NCIA/ACQ/14/6124

MS-CO-13791-AGS

27 June 2014

Request for Information (RFI)

" Provide Additional SATCOM Space Segment Capability for AGS - PHASE II (SATCOM Provisioning) CP 0A0201 - 0CM03129 "

NCI Agency Ref: MS-CO-13791-AGS

NCI Agency is seeking information from Nations and their Industry regarding service provision models and financial cost envelope for serving the Ku-band space segment requirements of the NATO Alliance Ground Surveillance programme (AGS), over a period of 20 years.

NCI Agency Senior Contracting Officer: Mr Peter Kowalski

E-mail: peter.kowalski@ncia.nato.int

To: See Distribution List

Subject: **NCI Agency RFI Request MS-CO-13791-AGS**

Ku-band Transponder Services related to NATO Project "Provide Additional SATCOM Space Segment Capability for AGS - PHASE II (SATCOM Provisioning) CP 0A0201 - 0CM03129"

1. NCI Agency requests the assistance of the Nations and their Industry in performing a life-cycle cost projection for the **Ku-band Transponder services** to be contracted under project " Provide Additional SATCOM Space Segment Capability for AGS - PHASE II (SATCOM Provisioning) CP 0A0201 - 0CM03129".

2. This RFI is being issued to:

   (1) identify those factors and contract variables that have a net financial impact on the procurement of the service, or can impact service provision assurance levels;

   (2) identify the acquisition strategy that provides NATO with the best return on investment over the life time of the AGS capability; and

   (3) identify the terms for translating that strategy into one or more Invitations for Bid (IFB) for Ku-band Transponder services, over that period.

3. The anticipated maximum period of performance of the prospective contract(s) is up to 20 years (from 2016 to 2037). This period may be broken down into shorter periods (and competitive bidding) in each cycle.

4. Fulfilling the requirements may entail placing a single or multiple award contracts.

5. In addition to the firms noted in Annex D of this letter, the broadest possible dissemination by Nations of this RFI Request to their qualified and interested industrial base above and beyond the Annex D list of firms is requested.

6. A summary of this emerging requirement is set forth in the Annex A attached hereto. The system specification referenced in Annex A is provided in Annex C. Respondents are requested to reply via the questionnaire at Annex B.

7. The NCI Agency reference for this RFI Request is MS-CO-13791-AGS, and all correspondence and submissions concerning this matter should reference this number.

8. Responses may be issued to the NCI Agency directly from Nations or from their Industry. Respondents are invited to carefully review the requirements in Annex A and the system specifications in Annex C.

9. Nations willing to offer Ku-band transponder services as contribution in-kind can directly respond to the RFI, or through their industrial partners, detailing the nature of their CiK proposal.

10. Responses shall in all cases include the name of the firm, telephone number, E-mail address, designated Point of Contact, and a NATO UNCLASSIFIED description of the capability available and its functionalities. This shall include any restrictions (e.g. export controls) for direct procurement of the various capabilities by NCI Agency. Non-binding indicative service pricing information is also requested as called out in Annex B.

11. Responses are due back to NCI Agency no later than **close of business 4 August 2014**.

12. Please send all responses either via post/courier or email to the following NCI Agency contact:

For Attention Of:	Mr. Peter Kowalski Senior Contracting Officer – ACQ
Postal address:	NATO Communications and Information Agency Boulevard Leopold III 1110 Brussels Belgium
e-mail	peter.kowalski@ncia.nato.int
Courier delivery address (e.g. DHL or FEDEX):	NATO Communications and Information Agency Bourgetlaan 140 1140 Evere Belgium

13. Product demonstrations or face-to-face briefings/meetings with industry are not foreseen during this initial stage. Respondents are requested to await further instructions after their submissions and are requested not to contact any NCI Agency staff directly other than the POC identified above in Para 12.
14. Any response to this request shall be provided on a voluntary basis. Negative responses shall not prejudice or cause the exclusion of companies from any future procurement that may arise from this RFI.
15. Responses to this request, and any information provided within the context of this survey, including but not limited to pricing, quantities, capabilities, functionalities and requirements will be considered as indicative and informational only and will not be construed as binding on NATO for any future acquisition.
16. The NCI Agency is not liable for any expenses incurred by firms in conjunction with their responses to this RFI and this RFI shall not be regarded as a commitment of any kind concerning future procurement of the items described.
17. Your assistance in this RFI request is greatly appreciated.

FOR THE GENERAL MANAGER:

[*Original Signed By*]

L. T. Herway
Chief of Contracts

NCIA/ACQ/14/6124

Attachment(s):

- Annex A – RFI Request - Summary of Requirements
- Annex B – RFI Questionnaire
- Annex C – AGS Air Segment and Ground Segment Specifications
- Annex D – RFI Industrial Recipients
- Annex E – ROM Cost Sheets (snapshots)

NCIA/ACQ/14/6124

Distribution List for Request for Information – MS-CO-13791-AGS
Provide Additional SATCOM Space Segment Capability for AGS - PHASE II
(SATCOM Provisioning) CP 0A0201 - 0CM03129

Potential Industrial Suppliers	1

NATO Delegations (Attn: Infrastructure Adviser):

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Belgium	1
Bulgaria	1
Canada	1
Croatia	1
Czech Republic	1
Denmark	1
Estonia	1
Germany	1
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Ku-band Transponder Services under NATO Project

“Provide SATCOM Space Segment Capability for AGS - Provision 0CM03129”

RFI Request MS-CO-13791-AGS

Annex A - Summary of Requirements

1. General

R.1 The NCI Agency is seeking to acquire access and long-term use of Ku-band capacity in support of NATO Alliance Ground Surveillance (AGS) as a service, i.e. the provider shall apportion and manage adequate and sufficient space segment resources to fulfil the specification of a service contract, over the performance period of that contract.

R.2 The AGS capability involves and air segment consisting of five Unmanned Aerial Vehicles (UAV). The supporting ground segments consists of two static Ku-band ground stations at the Mission Operations Base (MOB) in Sigonella (Sicily, Italy), and eight Ku-band transportable ground stations.

R.3 The space segment resources are intended to support two parallel missions in two separate geographical areas at any given time.

R.4 Each mission notionally involves two UAV in flight: one operating over the area of interest (this is referred to as the "on station" UAV), and one is in transit to/from that area (in route to take over the "on station" UAV, or returning to base after the hand-over). The UAV in transit is also referred to as the "standby" UAV.

R.5 The "on station" UAV has all sensors (SAR and GMTI) actively collecting data and transmitting it to the ground, while the “standby” UAV only has the GMTI sensor active. The SAR sensor is the most bandwidth consuming (about 30 Mbps), while the GMTI sensor requires much less bandwidth (about 4 Mbps). Both the "on station" UAV and the “standby” UAV require an active Command and Control (C2) link at all times, to control both the platform and the sensors from the MOB.

R.6 Transportable ground stations will be assigned to each mission in any ratio (a given mission may not deploy any ground station).

R.7 Transportable ground stations will deploy in the vicinity of the areas where the UAVs will operate. For the purposes of this RFI, it can be assumed that the transportable stations and the UAV will invariably be under the same coverage beam.

R.8 The provider can apportion transponder resources hosted on multiple satellites in order to meet the coverage and capacity requirements for any of the services discussed in this RFI, at his discretion, provided that the target availability requirements for the data links are met (refer to Annex C for link availability figure).

R.9 The provider shall deliver Ku-band Transponder Services to NATO over the two geographical areas below:

(1) Core Area, comprising a footprint of 5,000 km radius around Sigonella;

(2) Extended Core Area, comprising the region between the 5,000 km and 8,000 km radii around Sigonella.

R.10 The services being sought cater for transponded capacity, as bandwidth and bandwidth-equivalent transponder power, provided over one or more satellite constellations. Bandwidth can be offered on transponders of any size (36 MHz, 54 MHz, 72 MHz or 216 MHz). Access to full transponders is preferred over the use of shared transponders such that the transponder configuration can be optimised for the UAV missions.

