European Maritime Safety Agency

Appendix 1 to the tender specifications

SERVICE AND TECHNICAL REQUIREMENTS

Invitation to tender no. EMSA/OP/01/2018

Contracts for long endurance and long range Remotely Piloted Aircraft System (RPAS) services in support of the execution of Coast Guard functions

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1 Introduction and Objective of service

1.1.1.1 This call for tender is to contract European Remotely Piloted Aircraft System (RPAS) services in the civil maritime surveillance domain in support of executing Coast Guard functions.

1.1.1.2 The contracted RPAS services should have a high level of deployability and availability, which should lead to an increase of the operational Coast Guard capability and provide free of charge additional data streams to users from European Union (EU) Member States, Iceland, Norway, to the European Commission and to EU Agencies. Throughout this document the terms "user" and "Member States (MS)" refer to this given list of users.

1.1.1.3 A scalable service in terms of number of deployments is foreseen with a possibility to have a number of simultaneous RPAS deployments. The deployment should be based on mobile units (Local Ground Control Station - LGCS), which can be relocated as new requests may come over time. The RPAS services should be used as a complementary tool in the overall surveillance chain, including satellite imagery, vessel positioning information and surveillance by manned maritime patrol aircraft and vessels.

1.1.1.4 By establishing a contract to acquire RPAS services, the contracting authority seeks cooperation with a contractor covering the requirement of this tender. The provision of cost-efficient RPAS services in the maritime domain should include assets and relevant expert staff to pilot the RPA, capture and disseminate the data.

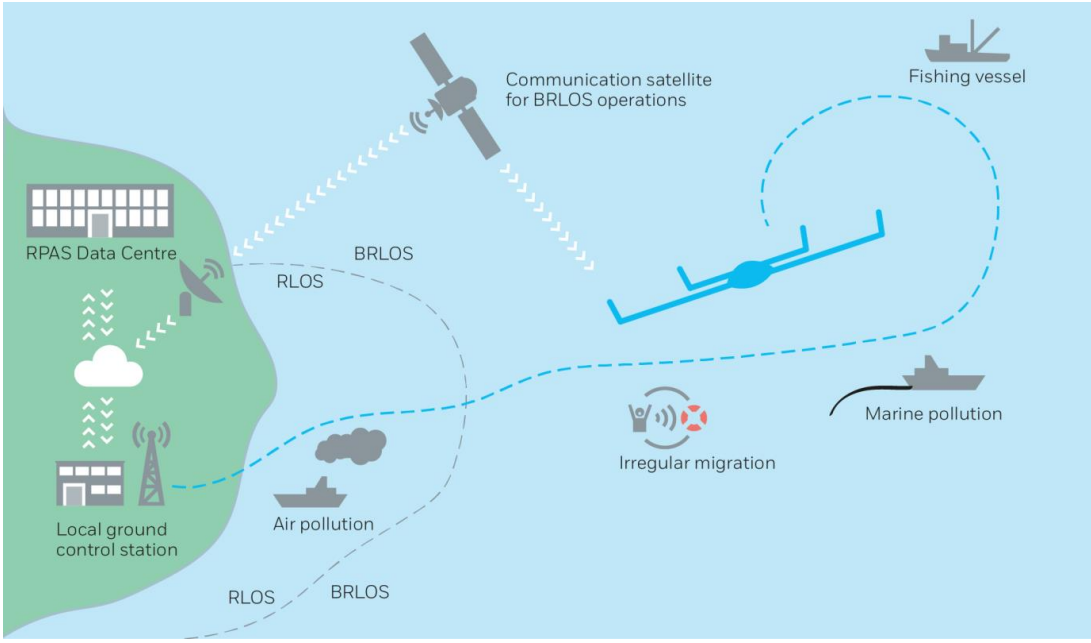


Figure 1: Typical RPAS operation in the maritime domain

1.1.1.5 The scenario depicted in Figure 1 illustrates a type of surveillance service the contracting authority may request. The figure reflects the foreseen deployment

where the RPAS surveys an Area of Interest (AoI). This deployment includes the taxi flight from the base airport to the AoI, the specific activity for the service requested and finally passing all surveillance information and payload data to the users. For this transfer, the RPAS is using a direct link when flying within Radio Line of Sight (RLOS) and changing seamlessly to a satellite link when flying Beyond Radio Line of Sight (BRLOS). The communication link with the Local Ground Control Station (LGCS) will be part of the contracted operations.

1.1.1.6 The aircraft and the sensors of the RPAS shall be designed to respond to the user requirements of the three European Agencies covering their Member State requirements in the areas of maritime surveillance activities.

1.1.1.7 The RPAS operations should address multiple purposes and cover different maritime surveillance needs, including fisheries, illegal immigration, anti-drug trafficking, etc., but could also be used for other public purposes on an emergency basis.

1.1.1.8 The RPAS services will only be initiated following specific requests from these users and the consent of the country(s) where the RPAS will be operating.

