converters before connected to the RED Switch. Please clarify who is responsible to provide IP to serial data convertors.	It is the Contractor’s responsibility	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.154</b>	SOW Annex-A 6.8.14.a;	<p>The number of actually used communication channels were defined and the engineering design will be based on those figures. However the capacity of the recorders available in the market are much higher than the actual defined number of channels. Please clarify;</p> <ul style="list-style-type: none"> <li>- the capacity of the recorders,</li> <li>- audio format used for recording,</li> </ul> <p>in order to listen to recorded voice communications which subsystems shall be connected to these recorders?</p>	<p>The SOW reference requires the VMSS “to save all voice communication on request” and the answers to T.116 and T.117 specify the capacity required.</p> <p>The audio format is not specified and the contractor is free to supply recordings in any format providing that they shall not degrade the intelligibility of the recorded voice channel.</p> <p>Recorders are a requirement for the voice system only, and don’t require high fidelity.</p>	No
<b>T.155</b>	SOW Annex-A 6.11.1.e 6.12.1.c;	<p>Please confirm that Tx and Rx Voice modem is actually Advanced STANAG 4197 Narrowband Digital Voice Terminal Equipment (ANDVT or AN/DVT) which can transmit encrypted digital voice over HF.</p>	It is confirmed	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.156	SOW Annex-A 6.6.4.; 6.14	Please clarify that mentioned “NDN” between ACMS, Tx and Rx sites is going to be “DLOS” as specified under paragraph 6.14.	Confirmed. National Defense Network (NDN) between ACMS, Tx and Rx sites is going to be “DLOS” as specified under SOW Annex-A 6.14.  Please also see T.142	No

<p><b>T.157</b></p>	<p>SOW Annex-A 6.8.9 Human Machine Interface (Voice Terminals):</p>	<p>Under paragraph 6.8.9, there is a requirement for digital voice (built in vocoder) communication with crypto or plain selection via mechanical switch.</p> <p>Please clarify whether Voice terminal equipment would also have analogue Audio output and input which would be de-crypted or en-crypted by using Tx and RX Voice Modems.</p>	<p>Digital voice in this paragraph can refer specifically to users equipped with STANAG 4591 or STANAG 4197/4198 codecs. STANAG 4198 specifies inter alia the digital bit stream for interoperability between voice codecs using Linear-Predictive Coding; STANAG 4197 specifies inter alia the modem's transformation of a STANAG 4198 codec's digital voice stream to a 39-tone HF modulation.. The PFE voice terminal integrates STANAG 4198/4197 and crypto in a single unit, with red-side analogue interface (plain) black-side analogue interface (encrypted); encryption/decryption outside the PFE voice terminal can only be done on a the terminal's digital interface that gives access to the STANAG 4198 (or</p>	<p>No</p>
---------------------	---	---	--	-----------

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
			<p>STANAG 4591 / MELP) codec, and is not done in the Tx/Rx voice modems. However, digital voice here may also refer to other digital voice codecs (e.g., for Voice-over-IP) proposed by the bidder for use within the ACMS and Tx/Rx sites to meet other SOW requirements for voice services. In the context of this paragraph, remote analogue users may be aboard maritime platforms (or other deployed platform accessing the BRASS node). anywhere in the NATO Area or Responsibility.</p>	
<p><b>T.158</b></p>	<p>BOOK II PART I SECTION 1-SSS</p>	<p>In CLIN table as well as in IFB, there are predefined various 19" Racks with certain quantities.</p> <p>Please clarify whether it is possible for the bidders to propose different solution in terms of 19" Racks including quantities depending on its own system solution.</p>	<p>It is possible to propose different solution in terms of quantity of 19' Racks as long as proposal meets the contractual requirements.</p>	<p>No</p>

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.159	BOOK II PART I SECTION 1- (SSS)	<p>In CLIN table as well as in IFB, there are predefined various 19” Rack Type UPS with certain quantities where for transmitters only Exciters will be connected to UPS.</p> <p>It was also specified that a large UPS capacity will be available for the 5kW transmitters under the scope of HN’s local civil Contractor.</p> <p>Please confirm that additional UPS equipment are needed in addition to the large UPS only for exciters which are not standard products but need to be implemented by the Transmitter manufacturers’ into the each transmitter.</p>	Please see SOW paragraph 3.5.16	No
T.160	BOOK II PART I SECTION 1- (SSS) 7.2	<p>In CLIN table as well as in IFB, under the list of HARDWARE for RX Site at Galata (7.2), RCS LAN equipment are not listed.</p> <p>Please clarify that HARDWARE for RX Site at Galata in CLIN table has RSC LAN Equipment.</p>	<p>CLIN 7.2.5 will be added to the SSS as to read:</p> <p><b>RSC LAN</b></p>	Yes, IFB AMD3
T.161	BOOK II PART I SECTION 1- (SSS) CLIN 5.2.5 CLIN 5.4.1 CLIN 5.4.3	<p>In CLIN table as well as in IFB, under the list of HARDWARE for ACMS at Gorna Traka; Multiplexer (Intersite) (5.2.5), Black Voice Network (5.4.1) and Black Voice Switch (5.4.3) items are defined as separate equipment.</p> <p>Please clarify that bidders can propose different solution which has a Black Digital Switch (5.2.2) that can handle Multiplexer (Intersite) (5.25), Black Voice Network (5.4.1) and Black Voice Switch (5.4.3) equipments functions in one unit.</p>	Confirmed. Bidders can propose different solution that can handle all relevant hardware in one unit as long as Bidder’s solution meets contractual requirements.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.162</b>	BOOK II PART I SECTION 1- (SSS) CLIN 5.4.2 CLIN 5.4.4 CLIN 5.2.1	In CLIN table as well as in IFB, under the list of HARDWARE for ACMS at Gorna Traka; Red Voice Network (5.4.2) and Red Voice Switch (5.4.4) items are defined as separate equipment.  Please clarify that bidders can propose different solution which has a Red Digital Switch (5.2.1) that can handle Red Voice Network (5.4.2) and Red Voice Switch (5.4.4) equipments functions in one unit.	Confirmed. Bidders can propose different solution that can handle all relevant hardware/system in one unit as long as Bidder’s solution meets contractual requirements.	No
<b>T.163</b>	BOOK II PART I SECTION 1- (SSS) CLIN 5.5.1 CLIN 5.5.2 CLIN 5.5.3	In CLIN table as well as in IFB, under the list of HARDWARE for ACMS at Gorna Traka; Distribution Unit (5.5.2) and GPS Receiver (5.5.3) items are defined as separate equipment.  Please clarify that bidders can propose different solution which has a PTFS Main Unit (5.5.1) that can handle Distribution Unit (5.5.2) and GPS Receiver (5.5.3) equipments functions in one unit.	Confirmed. Bidders can propose different solution that can handle all relevant hardware/system in one unit as long as Bidder’s solution meets contractual requirements.	No
<b>T.164</b>	BOOK II PART I SECTION 1- (SSS) CLIN 6.1.3 CLIN 6.1.4 CLIN 6.1.6	In CLIN table as well as in IFB, under the list of HARDWARE for TX Site at Asparuhovo; Audio Switch (6.1.3) and Data Switch (6.1.4) items are defined as separate equipment.  Please clarify that bidders can propose different solution which has a Black Switch (6.1.6) ) that can handle Audio Switch (6.1.3) and Data Switch (6.1.4) equipments functions in one unit.	Confirmed. Bidders can propose different solution that can handle all relevant hardware/system in one unit as long as Bidder’s solution meets contractual requirements.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.165</b>	BOOK II PART I SECTION 1- (SSS) CLIN 7.1.3 CLIN 7.1.4	In CLIN table as well as in IFB, under the list of HARDWARE for RX Site at Galata; Audio Switch for Remote Site (7.1.3) and Data Switch (7.1.4) items are defined as separate equipments.  Please clarify that bidders can propose different solution which might have a Black Switch (7.1.1) that can handle Audio Switch for Remote Site (7.1.3) and Data Switch (7.1.4) equipments functions in one unit.	Confirmed. Bidders can propose different solution that can handle all relevant hardware/system in one unit as long as Bidder’s solution meets contractual requirements.	No
<b>T.166</b>	Book II Part IV SOW 5.7.1	It was assumed that security accreditation process will be in English language only.  Is it required to get security accreditation of “whole BRASS BGR system also in Bulgarian”?	Security Accreditation documentation shall be in English and Bulgarian language in accordance with SOW 5.7.1.	No
<b>T.167</b>	Book-I Bidding Instruction para. 4.4.9.l.i and 4.4.9.f.iii	Is Bidder required to provide preliminary SAP and STEP in Bulgarian language besides English?	No, Bidder shall provide preliminary SAP and STEP in only English in his proposal. However, all security accreditation documentation (including final SAP and STEP) shall be prepared in English and in Bulgarian language in accordance with SOW 5.7.1.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.168</b>	Book II Part IV SOW 12.4.9.	In various sections of the IFB document, the BRASS BGR Contractor was required to implement the communication related equipment and had no requirement to modify the buildings. It seems like the application for the building permits shall be done by the HN's local contractor since the complete infrastructure, civil, electric and mechanical works are in their scope! Please clarify.	The installation of the antennae and all related equipment is Contractor's responsibility.	No
<b>T.169</b>	Book II Part IV SOW 12.4.11. 13.14.1.	The masts and equipment are going to be supplied by English manuals and those do not come in Bulgarian language. The training of the BRASS BGR also specifies personnel at HN with sufficient and certified English language skills. Besides it was also mentioned in SOW that all documentation should be in English language.  Please clarify.	SOW paragraph 12.4.11 and 13.14.1 doesn't conflict.  SOW paragraph 12.4.1 is related to Health and Safety (H&S) and SOW paragraph 13.14.1 refers to H&S.  Documentation affecting Safety Hazard and health protection matters shall be delivered in both English and HN language – Bulgarian in accordance with SOW 13.14.1.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.170	SOW 14.5.4.b	<p>It seems like the HN's Local Contractor's scope of work was mentioned in the training section which is not part of BRASS BGC Contractor's scope of work.</p> <p>Please clarify.</p>	<p>Agreed. SOW 14.5.4.b will be amended as follows:</p> <p>The training shall cover all aspects required to configure, maintain and trouble shoot the BRASS BGR System and any of its sub-systems (including <del>BRASS dedicated NB SB and PSS, BRASS dedicated HVAC and Fire Extinguishing System (FES)</del> <b>DLOS antenna masts, aircraft warning Lights, lightning protection, and grounding</b> at the ACMS site. It shall include as necessary control aspects for all hardware, firmware and software maintenance aspects.</p>	Yes, IFB AMD3

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

<p><b>T.171</b></p>	<p>CR T.72 Tree cutting requirements</p>	<p>It was mentioned in the several parts of the IFB document and also in CR that the BRASS BGR's Contractor is responsible for cutting the trees and related permissions.</p> <p>The separation of works for BRASS BGR and HN's Local Civil Contractor was defined as; Civil Contractor is responsible for preparation of antenna farm, access roads, cable trenches, manholes, excavation and leveling etc while BRASS BGR contractor is responsible for the antenna foundation works and erecting, installing the antennas.</p> <p>An example of the order of the works might be as follows;</p> <ul style="list-style-type: none"> <li>- After EDC, during the site survey, the locations of the antennas will be defined and agreed.</li> <li>- The access roads and cable trenches will be defined and agreed.</li> <li>- Civil contractor will start the works and will do above mentioned works which shall include cutting of the trees along the way to the antennas assuming that a truck and a crane shall have access for the antenna works.</li> <li>- BRASS BGR contractor starts building of the foundation blocks and installation of the antennas.</li> </ul> <p>In this process, it is assumed that local civil contractor will be dealing with cutting the trees because of the access roads, preparation of parking and maneuvering area near</p>	<p>Bidder's understanding is not confirmed.</p> <p>Cutting the trees are Contractor's responsibility.</p> <p>Please also see T.52; T.63 and T.72</p>	<p>No</p>
---------------------	--	---	--	-----------

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
		<p>future antenna foundation locations in order to permit cranes and trucks to access the area.</p> <p>Another point is that rather than a foreign company who is specialized on communications and electronic systems trying to deal with local government organizations to receive permits, it might be much easier for the local civil contractor where such permits are required and handled for their scope of work.</p> <p>Please kindly reconsider the responsible party for “permits of cutting the trees” since the cost and delays of such process cannot be estimated easily.</p>		
<p><b>T.172</b></p>	<p>CR T.31 .</p>	<p>The BRASS ICC is intended to operate new equipment however, IFB mentions existing equipment and antennas. It may not be possible to develop software drivers and interfaces for the existing equipment at HN.</p> <p>Please clarify whether only the new equipment under the scope of BRASS BGR would be connected to BRASS ICC.</p>	<p>Only new equipment to be procured under BRASS BGR shall be connected to BRASS ICC.</p>	<p>No</p>

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.173	CR T.34 Antenna feeders	Please clarify whether the feeders and cables of old antennas would be removed under the civil contractor's scope of work.	Only feeders and cables that belong to all old antennas that are to be dismantled will be removed.  Feeders and cables of old antennas that will continue to exist will remain.	No
T.174	CR T.35 Rhombic antenna	Please clarify whether the rhombic antenna and related material and equipment would be removed under the civil contractor's scope of work.	The rhombic antenna and related material and equipment will be removed under the civil contractor's scope of work	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.175	CR T.48 Digital MTX	Please clarify whether digital matrix, data and antenna matrices in BRASS BGR would be connected to the new equipment, not to the existing equipment.	It is confirmed  Digital matrix, data and antenna matrices in BRASS BGR would be connected to the new equipment, not to the existing equipment.  Please also see T.48.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.176	BOOK II PART IV ANNEX-A PAGE 53, 64	<p>Item 6.11.1. and item 6.12.1 states that “five (5) modems STANAG 4285 and 4539 as well as STANAG 4197 compliant; 1 time (1-NATO BCST, 1 National BCST, 2-S-S, 1-MRL); “ and “three (3) voice RF modems compliant with STANAG 4197”</p> <p><b>Q:</b> Crypto equipment generally have the capability of voice processing in accordance with STANAG 4197. In this context, is it necessary to do the voice processing on the modem in accordance with STANAG 4197 or pass it through the signal which is processed in TADPOLE crypto devices in accordance with STANAG 4197?</p>	<p>Crypto equipment does NOT generally have the capability of voice processing in accordance with STANAG 4197. And the voice processing standard is not solely STANAG 4197, which is an HF modem standard for LPC-10 voice interoperability, but includes STANAG 4198, which specifies the LPC-10 voice codec. TADPOLE is not a voice processing standard; it specifies a class of cryptographic algorithms.</p> <p>Please also see T.111</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.177	BOOK II PART IV ANNEX-A 5.1.2	<p>The BRASS ICC software package will be delivered to the Contractor to adapt the software to the new hardware and system specific functions. Since it is not a requirement for the Bidders to work with the original developer company, for the Contractor it should be possible to further develop and adapt the delivered version of the BRASS ICC software. The source code and the help files should be delivered as a package to the Contractor.</p> <p>Please confirm that all the <u>help files and documentation</u> to further develop and adapt the BRASS ICC Software for BRASS BGR project which will be delivered to the Contractor is <u>completely in English Language</u>.</p>	<p>Confirmed. Current BRASS software (BICC software version 1.6) that has help files and documentation will be delivered to the Contractor only in English language.</p>	No

<p><b>T.178</b></p>	<p>BOOK II PART IV ANNEX-A 1.2.4.</p>	<p>Please clarify what is expected from the Contractor to “take necessary precautions to avoid risk of interference with other commercial, public safety or international users” and “unexpected interference” since the SOW does not require functions such as ALE, frequency hopping or anti-jamming methods to overcome such issues.</p>	<p>The requirement is confirmed. The interference referred to in this requirement consists in (transmit) interference generated by the BRASS BGR transmit site into other users due to excessive combined out-of-band/spurious emissions, (receive) interference from other users into the BRASS BGR receive site, (transmit-receive) self-interference between the BRASS BGR transmit site into the BRASS BGR receive site due to combined out-of-band/spurious emissions and/or lack of appropriate filtering. Necessary precautions include but are not limited to all SOW provisions for EMC/EMI, TEMPEST, Health and Safety Certifications</p>	<p>No</p>
---------------------	---	---	---	-----------

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.179</b>	ANNEX C	<p>The provided site drawings are only in <u>estimated scale</u> and do not match with the data provided on Google maps.</p> <p>Please confirm that the antenna farm layout, which will be a draft and approximate, to be based on the <u>new drawings</u> not the Google maps and those can only be finalized during and after the site survey after EDC.</p>	<p>It is confirmed. Drawings can only be finalized during or after site survey after the Contract Award.</p>	No
<b>T.180</b>	BOOK II PART IV ANNEX-A 6.7.5.e	<p>The SOW requires and additional isolator device between MPS and RSC which seems to have a function similar to an “ARQ isolator” in addition to the 3 each ARQ isolators between ARQ Processors and RSC.</p> <p>RSC only controls the equipment at black side and do not have interface to any other red device except 3 each ARQ processors.</p> <p>Please clarify where the additional isolator is planned.</p>	<p>Isolator requirement is clearly stated in the SOW Annex-A 5.2.5.a.iii; 6.1 (Figure-5); 6.6.15.b; 6.6.15.c; 6.6.15.e; 6.7.3; 6.7.4; 6.7.10.</p> <p>Please also see SOW Annex-A paragraph 6.7.10 c. for details about FAB sent from MPS to RSC.</p>	No
<b>T.181</b>	BOOK II PART IV ANNEX-A PAGE 51, Item 6.10.6	<p>Item 6.10.6.c. states that “The UPS shall provide a minimum of fifteen (15) minutes backup power in case the Prime Power Supply System fails.”</p> <p>Item 6.10.6.h.iv. states that “Operating time with max load not less than 30 min”</p> <p>Please clarify how long UPS shall provide the backup power.</p>	<p>Please see T.122</p>	Yes, IFB AMD3

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.182	BOOK II PART IV ANNEX-A PAGE 64, item 6.12.1 and BOOK II PART I SECTION 1 PAGE 10	RSC LAN is a requirement for TX and ACMS site. But RSC LAN is not a defined requirement for RX site in the IFB. Could you please clarify the rationale behind this issue?	Please see T.160	Yes, IFB AMD3
T.183	SOW Annex A 6.7.5.d; CR T.6	Two(2) RSC workstations are indicated however IFB-CO-13733-BRASS-BGR-AMD2 SOW Annex A Figure 5 shows total one (1) RSC workstations in ACMS and total three(3) workstations for BRASS RSC (one for ACMS, ONE for RX and one for TX), please can you confirm the required number of RSC workstations in each site?	<p>The drawings of work stations in Figure-5 should be considered as 'Generic'. Regarding number of work stations, please see SOW Annex-A 6.5.3.c; 6.5.9; 6.7.5.d; 6.7.8; 6.11.1.i; 6.12.1.g as well as SSS CLIN 5.1.2; 5.3.3; 6.2.2 and 7.2.1</p> <p>Both workstations at ACMS RSC (CLIN 5.3.3) should have the same software installed and should be connected to RSC network. One should play the role of the backup other.</p>	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.184</b>	SOW Annex-C Appendix-1 7a2-Figure-2 (ACMS Building N11) CR, T.6	Please can you indicate which are the rooms usable for the BRASS BLACK equipment in ACMS?	BRASS BLACK equipment will be placed in room 017. In case room 017 is not sufficient for the equipment, part of it might be placed in room 016 together with ACMS and communication equipment.	No
<b>T.185</b>	SOW Annex A Figure 5; CR , T.29	Please clarify which are the available interfaces of the UAR represented in green color in figure (serial/IP)?	Please see T.134	No
<b>T.186</b>	SOW Annex A 6.6.11.d.ii; CR, T.29	Please provide details about the protocol (IP or E1) of the NGCS interface	It can be established IP connection between PoP in Sofia and ACMS in Gorna Traka area.  In addition, please see IFB SOW 3.5.2	No
<b>T.187</b>	SOW Annex A 6.6.11.d.ii 6.6.11.d.i; CR, T.29	Please provide details about the local PABX interface	Please see T.149	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.188</b>	SOW Annex-A 3.1; CR T.46	<p>In Section 3.1 it is stated that “At both the Transmit and Receive Sites, the isolation between any two different antenna terminals shall be at least 30 dB, for any two physically separated antenna terminals, and 25 dB, for any two antenna ports belonging to the same multipoint antenna, at maximum transmit power in CW.”</p> <p>Existing antennas must be considered as part of this requirement?</p> <p>If yes, we need more information about these antennas (polarization, radiation pattern, etc.)</p>	<p>There are two microwave antennas with vertical polarization (DLOS) on each site (Rx and TX)</p> <p>Since the antenna field on the TX site was built back in 1960, NAVY does not have the required documentation.</p> <p>Please, take into account the answer to question 46.</p>	No
<b>T.189</b>	SOW ANNEX-A 6.14.2.a.viii; CR T.68	<p>It is required a DLOS with software product for monitoring and management compatible with software product “Provision” of “Aviat Network” company : can you please provide details of that software? Which are the supported protocols for integration of third party DLOS systems?</p>	<p>Software product for monitoring and management of DLOS – “Provision” by “Aviat Network” for DLOS “Eclipse” produced in 2015 or later</p>	No

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.190	SOW ANNEX-A 6.14.2.b.i; CR, T.68	<p>On referred paragraph is stated; “DLOS frequency range as defined for BGR MoD use: 7989-8129 MHz 8299-8439 MHz”</p> <p>but on your answer on question T.68 you specify: “Contractor shall choose the frequency band for the DLOS whereas the HN will obtain permission for specific frequencies.”</p> <p>Please clarify if a different frequency range can be used for the DLOS links? Please can you specify any restrictions?8299-8439 MHz”</p> <p>but on your answer on question T.68 you specify: “Contractor shall choose the frequency band for the DLOS whereas the HN will obtain permission for specific frequencies.”</p>	<p>Frequency specification: Frequencies of radio band and DLOS systems for frequency range 7,725-8,5GHz should be able to tune for each channel from frequency range according to recommendation ITU-R F.386-8-A2 and A3 and ECC(CEPT/ERC) (02) 06 A1.2.1.</p> <p>MoD Bulgaria will provide for use 7,9-8,4GHz by using 5,6,7 and 8 channels to establish DLOS connection.:</p> <p>In addition, typo will be corrected at the SOW Annex-A 6.14.2.b</p>	Yes, IFB AMD 4