R.11 Bandwidth apportioned to these services can be subject to re-grooming and optimization by the provider (e.g. moving and regrouping bandwidth allocations across transponders and satellites). This may be accepted by the Purchaser, provided that:

(1) These operations have no impact on agreed service levels;

(2) Any changes are coordinated at least 1-month in advance, for NATO to assess operational impact;

(3) Changes do not occur during the planning or execution phases of a mission.

R.12 When cross-connected beams and transponders are involved, the provider is responsible for any technical arrangements required to meet the following topology, connectivity and availability requirements:

(1) the UAV sensor data (outbound broadcast link) shall simultaneously be received at the ground station in the MOB and at the transportable ground terminals, the latter deploying in the vicinity of the area where the UAV operates;

(2) The MOB ground station shall maintain bi-directional connectivity for C2 to all the UAV at all times;

(3) The transportable ground stations shall maintain bi-directional connectivity to the MOB ground station at all times;

(4) All transportable ground stations deployed under the same coverage beam shall be able to establishing bi-directional links amongst them.

(5) Link availability of 99.7% or higher, for the C2 link, the sensor data broadcast link and the ground station interconnection network.

R.13 Arrangements to support the above requirements do not exclude the following solutions:

(1) Anchor (or teleport) services, including terrestrial connectivity to the MOB, when the MOB is not reachable under the coverage footprint of the beam(s). These services are also referred to as Out-of-Area SATCOM services.

(2) Broadcast relay of the UAV broadcast link to the network of transportable ground terminals, through the provider's teleport (double-hop), when there is no connectivity within the beam the UAV operates on. These services are also referred to as Broadcast Relay Services.

(3) Under the same scenario of (2) above, relay of the TDMA carriers transmitted by the transportable ground stations through the provider's teleport (double-hop), in order to enable connectivity between transportable ground stations within the beam.

(4) Other solutions available to the provider.

R.14 Any arrangements to support the requirements above, including those outlined in the paragraph above, are the responsibility of the provider. They shall be managed and delivered as part of the Ku-band Transponder services identified in this RFI. Anchor services or Broadcast relay services will not be specified nor contracted

separately. The cost of the resources involved shall be factored into the cost projections and be included in the answers to the questions in Annex B.

R.15 Alternatively, the delta cost of such arrangements (e.g. additional capacity for broadcast relay purposes) can be quoted separately, for NATO to assess alternative options, within or outside the framework of the service provision contract, in search of the most cost-effective solutions to meet the requirements.

2. Home Transponder Service

R.16 The EUMENA[1] region of the Core Area shall be served by the so-called **Home Transponder** service, featuring access to a minimum 54 MHz of bandwidth over the notional area outlined in Figure 1[2].

R.17 The Home Transponder service will primarily support routine and recurring operations.

R.18 The provider can ultimately assign more than one transponder and satellite to fulfil the geographical coverage requirements of the Home Transponder service in full, provided that:

(1) At any one time the service is provided over one single transponder and satellite, with a minimum of 54 MHz of continuous bandwidth.;

(2) Not more than two transponders and/or satellites are involved in delivering the service;

(3) No cross-connected beams and cross-strapped transponders are involved, in order to guarantee single-hop broadcast feeds from the UAV to the transportable ground stations;

(4) No beams with footprints excluding Sigonella, and thus requiring teleport/anchor services, are involved.

[1] European Union, Middle East and North Africa.
[2] The upper edge of the figure corresponds to 70 degree latitude.

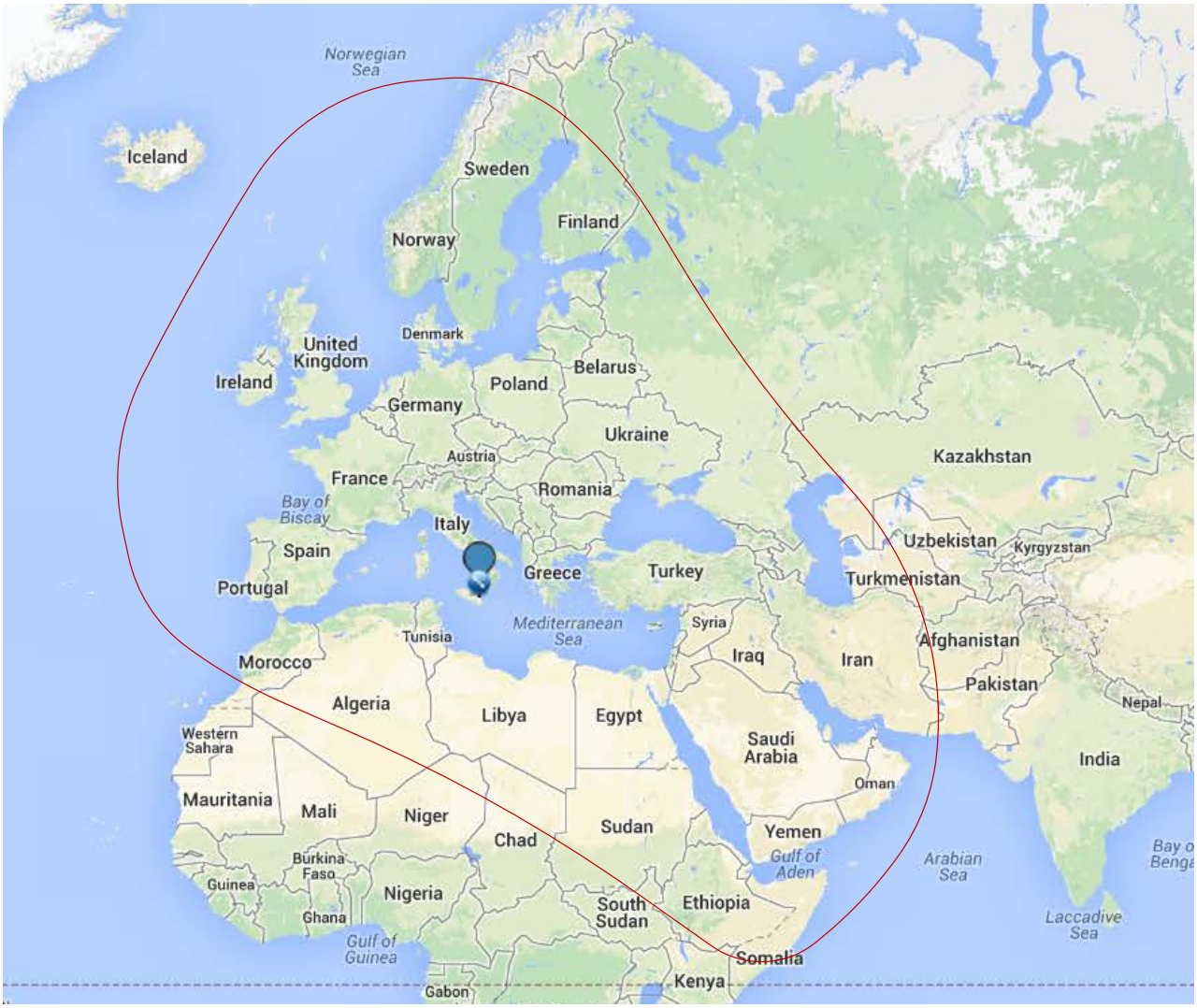


Figure 1 Home Transponder Service - Notional coverage (EUMENA)

3. Portable Transponder Service

R.19 The Core Area shall also be served by the so-called **Portable Transponder** service, notionally serving locations within a 5,000 km radius from Sigonella (see notional coverage in Figure 2).

R.20 The Portable Transponder service will primarily support a single mission in addition to the mission supported on the Home Transponder and shall cover the same coverage area as the Home Transponder, as well as regions outside but up to the 5,000 km radius from Sigonella. The two main regions of interest are depicted in Figure 3 and are referred to as:

(1) The Stans region, comprising Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan and Uzbekistan;

(2) The sub-Saharan and Central African region.