1.1.1.9 The RPAS shall be available on a scheduled basis, but shall also allow unscheduled requests on a best effort basis, see section 3.5 "Module 4: Flight operations/missions".

2 Requested Services

2.1 General Considerations

2.1.1.1 The contract seeks to acquire RPAS based maritime surveillance services, including set-up, operations, piloting, maintenance, and data dissemination as defined in the specific contracts and based on user needs.

2.1.1.2 Any services requested should be performed by the Contractor in line with the operations defined in the Specific Contracts based on user needs.

2.1.1.3 Areas of operation can be all sea areas surrounding the European Union with an EU or EFTA country as a starting point of the service and if requested by governmental users, the service could be extended outside EU adjacent seas upon common agreement.

2.1.1.4 The following are expected as part of the service provided by the Contractor:

- RPAS fitted with (ad-hoc) payload, communications and deployment support;
- Being available on-site for deployments;
- Surveillance flight hours following the tasking requested by a user for a specific deployment and flight missions;

- Data sent, in the agreed format and from the following:
  - Payload data (images, videos, etc.);
  - RPAS housekeeping data (aircraft system information such as heading, position, system status, etc.).

  The data should be made available in the shortest possible time from when the data is acquired by the sensor on the RPAS to it being available to the EMSA applications for the user.

  The collected data will be streamed into the systems run by EMSA (EMSA RPAS Data Centre via a common data interface as provided in Enclosure 2 to these technical specifications[1]) and further distributed to the final users of the services (National authorities in charge of Coast Guard functions, other agencies e.g. FRONTEX and EFCA).

2.2 Maritime surveillance

2.2.1 Multi-purpose activities

2.2.1.1 The maritime surveillance in the framework of this procurement is addressing any of the Coast Guard Functions.

2.2.1.2 Presently used satellite information provides an important source of information but in general is only available at certain times according to the satellite orbits. Additional services based on Remotely Piloted Aircraft Systems, can overcome these limitations.

2.2.1.3 The surveillance operation for maritime safety (2.2.2), maritime security (2.2.2.13) and fishery control (2.2.3.8) as described below could be provided by similar RPAS configurations. It is therefore the aim of the Agencies to operate the RPAS in a multi-purpose mode, meaning that several of the described activities are facilitated concurrently in a single deployment.

2.2.1.4 All of the before mentioned operations are relying on vessel detection (2.2.4.1), vessel identification and behaviour monitoring (2.2.4.5) as detailed further down in this chapter.

2.2.2 Maritime safety

2.2.2.1 The International Convention on Maritime Search and Rescue (1979), commonly referred to as "the Search and Rescue Convention" (S&R; this is not the common abbreviation, but used throughout this document to avoid confusion

[1] *Tender Specifications Appendix 1 Technical Specifications Enclosure 2 RPAS-DC ICD*

with "Synthetic Aperture Radar"), was the first convention to establish an internationally recognised system covering search and rescue operations. The "North Atlantic Coast Guard forum" recently reiterated the importance of search and rescue activities, and is requesting further improvement of response operations. S&R is particularly challenging in remote areas and during bad weather conditions. Difficult sea conditions in general mean that the capacity to respond is diminished.

2.2.2.2 The Global Maritime Distress and Safety System (GMDSS) is a global network of emergency communications for ships comprising various different communication networks using both satellite and terrestrial radio services. The GMDSS system makes use of shipboard search and rescue devices, one of which is the AIS Search and Rescue Transmitter (AIS-SART), which, since 1 January 2010, can be used in lieu of a radar Search and Rescue Transponder (X-Band SART) on SOLAS ships.

2.2.2.3 <u>Detection of survival crafts and humans at sea</u>

2.2.2.4 S&R operations are often undertaken in conditions which are less than ideal. RPAs could support coastguards by making operations safer and by making certain operations possible which might not be otherwise.

2.2.2.5 (Satellite) AIS messages from ships which are distant from shore can be used for locating distressed vessels or survival craft. The same applies to RPAS equipped with an AIS sensor, with the added advantage that RPAS could stay in the area of the vessel in distress. The same applies for the reception of signals from Emergency Position-Indicating Radio Beacons (EPIRB) or also mobile detection signals which could help to direct the RPAS to the area where Search and Rescue is needed.

2.2.2.6 Finally, radar and thermal mapping of large areas and/or from great distances allows targets to be found more effectively. Search-and-rescue teams already use radar and infrared imagers to find and rescue humans lost at sea, in particular at night.

2.2.2.7 <u>Safety of the environment against marine pollution</u>

2.2.2.8 The European Union has adopted multiple directives, e.g. to address the "The International Convention for the Prevention of Pollution from Ships (MARPOL)"[2], in order to protect the environment from threats by shipping. RPAS could

[2] The MARPOL Convention was adopted on 2 November 1973 at IMO, amended in 1978 and entered into force on 2 October 1983.

provide monitoring services to strengthen the enforcement of directives and identify MARPOL violations.