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.191	SOW ANNEX-A  6.14.2.a.ii; CR, T.68	On BOOK II PART IV ANNEX-A 6.14.2.a.i is required a DLOS operating in the frequency range of 8 GHz but the channeling recommendation ITU-R F.636-3 is referred to fixed wireless systems operating in the 15 GHz band.  Please clarify, which requirement take precedence?	(Please see T.190)  Following amendment will be done at SOW Annex-A 6.14.2.b.ii:  <del>Chanelling: ITU-R 636-3;</del> ITU-R F.386-8-A2 and A3 and ECC(CEPT/ERC) (02) 06 A1.2.1.	Yes IFB AMD4
T.192	SOW  Annex-C Appendix-1 7a3-Figure-3 (Tx site CR, T.69	We noted a misalignment between the North direction indicated on this drawing and the real North. This may impact on the correctness of the Dipoles preferred direction and consequently on the RF Coverage Study. Please can you confirm the correctness of the Nord direction in the drawing according to the actual site area orientation?	North direction shown on the scheme is approximate. For determination of the exact North direction, it is necessary N and N-E pointers to be rotated about approximately 10 degrees clockwise. The Contractor should estimate the exact orientation of the Dipoles on site.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.193</b>	SOW Annex A 6.10.6 a; CR: T.70	Shall battery packs for the UPS be redundant?	Confirmed, Battery packs for the UPS shall be redundant.	Yes, IFB AMD4
<b>T.194</b>	SOW Annex A Figure 5; CR, T.82	Please clarify how the orange “Z” is required to be connected to the Black Switch	Orange “Z” is NATO IP Cryptographic Equipment.	No
<b>T.195</b>	SOW Annex A Figure 5; CR, T.82	Please clarify which is the purpose of the chain: IP/Serial Converter – Router – Orange “Z” – Black switch	The purpose of this chain is to establish the serial connectivity from the NATO Allied Information Flow System (AIFS) to the MPS system in ACMS. The ACP 127 serial output of AIFS is converted to IP, encrypted and routed to ACMS where it should be decrypted and converted back from IP to serial.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.196	SOW Annex A Figure 5; CR, T.82	Are IP/Serial Converter – Router – Orange “Z” PFE equipment required for the Connectivity to the NATO General purpose Communications System (NGCS)?	IP/Serial Converter and NATO IP Cryptographic Equipment are PFE.  Routers <u>are not</u> PFE and needs to be procured by Contractor. Please see T.134; SSS CLIN 5.1.3; CLIN 5.6 (5.6.1 and 5.6.2) as well as SOW Annex-A.	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<p><b>T.197</b></p>	<p>SOW ANNEX-A 4.2.2. PAGE 14, Item “ARQ Software”</p>	<p>Item 4.2.2.b. states that ARQ software shall support full duplex operations.</p> <p>Some ARQ vendors have implemented a full duplex capability into their products. ARQ vendors have implemented their own solutions where the standard is not definitive. Vendors' own solutions have brought about interoperability issues. As for BICC software, it may require major modifications for full duplex implementation.</p> <p>Considering the abovementioned issues, could bidders offer half duplex ARQ servers?</p>	<p>As specified at many places of the SOW Annex-A, STANAG 5066 capability is a requirement for BRASS systems.</p> <p>Based on this, adaptive Mode in full duplex is a mandatory requirement as per STANAG 5066.</p> <p>As a result, full duplex functionality of STANAG 5066 protocol shall be implemented in the ARQ software by the Contractor in any case.</p> <p>Please also see SOW Annex-A 5.1.8 COTS table ARQ software Note-2.</p> <p>However, Bidders are free to propose any other ARQ COTS software as long as it meets the contractual requirements.</p>	<p>No</p>

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<p><b>T.198</b></p>	<p>SOW ANNEX-A 4.1.5. 4.1.6. 5.1.26  5.1.27.</p>	<p>Some vendors have end to end BRASS software solutions which are in full operational use and provide field-proven interoperability with other BRASS solutions. It is considered that using this COTS software is more practical and reasonable during the CLS period.</p> <p>Could bidders offer COTS BRASS software instead of modification of BICC software?</p>	<p>As long as all the software, technical and security requirements of the contract are met and the source code of the final software suit and other engineering documentation is delivered to the Purchaser at FSA, any (or whole) part of BICC (BRASS Initial Core Capability) software can be substituted. Any COTS product that is used currently by BICC software can be substituted by another as long as it has the required functionality (also in terms of security) and the BICC software is adapted to work with it.</p> <p>Please also see Book II Part II (Contract Special Provisions) Article 18.2 and SOW Annex-A 4.1.2</p>	<p>No</p>

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.199	SOW ANNEX-A PAGE 23, Item 6.3.1	<p>Item 6.3.1. says “The hardware (only workstations, monitors, displays and port cables) supplied for this project, shall meet the hardware specifications defined in SOW Annex-A Appendix-3.”</p> <p>The total number of workstations in the project is 9. Five of them will be used in MPS network and they shall be TEMPEST. TEMPEST equipment vendors supply a few kinds of specific model workstations which may not fit the SOW Annex-A Appendix-3. Moreover, workstations defined in the SOW may be obsolete by CDR due to the fast-developing nature of desktop PC and monitor market.</p> <p>Could the SOW Annex-A Appendix-3 be removed from IFB?</p>	<p>No, SOW Annex-A Appendix-3 remains in force in the IFB package.</p> <p>Note that TEMPEST certificate is required for all peripherals and accessories delivered with a workstation. In addition, please see SOW Annex-A 6.5.14.h</p> <p>In case of technology obsolescence, Bidders shall provide equipment with equal or better capacity, performance, interfaces and physical parameters while retaining backward compatibility.</p> <p>Specs in the SOW Annex-A Appendix-3 are minimum requirements except for maximum dimensions in form factor for the desktop which is a maximum spec.</p> <p>Therefore, the Contractor shall also take into account “Form Factor” aspects and it is the responsibility of Contractor to find appropriate hardware meeting the IFB requirements for the whole system..</p>	Yes, IFB AMD4

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<p><b>T.200</b></p>	<p>BOOK II PART IV ANNEX-A Appendix-1 Section 3.5.7.f</p>	<p>Is it possible to investigate the influence of the dynamic wind react to the mast with Equipment in accordance with international rules like EIA/TAI Standard 222 G?</p> <p>The requested fundamental resonance frequency of the mast with equipment greater than 3Hz.</p> <p>Is reasonable only in very special cases of top loaded masts with mechanical-dynamical equipment like radar.</p> <p>The design of guyed masts and towers to support antenna structures in accordance with international</p> <p>Rules like EIA/TIA 222 G standard is state of the art.</p>	<p>Yes, EIA-TIA-222-G standard shall be used to calculate the axial forces (FAM), side forces (FSM), and twisting moments (MM) generated on the antenna structures according to the recommendations set forth in its Section C.2 and considering <math>q_z=1.004 \times V^2</math> [N/m<sup>2</sup>] (velocity pressure, [N/m<sup>2</sup>]; V=basic wind speed, [m/s]), Gh=1 (gust factor), and the coefficients contained in Tables C-1 through C-4 as a function of the proposed antenna and mast type and of the worst-case wind direction.”</p>	<p>No</p>

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.201</b>	BOOK II PART IV ANNEX-A 5.2.6	The VMSS shall be a voice network, unconnected with the MPS Local Area Network for security reasons:  The item 6.5.11.iii requires that MPS shall interface with VMSS for “control data”. Could you please explain what kind of interface is required and how it can be achieved without connecting to LAN? Are VMSS terminals required to connect to Message Terminals via RS-232 type of serial interfaces?	VMSS terminals are not required to connect to Message Terminals. Only Red Voice switch shall be controlled by MPS server. Please See SOW Annex-A 6.8.7.b; 6.8.8; 6.8.13 a.	No
<b>T.202</b>	BOOK II PART IV ANNEX-A 6.7.10; iii.	RSC is required to provide the connection to crypto voice pool. Does that specification contradict with 6.5.11.iii where such control function is provided via MPS?	It should be provided on both sides to be able to assign required voice crypto device to every voice circuit. Please See SOW Annex-A 6.8.13.	No
<b>T.203</b>	BOOK II PART IV ANNEX-A 6.5.9 a.	Under this paragraph, it was stated that Hardware solution for WSs shall be COTS based.  There is another requirement under 6.5.14 of BOOK II PART IV ANNEX-A, where it is stated that MPS WS will either be certified as per SDIP-27 or installed in a shielded enclosure as per SDIP-27.  We believe there is conflict between these two requirements, and kindly ask you to confirm that all the Red Zone equipment is certified as per SDIP-27 or installed in a shielded enclosure as per SDIP-27.	There is no conflict.  All the Red Zone equipment shall be certified as per SDIP-27 or installed in a shielded enclosure as per SDIP-27.  See SOW annex-A 6.5.14 and SOW 4.5 d as well as T.199	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.204</b>	BOOK II PART IV Annex-A 1.2.3. g.	<p>In accordance to paragraph 6.8.9 of BOOK II PART IV ANNEX-A Voice Terminals will be located at Red Zone (classified area).</p> <p>It was also stated that Red and Black network separation will be maintained via mechanical switch as stated under the same paragraph.</p> <p>Would you please clarify, that having black voice communication in RED zone will not cause any conflict to Security Accreditation?</p>	<p>The approval of Security Accreditation is the responsibility of the National Security Authority and the outcome cannot be predicted at this stage.</p> <p>It is the responsibility of the Contractor to analyse and provide solutions to entire satisfaction of the purchaser.</p> <p>Please see also SOW Annex-A 6.8.9 c.</p>	No

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.205</b>	IFB-CO-13733-BRASS-BGR-AMD2 Bidding-sheets CLIN 5.1.9 and 5.1.10 CLIN 5.3.7 and 5.3.8 CLIN 6.2.4 and 6.2.5 CLIN 6.3.7 and 6.3.8 CLIN 7.2.3 and 7.2.4 CLIN 7.3.6 and 7.3.7 Clarifications, T.70	Shall every BRASS Tx, Rx and ACMS rack have its own redundant UPS?	Yes. Please see SOW Annex-A 6.10.6.a.  Please also see T.193	No
<b>T.206</b>	Appendix 2 to SOW Annex-C_ SPDP 1 h  SOW Annex A 6.10.6  CR, T.70.	Shall UPS provide a minimum of fifteen (15) or ten (10) minutes backup power in case the Prime Power Supply System fails? Please clarify	Please see T.122 and IFB AMD3  Please also see SOW Annex-C paragraph 1.1.3	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.207</b>	SOW Annex A 6.10.6 h i CR, T.70	Shall UPS for the equipment racks have three phase 400VAC input voltage? Please note that an UPS with three phase input and parallel operation will determine a model that has:  - Oversized power for the rack power consumption High mechanical size that it can create space problem with other equipment in the rack	The requirement in the SOW ANNEX-A 6.10.6.h. remains.  The Contractor shall find the solution to mitigate the risks to meet the contractual requirements.	No
<b>T.208</b>	SOW Annex A 6.11.7 f CR, T.70	Is UPS for the transmitter exciter in the scope of work?	Yes.	No
<b>T.209</b>	SOW Annex A 6.10.6 a CR, T.70	Shall the BRASS UPS be sized to include workstations and other peripherals/utilities?	Yes	No
<b>T.210</b>	Appendix 2 to SOW Annex- C_SPDP 1 m CR, T.70	Shall contractor provide a rack mounted manual bypass switch (for maintenance purpose) for each UPS in every BRASS RACK?	It is not a requirement.  Please also see SOW Annex-C paragraph 1.1.3	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.211</b>	SOW ANNEX-A 6.11.7.d. v.	In Book II Part IV (SOW) ANNEX-A 6.11.7.d bullet v., the PSK is specified as a mode of the HF Transmitter, while it is a waveform to be implemented by the external modem specified in para 6.11.5. Please confirm the PSK is required to the modems as specified in para. 6.11.5 and not to the HF Transmitters.	Please see 6.11.7.d.v ; 6.14.2 b.vi and 6.11.5.a.  The HF transmitters and receivers must be capable of supporting PSK modes implemented by external modems.	No
<b>T.212</b>	SOW ANNEX-A 6.11.7.d.viii. PAGE 54.	In Book II Part IV (SOW) ANNEX-A 6.11.7.d bullet viii, for a load of 50ohm is specified a WSVR 3:1 max, while for this load the WSVR is 1:1. Please clarify.	The requirements remain the same.  Contractor is responsible to meet the Contractual requirements and find mitigation measures to meet Contractual requirements.	No
<b>T.213</b>	SOW ANNEX-A 6.12.1.a,b,c, Figure 5 in para. 6.1	As specified in 6.12.1 bullet a the total number of receivers is five (5), while as specified in 6.12.1 bullet b and c the total number of modems are in a different number, i.e. eight (8). Besides, in figure 5 of BOOK II PART IV ANNEX-A para. 6.1 page 23 are specified eight (8) receivers. Please confirm the total number of receivers and modems requested.	For the number of modems in Rx site; please see SSS CLIN 7.1.2 and 7.1.6 as well as SOW Annex-A 6.12.1.b and c. For the number of receivers in Rx site please see SSS CLIN 7.3.1 and SOW Annex-A 6.12.1.a,  Figure 5 is a generic drawing. However, it will be modified as to show 5 receivers in Rx site to avoid confusion.	Yes, IFB AMD4

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.214</b>	SOW ANNEX-A 6.12.1.f. Figure 5 in para. 6.1	Figure 5 of BOOK II PART IV ANNEX-A para. 6.1 page 23 specify one (1) Wideband dipole, while 6.12.1 bullet f. specify three (3) Wideband Horizontal Dipole Antenna. Please specify the correct number of Wideband Horizontal Dipole Antenna.	For the number of Wideband dipole antenna in Rx site; please see SSS CLIN 7.3.4 and SOW Annex-A 6.12.1.f  Figure 5 is a generic drawing. However, it will be modified as to show 3 Wideband Dipole Antennas in Rx site to avoid confusion.	Yes, IFB AMD4
<b>T.215</b>	SOW ANNEX-A 6.11.1. d. 6.12.1.b.	What do you mean for "1 time" in the statement: "six (6) modems STANAG 4285/STANAG 4197 compliant; 1 time (1-BCST, 4-S-S, 1-MRL);"	It is related to one of the Operational Requirements. However, the term "1 time" will be deleted from the paragraphs 6.11.1.d and 6.12.1.b to avoid confusion.	Yes IFB AMD4
<b>T.216</b>	SOW ANNEX-A 6.6.11 d.i.	Please clarify what do you mean for "The Black Switch's interface to the NDN is through the Local PABX" and detail the PABX interfaces characteristics.	Please see T.134 and T.149	No
<b>T.217</b>	SOW ANNEX-A 6.6.11 d.ii.	Please specify the OSI level 2 NGCS interface to Black Switch.	Please see T.134; T.139; T.186; T.196	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.218</b>	SOW ANNEX-A 6.6.14 b.v. 6.6.14 h	Please clarify the aim to use IP-to-serial converters for connectivity to NGCS.	Crypto equipment, which will be integrated for connectivity to NGCS in the ACMS, will consist of the following components: a) NATO IP cryptographic equipment; b) IP-to-Serial converters.  Both are PFE.	No
<b>T.219</b>	SOW ANNEX-A 4.2.2.d. 6.6.8 e.iv..	Do the asynchronous/ synchronous serial communications to five locations (see paragraph 4.2.2 bullet d. Point to Point services) uses the crypto pool equipment? Which is the used crypto device? Are these the same "Other PtoP users" described at paragraph 6.6.8 e. bullet iv?	The asynchronous/ synchronous serial communications to five locations mentioned in 4.2.2 (also in 6.6.8 e) are for the future use. There is no crypto device assigned for the moment.	No
<b>T.220</b>	ANNEX A-1 to BOOK I - Bidding Sheets-	The Red and black routers described at CLIN 5,6 are not described in the System Requirements Specification and the System architecture diagram (Figure 5 PAGE 23, BOOK II PART IV ANNEX-A IFB AMD 2). Please confirm that their scope is limited to connect directly the NCGS to ACMS.	It is confirmed.  Please also see T.134	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.221</b>	SOW ANNEX-A 6.8.12.a	“A pool of crypto voice devices shall link the Red Voice Switch and the Black Switches, under the control of MPS Server Cluster”. Please clarify the requirements of controls	The MPS operator shall be able to assign any available voice crypto to any voice circuit defined in the system. This should be identical to crypto assignment for other circuits in the system (BCST, MRL, Ship – Shore).	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
T.222	-	<p>We would appreciate if you could help us in better defining the following contractual position of BRASS Bulgaria, confirm that:</p> <p>System Owner: After FSA the system will be handed over to NCIA that will take the ownership End User: Host Nation Bulgaria</p> <p>Will the system be ever owned by Host Nation Bulgaria? I need these clarifications in order to better identify with some vendors the regulations governing the export of equipment.</p>	<p>'As per Contract Special Provisions Article 18.2:</p> <p>The Title and Risk of Loss or Damages to all delivered/installed equipment, software (including source code) for the BICC Software, and documentation covered by this Contract shall pass to and vest with the Purchaser upon notification of Final System Acceptance (FSA) as defined in the SOW.</p> <p>Please consider that the Purchaser holds ownership title <u>on behalf of NATO</u>, as specified in Clause 30.3 of the Agency Contract General Provisions:</p> <p>All Foreground IPR is the property of the Purchaser on behalf of NATO. Consequently, no statement shall be made restricting the rights of the Purchaser in the Foreground IPR.</p> <p>Therefore, Owner and End User is NATO, final destination is Host Nation BGR.'</p>	No

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.223</b>	SOW 2.3.1.j.vi	What is the title of PIP 6? Is it Test and Evaluation or Test and Verification Plan (STVP)?	<p>Bidders firstly shall take into consideration Book-I when they prepare their Bid.</p> <p>Title of PIP 6 is Test and Evaluation as specified SOW 2.3.7.</p> <p>STVP (Test and Verification Plan) is a part of PIP 6.</p> <p>SOW paragraph 2.3.1.j.vi will be modified accordingly but this modification will be reflected in the text of the SOW at the Contract Award.</p>	Yes, IFB AMD4
<b>T.224</b>	IFB AMD 3 BOOK II PART IV ANNEX A 6.8.4 and 6.8.5  IFB-CO-13733- BRASS-BGR- AMD3 Clarifications T.149	<p>“For achieving capabilities, as according to 6.8.4, 6.8.5 and 6.8.7 in SOW Annex-A, it is necessary that the Contractor provides an individual local PABX with a capacity up to 20 IP users /including a 20 port IP switch and 20 IP phone stations/. This PABX is not to be connected to existing phone network.”</p> <p>Please provide CLIN relevant to required PABX, IP Switch and IP Telephone.</p>	MPS LAN	No

(ANSWERS TO CLARIFICATION REQUESTS – 3<sup>rd</sup> Release - Version 25 February 2016)

Serial NR	IFB REF	BIDDERS QUESTION	NCI AGENCY ANSWER	STATUS*
<b>T.225</b>	IFB-CO-13733-BRASS-BGR Appendix-2 to Book II Part IV Annex B 16.4.3	Please confirm that X.400 is a mandatory requirement to perform the exchange of management information between the managing workstations or a COTS “no military” email application could be proposed.	COTS “no military” email application could be proposed as well.	No
<b>T.226</b>	IFB-CO-13733-BRASS-BGR Book II Part IV Annex A, para.6.5.9 bullet b.ii, page 28	Please confirm if the required voice-communications sets are mandatory. Please specify if these equipment are in addition to the ones provided for the red VMSS.	It’s mandatory and additional.	No

A= Administrative/Contractual; P= Price; T= Technical

\* Status: Is Amendment to IFB required as a direct result of the Clarification Request?

CO-13733-BRASS BGR

N A T O U N C L A S S I F I E D

# CO-13733-BRASS BGR

**IFB AMD 4**



**BOOK II  
PART IV**

**ANNEX A  
SYSTEM REQUIREMENTS SPECIFICATION**

N A T O U N C L A S S I F I E D

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

**Page Intentionally Left Blank**

N A T O U N C L A S S I F I E D

Book II Part IV Annex-A Page ii

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

INDEX

<b>1.</b>	<b>Introduction .....</b>	<b>1</b>
1.1.	Purpose	1
1.2.	Scope	1
<b>2.</b>	<b>General BRASS System Characterization .....</b>	<b>2</b>
2.1.	General Description	2
2.2.	Maritime Communications Control Organization and Duties	3
<b>3.</b>	<b>Operational Objectives for the BRASS Implementation .....</b>	<b>5</b>
3.1.	Support By/To a NATO BRASS Node	5
3.2.	Functional Requirements to Support By/To a NATO BRASS Node	8
<b>4.</b>	<b>Particular Bulgarian BRASS system description.....</b>	<b>8</b>
4.1.	Purpose	8
4.2.	Provided Services:	9
4.3.	Descriptions and location of sites	10
4.4.	Automated Control and Management System (ACMS)	11
4.5.	Transmitter Site	11
4.6.	Receiver Site	11
<b>5.</b>	<b>System Functional Description .....</b>	<b>12</b>
5.1.	Software functional description	12
5.2.	ACMS General Functional Requirements	17
<b>6.</b>	<b>System Technical Description.....</b>	<b>23</b>
6.1.	Summary of Technical Concept	23
6.2.	System Software General Technical Description	23
6.3.	System Hardware General Specification	23
6.4.	General ACMS	24
6.5.	Message Processing System (MPS)	24
6.6.	Communication Interface and Switching Management System (CISS)	32

N A T O U N C L A S S I F I E D

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

6.7.	Remote Supervisory and Control (RSC):	41
6.8.	Voice Management Sub-System (VMSS)	45
6.9.	Precision Timer and Frequency Standard Sub-System (PTFS)	50
6.10.	Power Supply Sub-System (PSS)	50
6.11.	Transmitter Site (TX)	52
6.12.	Receiver Site (TX)	65
6.13	Connection to ACP-127 Network	68
6.14	Direct Line of Sight (DLOS) System between ACMS/Tx/Rx sites	68

- Appendix-1 Antenna Masts Requirements**
- Appendix-2 System Performance Requirements**
- Appendix-3 Hardware Specifications**
- Appendix-4 Abbreviations**

## SECTION 1 INTRODUCTION

### 1.1. Purpose

- 1.1.1. The purpose of this document is to specify the System Requirements of BRASS portion of the BRASS BGR project that is planned for modernization and upgrade of the existing HF Maritime Radio Stations and COMMCEN (Communication Center) of Bulgaria.
- 1.1.2. The purpose of a general BRASS system is to provide communications and associated services between the ashore Maritime Commanders and their assigned naval forces.

### 1.2. Scope

- 1.2.1. The System shall provide Broadcast, Ship-shore, MRL and Voice Communication capabilities to Bulgaria and to NATO in accordance with BRASS Baseline specifications. It shall manage and conduct the provision, implementation monitoring and acceptance of BRASS compliant Automated Control and Management System (ACMS) in Naval Communications Centre GORNA TRAKA (NAVCOMMEN) in order to improve its performances and services interoperable with NATO units. New transmitting and receiving sites shall be established in ASPARUHOVO and GALATA to improve HF coverage. The ACMS and Tx/Rx radio sites are on the outskirts of the city of Varna on the Black Sea Coast.
- 1.2.2. The core software shall be a replication of the Approved BICC SW (BRASS Initial Core Capability Software), adapted by the Contractor for the Host Nation (HN) to tailor the specific installation and integrated with Commercial off the Shelf (COTS) applications.
- 1.2.3. Scope of the project is summarized below
  - a. Implementation of a full BRASS ACMS capability with Message Processing; Communications Interface and Switching; Remote Supervisory and Control; Voice Management; and Power Supply sub-systems;
  - b. Implementation of eight 5kW solid-state HF transmitters, related antenna matrix (min 10x11) and ancillary equipment at Asparuhovo Transmitter Site;
  - c. Implementation of 6 wide-band dipole and 2 Rotatable Horizontal Log-periodic Array (RHLPA) antennas at Asparuhovo Transmitter Site;

- d. Implementation of 5 HF receivers, related antenna matrix (min 7x7) and ancillary equipment at Gorna Traka Receiver Site;
  - e. Implementation of 3 wide-band dipole and two RHLPA antennas at Galata Receiver Site;
  - f. Implementation of a DLOS system, consisting of base stations, masts and antennas to connect the Gorna Traka (ACMS), Asparuhovo (Tx) and Galata (Rx) sites;
  - g. Implementation of a voice system that can be connected to either the RED or BLACK network, thereby providing both secure and unclassified services. Contractor's design shall not allow RED traffic to flow into the BLACK network (or vice-versa) through the voice system.
  - h. Civil works at all 3 stations to include BRASS and DLOS antenna foundations and subsequent installation and mounting as well as distribution electrical power panels. The Contractor is responsible for antennas' correct operation.
- 1.2.4. The Asparuhovo transmitter site is in an elevated position about 100m above the nearest inhabited areas. Contractor shall take necessary precautions to avoid risk of interference with other commercial, public safety or international users. In the event of unexpected interference being identified, corrective action shall be taken by the Contractor.