R.21 The Portable Transponder service can be provided in three variants, and deliver enough capacity to match the three loading conditions described in Annex C, i.e.:

(1) Single 54 MHz transponder (90% loaded), in support of the Nominal Loading condition, with a single beam coverage;

(2) Single 36 MHz transponder (100% loaded), in support of the Limited Loading condition, in case insufficient capacity is available to support the Nominal loading condition;

(3) Multiple 36 or 54 MHz transponders in support of the Split Loading condition, with cross-connected up- and down-link beams.

R.22 The provider can ultimately assign more than one transponder to fulfil the coverage requirements of the Portable Transponder service, provided that:

(1) The total bandwidth associated to the selected loading condition (Nominal, Limited or Split) is available in full;

(2) In terms of occupied transponders, the bandwidth is apportioned as described in Annex C (for each of those three conditions);

(3) Any cross-connected beams and cross-strapped transponders are managed as specified in R.10.

R.23 The Portable Transponder service can be provided on the same satellite that also provides the Home Transponder service or can be provided on a separate satellite.

R.24 The Portable Transponder service shall be available during the full operational period, but coverage can vary subject to changed operational requirements, where coverage changes shall become available for use following an activation notice period between 3 weeks and 3 months.

R.25 The minimum activation period may be subject to revision throughout the life time of the contract. Notice periods longer than 3 months may be contemplated, provided interim solutions to deliver connectivity over those periods exist.

R.26 Once activated the Portable Transponder service will nominally remain active for at least a 6 month period.

R.27 A guaranteed availability of the Portable transponder service within the prescribed coverage area has to be provided.

Figure 2 5,000 km radius footprint (Core Area) with Home Transponder Service notional coverage

Figure 3 Stans and Sub-Saharan/central Africa regions of the Core Area

4. Nomadic Transponder Service

R.28 The Extended Core Area, consisting of any continental land mass and sea region in the Earth surface ring from 5,000 km to 8,000 from Sigonella (see Figure 4), shall be covered through a so-called **Nomadic Transponder** service. The Nomadic Transponder will serve non-routine operations in the Extended Core Area.

R.29 In terms of net capacity, the Nomadic Transponder Service shall deliver the same capacity as specified for the Portable Transponder Service. Only the geographical coverage region and the contracting (ad-hoc) and activation (as-available) mechanisms will differ.

R.30 Unlike the Home and Portable Transponder services, and owing to the nature of this service (ad-hoc, coverage and capacity augmentation outside the Core Area),

the Nomadic Transponder Service shall not be limited in capacity. It shall remain open to grow through Task Orders placed against an Indefinite Delivery / Indefinite Quantity (IDIQ) contract framework with the provider, up to a maximum of 108 MHz (the equivalent of two 54 MHz transponders).

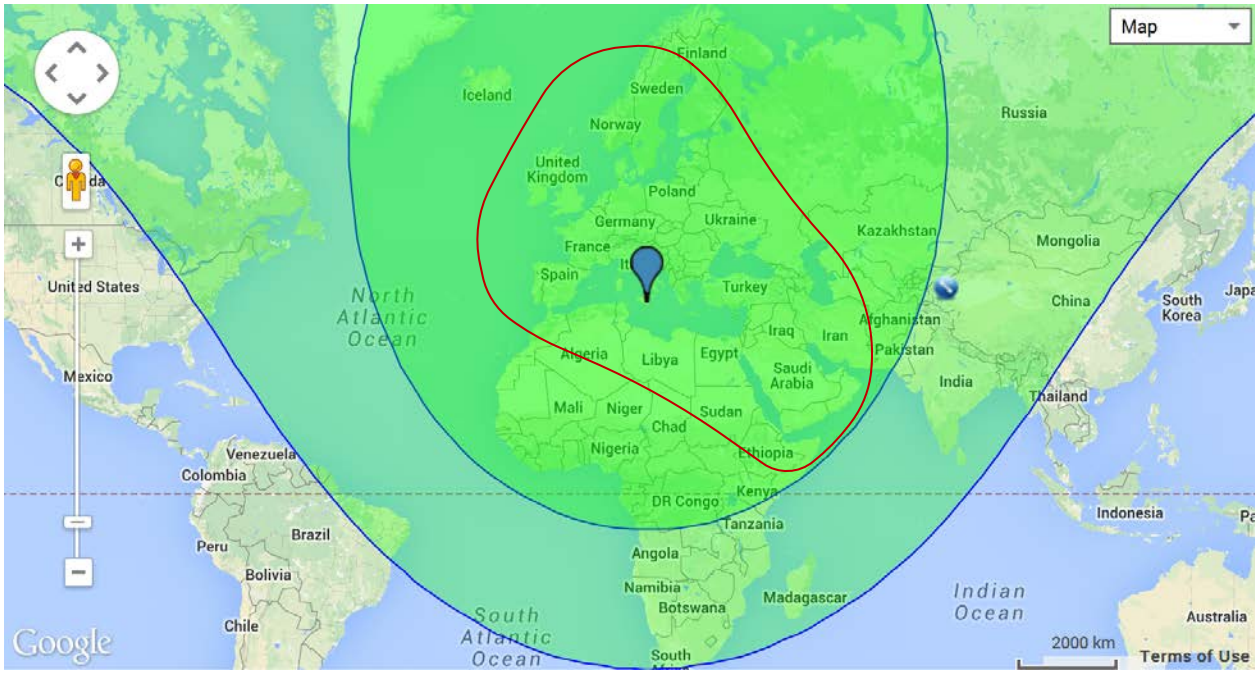


Figure 4 5,000 and 8,000 km radii ring (Extended Core area)

R.31 The Extended Core Area is in turn broken down into two segments (or corridors), as follows (refer to Figure 5):

(1) South and Eastern Africa and Indian Ocean corridor

(2) Central Asia corridor

R.32 The Nomadic Transponder service can be provided on a separate satellite.

R.33 The Nomadic Transponder service shall only be available on request and subject to availability, following an activation notice period of at least 3 months.

R.34 Once activated the Nomadic Transponder service will nominally remain active for at least a 6 month period.

R.35 Access to the Nomadic transponder service within the prescribed coverage area will be subject to availability.

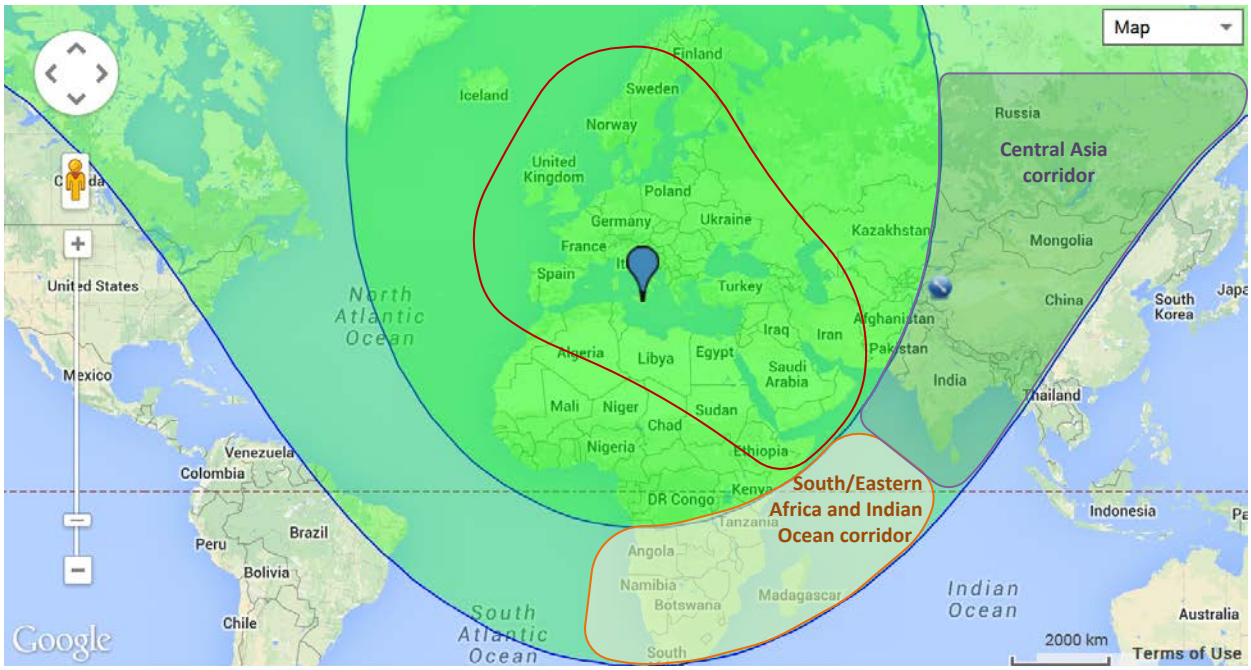


Figure 5 South and East Africa, Indian Ocean and Central Asia corridors (Extended Core area)

5. Other Considerations

R.36 Operating over inclined orbit satellites is feasible, owing to inherent antenna steering requirement for the UAV, and the limited tracking ability of the MOB ground stations and the transportable ground stations. This option particularly applies to and will be considered when contracting the Portable and Nomadic Transponder services.

R.37 When operating over dual-polarization transponders, any impact of the system specifications in Annex C, or any impact of 3rd party systems accessing or in visibility of the satellite, in terms of cross-polar interference, shall be managed by the provider. This assumes that both the ground station and the UAV antennas are adequately aligned to the agreed polarization, and remain aligned throughout the flight.

R.38 Unwanted or intentional interference leading to degraded service levels for any of the services identified in this RFI shall be managed by the provider, in terms of interference identification and ultimately Geolocation of the interfering sources.

R.39 Ancillary services offered by the provider, like real-time (remote) spectrum monitoring and geo-location of interfering sources, shall be factored into the service provision cost.

R.40 In the event of more powerful beams and transponders becoming available to the provider (on newly launched satellites):

(1) It shall be possible to shift Home Transponder services to those payloads and use higher density modulation schemes to consume less bandwidth (within the power-equivalent bandwidth limit), while trading any surplus bandwidth for additional capacity on the Portable Transponder Services, or Nomadic Transponder Services contracts.

(2) Alternatively, it shall be possible to use the full amount of bandwidth contracted (54 MHz) to operate at rates higher than those listed in Annex A (within the power-equivalent bandwidth limit).

Annex B – RFI Questionnaire

Industrial Organisation name: _____

Name & full contact details of POC within Industrial Organisation: _____

Notes

- Please answer the relevant questions as accurately as possible.
- Please use the provided format and document structure to provide your answers in line, inside this document. Use the *Answers* style of the document template for that purpose (Arial Italic, 12pt). Please minimize any changes to the document format or style.
- All questions within this document should be answered in conjunction with the summary of requirements in Annex A, and the system specifications in Annex B. Document all business ground rules and assumptions in your response.
- Please do not include any company marketing or sales material as part of your answers to the questions below. Please submit such material as enclosures with the appropriate references.
- Please include any experience with similar government or military procurement agencies to demonstrate your company's ability to adapt the commercial model to meet the military requirements.
- Any Rough Order Magnitude (ROM) estimates shall be provided using the tabular ROM cost sheets accompanying this document (see snapshots in Annex E). The ROM cost sheets are provided to assess the business impact and cost of this capability across a 20 year life cycle. This Agency will use this information to support budget planning and future contracting strategies.
- Please indicate the ground rules and assumptions used to generate the cost estimates. Please state and include inflation assumptions used in any answers involving relative cost projections over time. Percentages (%) may be used to account for confidence/uncertainty range (e.g., between 10 and 15%). Please document the use of these percentages and when they are applied.

- In all cases, please assume annual payments of service fees (no lump-sum payments upfront). In all questions below, "service fee" shall always be interpreted and quoted as "annual service fee".

- In the ROM cost sheets, please use the Base Business Case template (see Figure 7 in Annex E) to estimate a baseline cost for the Home Transponder and Portable Transponder for a period of 5 years with no option years. Additionally, please duplicate the Business Base Case table section to estimate a baseline cost for the Home Transponder and Portable Transponder for a period of 10 years with no option years.

- All quantitative questions below, when involving cost projections over time, shall also be answered using a dedicated business case table in the ROM cost sheets, to show cost advantages of contractual commitment across the life-cycle of the service. Please create new business case tables from the General Business Case template (see Figure 8 in Annex E), as needed, while adhering to the following rules:

  (1) Use the columns for presenting cost projections over time, i.e. columns to cover the years under fixed-price contract, followed by columns to cover any optional years.

  (2) Use the rows for quoting the possible variations within the contract, occurring anytime during the contract performance period. These are only applicable to the Portable Transponder Service, and concern any of the following changes, standing over one or more years:

  a) Change in the default activation notice period

  b) Temporary parking of capacity over a given geographical area

  c) Increase of capacity (surge capacity).

  (3) The template provides one example covering the various possible changes above.

1. General

The following questions are intended to obtain a general assessment by the potential provider of Ku-band Transponder services of the construct of services conveyed by this RFI.

Q.1 Provide your general assessment of the commercial viability and sustainability of the requirements presented in Annex A, when implemented following the paradigm below:

(1) Long-term, multi-year service contract for the Home Transponder service, with fixed capacity (54 MHz), fixed coverage over the EUMENA region, and fixed price over the contract duration (minimum 5 years), with options for additional years.

(2) Long-term, multi-year service contract for Portable Transponder service, with limited capacity (up to 54 MHz), flexible coverage within 5,000 km from Sigonella, and fixed price over the contract duration (minimum 5 years), with options for:

a) Additional years

b) "Parking" the capacity over a given coverage area (smaller than half of the Core Area coverage), for a given period of time.

c) Reducing or reapportioning capacity, i.e. supporting loading conditions other than the Nominal Loading condition, in the event that 54 MHz of capacity cannot be made available as one continuous segment of bandwidth over the desired geographical spot, for the required service duration.

d) Adding capacity

e) Reducing the activation notice period.

(3) Ad-hoc, short-duration or multi-year service contract(s) for the Nomadic Transponder service, with capacity amounts provided on demand and as required, anywhere within 8,000 km from Sigonella, but subject to availability and prioritisation of requests.

Q.2 If variations to the paradigm presented under Q.1 above, or alternative, more cost effective and flexible models to meet the requirements are deemed to exist, including different contract types, please quote them here, and develop them separately in an Appendix to this Questionnaire. When developing them please

back your proposals with examples and lessons learned from exercising such arrangements to meet similar requirements in the past.

Q.3 It is currently contemplated that the Purchaser will enter a multi-year service agreement with one single provider, for both the Home Transponder and the Portable Transponder services together, using two separate contracts. Describe (qualitatively) a possible 'framework contract' to consolidate the Home and Portable Transponder services into one single service, contracted over a period of time of 10 years or longer, with options to activate capacity when and where required, in the amounts required, anywhere within the Core Area, and assuming:

(1) No notice period for capacity in the area outlined in Figure 1, when the volume is less than 54 MHz;

(2) Variable notice periods, up to 3 months long, for the activation of capacity in the overall Core Area of Figure 2, ultimately proportional to the volume and distribution of the capacity to be activated (nominal, limited or split loading conditions apply).

Q.4 It is assumed that NATO will contract Nomadic Transponder services in an ad-hoc manner, either as new capacity, or by promoting and shifting (geographically) capacity already committed to the Portable Transponder service, for a given period of time. Provide your assessment of the practical viability of promoting potentially unused services from the Core Area to the Extended Core Area.

Q.5 In the event of the Nomadic Transponder Service being contracted through an indefinite-delivery/indefinite-quantity (ID/IQ) scheme, subject to availability and contention with other users, provide your assessment of possible priority-based arrangements to increase the chances of obtaining the capacity required over heavily contended areas, when required.