## **SECTION 2 GENERAL BRASS SYSTEM CHARACTERIZATION**

The following information is taken from BRASS Baseline Architecture.

Unless otherwise stated, the specifications and descriptions described below shall be accepted as requirements for the BRASS BGR system.

### **2.1. General Description**

- 2.1.1. The purpose of BRASS is to provide communications and associated services between the ashore Maritime Commanders and their assigned naval forces.
- 2.1.2. Implementation of BRASS shall provide enhancement to Broadcast, Maritime Rear Link (MRL), and Ship Shore (S-S) services; thus ensuring timely, accurate and reliable command communications and exchange of information between Maritime Commanders and their assigned naval forces, as operationally required. It further provides:
  - a. Interoperability between different naval communications systems;
  - b. Security and survivability;

- c. Flexibility;
- d. Adaptive communications management by Maritime Commanders;
- e. A high degree of automation, supervision and control;
- f. Exchange of information/directives among the BRASS authorities, which are BRASS Co-ordinating Authority (BCOA), BRASS Control Authority (BCA) and BRASS Control Stations (BCS). Those are operational entities for the operational control of the broadcast capabilities.

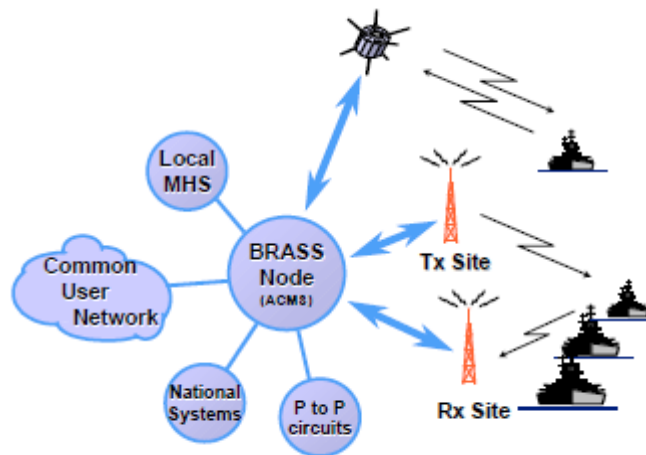


Figure 1: General BRASS High Level Conceptual View

- 2.1.3. Routing of messages from shore to ship is normally performed by one-way transmission, shore to ship, called "BROADCAST" that do not require reply from the ship. Routing of messages from ship to shore is performed by a two-way link called "SHIP-SHORE". For particular purposes a two-way link called Maritime Rear Link "MRL" may be established for exchanging record message traffic between a Command ashore and a Command afloat.

## 2.2. Maritime Communications Control Organization and Duties

- 2.2.1. The Maritime Communications Control Organization has a hierarchical structure and comprises three levels of authority;
  - a. The Broadcast Co-ordinating Authority (BCOA) is the highest authority within the Maritime Communications Control Organisation, responsible to the Strategic Commander(s) for the coordination of all maritime communication services.

N A T O U N C L A S S I F I E D

- b. The Broadcast Control Authority (BCA) is responsible to the Operational Control (OPCON) Authority for communication planning and managing broadcast, ship-shore and MRL services in support of operations and exercises. It is located in a NATO/National Maritime Headquarter (HQ).
- c. The Broadcast Control Stations (BCS) are the lowest level of BRASS authority that is operating and controlling BRASS services (Broadcast, Ship-Shore and MRL). They have to monitor circuits and correct technical malfunctions where necessary and when possible. In the current BRASS system, the BCS provides a network-enabled Fleet Interface Point to the NGCS, NATO Messaging Systems, national systems (where security certifications allow) for military messaging in a variety of formats (e.g., X.400, STANAG 4406 Annex-E SMTP, ACP-127).

2.2.2. In this organization each BRASS Control Station shall:

- a. receive the message traffic to be dispatched by the Broadcast(s);
- b. compile the Broadcast(s) and forward it to the Transmitting Site in keystore form;
- c. perform the OFF The Air Monitoring (OTAM) of each radiated HF Broadcast;
- d. switch and route received and transmitted messages between all connected systems and PtoP users.
- e. manage the Ship-to-Shore circuits associated with the Broadcasts;
- f. manage MRLs circuits;
- g. forward the message traffic received on the Ship-to-Shore circuits;
- h. perform any format modification to adapt the traffic received on the Ship-to-Shore circuits with the format required by the forwarding circuits;
- i. store, retrieve and forward on request, the message traffic handled by system;
- j. manage the backlogs, if any;
- k. log all the relevant activities performed within the system.
- l. provide capability to generate messages.
- m. reroute messages to another broadcast.
- n. implement contingency procedures in support of 24/7 operation.

N A T O U N C L A S S I F I E D

- 2.2.3. In addition to above listed tasks, each BRASS CS shall also perform the following routine activities, strictly linked with the Broadcast management:
- a. issue its own daily Broadcast Guard List,
  - b. issue hourly Traffic Lists (RECAP);
  - c. inform the users of a Broadcast about the traffic dispatched on it.
- 2.2.4. BRASS CS shall also include the capability for exchanging messages with the respective Broadcast Coordination Authority (BCOA) and BRASS Control Authority (BCA) all the information necessary to allow the superior authorities to perform their functions.

### SECTION 3 OPERATIONAL OBJECTIVES FOR THE BRASS IMPLEMENTATION

The overall operational requirement for a BRASS system is to provide the automation and enhancement of the services described in subsequent sections within the ACMS, Rx and Tx sites.

#### 3.1. Support By/To a NATO BRASS Node

- 3.1.1. Adequate support by/to other BRASS nodes is an important aspect of the BRASS system. The support can range from a mere re-routing of traffic via an alternate path, to radiating additional Broadcast or Ship-Shore components upon approval by the parent Broadcast Co-ordination Authority (BCOA). Approval by the BCOA is not automated in the BICC software.
- 3.1.2. Support is required in two cases:
- a. In case of major failure of one element of a BCS;
  - b. To improve the coverage of a given broadcast.
- 3.1.3. Failure of one element of the BRASS Control Station may require a support from an adjacent BRASS Node. Failures can occur in three ways.
- Transmitting site is out of order;
  - Link between BCS and transmitting site is out of order;
  - BCS is out of order.

#### a. **Transmitting Site is Out of Order:**

Considering the following figure, the Broadcast Control Station (A) (BCS (A)) is still capable of compiling its broadcast but its TX site is out of order.

In this case there shall be two support options.

- i. The compiled and encrypted broadcast message (in keystream form) is transferred to the adjacent BCS (B). There it is sent to the Tx (B) where the keystream is transmitted by using some of frequencies allocated to (B).
- ii. The message is sent to BCS(B) through CUN. BCS(B) then compiles, encrypts and transmits the broadcast message using its own TX site.

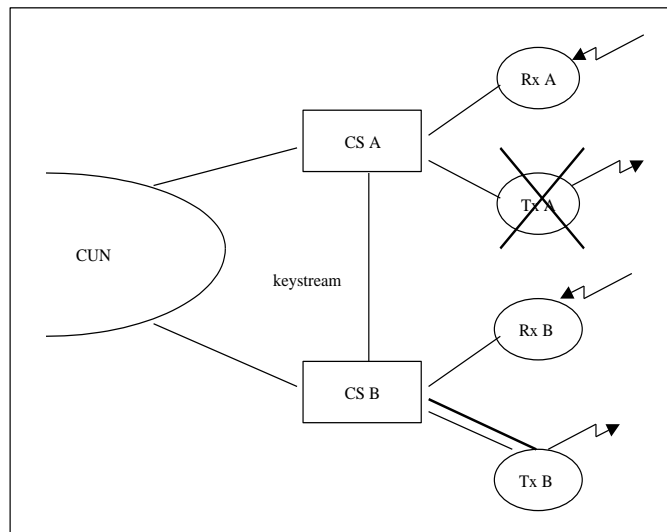


Figure 2: Connectivity needed when Tx site is out of order

b. **Link between BCS and transmitting site out of order**

Considering the following figure, this case is similar to previous case and the same options shall be valid for this case too.

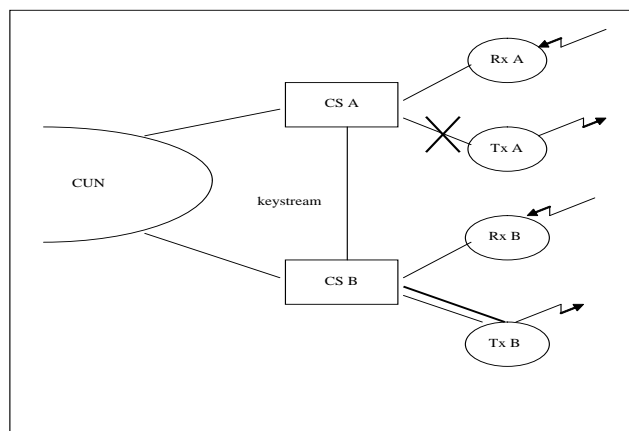


Figure 3: Connectivity needed when link between BCS and its transmitting site is down

c. **BCS is out of order**

Considering the following figure, the ACMS cannot compile its broadcast.

In this case the following way of action shall be possible.

The message is sent to BCS(B) through CUN with ACP-127. BCS(B) then compiles, encrypts and transmits the broadcast message using its own TX site.

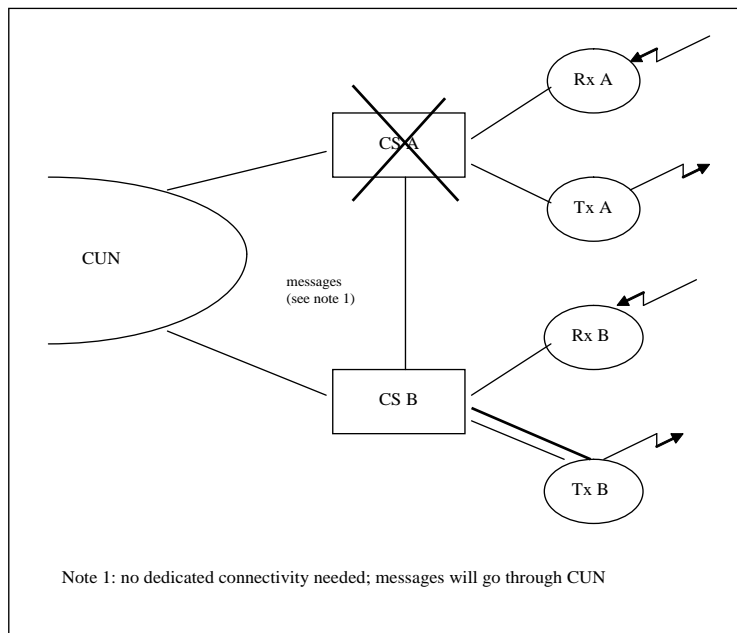


Figure 4: Connectivity needed when BCS is out of order

3.1.4. **Improve the coverage of a broadcast**

- a. To improve the coverage of a given broadcast, it may be necessary to transmit some messages or the whole keystream through an additional transmitting site. If the whole broadcast has to be transmitted through an additional site, the case is similar, from the adjacent point of view, to the case of a transmitting site failure. The system shall allow the following scenario:
  - i. First. the BCS A shall transmit the compiled broadcast keystream to BCS B:
  - ii. Second. the BCS B shall radiate the keystream from its transmitting site, using some of its own frequencies.

- b. Due to the limited amount of available frequencies and transmitters, the performance of the broadcast naturally belonging to B will decrease (i.e.: improving the coverage of one broadcast will then deteriorate the performance of any other broadcast).

### **3.2. Functional Requirements to Support By/To a NATO BRASS Node**

- 3.2.1. The ACMS shall be able to be connected to the National Defence Network (NDN) and thereto to the NATO Point-of-Presence to receive/transmit messages and key streams from/to external users, including NATO ACMSs.
- 3.2.2. To allow the above mentioned (paragraph 3.1 of this Annex), supports, the present node shall keep the broadcast databases of an adjacent node to support up to date.
- 3.2.3. The system shall be able to accept the key-stream from another BRASS node. The key-stream is the output of the crypto device that shall be transmitted directly, without further processing by the red side of the system. Data rates for key-streams shall be in compliance with the data rate specified in Broadcast, S/S and MRL services. The same rates apply to the BGR BRASS project for HF services for Broadcast, Ship Shore and MRL. National Connectivity to NGCS is a Host Nation / NATO responsibility, and the Contractor shall assume that there is an interface point to the NDN in ACMS. Approved NATO operating procedures and concept for data transfer between NATO General Communication System (NGCS) and National Defence Networks (NDN) will be employed for retransmission of NATO key streams (re-keying).

## **SECTION 4 PARTICULAR BULGARIAN BRASS SYSTEM DESCRIPTION**

### **4.1. Purpose**

- 4.1.1. The purpose of implementing BRASS in Bulgaria (National Component) and upgrading the existing communications equipment is to provide adequate telecommunications infrastructure (receivers, transmitters, ancillary equipment, and antennas) to BRASS implementation, as well as providing a backup to NATO BRASS facilities in the Eastern and Southern regions.

- 4.1.2. This project shall develop shore-based surface C2 infrastructure in Bulgaria in accordance with NATO standards. The overall operational requirement for this project is to provide the automation and enhancement of the required services within the ACMS and the Rx site in Galata and Tx site in Asparuhovo. The implementation shall follow the specifications and requirements as in this Contract which, by itself, prepares the capability for an eventual future BRASS Enhancement implementation.
- 4.1.3. The installation of BRASS compliant Automatic Data Processing (ADP) and radio support in Bulgaria, is required to improve its performances and to automate some tasks that are presently manually carried out by operators (man-functions), through implementation of proper ADP oriented solutions (machine-functions).
- 4.1.4. It shall use existing equipment to the maximum extent possible; however, it shall provide the required hardware (mainly COTS products) to make it a coherent entity.
- 4.1.5. The core software shall be a replication of the existing NATO-owned BRASS software, integrated with COTS applications. However, due to the inherent specificity of the project architecture, some software modifications and adaptations (to the core software) shall be done. This will be further detailed in following sections. The Annex B "Software Functional Description" constitute the functional requirements of the BICC SW as originally contracted.
- 4.1.6. The Contractor shall provide installation, modification and adaptation of the BICC SW (as specified in SSS CLIN 8) to the specific implementation proposed by the Contractor and that are not included in the Annex B functionalities.

#### **4.2. Provided Services:**

- 4.2.1. The overall operational requirement for this project is to establish the following services within Naval Communications Centre GORNA TRAKA (NAVCOMMEN), using new transmitting and receiving sites.
  - a. Provision of NATO Broadcast re-key capability;
  - b. Off the Air Monitoring (OTAM);
  - c. Management of naval Broadcast, Ship-Shore, MRL and Point-to-Point (PtP) circuits;
  - d. Provision of plain and NATO secure narrow band voice communications;
  - e. Support to shore to ship messaging;
  - f. Management of Crypto equipment;

- g. Automatic storage and retrieval of message traffic handled by Naval Communications Centre GORNA TRAKA (NAVCOMMEN);
  - h. Remote control of assets belonging to the system in transmitting and receiving sites.
- 4.2.2. The system shall provide the following general services
- a. **Broadcast re-key**  
Re-keying and monitoring of one NATO compiled and directed broadcast and provision of one National Broadcast in accordance with STANAG 4285 and 4539. The modulated signal shall be transmitted in J2B mode, at up to 600 baud on HF components and capable of being directed to any achievable area beyond traditional AOR, when required by NATO. Broadcast Designator will be assigned in future.
  - b. **Ship Shore (S-S) and Maritime Rear Link (MRL)**  
Management of two S-S circuits and one MRL circuit, covering Black Sea, Mediterranean Sea, Middle East and Red Sea. Half and full duplex mode of operation, at (up to) 2400 bps, in accordance with STANAG 4285 and 4539 and protocol in accordance with STANAG 5066 techniques are required.
  - c. **Voice Management service**  
This capability shall support both open and secure narrow band voice communications on simplex and duplex mode. It is assumed that this service will share radios listed above and only two voice channel required at a time and for a short period. In this respect, voice communication service shall share transmitters and receivers with S-S or MRL services.  
  
The MRL receiver shall also be used for continuous watch keeping on voice channel.
  - d. **Point to Point services:**  
This capability shall support asynchronous / synchronous serial communications to 5 (five) locations on top of other requirements. It shall be possible to expand capacity to 50 locations by adding additional hardware.

### 4.3. Descriptions and location of sites

- 4.3.1. Bulgarian BRASS node shall consist of:
  - a. One (1) Automated Control and Management System (ACMS);
  - b. One (1) Transmitter (Tx) Site (at Asparuhovo);

- c. One (1) Receiver (Rx) Site (at Galata);
- 4.3.2. Present situation of the sites at Gorna Traka, Galata and Asparuhovo is comprehensively presented in SOW Annex C.
- 4.3.3. The main parts of each site are given below. The detailed technical and functional explanation of each part is given in Section 5 System Functional Description and Section 6 System Technical Description.

#### **4.4. Automated Control and Management System (ACMS)**

- 4.4.1. The system shall be controlled and managed by Bulgarian Naval Communications Centre. The Centre is located in GORNA TRAKA. The ACMS shall consist of the following elements:
  - a. Message Processing System (MPS);
  - b. Communication Interface and Switching Management System (CISS);
  - c. Remote Supervisory and Control (RSC) System;
  - d. Voice Management Sub System (VMSS);
  - e. Precise Timer and Frequency Standard Sub System (PTFS)
  - f. Power Supply Sub-System

#### **4.5. Transmitter site**

- 4.5.1. The transmitter site will be built up in ASPARUHOVO the distance from the ACMS is approximately 9 km.
- 4.5.2. The site shall be mainly equipped with:
  - a. Four (4) 5 kW transmitters for NATO BCST re-key service;
  - b. Four (4) 5 kW transmitters for National BCST, S-S and MRL services;
- 4.5.3. Details are specified at SOW Annex-A paragraph 6.11

#### **4.6. Receiver site**

- 4.6.1. The receiver site will be built in GALATA, in the south-eastern part of Bulgaria approximately 5 km from coast line, 8 km from GORNA TRAKA ACMS site and 2,5 km from Asparuhovo transmitter site.
- 4.6.2. The site shall be mainly equipped with:
  - a. One (1) receiver, for NATO BCST re-keying service – Off the Air Monitoring (OTAM);

- b. Four (4) receiver, for one (1) National BCST service – Off the Air Monitoring (OTAM), two (2) S-S service and one (1) receiver, for MRL service and watch keeping on voice channel;

4.6.3. Details are specified at SOW Annex-A paragraph 6.12

## **SECTION 5 SYSTEM FUNCTIONAL DESCRIPTION**

### **5.1. Software functional description**

- 5.1.1. System software functional description is presented explicitly in SOW Annex B. Other requirements and issues related to software are presented below.
- 5.1.2. The Application software to run on the MPS and RSC shall be based on the BRASS ICC Software MPS/RSC being developed for the BICC. The BRASS ICC Software MPS/RSC will be PFE and will be provided by the Purchaser after Contractor's site survey report is issued to the NCI Agency (once contract is awarded) as well as after Facility Security Clearance (FSC) is submitted to the Purchaser as stated in SOW Annex-D. BICC software shall be modified and adapted by the Contractor for the BRASS BGR and specific site configuration. The PFE delivery of BICC software will include the followings:
  - a. BICC software source code
  - b. System Design Document for MPS
  - c. System Design Document for RSC
  - d. Database Design Document
  - e. BICC software Handbook
  - f. Operator Manuals for MPS and RSC
- 5.1.3. The software shall be modified (change in the source code), if required, to adapt it to the local condition (e.g. Adding new drivers and related GUI for remote control of the new equipment) and to BRASS BGR system other functional and performance requirements. BICC software can exchange information with other components (STANAG 5066; X.400 and ACP-127) through the serial ports and network connections.
- 5.1.4. It shall be noted that the current version of BICC software runs with the following COTS software applications (presented at Table 1 in paragraph 5.1.8).
- 5.1.5. COTS software shall be upgraded according to the current technology.
- 5.1.6. COTS software applications shall be provided by the Contractor as they will not be provided as PFE.

5.1.7. The delivery of any COTS software shall include licenses, documentation and CD or DVD containing the software and any activation key required.

a. Windows Server

The current version of the BICC software is designed to work on Windows Server 2003. The Contractor shall port the required BICC software modules to Windows Server 2012 or newer. The change of the version of operating system or COTS has to be coordinated with Security Accreditation Authorities.

b. Windows Client

The current version of the BICC software is designed to work on Windows XP SP3 on workstations. The Contractor shall port the required BICC software modules to Windows 10 or newer. The change of the version of operating system or COTS has to be coordinated with Security Accreditation Authorities.

c. Oracle.

The current version of the BICC software is designed to work with Oracle 10g (Database management system). The Contractor shall provide an adaptation of the BICC SW to work with the newest version of the Oracle database or any other comparable database management system with clustering capabilities. This change shall be coordinated with the Security Accreditation Authorities.

d. Acrobat Reader

e. Open Master

f. Open master Agent

g. VNC Client

h. Microsoft Office Professional

The Contractor shall provide the most current version of the Microsoft Office Suite approved from security point of view. There are no interfaces between the Office suit and the BICC software.

i. Winproject

The Contractor shall provide the most current version of the Microsoft Project approved from security point of view.

j. Development environment used for porting of the BICC software

The Contractor shall provide the most current version of the Integrated Development Environment (IDE), Compilers, Version Control System, bug reporting system and other tools required for software maintenance.

N A T O U N C L A S S I F I E D

- k. Open Agent Tool Kit
- l. EMS (Nms2K-xEMS Selex)
- m. RACALL
- n. McAfee Antivirus Client (Latest Version)
- o. McAfee Antivirus Server (Latest Version)
- p. ARQ Software
- q. X.400 Application (XOMAIL or other compatible X.400 solution.  
The X.400 capability is not currently part of the BICC software and shall be delivered to the ACMS by the COTS application (X.400 Application).
- r. Gateways (X.400 software).

## 5.1.8. List of COTS that is known to be compatible with BICC SW:

Windows	2003 SP2
	XP SP3
Oracle 10g	Standard Edition 1 release 10.2.0.1
	Enterprise Edition release 10.2.0.1 + Oracle Fail Safe
	Client release 10.2.0.1
Acrobat reader 7.0	
WinProject 2000	
McAfee Agent for Epo 4.5.0.	McAfee Viruscan Enterprise 8.7i (release 8.7.0)
	McAfee Epo(Orchestrator) 4.5.0
ARQ Software	(MDH Stanag 5066 sw 1.10.4 - Selex) <i>Note 1: At the time of IFB release, the MDH software, does not support the full-duplex MRL mode required for STANAG 5066 compliance.</i> <i>Note 2" Full duplex functionality of STANAG 5066 protocol shall be implemented in the ARQ software by the Contractor.</i>
-Nms2K-xEMS Selex	(only if Selex switches family CD141 is used)
Open Master Evidian SW suite (SLM 6.0)	
MS Visual Studio Enterprise 6.0	

N A T O U N C L A S S I F I E D

Office XP Professional 2007	
Racall	(only if Selex switches family CD141 is used)

Table 1: List of COTS that is known to be compatible with BICC SW

- 5.1.9. If any of the COTS applications, listed above, need to be upgraded (if not supported or available at the time of project implementation and warranty), the Contractor shall be responsible for integration, modification and adaptation of the BICC software.
- 5.1.10. Not every workstation has to be provided with these applications. Microsoft office shall be available on all workstations. For Visual Studio and Winproject, one licence is enough.
- 5.1.11. The contractor shall provide the necessary number of licences for the applications (DBMS, Antivirus, XOMAIL etc.) and operating systems used in his solution.
- 5.1.12. The type of Oracle licence depends on many factors like the number of processors on the servers or the role of the host computer in the system or the number of connected clients. For MPS and RSC servers it is the Enterprise Edition because of the support for clustering. Other licensing solution can be available. Oracle licensing policy shall be referred for details.
- 5.1.13. COTS products may be replaced. Replacing these COTS may add some extra development work to BICC software adaptation and use of some COTS products may not be allowed from the security point of view or may require additional approval process.
- 5.1.14. Only products from the Approved Fielded Products List (AFPL) are allowed on the NATO Secret networks. AFPL is a collection of products Software, Hardware and Firmware authorized to be used on networks managed by NCI Agency. AFPL products are only mandatory for NCI Agency managed networks but compatibility with this list will be beneficial during the accreditation process of the interconnection to the NATO network.
- 5.1.15. In case of replacement of COTS products the Contractor shall use the ones reconized by the NATO AFPL.

- 5.1.16. It shall be noted that the operating system will be applied security policies pursuant to latest NATO Approved Security Policies, including security setting templates. The Contractor shall be responsible for modifying the BICC software to allow operation with the NATO security settings if settings are different from the current one.
- 5.1.17. The security settings changes in time and are different for different versions of operating system. Current version of BICC software works with the current settings for Windows 2003.
- 5.1.18. The Contractor shall be responsible for modifying the BICC software to allow operation with the National and NATO security settings if required.
- 5.1.19. Security settings shall comply with the NATO security settings in accordance with NATO document: "AC/322-D/0048-Rev2; INFOSEC Technical and Implementation Directive for Computer and Local Area Network (LAN) Security" and other relevant NATO documentation stated in the Contract.
- 5.1.20. Porting the BICC software to the supported version of the operating system is required. The operating system shall be supported during the contract including the warranty period. The version of operating system or COTS shall be coordinated with Security Accreditation Authorities.
- 5.1.21. The software design environment used to develop BICC software is MS Visual Studio Enterprise 6.0. Most of the code is written in Microsoft Visual Basic 6.0 (Graphical User Interface part) and Microsoft Visual C++ for the drivers part. For the remote control some parts of Open Master API are used on the SNMP agent site.
- 5.1.22. The BICC software consist of around 35 applications of different purpose and more than 70 drivers and services for different kind of equipment to allow the remote control. Version 1.6 of the BICC SW will be delivered as PFE to the Contractor.
- 5.1.23. The communication among MPS applications is based on Oracle DB, DCOM and MSMQ and on RSC site on Oracle DB, SMNP protocol and file system.
- 5.1.24. In order to meet the NATO security policy, the COTS Software to be provided by the Contractor shall be current and supported versions by the Original Vendor and the Contractor shall be responsible for porting of the PFE software and its integration onto these software platforms.
- 5.1.25. The Contractor shall provide licenses and support for the COTS software at not only implementation phase but also during the warranty period.

- 5.1.26. The Contractor shall perform all the required preparation, porting, modification, and adaptation of the PFE BICC SW in order to have it run on the new BRASS Bulgaria SW and HW environment and to meet all the functional and performance requirements of the project.
- 5.1.27. In case of a design change required to provide a functional and performance requirement of the BRASS Bulgaria system specified in this contract, the modification of the BICC SW shall be contractor responsibility.
- 5.1.28. Any deficiency or bug found in the SW after contractor activities shall be considered as the result of the Contractor's SW modification activities unless the Contractor proves and demonstrates the opposite (i.e. the source of the problem is PFE BICC SW).

## **5.2. AUTOMATED CONTROL AND MANAGEMENT SYSTEM (ACMS)**

### **5.2.1. General Functional Requirements**

- a. The ACMS shall receive messages and key-streams to be broadcast from the NATO Messaging System, point-to-point circuits, Communication Centres and other ACMSs. Having processed the messages, it shall broadcast them to the commands and the surface ships at sea.
- b. The ACMS shall also receive Shore-to-Ship and MRL messages from ashore, and MRL and Ship-to-Shore messages from the units afloat. The ACMS shall process and route Ship-to-Shore and MRL traffic. ACMSs of different BRASS systems are interconnected via dedicated encrypted circuits or via the NGCS and NDN connectivity. The afloat units are interconnected to the ACMSs via protected HF, and/or SATCOM circuits accessed through NDN and NGCS.
- c. The ACMS shall meet the following main functional requirements:
  - i. the receiving of messages from various incoming sources (Common User Network-CUN, local message handling systems, NATO SATCOM, Local CCIS (or similar), National systems, other NATO networks, in house sources (e.g keyboards, tape readers, scanners...) and ship side sources/circuits), for display, editing, routing, distribution, compilation, screening and vetting by various operators, with varying levels of access and processing authority;
  - ii. forwarding of messages to BCST, Ship-Shore and MRL circuits for transmission;

N A T O U N C L A S S I F I E D

- iii. routing of messages to shore circuits for distribution to addresses;
- iv. assisting of messages drafting and creating free text documents;
- v. accepting input traffic in all following formats: ACP 123, ACP126, ACP 127, ACP 128, X.400; STANAG 4406 (for compatibility with the NATO Messaging System). In the current BRASS architecture, only ACP-127 text messages are sent to the subscribers at sea;
- vi. translating input messages into ACP 127 format prior to distribution to operators;
- vii. recording message traffic in appropriate databases and storing the information necessary for message compilation;
- viii. keeping trace of the work carried out to allow statistical analysis;
- ix. character by character comparing of the sample message and decrypted message received off the air, in accordance to the OTAM functional requirements;
- x. circuits and key-streams management;
- xi. system management and control;
- xii. message processing with the main function of providing automation support to the operators for transmission, reception, analysis and storage of the messages.

#### 5.2.2. **ACMS Automation Functions**

- a. The BGR ACMS shall provide automation for the functions related with the services listed below (Services and related automatic functions are indicated in Book II Part IV Annex-A and B in detail):
  - i. Message Management and Handling, functions related with the message acceptance, assembly, distribution, display, editing and output: comprising the update of the archives, databases and relevant records;
  - ii. Radio Link Management, functions related with the message reception and transmission of message traffic over broadcast, S-S, MRL and Point to Point circuit, segmentation and OTAM;

N A T O U N C L A S S I F I E D

N A T O U N C L A S S I F I E D

- iii. Remote Control of the BRASS Assets, functions related with the system management, monitoring and remote control of radio devices, antennas and communication links;
  - iv. Voice Management, functions related with the communication in voice (internal and/or over the radio circuits);
  - v. Support by/to the adjacent BRASS Nodes, to share the BRASS assets amongst adjacent nodes to allow backup in case of major failure or to allow major Succession of Command (SUCOC) or Change of Location of Command (COLOC). This functionality is integrated as part of the existing BICC software. The information (messages, configuration etc.) is stored in the BICC databases. The BICC software supports copying of the messages sent to the transmission queue into the database of the adjacent node. In case of SUCOC or COLOC the adjacent node has the history of the supported broadcast.
- b. Each one of those functions have their own requirements, most of them covered in the existing NATO-owned BRASS software, which will be provided by the Purchaser as PFE.
  - c. The national requirements, which may not be covered by the PFE software, shall be implemented as complementary adaptations and modifications to the core software, and are described in the SOW Annex B. Book II, Part IV, Annex B (Software Functional Description) describe the BICC SW functional requirements of the BICC SW.

### 5.2.3. **Message Processing System (MPS)**

- a. The MPS is a subset of the ACMS capability in BRASS and shall perform the following main functions:
  - i. Support the operators of the ACMS used in communications centres, to allow management, handling, automatic transmission, reception, analysis and storage of the messages, complying with the Functional Requirements;
  - ii. Operational planning, by providing tools to aid the planning of broadcast, point to point and multi-point circuits, time slot and radio frequency requirements for maritime operations. Such tools shall include modeling and simulation tools for predicting the coverage of transmitter and receiver sites.
  - iii. Allow operators to perform the analysis of each Tx/Rx message queue.

N A T O U N C L A S S I F I E D

N A T O U N C L A S S I F I E D

- iv. Information management, by providing the means to receive, analyse, store and route messages between the OPCON authority and the forces assigned to him.
- v. Control and monitoring the Red Switch (red devices process/manage/handle unencrypted classified information) and the Crypto devices;
- vi. Perform the Off The Air Monitoring (OTAM) of the broadcast(s).

#### 5.2.4. **Communication Interface and Switching Management System (CISS)**

- a. The CISS shall be the “front end” device to the communication media. It shall mainly perform the switching management under control of Remote Supervisory and Control (RSC), that is:
  - i. Connect the message, data and voice circuits with the transmitting/receiving devices;
  - ii. Connect ACMS to other users, namely ACP 127, X.400 and Private Branch Exchange (PABX) (or equivalent) users; for data and voice services.
  - iii. Routing the single messages/key streams as appropriate/necessary.

#### 5.2.5. **Remote Supervisory and Control (RSC)**

- a. The RSC shall perform the following main functions/activities (the functionalities are included in the BICC software):
  - i. Circuits management; which consists in opening/creating and closing the circuits needed to handle the message traffic, by coupling/connecting and disconnecting channels, modems, radio devices and antennas as appropriate/necessary;
  - ii. Circuit management by means of remote control of CISS Black side and VMSS Black side. National systems can be connected to the black side of the BRASS system via CISS or VMSS as appropriate to the circuit type;
  - iii. Modem control both from the RSC console and ARQ processors through isolator functionality from the red side.
  - iv. Displaying the circuit operating conditions/status;

N A T O U N C L A S S I F I E D

N A T O U N C L A S S I F I E D

- v. Monitoring the systems and equipment operating condition/status. This monitoring function shall include:
  - Monitoring the operational status of the device (up, down, warning, out of control)
  - Displaying all the alarms provided by the device. These alarms are dependent on the device and are defined in the device MIB.
  - When the device implements BITE (Built-In Test Equipment) the driver shall perform this BITE test remotely and display the result at any time.
- vi. Remote control and monitoring of the lines, modems, interfaces, radio devices and antennas at the receiving site (Galata) and transmitting site (Asparuhovo);
- vii. The RSC shall also provide HF coverage analysis making use of the available COTS software packages.

#### 5.2.6. **Voice Management Subsystem (VMSS)**

- a. The VMSS shall be a voice network, unconnected with the MPS Local Area Network for security reasons. The VMSS shall perform the following functions:
  - i. Support the operators in setting internal and external voice channels for internal and external units;
    - Internal voice channels refer to classified or unclassified communications between operator stations within a BRASS node.
    - Black external voice channels are required for unclassified unencrypted coded digital voice communications;
  - ii. Control the voice network efficiency, such as:
    - selecting codecs for PtoP users or transcoding algorithms (where required) for voice calls between internal or external ship-shore users,
    - managing the utilization of network resources (e.g., bandwidth) through specification and management of class-of-service/quality-of-service traffic markings (e.g., where VoIP services are used within the ACMS or with external users),
    - managing voice-call admission, priority, or pre-emption in the network to achieve SOW requirements on voice-service performance.)

N A T O U N C L A S S I F I E D

- iii. The control of the network efficiency is not a function of the BICC software package but only a requirement of the VMSS.
- iv. Separate “red” voice communications from “black” ones (red devices process/manage/handle unencrypted classified information; whereas black devices process/manage/handle unclassified or encrypted classified information).

#### 5.2.7. **Precision Time and Frequency Standard Subsystem (PTFS)**

- a. The PTFS shall perform the following functions:
  - i. Acquisition of precise GPS time information;
  - ii. Generate and distribute Precise Time and Frequency to those devices within the ACMS that require to be synchronized (modems, crypto devices, switching units, etc.) or need a precise frequency for their operation (radio transmitters and receivers).
- b. The PTFS reference shall be utilized to update the ACMS computers’ time of the day (i.e.: servers, workstations, ARQ processors, FEPs. etc.) as well as Tx and Rx sites computers’ time of the day (i.e: work stations, FEPs, etc.).
- c. GPS time standard shall be installed as part of the PTFS.
- d. PTFS shall acquire time from a GPS receiver or equivalent;
- e. The Contractor shall provide a solution to synchronize all relevant communication components in ACMS, Tx and Rx sites with PTFS reference without any data losses.

#### 5.2.8. **Power Supply Subsystem (PSS)**

- a. The PSS shall supply energy to ACMS devices using TEMPEST approved filters for the red communication devices. The installation shall comply with the requirements of the stipulated SDIPs. The provision of filters will then depend on site specific conditions and a security classification of processed information. The contractor shall take these variables into account.
- b. It shall be integrated to the Short Break (SB) PSS provided by HN and No Break (NB) PSS (Uninterrupted Power Supplies) provided by the HN and Contractor.

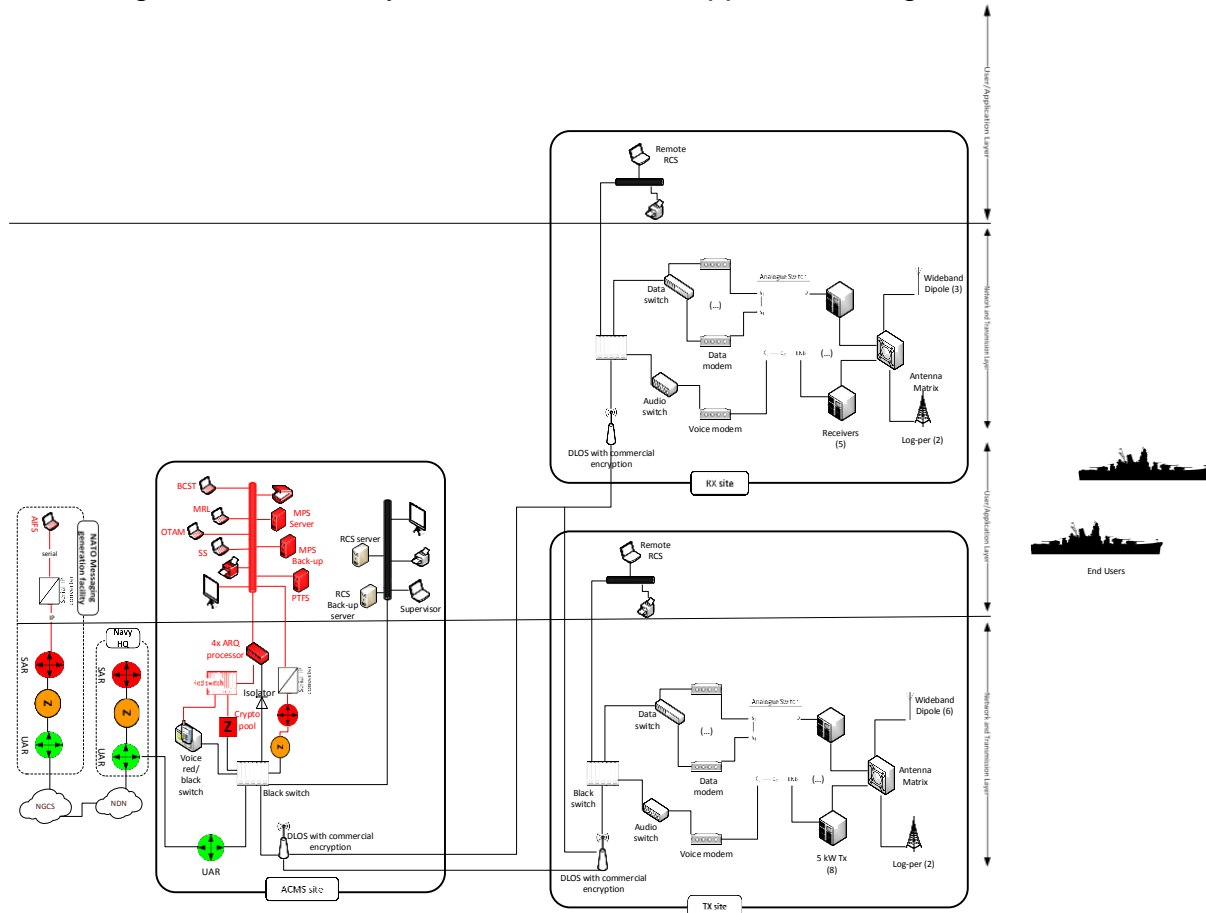
#### 5.2.9. **Manual Control**

- a. Adequate manual control shall also be implemented in order to ensure minimum disruption of service in the event an ACMS malfunction occurs. Each site shall be able to control locally its own devices.

**SECTION 6 SYSTEM TECHNICAL DESCRIPTION**

**6.1. Summary of Technical Concept**

A generic BRASS System View can be mapped in the Figure below.



**Figure 5:** BRASS BGR Overview and System Architecture

6.1.1. A permanent connection between ACMS and its transmitting and receiving sites shall be provided by Direct Line of Sight (DLOS) system implemented by the Contractor.

**6.2. System Software General Technical Description**

6.2.1. The Application software to run on the MPS and RSC shall be based on BICC SW. Detail of the SW is presented in SOW Annex-B.

**6.3. System Hardware General Specification**

6.3.1. The hardware (only workstations, monitors, displays and port cables) supplied for this project, shall meet the hardware specifications defined in SOW Annex-A Appendix-3. **In case of technology obsolescence, Contractor shall provide equipment with equal or better capacity, performance, interfaces and physical parameters while retaining backward compatibility.**

- 6.3.2. The remaining IT hardware supplied for this project shall be “state of the art” complying with NATO and National standards.
- 6.3.3. For the non-IT equipment the system shall meet the following specifications:
  - i. TEMPERATURE = -10°C to +45°C (operating);
  - ii. HUMIDITY = 0 to 95%, non-condensing
  - iii. EMC/EMI = MIL-STD-461F, or comparable IEC 61000 test procedures (Contractor to demonstrate compliance)
  - iv. SAFETY = IEC/EN 60950
  - v. Maximum Altitude (operation) = < 1000 meters

#### **6.4. General ACMS**

- 6.4.1. The ACMS shall consist of the following elements:
  - a. Message Processing System - MPS;
  - b. Communication Interface and Switching SubSystem - CISS;
  - c. Remote Supervisory and Control - RSC;
  - d. Voice Management SubSystem - VMSS;
  - e. Precision Time and Frequency Standard subsystem - PTFS;
  - f. Power Supply Subsystem - PSS.
- 6.4.2. The ACMS shall mainly consist of servers and operator Work Stations (WS), interconnected by LAN, to carry out message handling and remote control services. The ACMS shall also include digital switches, necessary for flexible allocation of communication channels.
- 6.4.3. The system architecture shall be in accordance with the client/server model and shall be modular, distributed, expandable and redundant.

#### **6.5. Message Processing System (MPS)**

- 6.5.1. The MPS shall be based on a distributed and modular architecture, where a main computer acts as a server for client workstation (WS) and other terminal equipment, linked by a LAN.
- 6.5.2. The MPS shall also provide the means to monitor the status of the red network. Note that, the black network will be controlled by the RSC.
- 6.5.3. The MPS shall consist of the following devices:

- a. one (1) MPS Server;
  - b. one (1) MPS Server Backup;
  - c. five (5) WS(s); (supervisor selects which workstation screen has to be projected on the large screen display);
  - d. one (1) MPS dual LAN Fiber optic (to include IP layer routers and switches);
  - e. peripheral devices:
    - i. one (1) large screen display
    - ii. one (1) scanner with OCR;
    - iii. one (1) MPS storage Unit (disk array)
    - iv. two (2) Network printer (laser);
    - v. one (1) MPS paper tape puncher/reader (for off line encryption/decryption);
  - f. 3 UPSs in Rack;
  - g. 3 Racks std 19"
  - h. Tempest protection (MPS and CISS Red Hardware)
- 6.5.4. The MPS shall allow interoperability between multivendor devices using standard communication protocols at each level of the OSI (Open System Interconnection) model and shall be architected to the OSE (Open System Environment) model.
- 6.5.5. MPS shall perform many interactive processes and many hardware/software accesses at the same time, thus requiring a multi-user/multi-tasking operating system.
- 6.5.6. MPS Performances and Sizing: For an accurate sizing of the system components, the following factors and expected minimum performances shall be considered:
- a. peak day traffic load: 5.000 messages per day;
  - b. average length of messages: 5.000 characters;
  - c. approximately 60 transactions per operator per hour;
  - d. on-line storage of the traffic of the previous 60 days;
  - e. off-line storage of the traffic of the previous 3 years;
  - f. a site depending number of circuits (radio, telegraph, data) to be managed;
  - g. a site depending number and type of workstations and peripheral to be controlled;

- h. messages handling time constraints as detailed in the Software Functional Requirements;
  - i. messages search time constraints as detailed in the Software Functional Requirements;
  - j. a site depending number of CUNs to interface.
- 6.5.7. MPS Processing Load: Time constraints shall be achieved independently from the processing load that is generated by:
- a. messages handling;
  - b. communication activity;
  - c. databases update;
  - d. interactive activities performed by System Operators;
  - e. background applications (e.g. Red Switch, LAN, peripherals and Crypto control).
- 6.5.8. **MPS Server Cluster (Master and Slave Servers):**
- a. Hardware solution for servers shall be COTS based.
  - b. Shall be able to handle at least 50 communication lines to the Red Switch; (This requirement applies to both the ACMS software and the red switch.)
  - c. The serial communication lines between MPS and CISS shall be identical to increase the flexibility of the system and shall handle rates among 75, 150, 300, 600, 1200, 4800, 9600, 19200, 32000, 64000 bps.
  - d. The interfaces between MPS and CISS shall comply with ITU V-series standards. Note that The BRASS ICC software supports this requirement. There are no BRASS HF circuit requirements with data interfaces operating at higher than 64000 bps. This does not preclude requirements to aggregate traffic and control circuits for transmission over a high-speed interface operating between sites (e.g., the inter-site 2 Mbps digital links over the black-national defence network that provides inter-site communications.) Nor does it preclude the contractor from the use of such high-speed interfaces intra-site. The Contractor shall use max available speed between sites (links provided by HN) and shall not limit circuits speed to 64000 bps as well.)
  - e. MPS Servers shall link the communication lines to operators" WS(s) through the LAN;
  - f. MPS Servers shall manage communication lines to CUN;
  - g. MPS Servers shall prevent data loss (WS(s) failures, power supply black out etc.);

- h. MPS Servers shall control UPS monitoring;
- i. MPS Servers shall provide warnings to operators and regular system shutdown after 10 minutes of UPS activation (without losing data);
- j. MPS Servers shall interface with adjacent Control Station (CS) for backup operations and SUCOC/COLOC functions.
- k. MPS Servers shall be equipped with:
  - i. Internal hard disk to store the non-shared data (Non-shared data shall be mirrored on the Backup system);
  - ii. CD/DVD-ROM/Writer: to install software (This device shall be removable and/or provided with key-lock);
  - iii. A state-of-the-art system console with monitor, mouse, keyboard, and keyboard/ video/ mouse (KVM) switch. The console shall provide a minimum resolution of 1920 x 1200 pixels, 32-bit color. The system console shall have enough keyboard/ video/ mouse (KVM) inputs to manage all the MPS devices from a single console;
  - iv. I/O interfaces. (The server shall have at least the following interfaces:
    - Minimum 2 1000Mbps Ethernet port.(1 for cluster interconnect)
    - Minimum 2 1000 Mbps ports.(at least 1 may be used to connect to external Storage system (DAS or NAS or IP SAN)
    - Minimum 2 Serial ports (RS-232).
    - Minimum 3 USB 3.0 ports
    - 50 communications lines to CISS
  - v. CPU (MPS server shall use high-power latest-generation processors in a multi-processor – shared memory configuration);
  - vi. Disk array: the disk array is used as common storage memory available for all the clients. Please see SOW Annex-A paragraph 6.5.10 for more details.