2. Technical Solution

Q.6 Provide a high level description of a representative technical solution to support the satellite link as specified in Annex C, with the fixed coverage of the Home Transponder Service as specified in Annex A. This should include:

(1) The payload characteristics for the satellite(s) proposed (EIRP and G/T contours over the coverage area, SFD range).

(2) One representative link budget for the Home Transponder service and one for the Portable Transponder service, based on the system specifications provided in Annex C. Each link budget shall cover the following links:

a) UAV to MOB ground station, for both “on-station” and “standby” UAV

b) MOB grounds station to UAV , for both “on-station” and “standby” UAV

c) UAV to transportable ground station, for “on-station” UAV only

d) Transportable to Transportable ground station (TDMA only)

e) MOB to transportable ground station (TDMA only)

(3) One representative link budget for the Nomadic Transponder Service, involving one 54 MHz transponder serving the South/East African and Indian Ocean corridor, and considering the impact of the rainfall model applicable to that area on link sizing and availability. The same links listed above shall be covered.

Q.7 Describe any ancillary services that can be provided as part of the transponder services, to secure satellite frequency clearance and landing rights for the capacity contracted, including the arrangement of Host Nation Agreements for the operation of the transportable ground stations in specific locations. Provide your estimate of the one-off, non-recurring cost of such services.

Q.8 Describe how NATO will be granted access to real-time spectrum monitoring information collected at the provider's teleport(s), and to which extent.

Q.9 Describe the tools that will be available for measuring compliance (on both sides) to the agreed spectral and power marks, and to the service levels of the prospective SLA.

Q.10 Provide a list of representative performance indicators for each of the services listed in this RFI (Home, Portable and Nomadic Transponder service).

Q.11 Describe briefly the tools that will be available to visualize changes in both the frequency and time domains (waterfall), both in real-time, and off-line (from stored data).

Q.12 Describe briefly your security posture concerning the mitigation of cyber and intentional jamming threats on the integrity or the availability of satellite links as those specified in Annex C. The perceived risks result from the fact that the spectral signature of the Ku-band carriers monitored from the ground reveal unmistakably their purpose[3].

Q.13 Indicate the mission assurance category (MAC) level of your control facilities.

3. Home Transponder Service

The following questions are intended to assess the financial gain associated to contracting the Home Transponder Service over long periods of time (multi-year), taking advantage of the static nature of the requirement, in terms of capacity (54 MHz) and coverage (fixed and coverable under one single beam, without cross-connects).

The questions are also intended to assess the financial aspects of adding one or more 1-year, or 5-year extensions to short fixed-price and duration contract.

The following assumptions are made:

(1) Home Transponder services, with the full capacity and coverage stated in Annex A, will be guaranteed, at all times. Access to and use of the resources will require no prior notice period.

(2) The transponder will be used in support of one mission (i.e. two UAVs) at a time.

(3) The second mission will be diverted to the Portable Transponder Service, which will be activated following the agreed notice period, ultimately over the same coverage area of the Home Transponder service.

[3] Link asymmetry, data rates, periodic signal amplitude variations and Doppler shift patterns (recurring loop trajectory) are clear indicators of one of the link end-points being an advanced airborne ISR platform.

Q.14 Provide your estimate of the service fee, relative to a 3-year service contract for a single 54 MHz transponder over the coverage area of Figure 1 (reference[4]), for a fixed-price service contract lasting:

(1) 5 years

(2) 10 years

(3) 15 years

(4) 20 years

Q.15 Provide your estimate of the service fee for the following extensions of a base 5-year fixed-price contract, relative to the last annual fee of that contract:

(1) 1 year extensions, covering up to 15 additional years

(2) 5 year extensions (funded annually) , covering up to 15 additional years

Q.16 Provide your estimate of the service fee for the following extensions of a base 10-year fixed-price contract, relative to the last annual fee of that contract:

(1) 1 year extensions, covering up to 10 additional years

(2) 5 year extensions (funded annually), covering up to 10 additional years

Q.17 Provide your estimate of the service fee for the following extensions of a 15-year fixed-price contract, relative to the last annual fee of that contract:

(1) 1 year extensions, covering up to 5 additional years

(2) One 5 year extension

Q.18 Indicate if 2 or 3 year extension options are available as service options and present the service cost projections using the ROM cost sheets (as a new business case table).

Q.19 Provide your estimate of the service fee resulting from adding an early termination option in the fixed-price contract (assuming 6-month notice and the option being

[4] This RFI uses the cost of a "3-year service contract for a single 54 MHz transponder over the coverage area of Figure 1" as reference. Costs associated to different contract durations can be presented relative (%) to that reference cost figure. Alternatively, the respondents may provide absolute cost figures.

exercised not earlier than the second half of the period of performance of the contract) in the following cases:

(1) 5 year service (termination option can be exercised after 2.5 years)

(2) 10 year service (termination option can be exercised after 5 years)

(3) 15 year service (termination option can be exercised after 7.5 years)

Q.20 Provide your estimate of the service fee (ceiling) resulting from adding a prospective price redetermination option with a 5-year price revision cycle, in the following cases:

(1) 10 year service (price redetermination after 5 years)

(2) 15 year service (price redetermination after 5, 10 years)

(3) 20 year service (price redetermination after 5, 10, 15 years)

Q.21 In the event of more powerful beams and transponders becoming available to the provider (on newly launched satellites), describe the possible arrangements (and their financial implications) to trade any surplus Home Transponder bandwidth for additional capacity on the Portable Transponder Services, or Nomadic Transponder Services contracts.

4. Portable Transponder Service

The questions below are intended to assess the relative costs associated with the portability of the bandwidth over an area wider than the one considered for the Home Transponder service, while also assessing the cost advantage resulting from a multi-year commitment, ultimately aligned with the Home Transponder service contract.

In all questions below, it is assumed that any changes in market value of the resource (54 MHz of bandwidth in this case) resulting from re-apportioning the capacity over a different location, are factored and included (distributed) into the Portable Transponder service fees.

All questions assume the Nominal Loading condition described in Annex C (i.e. 54 MHz transponder).

In all questions below, it is assumed that the duration of any multi-year, fixed price service contract for Portable Transponder services will be bound by changes leading to depreciation or appreciation of the resources involved, e.g.:

(1) Market changes affecting transponder pricing (e.g. changes in demand, higher competition, etc)

(2) Technology changes (more efficient resources)

Q.22 Provide a recommendation on the optimal duration of a fixed-price contract for Portable Transponder services, as well as the optimal duration of any optional follow-on contract extensions, considering the above listed factors and a balanced sharing of the risk between the Purchaser and the Supplier. Develop the cost projection associated with this proposal, using a business case table in the ROM cost sheets.

Q.23 Assuming a 3-month activation notice period (applicable to each instance the transponder service is invoked), provide your estimate of the service fee, relative to contracts of the same duration for the Home Transponder service above, for a fixed-price contract lasting:

(1) 5 years

(2) 10 years

(3) 15 years

Q.24 Provide your estimate of the service fee for the following extensions of a 5-year fixed-price contract, relative to the last annual fee of the contract:

(1) 1 year extensions, covering up to 15 additional years

(2) 5 year extensions (funded annually) , covering up to 15 additional years

Q.25 Provide your estimate of the service fee for the following extensions of a 10-year fixed-price contract, relative to the last annual fee of the contract:

(1) 1 year extensions, covering up to 10 additional years

(2) 5 year extension (funded annually), covering 10 additional years

Q.26 Provide your estimate of the service fee resulting from adding an early termination option in the fixed-price contract (assuming 6-month notice and the option being exercised not earlier than the second half of the period of performance of the contract) in the following cases:

(1) 5 year service (termination option can be exercised after 2.5 years)

(2) 10 year service (termination option can be exercised after 5 years)

(3) 15 year service (termination option can be exercised after 7.5 years)

Q.27 Provide your estimate of the service fee (ceiling) resulting from adding a prospective price redetermination option with a 5-year price revision cycle, in the following cases:

(1) 10 year service (price redetermination after 5 years, then every year)

(2) 15 year service (price redetermination after 5, 10 years, then every year)

Q.28 Provide your estimate of the service fee, relative to a 5-year fixed-price contract with 3-month activation notice, for the following (shorter) activation notice periods, assuming the new activation period remains the same for at least 1 year:

(1) 2 month

(2) 6 weeks

(3) 3 weeks

Q.29 In the event that any of the shorter activation notice periods cannot be supported, present alternatives and estimate their one-off cost (absolute or relative to the recurring service fee of the Portable Transponder service), to fill the gap until the activation of the service can take place.

In all the following questions, provide the estimate within (and relative to) the service fee of a 5-year fixed-price contract with 3-month activation notice.

Q.30 Provide your estimate of the service fee associated with "parking" the Portable Transponder capacity over the area comprising the 2Q and 3Q of the 5,000 coverage circle (refer to Figure 6), for the following periods of time:

(1) 1-year parking

(2) 3-year parking

(3) 5-year parking

Q.31 Provide your estimate of the service fee associated with "parking" the Portable Transponder capacity over the area comprising the 1Q and 2Q of the 5,000 coverage circle, for the following periods of time:

(1) 1-year parking

(2) 3-year parking

(3) 5-year parking

Q.32 Provide your estimate of the service fee associated with "parking" the Portable Transponder capacity over the area comprising the 4Q and 1Q of the 5,000 coverage circle, for the following periods of time:

(1) 1-year parking

(2) 3-year parking

(3) 5-year parking

Q.33 Provide your estimate of the service fee for contracting 50% additional surge capacity (27 MHz), requested with a 3-month notice period, and "parked" at any of the three areas listed above, for the following periods of time:

(1) 6-months parking

(2) 1-year parking

(3) 2-year parking

Q.34 Provide your estimate of the service fee for contracting 100% additional surge capacity (54 MHz), requested with a 3-month notice period, and "parked" at any of the three areas listed above, for the following periods of time:

(1) 6-months parking

(2) 1-year parking

(3) 2-year parking

Q.35 Provide your estimate of the service fee associated with promoting the Portable Transponder service to a Nomadic Transponder service (as described in Annex A, with 3-month notice period) serving the South and Eastern African land mass plus the Indian Ocean corridor (3,000 km wide, see Figure 5), for the following "parking" periods:

(1) 6 months parking

(2) 1 year parking

(3) 3 years parking

(4) 5 years parking

This question assumes that the Portable Transponder Service within the Core area would cease and not be available during the time Nomadic Transponder is active.

Q.36 Same as above, for serving the Central Asia corridor (3,000 km wide, see Figure 5).

Figure 6 Segmentation of the 5,000 coverage area

Q.37 Describe the case of repurposed inclined-orbit satellites over the region of the Portable Transponder Service, and estimate the service fee associated to relocating (parking) the resource (54 MHz or 36 MHz) to one of those satellites, and the impact (if any) on link availability, for each of the following parking periods:

(1) 1-year

(2) 3-years

(3) 5-years

Q.38 Briefly analyze the impact of adopting the Split Loading condition (two transponders of 36 MHz, 90% and 45% loaded, instead of one of 54 MHz), in terms of capacity, availability and costs.

Q.39 Briefly analyze the impact of adopting the Limited Loading condition (one transponder of 36 MHz, 100% loaded), in terms of capacity, availability and costs.

Q.40 Provide your estimate of the service fee associated with the provision of an anchor service as part of the Portable Transponder service (including terrestrial connectivity to Sigonella), when Sigonella falls outside the coverage footprint of the beam(s).

5. Nomadic Transponder Service

The questions below are intended to assess the costs associated with an ad-hoc, IDIQ contracting approach for contracting bulk capacity over short periods or multiple years (multi-year leases).

Q.41 Provide your estimate of the service fee for a 54 MHz transponder (Nominal Loading condition) relative to the annual fee of a 3-year service contract of a 54 MHz Transponder over the coverage area of Figure 1 (reference), for the following three cases:

(1) 1-month notice activation, South and Eastern African land mass and the Indian Ocean corridor (refer to Figure 5), for 6-months, 1-year and 2-year service periods (with 6-months renewable optional extensions in all cases)

(2) 3-month notice activation, South and Eastern African land mass and the Indian Ocean corridor (refer to Figure 5), for 1-year , 2-year and 3-year

service periods (with 6-months renewable optional extensions in all cases)

(3) Same as in (1) and (2) above, for the Central Asia corridor.

Q.42 Same as above, for one 36 MHz transponder (Limited Loading condition)

Q.43 Same as above, for one 1 and ½ 36 MHz transponders (Split Loading condition).

Q.44 Provide your views on any alternative contracting mechanisms suitable for meeting the Nomadic Transponder Service requirements, minding the following:

(1) Contracts will not exceed 1 year in duration, but will be subject to renewal on a yearly basis, if the demand persists

(2) Total capacity contracted will not exceed 108 MHz.

Q.45 Provide your estimate of the service fee associated with the provision of an anchor service as part of the Nomadic Transponder Service (including terrestrial connectivity to Sigonella), when Sigonella is outside the coverage footprint of the beam.

Q.46 Describe the case of repurposed inclined-orbit satellites over the region of the Nomadic Transponder Service, in terms of availability and long-term continuity prospects (i.e. forecasting the number of aging satellites available over that region over time).

Q.47 For repurposed inclined-orbit satellites, Provide your estimate of the service fee associated to relocating (parking) the resource (54 MHz or 36 MHz) to one of those satellites, and the impact (if any) on link availability, for each of the following parking periods:

(1) 1-year

(2) 3-years

(3) 5-years

6. Ongoing and Forgoing UAV SATCOM Experience

Q.48 Is your company engaged, or has it been recently engaged, in providing Ku-band Transponder services in support of military operations involving UAV? If so, briefly outline the scope and the duration of the services, to the extent contract terms, confidentiality, information disclosure or security classification conditions allow.

Q.49 Does your company own and manage all the satellite resources on offer, in full? If not, please list the 1st tier providers expected to contribute to the resource pool.

Q.50 Describe any underlying contract terms and conditions with any 1st tier providers that may affect the transponder services described in this RFI, in terms of availability and service assurance.

Q.51 What are in your experience the most critical technical aspects of operating Ku-band links as specified in Annex C.

Q.52 If any of the technical aspects above leads to an operating constraint, please describe how such constraint(s) can impact:

(1) The cost of the service (i.e. expenses involved in overcoming the constraint);

(2) The availability of the service.

7. Former experience delivering transponded capacity services

Q.53 Provide a list of previous commitments with NATO or with any of its member nations and their procurement agencies, for delivering military or commercial transponded capacity services in support of government or military operations (not just for UAV support purposes).

Q.54 Briefly describe the contract types and the lessons learned from implementing the different procurement strategies in practice.

8. Closing Section

Q.55 Provide any details considered relevant and not covered by any of the questions above, while quoting any assumptions relied upon.

Q.56 Summarise your position and proposal in one page.

Annex C – System Specifications

1. Satellite Link Specification

S.1 The satellite link is specified for three operating conditions:

(1) Nominal Loading condition, 30 Mbps broadcast stream from the “on station” UAV and 4 Mbps from the “standby” UAV to ground, with nominal C2 links and ground-to-ground mission communications links leading to 90% use of a single 54 MHz transponder;

(2) Limited Loading condition, featuring a reduced 16 Mbps broadcast stream from the “on station” UAV and 4 Mbps from the “standby” UAV to ground, with nominal C2 links, and ground-to-ground mission communications limited to a 5 Mbps network (vice 10 Mbps). This results in 36 MHz of bandwidth (100% use of a 36 MHz transponder).

(3) Split Loading condition, same as Nominal loading condition, but split over two 36 MHz transponders with different cross connected beam coverage, leading to 90% use of Transponder 1, and 45 % use of Transponder 2.