N A T O U N C L A S S I F I E D

vii. Back-up system. Message handling and communication management shall be considered "mission critical applications". The hot-standby Backup system shall be automatically activated (i.e.: without any operators intervention and without interrupting operations of the server) in less than one minute. In case of MPS-server failure, an external hard disk shall be easily connected to the backup system to perform, in its turn, the back-up mirroring/storing functions. The failed server shall be replaced later on, without interrupting operations. The MPS Server shall therefore be supported by a Backup System implementing a cluster architecture with the following characteristics:

- use of mirroring techniques;
- continued performance of database functions in case of Server failure;
- applications-recovery time less than 60 sec;
- no data loss in case of Server failure and hot stand-by activation;
- reciprocal control with dedicated (i.e. not using the primary LAN) and duplicated lines.

l. MPS Servers shall require neither special powering nor special air conditioning. It shall be used in an office environment. Input power shall be single-phase, 110-to-240 VAC, 50/60 Hz. Internal AC to DC power supply shall be redundant with automatic activation and signalling in case of failure.

m. It shall be possible to increase performances of the server without increasing its physical size, specifically RAM, internal disk storage.

6.5.9. **Workstations (WS):**

a. Hardware solution for WSs shall be COTS based.

b. WS(s) shall consist of:

- i. standard personal computers to offer local processing capabilities to carry on man-machine interface procedures without any need of main systems processing power, according to client-server software architecture, and
- ii. voice-communications sets to carry on internal operator-to-operator communication and external voice telephony.

N A T O U N C L A S S I F I E D

- c. To increase flexibility, WS(s) shall be identical, irrespective of the assigned task, and shall not be operator specific (i.e.: Any operator shall be able to use any workstation). As an indication, the WS(s) might be used as follows:
  - i. Watch Supervisor;
  - ii. BCST and OTAM Operators;
  - iii. S-S Operators;
  - iv. MRL Operators;
  - v. Point to Point (PtoP) Operators.
- d. The operator WS shall be general PCs with minimum amount of extra hardware required. The connectivity between servers and WS shall be IP based.

6.5.10. **MPS LAN:**

- a. The MPS LAN shall be based on Ethernet standard allowing expanding capabilities and shall operate at NS system high mode of operation. The main switch shall be connected with the MPS server. Hardware devices used in the LAN shall be managed by the System Administrator using SNMP protocol. Note that BICC software currently works with SNMP v1, but SNMPv3 shall be required to get security accreditation. In this case the responsibility to modify the BICC software is on the Contractor.
- b. The Contractor shall clearly state how MPS secret LAN will be implemented.
- c. The Contractor shall clearly indicate how he plans to interconnect all the sites through the NDN and how the connection between a BRASS site and the NDN is done. The Contractor shall also clarify the interfaces between NDN and BRASS equipment

6.5.11. **MPS Connections and Interface Definitions:**

- a. The MPS shall interface with the RSC, CISS, VMSS and Gateways X.400/ACP127.
- b. The purpose of these connections is as follows:
  - i. RSC: The MPS shall provide the data and status of services, namely FAB pro-sign, red equipment status and control, time, RF modem settings, to allow the configuration of equipment in Tx/Rx sites.

- ii. CISS: The MPS shall provide to the Red Switch, through the ARQ processors, the control data that allows the implementation of the automatic repeat request functionalities as previously mentioned. This functionality may be disabled whenever appropriate. Additionally, it shall provide the connectivity for service establishment (sending and receiving messages), through the Red Switch.
- iii. VMSS: The MPS shall provide the control data to the red voice switch.
- c. In order to provide the suitable level of resilience, there shall be a secure network connection between the MPS LAN of the ACMS at adjacent BRASS Nodes. The required IP crypto and network devices shall be provided by the HN as an extension of NGCS tunnelled through National Defence Network (NDN) and integrated by the Contractor within the scope of this SOW and comply to NATO standards. The contractor's responsibility is up to the red interface of the IP Crypto equipment and to make sure that the system delivered operates with the existing IP Crypto.
- d. The BICC NATO-owned software part concerning the Message Handling may be modified but the final solution shall have at least the same functionality (not worse) than the BICC software.
- e. Currently the X.400/ACP127 gateway task is realised by the XOMAIL software in other BRASS systems. This gateway task shall be realised by a X.400 application (XOMAIL or similar) Interface Control Documents are not available. X.400/ACP127 gateways are not part of BICC software. The Gateway (X.400 software) is not PFE.
- f. The X400/ACP127 gateway shall be bi-directional. Its role is to convert incoming X400 messages into the ACP 127 format. But in the BRASS requirements the MPS shall also be able to route any output through networks employing X.400 protocols through a gateway.

#### 6.5.12. Large Screen Display

Large Screen Display shall have following functionalities:

- a. The state-of-art screen technology.
- b. Screen size: The screen shall be easily seen from each operator workstation.
- c. Full HD or higher relation.
- d. It shall be designed for 24/7 operation.
- e. Possibility to connect many sources of the video information.

- f. Easy switching of input signal

6.5.13. **Storage Unit (Disk Array)**

- a. The Storage Unit is used as common storage memory available for all the clients. The main function of the storage unit is to store the data in a redundant and reliable manner, with a high degree of availability.
- b. To fulfil this, the storage unit shall have the hardware characteristics that are described in the Bi-SC Minimum Hardware Procurement Specifications (Draft Version 5.6, dated 31 July 2012).
- c. The disk array shall be external and sized to store “on line” at least 60 days of messaging history, log information and working activity of the Control Station (CS) and at most one adjacent CS.
- d. In case of failure of one disk, the disk array shall automatically activate the backup, show the failed disk position in order to save time to repair, point out the final full working status.
- e. The data restoring on the new disk shall be performed “run time” using the other disks and the parity control. It shall be possible to perform hot swaps of hard drives without causing a system interruption.
- f. The MPS Server shall interface with a DVD-R Writer. The writer will periodically perform the transfer of the “on-line archive” to DVD-R discs, representing the “off-line storage/archive.
- g. The MPS Server shall perform the “off-line storing” automatically, pointing out the DVD-R disk status and the warnings to operators (warn operators to replace full DVD-R with empty ones, assign and record labels to the DVD-R to allow their identification and message retrieval, warn failures, etc);

6.5.14. **Tempest Protection (MPS and CISS Red Hardware)**

- a. The Contractor is responsible for provision, installation and connection of the BRASS dedicated EPDPs to MPDP including TEMPEST requirements for all BRASS system in premises at the ACMS, Tx and Rx sites.
- b. MPS servers and red equipment such as MPS FEPs and ARQ processors shall be installed in TEMPEST cabinets. In order to configure, manage and maintain those equipment enough quantity rack KVM switches and relative rack consoles (one for each red cabinet) shall be provided.
- c. The design and installation of any TEMPEST driven equipment and devices (i.e. Power Line Filters) shall be implemented by the Contractor

- d. MPS workstations, part of the red equipment, shall meet relevant TEMPEST Level requirements. The compliance to the relevant Tempest level is required for computer tower, monitor, keyboard and mouse. Furthermore, workstations shall be provided with media converters allowing fiber optic connection to the MPS LAN switch installed in the TEMPEST cabinet.
- e. Other peripheral devices such as MPS scanner, MPS Large Screen Display, MPS Tape Puncher Readers shall be complaint with relevant TEMPEST requirements.
- f. MPS LAN shall be physically separated from the black LAN according to system safety requirements and TEMPEST directives.
- g. All 19" rack mounted RED equipment (including RED switch, MPS servers, Front End Processors (FEPs)) handling classified information not yet encrypted, are installed in 19" relevant TEMPEST certified cabinets.
- h. Each equipment belonging to MPS (e.g. MPS workstation) and handling classified information are certificated as per SDIP-27 or installed in a shielded enclosure as per SDIP-27.

#### **6.6. Communication Interface and Switching Management System (CISS)**

6.6.1. The CISS shall consist of the following subsystems and components:

- a. Switching Subsystem:
  - i. Red digital switch;
  - ii. Crypto Pool;
  - iii. Black digital switch
  - iv. Audio switches
- b. Communication Subsystem:
  - i. ARQ processors
  - ii. ARQ isolators;
  - iii. Radio Frequency Modems
  - iv. Voice RF modems
  - v. Multiplexer (intersite)

- 6.6.2. The CISS is a subset of the BRASS ACMS capability and shall be collocated with the MPS. It shall route messages between the MPS LAN and the transmitting and receiving sites. The system shall comply with the specific CISS functions already included in the NATO owned BICC core software. Additionally it shall grant resilient connectivity capabilities (e.g. connectivity through commercial leased lines, between other ACMSs). The BRASS capability to “grant resilient connectivity capabilities” refers to system capabilities in the BICC software to route broadcast and ship/shore streams around failed ACMS, Tx and Rx subsystems through the use of redundant connectivity between sites provided (historically) through leased lines or other telecommunications service provider.
- 6.6.3. It shall be based on switches and routers.
- 6.6.4. The CISS shall consist of three components: one switching component installed in ACMS and two communications component, installed in Tx and Rx Sites, that shall be connected through the National Defence Network (NDN). Each one of those shall have components that shall be under control of either MPS or RSC as described in the following sections.
- 6.6.5. The CISS shall be the “front end” device to the communication media.
- 6.6.6. It shall be based on switching units, and modems. The requirement for use of ‘modems’ within the CISS refers to its requirement to route and transmit digital data streams over the connections between sites. The modems required for the CISS are the RF modems. The CISS has segments, i.e., the Tx and Rx sites, that include the RF modems; but, this does not preclude the Contractor from including additional modems required by his design, e.g., for interface to the connections between sites.
- 6.6.7. The IP Interfaces shall connect the CISS component of ACMS, Tx and Rx Sites through a connection nationally provided.
- 6.6.8. **Red Switch:**
- a. The Red Switch shall handle classified information not yet encrypted, therefore it shall be considered as a red device.
  - b. Basically, the CISS red switch will route traffic between the MPS LAN, the cryptographic pool and the ARQ processors, in accordance with traffic connectivity and coverage requirements. The red switch, cryptographic devices and the ARQ processors shall be monitored and controlled by the MPS.
  - c. Additionally the red CISS switch shall route traffic between the MPS LAN and external nodes through red interface.

N A T O U N C L A S S I F I E D

- d. It shall be flexible to allow both single and multi-channel streams, and capable to deal with data and voice communications, providing the quality of service envisaged.
- e. Red switch shall be able to handle at least 50 communication lines (This requirement applies to both the ACMS software and the red switch.). Consequently, the contractor shall do well to develop required number of input and output circuits for the Red Switch as well as their type and characteristics using SOW information and requirements provided but not limited to the Book II Part IV Annex A, from which the CISS Red Switch is required to connect and have bidirectional interfaces to:
  - i. MPS Server (through LAN);
  - ii. Crypto pool -including voice crypto at least the minimum number of serial-digital interfaces, required to satisfy the total Broadcast, Ship-Shore and MRL channels;
  - iii. The pool of ARQ processors-STANAG 5066 at least the minimum number of serial-digital interfaces to satisfy the requirements for Ship-Shore and MRL circuits;
  - iv. Other PtoP users Red Switch shall provide the capability for connections to PtoP users for classified information exchange.
  - v. VMSS red part voice segment.
  - vi. A number of other subsystems or devices for which the interface is unspecified and subject to the Contractor's own implementation choices to meet the SOW requirements.
- f. The Red Switch shall:
  - i. be flexible to allow both single user connection and multi-channel streams;
  - ii. use digital technology for transport and switching;
  - iii. be capable to deal with data and voice communications performing in each case the quality of service envisaged.
  - iv. Not require any special supply and/or special air conditioning; it shall be suitable to work in office environment.

N A T O U N C L A S S I F I E D

- g. Where circuits map many-to-one or one-to-many onto physical interfaces, the Contractor shall provide evidence of the number of circuits mapped onto each physical interface, evidence that the interface has the capacity to carry the supported number of circuits simultaneously, and a description of the embedded transcoding capability (with associated standards) they have employed.
- h. Contractor shall freely choose to embed protocol transcoding or interface-conversion within the Red Switch subsystem (e.g., in the manner of a serial-over-IP terminal concentrator for local-area-networks).

6.6.9. **Red Switch Internal Architecture:**

- a. The Red Switch shall be based on a multi-processor architecture suitable for handling all the interfaces and the switching functions.
- b. The Red Switch shall also be provided with a test equipment to perform on-line and off-line testing, allowing internal failed modules substitution without interrupting operations.
- c. In accordance with the number of communications lines to be implemented, the red switch shall be splitted into 2 or 3 independent sub switches, in order to assure partial operating conditions in case of Switch failure/maintenance and shall allow manual backup connections between IN and OUT ports in case of disruption.
- d. The Red Switch shall be modular in order to allow that the grouping of a different number of the same elements fulfils the requirements of the different sites.
- e. In case of power failure the switch shall maintain the last established configuration. The MPS Supervisor shall be provided with the possibility to program a prioritisation of the communication services carried out; in case of partial failure of the switch the MPS Supervisor shall be provided with the possibility to set an "automatic reconfiguration mode" that, based on the prioritisation previously programmed, forces the switch to interrupt low priority services to the advantage of the higher priority ones.
- f. Red switch shall be stackable in order to increase switching capability by simply adding modules.

**6.6.10. Red Switch Connectivity:**

- a. Connectivity between Red Switch and MPS Server: Connections to MPS Server shall be implemented as outlined in paragraph 6.5.8.k.iv; "MPS Server I/O Interfaces". In addition, separate connecting lines from MPS to the red switch shall be provided for control data.
- b. Connectivity between Red Switch and Crypto Pool: Classified lines between the Red and the Black Switches shall be linked by a pool of crypto devices. It is responsibility of the contractor to interface them to the switches.
- c. Connectivity between red Switch and ARQ processor: Red Switch shall interface ARQ processors complying with STANAG 5066 ARQ techniques.

**6.6.11. Black Switch:**

- a. Basically, the Black Switch shall switch, under the RSC control, the key-streams from the crypto pool to the radio circuits (and vice versa). It shall also route the traffic to and from adjacent BRASS nodes.
- b. It shall be flexible to allow both single and multi-channel streams, and capable to deal with data and voice communications, providing in each case the quality of service required.
- c. The exact number and nature of physical interfaces to the switch will depend on the Contractor's own design. Consequently, the Contractor would do well to develop and present in his design the required number of input and output circuits for the Black Switch as well as their type and characteristics using SOW information and requirements provided but not limited to the Book II Part IV Annex A, from which the CISS Black Switch is required to connect and have bidirectional interfaces to:
  - i. Crypto pool -including voice crypto at least the minimum number of serial-digital interfaces, required by design and interfaces of the PFE cryptos);
  - ii. RSC server (unspecified interface and open to the Contractors' implementation choices);
  - iii. VMSS black voice segment.
  - iv. Other point to point users (unspecified interface) accessed variously such as via the PABX, NDN or NGCS.
- d. Black Switch shall have provisions to interface:

N A T O U N C L A S S I F I E D

- i. Local PABX (Since the Black Switch's interface to the NDN is through the Local PABX, the Contractor's design shall provide the interface on the Black switch compatible with the Local PABX);
  - ii. NATO General Communication Services (NGCS). The physical interface towards the NGCS will be a RJ45 connector.
- e. The Black Switch shall:
- i. be flexible to allow both single user connection and multi-channel streams;
  - ii. use digital technology for transport and switching;
  - iii. be capable to deal with voice, data and video communications performing in each case the quality envisaged.
  - iv. be controlled and monitored by the RSC.
  - v. interface both with digital users and analogue users.
  - vi. not require any special supply and/or special air conditioning; it shall be suitable to work in an office environment.
- f. Where circuits map many-to-one onto physical interfaces, the Contractor shall provide evidence of the number of circuits mapped onto each physical interface, evidence that the interface has the capacity to carry the supported number of circuits simultaneously, and a description of the embedded transcoding capability (with associated standards) they have employed.
- g. The Contractor shall freely choose to embed protocol transcoding or interface-conversion within the Black Switch subsystem (e.g., in the manner of a serial-over-IP terminal concentrator for local-area-networks).

6.6.12. **Black Switch Internal Architecture:**

- a. The Black Switch shall be based on a multi-processor architecture suitable for handling all the interfaces and the switching functions
- b. The Black Switch shall also be provided with a test equipment to perform on-line and off-line testing, allowing internal failed modules substitution without interrupting operations

N A T O U N C L A S S I F I E D

- c. In accordance with the number of communications lines to be implemented, the black switch shall be split into 2 or 3 independent sub switches, in order to assure partial operating conditions in case of Switch failure/maintenance shall allow manual backup connections between in and out ports in case of disruption.
- d. Black Switch shall be modular in order to allow that the grouping of a different number of the same elements fulfils the requirements of the different sites.
- e. In case of power failure the switch shall maintain the last established configuration. The RSC Supervisor shall be provided with the possibility to program a prioritisation of the communication services carried out; in case of partial failure of the switch the RSC Supervisor shall be provided with the possibility to set an "automatic reconfiguration mode" that, based on the prioritisation previously programmed, forces the switch to interrupt low priority services to the advantage of the higher priority ones.
- f. The contractor is required to provide the Black Switch with manual back up connections between IN and OUT ports in case of disruption.

6.6.13. **Black Switch Connectivity:**

- a. Connectivity between Black Switch and Crypto Pool: The Black Switch shall interface with the black side of the crypto devices to/from which it shall transmit/receive encrypted data to switch in accordance with RSC controls.
- b. Connectivity between Black Switch and Local PABX: It is required to connect the Black Switch to the local PABX in order to directly access commercial/military - digital/analogue lines.
- c. Connectivity between Black Switch and RF modems: The Black Switch shall provide key-streams directly to the RF modems. For this reason, the Black Switch shall be provided with the necessary interfaces.
- d. Connectivity between Black Switch and RSC: Black switch shall be controlled by RSC via the local RSC LAN, thus shall be provided with a LAN interface.

6.6.14. **Crypto Pool:**

- a. The Red and the Black switches shall be linked to each other by a pool of crypto devices.
- b. The Crypto pool shall comprise the following devices (procured by Purchaser):

N A T O U N C L A S S I F I E D

- i. three (3) Broadcast crypto devices (KIV-7 or another equivalent if authorized at the date of crypto delivery) for BCST transmission (long haul and X11 widening); 1 time (1 NATO BCST +1 National BCST) + 1 spare;
  - ii. three (3) Broadcast crypto devices (KIV-7 or another equivalent if authorized at the date of crypto delivery) for BCST monitoring/receiving (OTAM); 1 time (1 NATO BCST + 1 National BCST) + 1 spare;
  - iii. three (3) TADPOLE Crypto Equipment for 2 SS+1 MRL (+ 1 PtoP when required in pool concept);
  - iv. three (3) voice Cryptographic Equipment for secure voice;
  - v. two (2) NATO IP cryptographic equipment and IP-to-serial converters for connectivity to NGCS.
  - vi. Crypto racks
- c. Crypto shall be installed in one or more racks, implementing the 'pool'.
  - d. The control of crypto shall be performed by MPS server.
  - e. The crypto devices to the red and black switches all use serial asynchronous/synchronous interfaces.
  - f. Crypto devices are managed locally.
  - g. The Interface configuration of the Red and Black switches (including voice switches if any) to the devices in the Crypto pool (including Voice Cryptos) shall be done in an automated fashion (i.e. via BICC SW MMI capability and via backed up configuration files.)
  - h. Crypto equipment, which will be integrated for connectivity to NGCS in the ACMS, shall consist of the NATO IP cryptographic equipment and IP-to-serial converters.
  - i. NATO IP cryptographic equipment shall be implemented to protect the interconnection of BRASS BGR to NS WAN over NATO General Purpose Segment Communication System (NGCS).
  - j. It is the Contractor's responsibility to test the integration of the Contractor's provided equipment with relevant equipment, elements and systems provided as PFE (including crypto equipment) and demonstrate that both the Contractor's provided equipment and PFE (including crypto) are compatible and function correctly as stipulated in this SOW and its Annexes.

N A T O U N C L A S S I F I E D

- k. The Contractor shall provide rack space for cryptos and all interconnecting cables.

6.6.15. **ARQ Processors:**

- a. The ARQ functionality shall be implemented through ARQ processors according with STANAG 5066 Edition 3 promulgated 30 March 2015. ARQ Processors are controlled by MPS Server and directly connected to the red switch.
- b. In the BICC implementation the ARQ processor communicates with the Red side through serial connections. The RED side is connected to Black side via a serial connection with an isolator functionality (details were given in respective paragraphs). Only on the black side, there is a software component managing modems via SNMP protocol based on requests from ARQ processor sent through the mentioned serial link.
- c. The ARQ Processors implement the STANAG 5066 transmission mode. In this mode, the link quality is monitored and the channel speed is adjusted (i.e. incremented in case of good channel, decreased in case of bad quality channel). The ARQ Technique is also based on the segmentation of the message in packets that are transmitted only when the previous packet has been acknowledged (i.e. received without errors) by the receiver. The ARQ processors are connected through a LAN to the MPS Server Cluster to receive the message to be transmitted, and they have two output lines: one is a data line that goes to the Red Switch, the other one is a control line that goes to the RSC through isolator functionality. It's in fact necessary to implement controls on the whole Chain of the equipment involved in the channel transmission and reception.
- d. In accordance with the Profile for Maritime HF Data Communication, stated in STANAG 5066, the "Link Layer" (OSI 2) shall provide the 3 sublayers (Subnetwork Interface, Channel Access, Data Transfer) necessary to implement a reliable ARQ data link service. The lowest of the 3 sublayers (the Data Transfer) shall interface with the COMSEC sublayer (OSI 1) and therefore ARQ processor shall be implemented before crypto devices on transmission lines and after crypto devices in receiving lines.

- e. **ARQ Isolator Functionality:** The Data Transfer sublayer defined in the STANAG 5066 (Ed.3) profile, supports automatically changing of the user data rate (that is, code rate) of the HF modem in response to changing channel conditions (adaptive data rate). This capability requires remote control of the HF modem through RSC. Therefore, as RSC is a black device and ARQ processors are red devices, the two shall be separated by a means providing isolator functionality. Isolator functionality shall meet security requirements outlined in the BRASS SSRS document and shall be approved by NATO or National Security Authorities to use between NS and NU systems to exchange information between the red and the black sides (in both directions). ARQ isolators shall possess Semantic Filtering, Rate Filtering and Reliability capabilities as stated in the BRASS SSRS paragraph 3.2.2. Implementation of isolator functionality shall cover also those related to semantic and rate filtering of the commands exchanged between the ARQ processors and the modems and radios under control of the RSC.

6.6.16. **Multiplexer (Intersite)**

- a. The multiplexer shall be able to provide intersite transport concurrently for at least 8 simultaneous full-duplex serial communications circuits each at rates up to 19.2 kbps with low jitter and delay commensurate with VoIP requirements.
- b. The multiplexer shall be provided with a LAN interface to be controlled from RSC via the RSC LAN. The parameters to be controlled shall be; master, slave configuration, internal-external clock; line activation/deactivation, rate and polarity of each interface, automatic self-diagnosis tests.
- c. In addition to above capacities, the multiplexer shall provide extra capacity to serve to two additional communication lines that will be established by a future BRASS Enhancement 1 (BREITA) Project.

**6.7 Remote Supervisory and Control (RSC):**

- 6.7.1 The RSC shall have its components spreaded through the ACMS and Tx/Rx Sites. Thus, the RSC node shall consist of three connected networks, ACMS, Tx and Rx Sites with the same architecture.
- 6.7.2 The RSC shall perform the remote control of the BRASS assets and provide HF coverage analysis. The existing BICC RSC software does not include the HF coverage analysis. However there are available tools to perform this task

- 6.7.3 The contractor has some flexibility implementing the solution for the remote control of modems. Just to enlighten the Contractor, in BICC implementation, ARQ processor communicates with Red side through serial connections. The RED side (red FEP) is connected to Black side (Black FEP) via a serial connection with an isolator functionality. Only on the black FEP, there is a software component managing modems via SNMP protocol based on requests from ARQ processor sent through the mentioned serial link.
- 6.7.4 The Contractor is free to propose the technical solution for the ARQ isolator. which may use LAN or serial interfaces. The proposed solution shall provide filters, or other protecting mechanisms to allow multiple connections for ARQ control from red side to black side in accordance with Section 6.6.15.e
- 6.7.5 The RSC shall consist of the following devices:
- a. one (1) RSC Server;
  - b. one (1) RSC backup Server;
  - c. one (1) RSC LAN (including switches, routers - Local and Remote);
  - d. two (2) RSC WS
  - e. one (1) Isolator (MPS-RSC)
  - f. three (3) UPS in Racks
  - g. peripheral devices:
    - i. one (1) network printers;
    - ii. one (1) large screen display
- 6.7.6 Circuit characteristics, devices status and power constraints, shall be represented on a Large Screen Display to inform MPS operators.
- 6.7.7 **RSC Server Cluster:**
- a. RSC Servers shall:
    - i. Supervise and control local and remote devices;
    - ii. Control and manage the Black Switch;
    - iii. Manage the communication lines to operators" WS(s) through the LAN;
    - iv. Manage communication lines to additional users linked to the Black Switch;

- v. Prevent data loss, WS(s) failures, power supply black out etc.;
- vi. Be “mirrored” by the other server
- vii. be equipped with:
  - Internal hard disk;
  - DVD/CD-ROM;
  - System console (monitor and keyboard);
  - I/O interfaces.

**6.7.8 RSC Workstations:**

- a. The RSC WSs shall be identical to the MPS ones.

**6.7.9 RSC LAN:**

- a. The RSC LAN shall be based on Ethernet standard.
- b. The Contractor shall demonstrate how MPS and RSC LANs comply with the system high standard for his configuration. The Contractor shall clear how these two secret LANs will be implemented.
- c. The Contractor shall clearly indicate how he plans to interconnect all the sites through the NDN and how the connection between a BRASS site and the NDN is done. The Contractor shall also clarify the interfaces between NDN and BRASS equipment.

**6.7.10 RSC Connections**

- a. Within the ACMS, the RSC shall execute the remote supervisory and control functions over connections provided through the Black Switch and the Black Voice Switch, with the execution of remote supervisory and control functions over the equipment installed at Tx/Rx sites accomplished through an IP Interface; the red-side ARQ Processors shall execute their controls over modem/radio subsystems at the Tx/Rx sites acting through secure isolators connecting the ARQ processors to the RSC.

N A T O U N C L A S S I F I E D

- b. The contractor shall make sure that the secure isolator solution shall be accredited as part of the full accredited BRASS BGR system. (Security reference for the accreditation process is referred in Book II – Part IV –SOW, Section 5.2). There is not a predefined format of allowable messages that can pass through the isolator, but there will be a limited set of messages as defined by the Contractor's own design (e.g. – only specific SNMP commands and responses). The Contractor shall implement secure isolators according to the requirements stated in BICC SSRS. The Contractor shall consider an isolator based on XML-guards or other proven guard technology. The contractor shall address in detail how relevant isolator hardware and its firewall/guard capabilities (e.g. its software programming and rules sets) will be used to implement the ARQ-RSC isolator function, or to do so in a way that can achieve the security accreditation and/or certification required by the SOW.
- c. The connection between MPS and RSC is for modem data rate control (ARQ) and for Frequency Availability Broadcast (FAB – ship shore). The data exchanged between MPS RED and RSC BLACK is the ASCII characters (ASCII commands for the HF modems or FAB text).
- d. The ACMS RSC components shall have connections to its own MPS, CISS and VMSS (via isolator and crypto pool as appropriate) and with the RSCs of other adjacent ACMS components. The purpose of these connections is as follows:
  - i. MPS: The RSC shall receive from MPS the data and status of services, namely FAB pro-sign, red equipment status and control and RF modem settings, to allow the configuration of equipment in Tx/Rx sites. Additionally, it receives the ARQ signals from the ARQ processors to implement the ARQ functionalities.
  - ii. CISS: it shall provide the control data for crypto pool and Black switch. The RSC provides any control data for BLACK-side control of crypto-pool devices while the MPS cluster provides any controls for RED-side control of crypto-pool devices. Separation of these two 'coloured' types of controls in accordance with SOW TEMPEST Requirements shall be provided in the Contractor's design.

N A T O U N C L A S S I F I E D

- iii. VMSS: it shall provide the control data for crypto voice pool and Black Voice Switch.
- iv. The local RSC system in the TX site shall control only the equipment belonging to the TX site. The local RSC system in the RX site shall control only the equipment belonging to the RX site.

## 6.8 Voice Management Sub-System (VMSS)

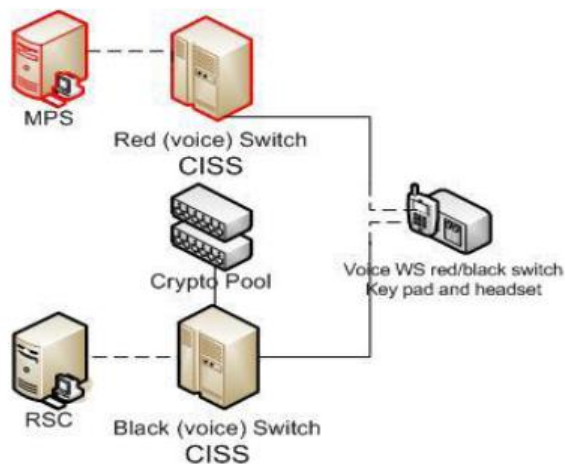


Figure 6: Voice Management Sub-System (VMSS)

- 6.8.1 It shall be based on voice networks, switches, man-machine interfaces and coders.
- 6.8.2 The VMSS shall be based on a voice network, not connected with the MPS LAN (for security purposes).
- 6.8.3 The VMSS shall consist of the following components:
  - a. one (1) Black Voice Switch;
  - b. one (1) Black Voice Network;
  - c. one (1) Red Voice Switch;
  - d. one (1) Red Voice Network;
  - e. four (4) Human Machine voice interfaces, one per operator, each one consisting of: headset, vocoder, mechanical switch, alphanumeric keypad, display.
  - f. two (2) Recorders

- 6.8.4 Internal Voice channels are established through the local PABX (PFE) among the operators equipped with the four (4) Human Machine interfaces (part of the VMSS) and other possible operators connected to the local PABX.
- 6.8.5 External voice channels are established through the local PABX (PFE) among the operators equipped with the four (4) Human Machine interfaces (part of the VMSS) via HF and satellite as well as voice channels between operators at different BRASS nodes and other sites accessible via the national communications network.
- 6.8.6 “Red” communications shall be mechanically separated from “black” ones.
- 6.8.7 **Black Voice Network:**
- a. Operators performing communications “in clear” shall be directly connected to the Black Voice Switch, which is envisaged to be part of the Black Switch of CISS, using a Black Voice Network under RSC control.
  - b. This shall create a local phone network inside the communication centre which shall allow controlled access from local PABX to Tx/Rx media under RSC control. The Black Voice Switch shall also provide connections to the Black Switch (CISS) in order to access external users via other means, namely HF and Satellite through a PABX. For this reason the Black Voice Switch shall be remotely controlled by the RSC. The main idea is to have voice communication from ship to PABX external users and back. It is the responsibility of the Contractor to analyze and provide solutions to entire satisfaction of the purchaser.
  - c. It is envisaged by this technical solution that Black Voice Switch is an integral part of the Black Switch.
  - d. However, digital voice is not implemented yet in every ship or aircraft (Black Voice in some cases is transmitted digitally to a ship or aircraft). For this reason Digital to Analogue converters shall be required to provide suitable analogue connections in order to allow MPS operators to talk with remote analogue operators.

- e. Note that, digital voice in the paragraph above can refer specifically to users equipped with STANAG 4591 or STANAG 4197/4198 codecs, without encryption as part of a Black (i.e., unsecured) ship/shore voice service. However, it also refers to other digital voice codecs proposed by the Contractor for use within the ACMS and Tx/Rx sites to meet other SOW requirements for voice services. In the context of this paragraph, remote analogue users are aboard maritime platforms (or other deployed platform accessing the BRASS node) anywhere in the NATO Area or Responsibility.

#### 6.8.8 **Red Voice Network:**

- a. Operators performing "secure voice" communications with external users shall be directly connected to the Red Voice Switch, which is envisaged to be part of the Red Switch of CISS, using the Red Voice Network, which shall be physically separated from any unsecured voice channel.
- b. The Red Voice Switch shall be connected through a pool of voice crypto devices. Crypto devices, part of the crypto pool, shall provide encoding and link the Red Voice Switch to the Black Switch.
- c. The Red Voice Switch shall be controlled by the MPS Server.

#### 6.8.9 **Human Machine Interface (Voice Terminals):**

- a. The Human Machine Interface (HMI), composed of microphones and headsets, shall allow the collection, transformation and delivery of the information (voice) from/to the operator as well as display and alphanumeric keypad.
- b. Headsets shall be provided for each workstation allowing operators to talk both with local or remote users.
- c. Operators will work in a classified area, thus microphones shall have background noise suppression, high directivity and shielding protections.
- d. It is also required to operators to perform multi point conferences, thus requiring to listen to 2 different communications on the 2 receivers of headset or, if not required to switch to single communication on both receivers. Both communications shall be either encrypted or plain. The mechanical switch shall prevent mixing the two.

- e. Headset shall be easily connected and disconnected from a connecting panel.
- f. The headset shall be provided with headband and ear cushions, both removable and washable and shall meet at least the following minimum requirements:
  - i. Receiver
    - Type: separately wired (in order to listen to 2 different communications);
    - Impedance: 300 or 150 ohm;
    - Frequency: At least 300 – 4000 Hz;
    - Distortion: <2%;
    - Sensitivity: At least 94 ±3 dB SPL (serial connection to both receivers, 1KHz and 200mV input).
  - ii. Microphone:
    - Noise suppression >10 dB
    - Frequency: at least 300-4000 Hz.
  - iii. Other requirements:
    - Microphone cordage protection and shielding;
    - Headset wire shielding.
  - iv. Display and alphanumeric keypad
    - The display installed in each operator place shall provide visual data concerning voice communications (at least coding, users, quality, channels, crypto device used, warnings, TX/RX used etc.) and the keypad shall allow operators to perform simple operation using alphanumeric keys (requests to RSC operators, telephone dialling etc.).
- g. The HMI shall prohibit interconnections between red side MPS Server and black side RSC server, which requires mechanical switching between red side and black side.

**6.8.10 Vocoder:**

- a. In order to reduce switch complexity and to meet channel quality requirements easily, each operator voice workstation shall be provided with voice digital coding, for example VOIP although it is not required.
- b. The requirement is NOT only on external voice channels. Digital coding shall be employed for all black internal and external voice services and for all red internal and external voice services.
- c. No specific voice coding other than 4591/4197/4198 is required, as digital coding compliant with STANAGs 4591/4197/4198 is implied and imposed through the PFE devices for voice services. However Contractor *may* provide additional codecs for voice services for internal and external users, Red and Black, to provide improved quality of service.
- d. Interoperability with legacy external digital users (e.g., STANAG 4591 users in ship-shore circuits or VoIP users in the NATO Core or NDN) shall be achieved by transcoding services provided within the red- and black- voice networks, and, for external analogue users, through the respective requirements of this Annex.

**6.8.11 Mechanical Switch:**

- a. Each operator shall switch between crypto or plain communications by using a Mechanical Switch, thus physically separating the Red from the Black Voice Network.

**6.8.12 Crypto Voice Pool:**

- a. A pool of crypto voice devices shall link the Red Voice Switch and the Black Switches, under the control of MPS Server Cluster.

**6.8.13 VMSS Connections:**

- a. The VMSS shall be connected to the Black Switch (CISS). The RSC shall have a control connection to the Black Voice Switch (BVS) and the MPS shall have the same type of connection to the Red Voice Switch (RVS). Control of VMSS switching is part of the existing BICC software package (HMI control and display) in the CISS/RSC/MPS components.

- b. The Black Voice Switch functionality may be integrated in the Black Switch. Basically the Black Switch connects the ACMS line to the HF modem in the remote site. The BICC software can define the ACMS lines and connect (or disconnect) the ACMS lines to the lines defined in the remote site. The GUI allows listing of the available lines in ACMS (already connected or available) and lines available in selected remote site. It is possible to connect available ACMS lines to the free remote lines.

#### 6.8.14 Recorder

- a. The Voice Management Subsystem (VMSS) shall contain two recorders with possibilities to save all voice communications upon request. The Contractor shall provide appropriate recorder(s) to meet this requirement

### 6.9 Precision Timer and Frequency Standard Sub-System (PTFS)

6.9.1 The PTFS shall be formed by the following components:

- a. A main unit containing the input interfaces, a precise oscillator and clock unit time and frequency processing units and an output interface
- b. Reference Oscillator; it is required to generate the master clock with an accuracy of  $10^{-8}$ , not affected by temperature changes, vibration, acceleration and magnetic fields;
- c. Distribution Units as necessary with a common backplane capable of feeding as many output slots as required in each site. The Distribution Unit shall accept as input both the reference oscillator clock and the GPS clock. References shall be directly supplied to black devices while an isolator is required for MPS Server.
- d. One (1) GPS Receiver;
- e. Isolator for PTFS

6.9.2 The PFTS shall be connected to MPS, RSC and VMSS and mounted in a rack.

### 6.10 Power Supply Sub-System (PSS)

6.10.1 The PSS shall supply power to devices and equipment installed by the Contractor at ACMS, TX and RX sites. The PSS shall make use of TEMPEST approved filters to avoid compromising emissions and the installation shall comply with requirements stipulated in respective SDIPs listed in SOW Section 4. The provision of filters will depend on specific site conditions and on the level of security classification of processed information. It is the Contractor's responsibility to include above mentioned variables in the design and installation works.

- 6.10.2 At the ACMS, Tx and Rx sites the Contractor is responsible for provision and installation of BRASS dedicated NB PSS. It is the Contractor's responsibility to integrate BRASS dedicated NB PSS with the Prime Power Supply System and SB PSS provided by HN.
- 6.10.3 The PSS will be based on the following main units:
- a. BRASS dedicated Power Distribution Boards, breakers, RCD's, cabling associated ducts and trays, etc.
  - b. Short Break Power Supply Sub-System (SB PSS) - provided by HN -
  - c. No Break Power Supply Sub-System (NB PSS) – UPS with batteries;
- 6.10.4 The contractor shall establish a power budget to determine the capacity of the SB PSS and NB PSS for each site (ACMS, TX and RX). Considering number of power amplifiers of transmitters and antennas, in the worst case, the number of transmitters transmitting at maximum power is limited by the maximum number of available antennas. Those transmitters not transmitting shall be ready to be used (standby).
- 6.10.5 A reserve capacity of 20% shall also be assured. The result of this calculation shall be reflected in the System Design Document (SDD) where the contractor shall propose suitable products that will be approved by the purchaser. Cabling from the transformer to the bunker will be the contractor responsibility.
- 6.10.6 **NB PSS - UPS:**
- a. The project also requires the provision and installation of BRASS dedicated NB PSS at the ACMS, Tx and Rx sites to protect sensitive units and devices from having logical and physical damages in case the Prime Power Supply System fails, potential drop, peaks / transients, interference/noise and frequency change. Note that, all equipment on Transmission and Receiving chains except antennas and Amplifier layers of transmitters is considered sensitive units in this context. UPSs **as well as battery packs for UPSs** shall be provided in fully redundant configuration. Additionally, the NB PSS shall have 20% of spare capacity.
  - b. The UPS links to RSC shall be independent from the status of the Local RSC LAN, thus the UPS shall be connected to the RSC Server both through the LAN and through a direct serial connection using a proper SNMP integrated card. The SNMP card shall allow power monitoring from RSC WS(s).

N A T O U N C L A S S I F I E D

- c. The UPS shall provide no less than 30 (thirty) minutes backup power in case the Prime Power Supply System fails. Additionally, UPS is required to operate at maximum load for no less than 30 minutes
- d. The UPS shall be On-Line double conversion technology (AC/DC/AC) with zero time transfer.
- e. Harmonic distortion of less than 5% Total Harmonic Distortion (THD)
- f. The batteries shall be of sealed maintenance free type (the type and model that does not require dedicated ventilation). Replacement of the batteries shall be possible without powering down the UPS.
- g. The expected battery lifetime shall be ten (10) years .
- h. The Contractor shall supply UPS system at each site with the other following characteristics:
  - i. No Break Power
  - ii. Input voltage 400 Vac three phases with neutral, 45 to 65 Hz
  - iii. Output Power sized in accordance to the applied loads
  - iv. Operating time with max load not less than 30 min
  - v. 12 Volt batteries lead-acid type, recharging time less than 3 hours.

## 6.11 Transmitter Site (TX)

- 6.11.1 The ACMS shall be supported by the Asparuhovo transmitting site that shall be equipped with:
  - a. eight (8) 5 kW HF solid state transmitters if required with line flatteners;
  - b. six (6) Wideband Horizontal Dipole Antennas; two (2) RLP Antennas with lighting kit and safety climb system.
  - c. one (1) Antenna Matrix with one (1) 5 kW Dummy Load;
  - d. five (5) modems STANAG 4285 and 4539 as well as STANAG 4197 compliant; for 1-NATO BCST, 1 National BCST, 2-S-S, 1-MRL.
  - e. three (3) voice RF modems compliant with STANAG 4197;

N A T O U N C L A S S I F I E D

N A T O U N C L A S S I F I E D

- f. one (1) Digital Black switch, one (1) Analog switch, data switch as well as one (1) audio switch.
  - g. one (1) RSC LAN (including switches, routers)
  - h. RF transmission lines
  - i. one (1) workstation
  - j. one (1) network printer (laser)
  - k. four (4) UPSs in Rack
  - l. two (2) base stations, two (2) antenna and cabling and one (1) antenna mast for DLOS connection
- 6.11.2 The exact HF spectrum and frequencies for the BRASS BGR operation will be defined in detail at a later stage and is a responsibility of the National Spectrum Management Authority. It is done based on NATO operating requirement. As an indication of current usage of HF in NATO, the NATO's Allied Communication Procedures for maritime HF, specifies IER's for HF support using frequencies as low as 2 MHz. Although scientific definition of BRASS is specified as 3 – 30 MHz, typical military HF radios support operation from 2.000 MHz to 29.999 MHz, and such range of operation would be required to meet the NATO requirements.
- 6.11.3 The number of transmitters is established to support NATO Broadcast requirements, 1 (one) broadcast stream on 4 (four) frequencies. The information from the four transmitters shall be identical and can be serviced by the audio-output from a single modem and the only reason to have receiver for this requirement is OTAM, the broadcast service itself requires no receiver at all, and OTAM can be performed on a sampled basis examining one frequency at a time as required, therefore requiring only one modem at the receive-site for Broadcast. As a result, number of Modems is related to the number of circuits. 5 modems were considered for both Tx and Rx sites taking into consideration that it will be needed: 1 NATO BCST + 1 National BCST, 2 S-S + 1 MRL circuits for NATO and National purposes.
- 6.11.4 The Contractor shall consider continuous operation at 5kW with dummy load; Contractor's assumption of any additional operational requirements (e.g., forced air or water cooled termination, fail safe protection) will be dictated by their assessment of their capability to meet the system requirements for reliability, maintainability, and availability.

N A T O U N C L A S S I F I E D

**6.11.5 RF Modems (Both for Tx/Rx sites):**

- a. The RF modems shall be compliant with STANAG(s) 4285-4539 and 4197 for interoperability with the current BRASS programs being implemented. The system shall be compliant with STANAG 4203 edition 3. STANAG 4203 Ed.3 is applicable to HF modems to the extent that it defines baseband audio interface requirements (and constraints) applicable to HF modems, e.g., audio power and impedance levels, and passband. Specifically, STANAG 4203 Ed.3 contains audio passband requirements more suitable for the high-speed PSK HF modems than earlier editions of STANAG 4203. Other HF modem requirements that apply are defined in the other named STANAGs (i.e., 4285-4539 and 4197) in this same paragraph.

**6.11.6 Audio Switch (Both for Tx/Rx sites):**

- a. Audio switch is an audio matrix that connects the RF modems to transmitter/receivers. Audio switches shall be used in the transmission/receiving chain allowing to assign any transmitter/receiver to any audio line. (This component shall be controlled by the RSC Tx/Rx Site)
- b. The Audio Switch System shall be in a modular and flexible configuration in order to achieve, with different combination of its modules, different modularity in terms of input and output ports capacity.
- c. Audio switch shall have an extra capacity to serve to two additional communication lines that will be established with future BRASS Enhancement 1 (BREITA) Project.