S.2 In all three conditions above, and owing to the relatively low density modulation and coding schemes used, it is assumed that the bandwidth (vice power) will be the limiting factor for these links. Namely, in all cases the power-equivalent bandwidth will be less than the actual occupied bandwidth, hence making the below links viable without consuming all the power of the transponder.

S.3 In all cases, link availability targets are set to 99.7% or higher.

S.4 The Home Transponder Services shall deliver the capacity associated to the Nominal Loading condition. Portable Transponder Services and Nomadic Transponder Services can, when bandwidth availability circumstances so dictate and operational requirements allow, accommodate capacity associated to the Limited Loading or Split Loading conditions.

1.1. Nominal Loading condition

S.5 When the UAV is on-station (in operation), the following links are established:

(1) 30 Mbps from the UAV to the MOB ground station, using QPSK TPC 2/3

(2) 2 Mbps from the MOB Ground Station to the UAV, using QPSK TPC 1/2

S.6 The above results in 32.7 MHz bandwidth occupancy on the transponder (35% roll-off is assumed).

S.7 The UAV outbound link of 30 Mbps above is a broadcast link, which shall also be terminated at the transportable ground stations.

S.8 When the UAV is in-route, the following links are established:

(1) 4 Mbps from the UAV to the MOB ground station, using QPSK TPC 1/2

(2) 2 Mbps from the MOB ground station to the UAV, using QPSK TPC 1/2

S.9 The above results in 5.3 MHz and 2.7 MHz (8 MHz total) bandwidth occupancy on the transponder.

S.10 Besides the UAV to ground communications, there is a requirement for supporting a 10 Mbps any-to-any TDMA meshed network, providing:

(1) Backhaul connectivity between the MOB ground station and the Transportable Ground stations (5 Mbps broadcast from the MOB);

(2) Intra-operational area connectivity amongst MOB and Transportable ground stations (5 Mbps shared amongst the participating terminals, up to 8 terminals).

S.11 For the TDMA network a QPSK TPC 6/7 MODCOD is assumed, resulting in 8 MHz bandwidth occupancy on the transponder.

S.12 The total aggregate bandwidth associated with the above listed links (Nominal Configuration), involving one UAV on-station and one UAV in-transit, plus a 10 Mbps TDMA meshed network, is 48.7 MHz (90% of a 54 MHz transponder).

1.2. Limited Loading condition

S.13 The Limited Loading condition is based on the same parameters above, but assumes that the UAV on station broadcasts 16 Mbps (vice 30 Mbps), using QPSK TPC 1/2 (vice QPSK TPC 2/3), with the “standby” UAV still at 4 Mbps. This requires a total bandwidth of 32.0 MHz.

S.14 The Limited Loading condition also assumes that the ground-to-ground mission communications of S.10 above are reduced to a half (5 Mbps in total requiring 4 MHz of bandwidth).

S.15 The above results in a 36 MHz bandwidth occupancy (100% of a 36 MHz transponder.

1.3. Split Loading condition

S.16 The Split Loading condition is based on the same UAV data rate parameters as used for the Nominal Loading condition, but in this case satellite coverage is such that the beam covering the operational area does not cover the MOB location at Sigonella and transponders with cross-connected beams will be required.

S.17 In this case one transponder will carry the 30 Mbps traffic from the “on-station” UAV and the 4 Mbps from the “standby” UAV to the MOB (35.3 MHz) and a second transponder will carry the return traffic for C2 from the MOB to the two UAV (5.2 MHz).

S.18 In addition (and possibly on a separate transponder), 4 MHz is needed for the TDMA network traffic from the MOB to theatre and 4 MHz for the return traffic from theatre to the MOB. As this cross-connected scenario does not allow direct visibility of the sensor data in theatre, the 35.3 MHz received at the MOB needs to be re-broadcast to the theatre beam.

S.19 The above results in 39.3 MHz of bandwidth from theatre to the MOB and 44.7 MHz of bandwidth from the MOB to theatre. Transponder allocations can either be on 54 MHz transponders (shared) or on 36 MHz transponders (partly dedicated and partly shared).

2. Air Segment Specification

S.20 The UAV is equipped with a 1.2 m Ku-band parabolic steerable dish, with the following performance:

(1) G/T = 14.5 dB/K;

(2) EIRP at 1 dB CP = 65 dBW;

(3) Transmit frequency: 13.75 - 14.80 GHz;

(4) Receive frequency: 10.70 – 12.75 GHz;

(5) Linear polarization

S.21 The UAV is equipped with an FDMA modems that can support the following two modulation and coding (MODCOD) schemes:

(1) QPSK TPC 1/2 for any bit rate

(2) QPSK TPC 2/3 for bit rate equal or above 30 Mbps.

3. Ground Segment Specifications

3.1. Static Ground Station

S.22 The ground anchor facility for the UAV downlink is at the MOB, in Sigonella (Sicily, Italy) and consists of a 13.2 m Ku-band antenna with the following performance:

(1) G/T= 38.7 dB/K;

(2) Maximum saturated EIRP = 90 dBW;

(3) Maximum linear EIRP = 76 dBW (for 6 carriers and 6 dB OBO);

(4) Transmit frequency: 13.75 - 14.80 GHz;

(5) Receive frequency: 10.70 – 12.75 GHz;

(6) Linear polarization.

3.2. Transportable Ground Station

S.23 Transportable Ground stations (8 in total) consist of a 2.4 m Ku-band antenna with the following performance:

(1) G/T = 23.7 dB/K;

(2) EIRP at 1 dB CPO= 68.5 dBW;

(3) Transmit frequency: 13.75 - 14.80 GHz;

(4) Receive frequency: 10.70 – 12.75 GHz;

(5) Linear polarization

S.24 The static and transportable ground terminals are equipped with:

(1) FDMA modems (Viasat EBEM) for establishing links with the UAV

(2) SkyWAN IDU 7000 modems in support of the TDMA network

ANNEX D
INDUSTRIAL DISTRIBUTION LIST
MS-CO-13791-AGS

BELGIUM
Astron N.V.
Avaya Inc.
Thales S.A.

CANADA
Norsat International Inc.
Telesat

GERMANY
CETel GmbH
Lambda-Space GmbH
ND SatCom Defence GmbH
Signalhorn Trusted Networks GmbH
TriaGnoSys GmbH
VEGA Deutschland GmbH

GREECE
ISI Hellas SA

ITALY
Selex ES SPA
Telespazio

LUXEMBOURG
SES ASTRA S.A.

NETHERLANDS
2connect-IT B.V.
Castor Networks B.V.
GeniO BV
Geoserve BV
Xantic B.V. (a Stratos company)