**6.11.7 HF Transmitters :**

- a. The Contractor shall supply, integrate and test HF Transmitter equipment of "Solid State" technology.
- b. A typical configuration of the transmitter 5kW includes the control circuits, low level RF, power amplifier and power supply.
- c. The HF transmitters shall be used to modulate the HF carrier with the baseband input signal and amplify it. (This component shall be controlled by the RSC Tx/Rx Site).
- d. The equipment of the rack transmitter component shall meet the following minimum requirements:
  - i. Frequency range: 2-29.999.99 MHz
  - ii. Tuning: automatic digital

- iii. Tuning steps: not higher than 10 Hz
- iv. Tuning time: max 10 s
- v. Modes: USB-LSB-ISB-AMCOMP-CW-PSK
- vi. Output RF power: 5kW PEP
- vii. Power levels: 1/1, 1/2, 1/4, 1/8
- viii. Output: on 50 Ohm load con VSWR 3:1 max
- ix. Frequency stability: + 1/10<sup>-8</sup> daily from 0°C to 50°C
- x. ITU\_R SM.329-7
- xi. MILSTD 188 141 B
- xii. Intermodulation attenuation: better than 35/36 dB
- xiii. Sideband attenuation: better than 50 dB
- xiv. Carrier attenuation: better that 10 dB
- xv. Audio input level: 0 dBm on 600 Ohm balanced
- xvi. Remote control capability including but not limited to: frequency, mode, power level, BITE.
- xvii. Programmed channels: minimum 10
- xviii. Monitoring capability including but not limited to: hours of operation, number of failures, tuning numbers, Forward and Reflected Power,
- xix. Power supply: 400 Vac, ±10%, three phases, 45-65 Hz
- xx. Power consumption: less than 20kW
- xxi. Operating temperature: 0°C - 50°C
- xxii. Humidity: max 95%
- xxiii. Cooling: forced air

N A T O U N C L A S S I F I E D

- e. The primary power consumption of each HF transmitter shall be maximum 20 kWatt at rated (5kWatt) RF output power. Rated RF output power is defined as the maximum continuous non saturated output and is required on all transmit frequencies of the transmitter. The power consumption of the 5 kW transmitter is required under normal conditions with voice modulation J3E and 5 kW PEP. The main requirement on the 5 kW transmitter is the operation under high VSWR conditions and the line flattener is treated as an example for means to fulfill this requirement.
- f. In case of power outage, the states of the transmitters shall be kept in order to avoid reconfiguring the exciter portion when the power comes back. The Contractor shall clearly specify the requirements of the UPS being used for that purpose.
- g. The Contractor shall prove compliance with any and all STANAG 4203 requirements (i.e. linearity, spectral containment of transmitted signal etc) during the transmitter acceptance test.
- h. Availability and MTBF are defined in Book II Part IV (SOW). Other applicable transmitter and receiver requirements such as sensitivity, phase linearity, level of harmonic freq, frequency stability and others are specified in STANAG 4203 Edition 3, which is applicable to this SOW.
- i. The Transmitters shall be manually (from the equipment from panel) and remotely controlled by the RSC in normal usage. In case of connection failure to the ACMS, the local RSC shall be able to control the transmitters and any other equipment that under normal operation would be controlled remotely.
- j. The applicable standard for this SOW (i.e., STANAG 4203 Edition 3) specifies transmit-to-receive and receive-to-transmit switching times (15 msec and 25 msec, respectively). Transmitter retuning times shall be compliant with STANAG 4538, which is applicable to Automatic Link Establishment (ALE). .

N A T O U N C L A S S I F I E D

- k. Audio splitters shall be used in the transmission chain whenever there is a need for the same (audio) information to be transmitted in more than one frequency (component). Each Audio Splitter can receive one single audio channel and can split it to (at least) five output channels. The Contractor shall provide one or more audio splitter with as many input and output circuits as necessary for the proposed solution to ensure system redundancy/frequency diversity.
- l. Contractor shall ensure that transmitters include filters (post selectors) preventing spurious signals from the transmitters having an adverse effect on the performance of the receivers

#### 6.11.8 HF Transmitters Equipment cooling

- a. The Contractor shall provide cooling for HF transmitters (as part of the transmitters) in accordance with:
  - i. Close circuit operations
  - ii. Intake air filters from the outside
  - iii. Ventilation or Ventilation/Cooling of the racks with high heat dissipation. Adjustable air flow to keep the mean temperature to the optimal value for the operating equipment. The energy consumption and the air flow shall be kept as low as possible.
- b. The following requirements shall be complied:
  - i. The cooling equipment shall be duplicated in order to guarantee continuous operations.
  - ii. The cooling system shall be of heat-pump type, air/air reversible, with split unit installed on the walls.
  - iii. The equipment shall be installed outside, preferably on the roof and splinter protected.
  - iv. High quality COTS shall be used.
  - v. The system shall be automatic and provided with remote control and monitoring interfaces
  - vi. Noise and vibrations shall be kept as low as possible and conforming to working environment specifications
  - vii. Use of fluid is not recommended

- viii. The air flow shall be in ducts. Plenum is not recommended. It is recommended the use of suitable diffusers.
- ix. The recommended cooling gas is R 407 C type or in accordance with the latest regulations.
- x. The incoming air flow shall be filtered at least to M Class
- xi. The Inside/outside openings shall be shaped (zig-zag) for splinter protection and secured to avoid entrance of animals, objects etc.
- xii. The racks shall be provided with automatic air flow control to maintain a constant operating temperature.
- xiii. Whenever possible avoid the use of ON/OFF devices.
- xiv. Special consideration shall be used in considering the heat exchanged of the HF transmitters with the room environment.
- xv. Minimal energy absorption shall be one of the main design requirements;
- xvi. In addition:
  - Outside openings security.
  - Heat distribution using insulated copper pipes.
  - Outside Moisture discharge.
- xvii. Figure 6 depicts an example of equipment cooling system

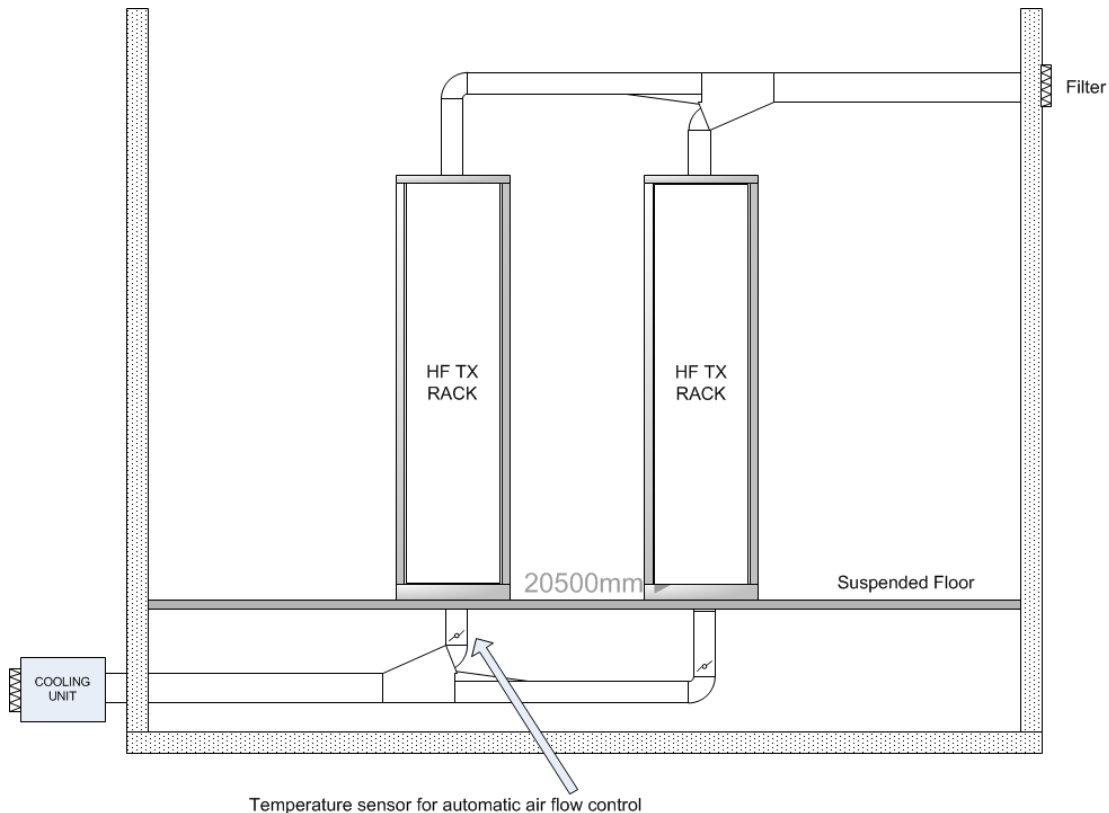


Figure 7: Equipment cooling example.

6.11.9 **HF Transmitting Antennas Matrix:**

- a. The Antenna matrix shall be used in the transmission chain, allowing assignment of any antenna to any HF transmitter. (This component shall be controlled by the RSC Tx/Rx Site)
- b. The Antenna matrix accomplishes the radio-frequency connection from each output of the transmitter equipment to one among the inputs for the antennas, by using a method that avoids the connection of more than one transmitter to a single antenna, and that also avoids the connection of more than one antenna to a single transmitter.
- c. Therefore, antenna matrix shall be provided with protections in order to avoid;
  - i. hot RF switching,
  - ii. antenna dangerous connections to more than one transmitter and,
  - iii. transmitter dangerous connection to more than one antenna.

- d. It shall also be provided with test points to perform VSWR measurements.
- e. It shall be possible to control the antenna matrix remotely and locally.

#### 6.11.10 HF Transmitting Antennas

- a. The RF cables shall present low losses at the transmitting band (losses < 1.7 dB/100m at 30 MHz). They shall comply with the same environmental requirements as specified in Annex-A Appendix-1.
- b. The Contractor shall develop and implement an antenna farm solution to locate the antennas of BRASS (8 + 2 (future enhancement)) to fulfil the requirements of the SOW and health and safety issues.
- c. The contractor shall obtain all required permits and documents to place the antennas in accordance with national legislation and law. This includes any requirements by ICAO in terms of aircraft warning lights. (Refer to Appendix-1 Book II Part IV Annex-A for further details.)
- d. Transmitter antenna environmental parameters for solar radiation, direct solar radiation and rain intensity are those typical of the host nation location and environment. Worst-case values for these parameters applied to the transmitter antenna structure shall be derived by the contractor from 50-year historical climate data for the sites.
- e. The Contractor shall deliver the equipment with the proper Ingress Protection (IP) rating in accordance with the environmental conditions on site.
- f. The antenna sub-systems mounted on the antenna masts, as well as the antenna masts themselves shall be capable of withstanding environmental conditions without suffering degradation of system performance (gain, pattern type, sensitivity) and suffering permanent mechanical damages. The environmental conditions are stipulated in Appendix 1 to SOW Annex-A, paragraph 3.5.
  - i. Additionally, the antenna sub-systems mounted on the antenna masts shall be compliant with following Electrical Conditions:
    - Max VSWR (over full frequency range) = 3.0
    - Max Power Input = 5 kW

N A T O U N C L A S S I F I E D

- ii. The isolation requirement shall be determined by the Contractor but not be less than 30 dB, and shall be sufficient to allow the operation of the required antennas in the determined antenna farm. The Contractor shall prove that the system will operate with the minimum mutual interference with the proposed design in order to comply with the RAMT requirements in Section 9 of the SOW.
  - iii. The Contractor shall provide and install lightning protection on all antennas in Asparuhovo.
  - iv. The contractor shall provide earthing and grounding system for equipment provided and installed at Tx site.
  - v. If, due to proximity of antennas and buildings locations and in accordance with respective BGR regulations, connection between earthing networks is required it is the Contractor's responsibility to connect the antenna earthing network to the earthing network implemented by HN. The ground resistance requirement at the Tx site and standards shall be in compliance with the governing HN electrical standards.
- g. The Contractor shall design and implement suitable antenna mast foundation works (including relevant earth works) required for the installation of new antenna mast for BRASS and DLOS systems. The antenna farms on Tx site will host the antennas of BRASS system as well as two additional antennas of future enhancement to BRASS (deployable land force support). Note that, with this project only the locations of the additional antennas will be determined. The two antennas will be procured in future projects. On Tx site, there will also be a facility building located close to the antenna farm. Therefore, the locations of the antennas will be important not only for the technical coverage requirements but also for the health and safety requirements and for preventing interferences between two different systems. The Contractor shall get the National Health and Safety Certification for Tx site from BGR national authorities

#### 6.11.11 **RF Cable Laying**

- a. The cable shall be of the following types:
  - i. Flexible cable (wrappable/cable conduit lay)

N A T O U N C L A S S I F I E D

- ii. Rigid/semi rigid cable
- b. The Contractor shall follow the below instructions related to the installation environment:
- i. Internal, laid
    - On metal duct, fixed in ordered manner
    - On metal duct or vertical cable ladder, fixed on the ducts or ladders with cable clamps designed to support the cable weight. The clamps shall be installed at least every linear meter of the cable length.
  - ii. External, laid in cable duct trench at a depth of 60cm with inspection wells every 50m
    - If flexible routed through pipes; the size of the pipes shall be sufficient to easily proceed with the installation of the cables. The size of the pipes shall also allow the installation of the same quantity of cables again as the initial installation.
    - If rigid lay in pipes made of two half concrete or clay pipes, with cable laying on the bottom half covered by the second half and sealed with mortar. Inspection wells shall be provided at junction points.
- c. The Contractor shall perform the installation in accordance with the following general requirements:
- i. The curve radius of the laid cables shall conform to the cable manufacturer specifications.
  - ii. In cable routing special care shall be made in order to avoid torsions that can damage the cable and which can prevent pulling out and/or further insertion of additional cables.
  - iii. Cable junctions are allowed only where they correspond to inspection wells.
  - iv. Cable section shall be the same for the whole length of the cable.

- v. The cables shall be labelled and identified with cable strips:
  - On both ends
    - At every inspection well
    - Every 10m along the cable ducts or cable ladders
    - Every time the cable change course

#### 6.11.12 HF Antenna Installation (Tx and Rx)

- a. For antennas that require a ground plane, the Contractor shall:
  - i. Prepare the area as described in paragraph 4.4
  - ii. Excavate up to 35cm the area intended for the laying of the ground plane and verify the flatness.
  - iii. Place pins on the area to allow position identification of antenna and guy line plinths
  - iv. Put in place a layer of dry rubble on the levelled area
  - v. Install the ground plane as per Manufacturer specifications
  - vi. Put in place a layer of at least 10cm of mixed quarry
- b. For antennas that do not require ground plane, the Contractor shall:
  - i. Clean and prepare the area as per paragraph 4.4
  - ii. Place pins on the area to allow position identification of antenna and guy lines plinths
- c. In addition, the Contractor shall perform the following civil works for HF antenna installation:
  - i. Construction in reinforced concrete of the plinths of such a size to be compatible with the Manufacturer specifications and the results of the soil tests
  - ii. The plinth at the base of the antenna mast shall be large enough to avoid that the grass growing around the area to come in contact with the antenna structure.

- Connect the metal structures among them to the earth pins
  - Prepare the base of the antenna for the RF cable joint, and the other devices as service power socket, discharger, Air Obstacle Light power transformer.
  - Build a security/safety fence around the concrete base of at least 1m high. Fence material and size shall be adequate to avoid personnel accidental contact and wild animal access.
  - Antenna installation in accordance with the Manufacturer instructions
- d. The infrastructure of antenna obstruction lights shall be implemented in accordance to ICAO Annex 14, Volume 1, Chapter 6, "Visual aids for denoting obstacles", latest edition.
- e. All the antennas shall be provided with obstruction light kits. The kit shall include a double toroid transformer to be connected to LT power supply at the base of the antennas. The LT power cable(s), connected to the electric panel of the site, shall be laid into a PVC pipeline laid underground with a sufficient number of inspection wells.

#### 6.11.13 **Lightning System for Tx and Rx antennas**

- a. The lightning system, which specific characteristics shall be identified in relation to the structure to be protected, shall be designed in relation to the following regulations:
- i. EN 62305-1:2011, "Protection against lightning - Part 1: General principles"
  - ii. EN 61000
  - iii. Safety regulations

#### 6.11.14 **Ground and Earth System for Tx and Rx antennas**

- a. The Earth system shall be implemented by means of an underground copper braid laid along the building perimeter reinforced with ground earth stakes accessible and sectioned via inspection wells.

- b. The Earth system shall be sized in accordance with the electric system specifications and of the surround soil type and quality. In any case the total earth resistance shall not be in excess of a few tenth of Ohm.
- c. The Ground System shall be implemented by connecting all metal structures existing in the building and of the concerned structures related to the civil infrastructure and the existing systems like electricity, air cooling ventilation heating etc.

## 6.12 Receiver Site (RX)

- 6.12.1 The ACMS shall be supported by the Galata receiving site that shall be equipped with:
  - a. five (5) receivers;
  - b. five (5) RF modems STANAG 4285-4539/STANAG 4197 compliant for 1-NATO BCST, 1 National BCST, 2-S-S, 1-MRL;
  - c. three (3) voice modems in accordance with STANAG 4197;
  - d. one (1) Black switch (with digital/analog interfaces) one (1) Analogue switch, one (1) audio switch and one (1) Data Switch,.
  - e. one (1) automated antenna matrix;
  - f. two (2) RLP antenna system with lighting kit and Safety climb system; and three (3) Wideband Horizontal Dipole Antenna with ancillaries.;
  - g. one (1) work station;
  - h. one (1) network printer (laser)
  - i. three (3) UPS in rack
  - j. RF transmission lines
  - k. two (2) base stations, two (2) antenna and cabling and one (1) antenna mast for DLOS connection
- 6.12.2 Unfortunately, when receiving data from afloat units or from an adjacent BRASS node, clocks might not be the same, thus requiring elastic buffers. When receiving data from the ships the clock may be different than the one at the BRASS site. The Contractor shall design a solution to cope with the difference in clocks. Regarding the siting and size of the buffers it is up to the Contractor to propose the best architecture to comply with this requirement.

6.12.3 The buffer size that shall be installed at the receiving site, shall be able to accommodate as a minimum  $\pm 1$  second drift at the highest data rate.

6.12.4 **HF Receiving Antennas:**

- a. Receiving antennas shall be able to receive HF signals.
- b. The contractor shall provide earthing and grounding system for equipment provided and installed at Rx site.
- c. The RF cables shall present low losses at the receiving band (losses  $< 1.7$  dB/100m at 30 MHz). They shall comply with the same environmental requirements as specified in Annex-A Appendix-1
- d. The contractor shall obtain all required permits and documents to place the antennas in accordance with national legislation and law. This includes any requirements by ICAO in terms of aircraft warning lights. (Refer to Appendix-1 Book II Part IV Annex-A for further details.)
- e. Receive antenna environmental parameters for solar radiation, direct solar radiation and rain intensity are those typical of the host nation location and environment. Worst-case values for these parameters applied to the transmitter antenna structure shall be derived by the contractor from 50-year historical climate data for the sites.
- f. The Contractor shall deliver the equipment with the proper Ingress Protection (IP) rating in accordance with the environmental conditions on site.
- g. The antenna sub-systems mounted on the antenna masts, as well as the antenna masts themselves shall be capable of withstanding environmental conditions without suffering degradation of system performance (gain, pattern type, sensitivity) and without suffering permanent mechanical damages. The environmental conditions are stipulated in App1 to SOW Annex-A paragraph 3.5.
  - i. Additionally, the antenna sub-system mounted on the antenna masts shall be compliant with following Electrical Conditions:
    - Max VSWR (over full frequency range) less or equal to 3.5
- h. Contractor shall provide and install lightning protection on all antennas in Galata.

- i. The contractor shall provide earthing and grounding system for equipment provided and installed at Rx site.
- j. If, due to proximity of antennas and buildings locations and in accordance with respective BGR regulations, connection between earthing networks is required it is the Contractor's responsibility to connect the antenna earthing network to the earthing network implemented by HN. The ground resistance requirement at the Rx site shall be in compliance with the governing HN electrical standards.
- k. The Contractor shall design and implement suitable antenna mast foundation works (including relevant earth works) required for the installation of new antenna mast for BRASS and DLOS systems. The antenna farms on Rx site will host the antennas of BRASS system as well as two additional antennas of future enhancement to BRASS (deployable land force support). Note that, with this project only the locations of the additional antennas will be determined. The two antennas will be procured in future projects.

#### 6.12.5 **HF Receiving Antennas Matrix:**

- a. Antenna matrix shall be used in the receiving chain, allowing to assign any antenna to any HF receiver. (This component shall be controlled by the RSC Tx/Rx Site).
- b. The Antenna matrix accomplishes the radio-frequency connection between input of receiver equipment and output of the antennas. It shall allow the connection from one antenna to one or more than one receiver at the same time.
- c. It shall also be provided with test points to perform VSWR measurements.
- d. It shall be possible to control the antenna matrix remotely and locally.
- e. Antenna matrix shall have an extra capacity to serve to two additional communication lines that will be establish with future BRASS Enhancement 1 (BREITA) Project.

#### 6.12.6 **HF Receivers :**

- a. The HF receivers shall be used to demodulate the received signal into the baseband signal (audio frequency) to be further processed. (This component shall be controlled by the RSC Tx/Rx Site):

- b. Contractor shall ensure that receivers include filters (pre-selectors) preventing spurious signals from the transmitters having an adverse effect on the performance of the receivers .

#### 6.12.7 **Audio Switch (Rx sites)**

An Audio switch shall be used in receiving chain, allowing assignment of any modem signal to the desired audio channel, which may be split as required.

### 6.13 **Connection to ACP 127 Network**

- 6.13.1 The ACMS will be based on ACP 127 formatted messages
- 6.13.2 Communications via the Bulgarian COMCEN to other BRASS nodes will be via the NDN and NGCS via a black key stream.

### 6.14 **Direct Line of Sight (DLOS) System between ACMS/Tx/Rx sites**

The connectivity between future ACMS site- Receiver site and Transmitter site is currently achieved through an old unreliable cabling system. A new Direct Line of Sight (DLOS) connectivity between sites shall be implemented by the Contractor.

#### 6.14.1 **High-level Functional Requirements**

- a. The BRASS BGR DLOS Links shall provide transparent transport of data between the Tx or Rx sites and the ACMS sites in a manner that the BRASS BGR system performance is not affected.
- b. The DLOS links shall provide the users with a monitoring function to allow quick detection of failures and issues by the operators at the ACMS site.
- c. The DLOS links shall provide adequate tributary interfaces to carry all intra-site BRASS traffic including management traffic.
- d. The DLOS links radio terminals shall be deployed at the BGR sites such that they cannot be obstructed by circulating vehicles (including trucks) in the vicinity of the site.
- e. The Contractor shall provide the capability to centrally manage (i.e. administer, configure, reconfigure, control and monitor), from a location in Gorna Traka, all radio equipment according to this SOW.