NORWAY
Astrium Services Enterprises AS
Nera Networks AS
Telenor

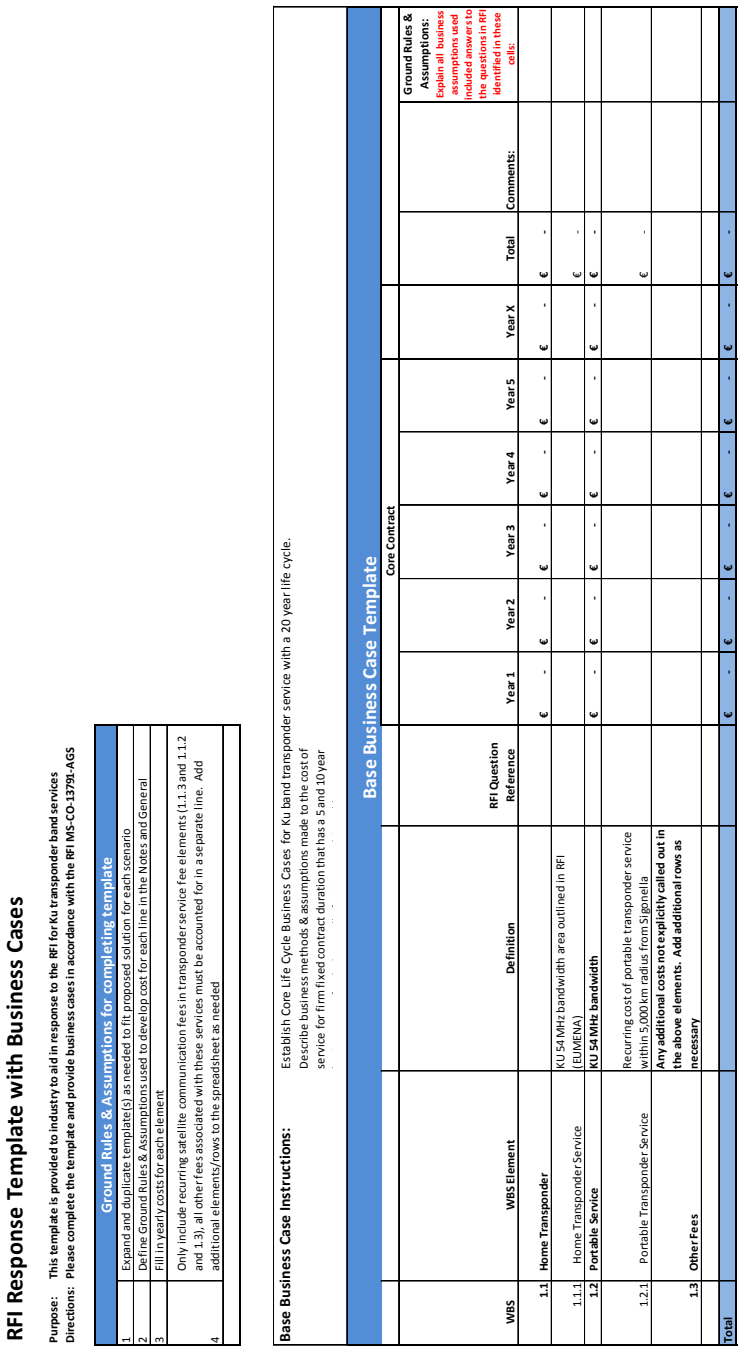
SPAIN
INDRA Espacio S.A.
Hispasat
HIDESAT

TURKEY
ASELSAN Elk. San ve Tic. A.S.

UNITED KINGDOM
Audax
Avanti Communications Group plc
BAE Systems Integrated System Technologies Ltd.
Esys Plc
Eutelsat
GigaSat Limited
NSSL ltd.
O3b Networks
Q-par Angus Ltd
Radyne ComStream
SNXP Ltd
Sematron UK Ltd
Vocality International Ltd
e2E Services Ltd
iSat Ltd

UNITED STATES
ADCI of Delaware, LLC
Americom Government Services
Applied Coherent Technology Corp.
Artel LLC
CapRock UK Limited
DRS Technical Services, Inc.
Emerging Markets Communications (EMC)
EXELIS, Inc.
Globecomm Systems Inc.
Harris CapRock
Hughes Network Systems, LLC
Intelsat General Corporation
JSAT International
Satcom Direct Communications, Inc.
Segovia Inc
Spacenet Integrated Government Solutions
TeleCommunication Systems, Inc.
The Boeing Company
UltiSat, Inc.
Viasat
XSAT USA

Annex E – ROM Cost Sheets (snapshots)



RFI Response Template with Business Cases

Purpose: This template is provided to industry to aid in response to the RFI for Ku transponder band services
Directions: Please complete the template and provide business cases in accordance with the RFI MS-CO-13791-AGS

Ground Rules & Assumptions for completing template	
1	Expand and duplicate template(s) as needed to fit proposed solution for each scenario
2	Define Ground Rules & Assumptions used to develop cost for each line in the Notes and General
3	Fill in yearly costs for each element
4	Only include recurring satellite communication fees in transponder service fee elements (1.1.3 and 1.1.2 and 1.3), all other fees associated with these services must be accounted for in a separate line. Add additional elements/rows to the spreadsheet as needed

Base Business Case Instructions:
Establish Core Life Cycle Business Cases for Ku band transponder service with a 20 year life cycle.
Describe business methods & assumptions made to the cost of service for firm fixed contract duration that has a 5 and 10 year

Base Business Case Template

					Core Contract										
WBS	WBS Element	Definition	RFI Question Reference	Year 1	Year 2	Year 3	Year 4	Year 5	Year X	Total	Comments:	Ground Rules & Assumptions: Explain all business assumptions used included answers to the questions in RFI identified in these cells:
1.1	**Home Transponder**			€ -	€ -	€ -	€ -	€ -	€ -	€ -		
1.1.1	Home Transponder Service	KU 54 MHz bandwidth area outlined in RFI (EUMENA)								€ -		
1.2	**Portable Service**	**KU 54 MHz bandwidth**		€ -	€ -	€ -	€ -	€ -	€ -	€ -		
1.2.1	Portable Transponder Service	Recurring cost of portable transponder service within 5,000 km radius from Sigonella								€ -		
1.3	**Other Fees**	**Any additional costs not explicitly called out in the above elements. Add additional rows as necessary**										
Total				€ -	€ -	€ -	€ -	€ -	€ -	€ -		

Figure 7 Base Business Case Template (no options)

Generic Business Case Instructions:
Establish Core Life Cycle Business Cases for Ku band transponder service with a 20 year life cycle
Describe business methods & assumptions made to the cost of service for firm fixed contract duration that has basic contract lenghts.
Use and tailor template below to describe the unique business cases.
Identify the question and RFI refrence being responded to in each element of the table
Duplicate and modify the table below as many times as necessary to present the business cases described in the RFI.

Generic Business Case Template

					Core Contract								Option X		
WBS	WBS Element	Definition	RFI Question Reference	Year 1	Year 2	Year 3	Year 4	Year 5	Year X	Year X	Year X	Year X	Year X	Year X	Comments:	Ground Rules & Assumptions: Describe business assumptions used included answers to the questions in RFI identified in these cells:
1.1	**Home Transponder**	KU 54 MHz bandwidth area outlined in RFI														
1.1.1	Home Transponder Service	(EUMENA)														
1.2	**Portable Service**	**KU 54 MHz bandwidth**														
1.2.1	Portable Transponder Service	Recurring cost of portable transponder service within 5,000 km radius from Sigonella (with default 3-month activation notice)														
1.2.2	2 months activation notice fee	Service fee for reducing activation notice period from 3-month to 2-month														
1.2.3	6 weeks activation notice fee	Service fee for reducing activation notice period from 3-month to 6-week														
1.2.4	3 weeks activation notice fee	Service fee for reducing activation notice period from 6-week to 2-week														
1.2.5	1 Year Parking (Q2-Q3 region)	Service fee associated with "Parking" the transponder for 1 year														
1.2.6	3 Year Parking (Q2-Q3 region)	Service fee associated with "Parking" the transponder for 3 year														
1.2.7	5 Year Parking (Q2-Q3 region)	Service fee associated with "Parking" the transponder for 5 year														
1.2.8	1 Year Parking (Q1-Q2 region)	Service fee associated with "Parking" the transponder for 1 year														
1.2.9	3 Year Parking (Q1-Q2 region)	Service fee associated with "Parking" the transponder for 3 year														
1.2.10	5 Year Parking (Q1-Q2 region)	Service fee associated with "Parking" the transponder for 5 year														
1.2.11	1 Year Parking (Q4-Q1 region)	Service fee associated with "Parking" the transponder for 1 year														
1.2.12	3 Year Parking (Q4-Q1 region)	Service fee associated with "Parking" the transponder for 3 year														
1.2.13	5 Year Parking (Q4-Q1 region)	Service fee associated with "Parking" the transponder for 5 year														
1.3	**Nomadic Service**															
1.3.1	54 MHz Transponder	KU 54 MHz bandwidth service cost														
1.3.2	36 MHz Transponder	KU 36 MHz bandwidth service cost														
1.6	**Other Fees**	**Any additional costs not explicitly called out in the above elements. Add additional rows as necessary**														

Figure 8 General Business Case Template (with options)