**6.14.2 High-level Technical Requirements**

- a. System Requirements
  - i. The 3dB lobe (beamwidth) of the antenna radiation pattern shall be maintained within 3 degrees.
  - ii. If antennas are mounted by means of auxiliary poles, the latter should be fixed to the main antenna mast via a minimum of two separate mechanical interfaces.
  - iii. All DLOS equipment shall be delivered in 1+1 HSB configuration.
  - iv. The DLOS links shall be engineered with a link availability of 99.98% of the year, taking into account the effects of propagation outages and equipment failures. Availability and reliability figures shall be confirmed during the project implementation to demonstrate his claims of compliance.
  - v. The solution delivered by the Contractor shall be flexible enough to allow any frequency modification that could become necessary after implementation, such a solution being detailed by the Contractor so that the Purchaser team can undertake all corresponding actions. Any specific tools and procedures necessary to undertake a frequency modification shall be provided by the Contractor at the central location within the scope of this contract.
  - vi. The Contractor shall provide all relevant detailed performance or characteristics of his deliverables including the following:
    - Level diagrams of the equipment and of the links, including antennas, filters and feeders.
    - Transmitter output power, dynamic range and radiated spectrum in channel and adjacent channels. Automatic power control mechanisms shall be documented. Out-of-band, spurious signals, and phase noise shall be described by the Contractor.
    - Receiver dynamic range, threshold and frequency selectivity.
    - Modulation and coding schemes, with transit time, BER performance curves and spectral

- efficiency. The multiplexing mechanism, whether such function is implemented separately or embedded in the DLOS equipment.
- Mass, volume and power consumption of his equipment, broken down to subsystem or LRU level, with specific emphasis on the indoor and outdoor equipment, and the one be mounted above the towers or masts.
  - Antenna size, gain, polarization, cross polarization discrimination (XPD) impedance, VSWR and radiation pattern for equipment supplied by the Contractor according to this SOW.
- vii. The DLOS links shall be for outdoor operation and shall be housed in a very compact and robust waterproof outdoor unit (ODU) to be mounted on the back of the antenna.
- viii. All DLOS equipment shall include agents for connection to a supervisory system capable of providing full diagnoses of the system performance and control of the network parameters. The supervisory software system shall include Alarm Status and Controls, Performance monitoring (G 821) and Configuration management. This applies not only for the new but also for the existing equipment the configuration of which may require upgrading to meet the network monitoring center requirements. The software product for monitoring and management of the radio relay stations must be compatible with the software product "Provision" of "Aviat Network" company, which is the current one for monitoring and management of the radio relay stations from the active in the moment system of BGR National Defence Network (NDN) "Strandza-2". This requirement is necessary to achieve an ability to build a unified communication environment that is monitored and managed by the unified automatic management system in one centralize control center.
- ix. Frequency requirements according to Rec. ITU-R

N A T O U N C L A S S I F I E D

- x. The Contractor shall provide the calculation results for each link showing the power consumption and the recommendation of the size of the battery packs required at each site for 30 and 60 minute support.
- b. Radio Requirements
- i. Frequency range as defined for BGR MoD use:  
7989-8129 MHz  
8299-8439 MHz
  - ii. Channeling: ITU-R F.386-8-A2 and A3 and ECC(CEPT/ERC) (02) 06 A1.2.1;
  - iii. Bandwidth: 14 MHz
  - iv. Channel spacing/ elongation: 310 MHz;
  - v. Polarization: no specific requirement
  - vi. Modulation: QPSK (or similar) and 16 QAM;
  - vii. Output Power (1 dB compression point): as required by the link budget computations, but not below +20 dBm;
  - viii. Dynamic range in transmission: adjustable between the 1 dB compression point and 20 dB below;
  - ix. Dynamic range in reception at least 40 dB above specified threshold;
  - x. Bit Error rate  $< 10E-11$  shall be provided with an availability of 99.99% calculated in accordance with ITU-R P530 for rain region L
  - xi. Link MTBF  $> 12\ 000$  hours
  - xii. Temperature range:  $-20^{\circ}\text{C}$  to  $+ 55^{\circ}\text{C}$  (outdoor equipment);
  - xiii. Solar Shielding
  - xiv. Physical dimensions: all indoor DLOS equipment shall fit in one 19 inch rack cabinet of depth  $< 600$  mm and height below 2 meters. All outdoor equipment shall be man-portable by not more than two persons and liftable to the mast without specialized equipment such as a crane.

N A T O U N C L A S S I F I E D

- xv. RF planning for DLOS Links should be in accordance with the Standing operation procedures (SOP) of NATO's frequency coordination and the authorization to use radio relay equipment.
- c. Performance Requirements
- i. The DLOS links shall ensure binary integrity count with no more than one bit slip per 96 hour period.
  - ii. The contractor shall provide a link margin of at least 30 dB for additional attenuation due to extreme weather condition, propagation anomalies, and/or interference from neighboring systems or antennas. Rain excess attenuation should be considered in nominal link conditions and calculated in accordance with ITU-R P530 for rain zone L and 99.99% radio link availability.
  - iii. The switchover from the primary electrical power to the batteries and vice versa shall not generate errors on the link nor bit slips nor synchronization losses.
  - iv. The DLOS system at the 3 sites shall include automatic rerouting of the affected traffic in case one of the 3 links fail.

**Appendix 1 to Book II Part IV Annex-A**

**ANTENNA MASTS REQUIREMENTS**

**SECTION 1 ANTENNA MASTS**

- 1.1. The Contractor shall design, provide and install the required number of antenna masts at each site. The Contractor is also responsible for provision of suitable antenna mast foundations required for the installation of new antenna masts.
- 1.2. The Contractor is responsible for obtaining all Military and Civil permissions for the installation and operation of antenna masts and all related installation activities such as cutting trees (for further details, refer to SOW Section 12).
- 1.3. The Contractor shall conduct and/or obtain soil study at the locations of antenna foundations.

**SECTION 2 CONTRACTOR'S RESPONSIBILITIES FOR THE ANTENNA MASTS:**

- 2.1. Provision and installation of new steel masts capable of supporting the BRASS system.
- 2.2. Provision and installation of mast ancillaries and civil works including but not limited to masts foundation, earth works including necessary trenches, cable ducts, earthing and grounding systems, cabling, cable ladders or trays, lightning protection, air-craft warning lights in accordance with ICAO standards, safe to climb structures.
- 2.3. Provision and installation of all required electrical, radio earthing and grounding connections..
- 2.4. Execution of site preparation works including cutting trees.
- 2.5. The design, production and installation of the antenna masts shall comply with following standards:
  - 2.5.1. EN ISO 1461 – Hot dip galvanized coatings on fabricated iron and steel articles;
  - 2.5.2. EN 10204 Metallic materials. Types of inspection documents
  - 2.5.3. EN 10025 – Hot rolled products of structural steels. General technical delivery conditions;
  - 2.5.4. EN ISO 14 713 (Part 1, 2 and 3) – Zinc coatings -- Guidelines and recommendations for the protection against corrosion of iron and steel in structures;

- 2.5.5. EN 10210-1 – Hot finished structural hollow sections of non-alloy and fine grain steels;
- 2.5.6. ISO 898 (part 1, 2 and 5) – Mechanical properties of fasteners made of carbon steel and alloy steel;
- 2.5.7. ISO 5817 – Welding -- Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) -- Quality levels for imperfections;
- 2.5.8. ISO 6520-1 – Welding and allied processes -- Classification of geometric imperfections in metallic materials -- Part 1: Fusion welding

### **SECTION 3      ANTENNA    MAST    DESIGN    REQUIREMENTS    AND SPECIFICATIONS**

- 3.1. An antenna mast lightning protection kit shall be provided and installed in order to ensure lightning protection of installed equipment. It shall consist of adequate lightning rods, surge protection and Earthing kit. The Earthing kit shall be installed, if required, before the concrete pouring for the antenna foundation works.
- 3.2. The expected lifetime of the antenna mast shall be at least 15 years without any heavy maintenance.
- 3.3. Health and safety measures shall be implemented: including but not limited to safe to climb structures, sharp corners avoidance and proper safety marking.
- 3.4. The mast shall be constructed according to quality craftsmanship standards.
- 3.5. The antenna sub-systems mounted on the antenna masts, as well as the antenna masts themselves shall be capable of withstanding following environmental conditions without suffering degradation of system performance (gain, pattern type, sensitivity) and without suffering permanent mechanical damages:
  - 3.5.1. Local weather conditions pertaining temperature, snow load and ice accumulation (glaze ice – 0.9g/ cm<sup>3</sup>), as per STANAG 4370. The region is defined as conditions A3 Intermediate and C0 Mild Cold (according to STANAG 4370) for the purpose of this Contract;
  - 3.5.2. High Temperature: Norm: + 55° C for operation;
  - 3.5.3. Low Temperature: Norm: - 20° C for operation;
  - 3.5.4. Permissible wind speed up to 31 m/s and gusting up to 50 m/s;
  - 3.5.5. Hailstones of up to 20 mm diameter, 0.9 g/cm<sup>3</sup> density and 58 m/s terminal velocity;

- 3.5.6. Sand and dust concentrations up to  $1\text{g/m}^3$ , with particle size down to  $20\ \mu\text{m}$  at an air speed up to  $20\ \text{m/s}$ ;
- 3.5.7. The fundamental resonance frequency of the mast with equipment shall be greater than  $3\ \text{Hz}$ ;
- 3.5.8. The design of the antenna masts shall take into account seismic conditions of HN.

#### **SECTION 4 ANTENNA AND ANCILLARIES PAINTING**

- 4.1. The steel structure of the mast shall be painted in accordance with the R.A.L colour coding schema that will be provided to the Contractor at least 1 month prior to start of installation activities.
- 4.2. Access ladder or stairs, cables ladder, floor of platforms shall also be painted in order to provide the correct corrosion protection.
- 4.3. The time between the galvanisation and the painting shall be as short as possible.
- 4.4. After cleaning of the steel galvanised structure, one coat of primary and two coat of polyurethane paint shall be applied as a minimum. A minimum thickness of  $80\mu$  shall be obtained

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

Page Intentionally Left Blank

N A T O U N C L A S S I F I E D

Appendix-1 to Book II Part IV Annex A Page 4

**Appendix 2 to Book II Part IV Annex-A**

**SYSTEM PERFORMANCE REQUIREMENTS**

**SECTION 1 General**

- 1.1. The BRASS BGR System shall be designed to operate with concurrent transmissions and receptions at any frequencies within the HF band 2 MHz to 30 MHz.
- 1.2. The BRASS BGR System shall be such that all combinations of transmit and receive frequencies, power levels and data rates can be achieved without degradation of performance, with transmit frequencies being just separated by as little as 6 kHz.
- 1.3. The antenna farms associated with the Transmit and Receive sites shall be designed in such way that, within a site, the directive antennas are distributed along an East-West axis, so that they do not block each other when pointing to a North/South direction.

**SECTION 2 Radio Coverage**

- 2.1. The BRASS BGR system shall provide transmit and receive radio coverage through a combination of propagation modes with the following distribution:
  - a. Two (2) concurrent directional long-range coverage modes via sky-wave propagation;
  - b. Four (4) concurrent medium-range radio coverage via sky-wave propagation;
  - c. Two (2) short-range radio coverage modes.

**SECTION 3 Antenna Isolation**

- 3.1. At both the Transmit and Receive Sites, the isolation between any two different antenna terminals shall be at least 30 dB, for any two physically separated antenna terminals, and 25 dB, for any two antenna ports belonging to the same multipoint antenna, at maximum transmit power in CW.

#### **SECTION 4 Transmission cable loss**

- 4.1. At the Transmit site, the transmission cable loss between transmit antenna matrix input (i.e. ports facing the transmitter) and any antenna input shall be less than 2.5 dB when measured at 30 MHz.
- 4.2. At the Receive site, the transmission cable loss between transmit antenna matrix input (i.e. facing the transmitter) and any antenna input shall be less than 3.0 dB when measured at 30 MHz.

#### **SECTION 5 VSWR**

- 5.1. The VSWR of any transmitting antenna port shall not exceed 3.0 at any frequency of the tuning range when measured at the associated antenna matrix input.
- 5.2. The VSWR of any receiving antenna port shall not exceed 3.5 at any frequency of the tuning range when measured at the associated antenna matrix output.

#### **SECTION 6 Minimum receive levels**

- 6.1. Sensitivity: The BRASS BGR system overall shall be capable of receiving radio signals (SSB mode) at -105 dBm with an output of 10 dB SINAD (Signal to Noise Distortion).

#### **SECTION 7 IMP performance**

- 7.1. The third-order intermodulation products (IMP) resulting from the transmission of any two CW carriers via the transmission function at maximum rated power shall not exceed -25 dBc (25 dB below either carrier) when received and measured at the Receive Site.

#### **SECTION 8 ARQ performance**

- 8.1. The ARQ functionality of the complete BRASS BGR system shall be capable of sending and receiving messages in STANAG 5066 Automatic Repeat Request (ARQ) and Adaptive Data Rate (ADR) modes at each of the BRASS system data rates defined for S/S and MRL services over mid-latitude skywave radio channels, defined here in accordance with the ITU-Recommendation F.1487 "Testing of HF modems with bandwidths of up to about 12 kHz using ionospheric channel simulators", Annex 3 Section 3 for all types (quiet, moderate, disturbed, and disturbed near vertical incidence) with the following performance...
  - a. with a rate of undetectable or uncorrected errors in received messages of 1 in a thousand (i.e.,  $10^{-3}$  message error rate);

- b. with capability to adapt to increased received signal-to-noise ratio by increasing modem data rate, resulting in success message reception at the specified undetected error rate;
- c. with capability to adapt to decreased received signal-to-noise ratio by decreasing modem data rate, resulting in success message reception at the specified undetected error rate.

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

Page Intentionally Left Blank

N A T O U N C L A S S I F I E D

Appendix-2 to Book II Part IV Annex A Page 4

## HARDWARE SPECIFICATIONS

### SECTION 1 Equipment Specifications

- 1.1. The equipment for this contract shall meet or exceed the specifications provided in this appendix for each of the equipment categories. The equipment is categorised as follows:
  - a) End-User Equipment
- 1.2. Where the specification identifies branded equipment, equipment from the brand manufacturer shall be offered.
- 1.3. Where the specification does not identify branded equipment or is generic, equipment from mainstream brand manufacturers shall be offered.
- 1.4. Changes to equipment specifications for future horizons, lifecycle or integration reasons will be performed through change proposals and contractual amendments.

### SECTION 2 End-User Equipment

- 2.1 The equipment in this category includes:
  - a) Desktop PC
  - b) Workstation Computers
  - c) Thin/Zero Clients
  - d) Laptops
  - e) Personal Mobile Devices
  - f) Monitors and displays
  - g) Supporting peripheral equipment
- 2.2 The equipment in this category shall be sourced from mainstream brand manufacturers including, but not limited to: Hewlett Packard, Dell, Lenovo, Wyse etc, in order to replace existing branded equipment.

### SECTION 3 Desktop PC (Generic)

#	Item	Minimum Requirements	Compliant
1.	Form Factor	Small Factory Form (SFF) Computer with the maximum chassis dimensions of H x W x D (mm): 380 x 120 x 380	
2.	Processor	4th Generation Desktop Intel Core i7 Processor	
3.	Graphics	Integrated Intel HD Graphics 4600	
4.	Memory	8GB (2x4GB) DDR3 1600MHz	
5.	Storage	Internal 2.5-inch Serial ATA 3.0 Solid State Drive (SSD) 250GB, drive shall support the: <ul style="list-style-type: none"> <li>• TRIM command specification</li> <li>• TCG OPAL 2.0 / eDrive encryption standard,</li> <li>• Endurance of 60TB writes.</li> </ul>	
6.	I/O Ports	2x USB 3.0 ports and 4x USB 2.0 ports (minimum 2x USB ports shall be accessible from the front), 2x DisplayPort 1.2 ports (Dual monitor support, modes of operation including multi-monitor clone and span), 1x Audio line-in / microphone port, 1x Audio line-out / headphone port both accessible from the front	
7.	Network	On-board Gigabit Ethernet controller 10/100/1000 MBit/s (RJ-45 interface port)	
8.	Drive Bays	1x internal 2.5-inch bay, 1x ready to use external 3.5-inch or 1 x 5.25-inch bay	
9.	Expansion Slots	Internal 1x PCIe x16 Gen3 slot, 1x PCIe x4 Gen2 slot, low profile	
10.	Keyboard	Ergonomic keyboard with low-profile keys, English (QWERTY US) with EURO key, USB interface	
11.	Mouse	Laser Mouse USB interface	
12.	OS	Windows 10 Pro 64Bit	
13.	Security	Embedded Trusted Platform Module (Security Chip compliant with TCG TPM 1.2 or 2.0), Kensington lock slot	
	<b>Options</b>		
14.	HDD cage	3.5inch or 5.25inch bay rugged removable drive enclosure for 2.5inch SATA SSD, full metal construction with key lock, SATA 6Gb/s interface, minimum 15000 carrier insertion cycles, shall be fully compatible to the SFF PC 3.5inch or 5.25inch external drive bay	
15.	Fiber NIC card	Low Profile Fast Ethernet Fiber Network Card 100Base-FX with PCIe interface and LC connector, NIC shall be fully compatible to the SFF PC internal PCIe expansion slot	

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

#	Item	Minimum Requirements	Compliant
16.	Fiber NIC card	Low Profile Gigabit Ethernet Fiber Network Card 1000Base-SX with PCIe interface and LC connector, NIC shall be fully compatible to the SFF PC internal PCIe expansion slot	

N A T O U N C L A S S I F I E D

## SECTION 4 Monitors (Generic)

#	Item	Minimum Requirements	Compliant
1.	Form Factor	24inch LCD monitor, 60.96 cm viewable area	
2.	Aspect Ratio	16:10 Widescreen	
3.	Panel Type	IPS (In-Plane Switching)	
4.	Surface	Anti-Glare with 3H hardness hard coating	
5.	Resolution	1920 x 1200dpi native resolution, response time 8ms, pixel pitch 0,27mm x 0,27mm, brightness 300 cd/m2, contrast ratio 1000:1, displayable colours 16.7 million	
6.	Video Connectivity	1x Digital Visual Interface connector (DVI-D) with HDCP, 1x DisplayPort (DP) 1.2 port with HDCP 1.4, 1x Video Graphics Array (VGA)	
7.	Build-in USB Hub	1x USB 2.0 upstream port, 2x USB 2.0 downstream ports accessible from the bottom and 2x USB 2.0 downstream ports accessible from the side	
8.	Sound	Multimedia Soundbar docking connectivity	
9.	Stand and mount	Height-adjustable stand, pivot rotation 90 degree, tilt and swivel option, VESA mount compatible	
10.	Security	Security lock slot	
	<b>Options</b>		

## SECTION 5 DisplayPort cables (Generic)

#	Item	Specification	Compliant
1.	DisplayPort Cable M/M with Latches Length: 2 m Colour: Black	High-resolution support of up to 4k x 2k  Support for High Bit Rate 2 (HBR2) bandwidth of up to 21.6 Gbps  Designed and manufactured to DisplayPort 1.2 standards  Supports the DPCP (DisplayPort Content Protection in addition to HDCP (High-bandwidth Digital Content Protection)	

## SECTION 6 Monitors (Generic)

#	Item	Minimum Requirements	Compliant
11.	Form Factor	24inch LCD monitor, 60.96 cm viewable area	
12.	Aspect Ratio	16:10 Widescreen	
13.	Panel Type	IPS (In-Plane Switching)	
14.	Surface	Anti-Glare with 3H hardness hard coating	
15.	Resolution	1920 x 1200dpi native resolution, response time 8ms, pixel pitch 0,27mm x 0,27mm, brightness 300 cd/m2, contrast ratio 1000:1, displayable colours 16.7 million	
16.	Video Connectivity	1x Digital Visual Interface connector (DVI-D) with HDCP, 1x DisplayPort (DP) 1.2 port with HDCP 1.4, 1x Video Graphics Array (VGA)	
17.	Build-in USB Hub	1x USB 2.0 upstream port, 2x USB 2.0 downstream ports accessible from the bottom and 2x USB 2.0 downstream ports accessible from the side	
18.	Sound	Multimedia Soundbar docking connectivity	
19.	Stand and mount	Height-adjustable stand, pivot rotation 90 degree, tilt and swivel option, VESA mount compatible	
20.	Security	Security lock slot	
	<b>Options</b>		
21.	Warranty	3 Years Europe-wide on-site warranty	

## DisplayPort cables (Generic)

#	Item	Specification	Compliant
2.	DisplayPort Cable M/M with Latches Length: 2 m Colour: Black	High-resolution support of up to 4k x 2k  Support for High Bit Rate 2 (HBR2) bandwidth of up to 21.6 Gbps  Designed and manufactured to DisplayPort 1.2 standards  Supports the DPCP (DisplayPort Content Protection in addition to HDCP (High-bandwidth Digital Content Protection)	

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

N A T O U N C L A S S I F I E D

**Appendix 4 to Book II Part IV Annex-A**

**Abbreviations**

<b><u>Acronym</u></b>	<b><u>Definition</u></b>
ACCS	Air Command and Control System
ACMS	Automatic Control and Management System
ACP	Allied Communication Publishing
ADP	Automatic Data Processing
AFPL	Approved Fielded Products List
AOR	Area of Responsibility
API	Application Programmer Interface
ARQ	Automatic Repeat Query
BCOA	BRASS Control Authority
BCS	BRASS Control Station
BICC	BRASS Initial Core Capability
BITE	Built-In Test Equipment
BLOS	Beyond Line-of-sight
BRASS	Broadcast Ship-Shore and Maritime Rear Link System
BREITA	BRASS Enhancements Increment (1) One Target Architecture
CCIS	Common Channel Interoffice Signalling
CISS	Communication Interface and Switching management System
CLIN	Contract Line Item Number
COLOC	Change of Location of Command
COMMCEN	Communication Centre
COTS	Commercial of the Shelf
CS	Control Station

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

CUN	Common User Network
DBMS	Database Management System
DCOM	Distributed Component Object Model
FAB	Frequency Availability Broadcast
FEP	Front End Processor
FES	Fire Extinguishing Systems
GUI	Graphical User Interface
HF	High Frequency
HMI	Human Machine Interface
HN	Host Nation
HQ	Headquarter
HVAC	Heating, Ventilation, & Air Conditioning
ICAO	International Civil Aviation Organization
ICC	Initial Core Capability
IFB	Invitation For Bid
IP	Internet Protocol
IP	Ingress Protection
ISO	Isolator
KVM	Keyboard Video Mouse
LAN	Local Area Network
MIB	Management Information Base
MPDB	Main Power Distribution Board
MPS	Message Processing System
MRL	Maritime Rear Link
MSMQ	Microsoft Message Queue Server
MTBF	Mean Time Between Failure
NAVCOMMEN	Naval COMMEN
NB	No Break

N A T O U N C L A S S I F I E D

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

NCI	NATO Communication and Information
NDN	National Defence Network
NGCS	NATO General Communication Services
NNEC	NATO Network Enabling Capability
OCR	Optical Character Recognition
OPCON	Operation Control
OSE	Open System Environment
OSI	Open System Interconnection
OTAM	Off the Air Monitoring
PABX	private automatic branch exchange
PFE	Purchaser Furnished Equipment
PSS	Power Supply Subsystem
PTFS	Precision Time and Frequency Standard
RAMT	Reliability, Availability, Maintainability & Testability
RLP	Rotatable Log Periodic
BGR	Bulgaria
RSC	Remote Supervisory and Control
RX	Receive
SATCOM	Satellite Communication
SB	Short Break
SDD	System Design Document
SDIP	SECAN Doctrine and Information Publications
SMTP	Simple Mail Transfer Protocol
SOW	Statement of Work
	Ship Shore Ship Buffer
STANAG	Standard Agreement
SUCOC	Succession of Command

N A T O U N C L A S S I F I E D

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

SW	Software
TA	Target Architecture
TX	Transmit
VMSS	Voice Management Sub System
VSWR	Voltage Standing Wave Ratio
WS	Workstation

N A T O U N C L A S S I F I E D

CO-13733-BRASS BGR  
N A T O U N C L A S S I F I E D

N A T O U N C L A S S I F I E D