2.2.2.9 In this regard, RPAS equipped with Synthetic Aperture Radars along with EO and IR cameras have proved to be a reliable asset to detect oil spills and other pollution at sea.

2.2.2.10 Once an oil spill or other pollution has been detected, further investigation with regard to its size, location, and possible spread or movement might be relevant for a decision on response activities and for guiding the response assets or dispersant aircrafts to the most relevant locations. This requires surveillance and monitoring systems which can be directed to the location at all time.

2.2.2.11 In addition, RPAS EO and IR cameras can sweep the area of interest in order to detect and identify the potential polluter while collecting evidence supporting future prosecution.

2.2.2.12 Furthermore in support to marine pollution clean-up operations, e.g. oil spills or marine litter, RPAS could be useful to stay on site and to monitor where large areas of pollution or waste may be located to then guide the relevant assets during the clean-up operations.

2.2.2.13 <u>Providing in-situ support</u>

2.2.2.14 Both, support to search and rescue and to analyse marine pollution, might require the dropping of objects at sea. This could be life-saving equipment, beacons to ensure the recovery of persons and/or ships, but also devices to collect pollution samples or automatic analysers of the pollution. It would be an advantage if the RPAS contracted would allow carrying objects and dropping as required.

2.2.3 Maritime Security

2.2.3.1 <u>Border control</u>

2.2.3.2 The EMSA regulation as of 2016 gives the contracting authority the role to organise and provide, as an institutional service provider, RPAS services in support of Member State border control authorities and Frontex in order to reinforce the protection of EU's external borders.

2.2.3.3 Currently EMSA provides services to Frontex supporting Frontex activities, including the European Border Surveillance System (EUROSUR). An intersystem service application has been set-up between EMSA and Frontex, allowing EMSA service layers to be visualised in the restricted Frontex (EUROSUR) Fusion Services web-interface.

2.2.3.4 Frontex and national border control authorities will substantially benefit from services collecting, processing, fusing and correlating data of human activity at sea. RPAS derived information would be handled as an additional data source.

2.2.3.5 In this regard, RPAS can scan wide areas and pursue suspicious behaviour at sea. The fusion of the data collected by their different sensors can facilitate the automatic detection of potential suspicious objects, for instance vessels detected by radar which are not broadcasting AIS information.

2.2.3.6 Once an object is detected and classified as suspicious, the RPAS can be commanded to engage in order to collect further details of the object of interest. The performance of the on-board sensors should allow the identification of the object of interest from a distance where the RPAS remains undetected.

2.2.3.7 In addition, Frontex and national border control authorities use complementary information sources. This information can be used to direct RPAS to specific targets of interest (i.e. vessels under investigation) and to track and monitor their behaviour without being detected.

2.2.3.8 <u>Fishery Control</u>

2.2.3.9 In support of the MS fishery inspection activities, EFCA is seeking to have access to the most complete maritime awareness picture available in view of fisheries Monitoring, Control and Surveillance (MCS).

2.2.3.10 RPAS may be primarily used to monitor compliance with spatial and temporal measures, such as closed areas, closed seasons and Real Time Closures (RTC's). Furthermore RPAS deployment will help to detect and identify vessels that are not emitting cooperative position data or that are suspected of not complying with fisheries regulations. Specific attention will be given to sensor capacities allowing to detect and to identify any discard of fish overboard.

2.2.3.11 EMSA provides EFCA with the EFCA Integrated Maritime Service (IMS) service. This is a layered operational ship tracking service to support fisheries control campaigns, which can be used for behaviour analysis, risk assessment and classification of possible non-compliance. The service has been operational since 2013. It combines various sources of vessel position data: T-AIS, SAT-AIS, and VMS (Vessel Monitoring System).

2.2.3.12 The EFCA IMS service is used by EFCA and MS authorities for the coordination of inspection activities and for monitoring fishing activity, as part of a dedicated risk management strategy. In addition, the service is used to gather information on possible IUU (Illegal, Unreported and Unregulated) fishing.

2.2.4 Maritime vessel monitoring and general surveillance

2.2.4.1 Vessel Surveillance: Detection, Recognition, Identification and Tracking

2.2.4.2 RPAS users are already provided by EMSA with a permanent feed of correlated terrestrial and satellite AIS combined with LRIT and VMS data combined with EMSA Central Ship Database information. The service provides integrated vessel track data for individual vessels and the information layers contain the last known vessel positions as well as other ship particulars.

2.2.4.3 RPAS sensor data shall complement the already available cooperative vessel position data sets. It will be used to cross-check vessel position and activity with the information available through available cooperative information sources in order to detect possible non-compliance to ship reporting and/or non-cooperative vessels (vessels not sending position information). The sensors carried by the RPAS will be able to allow detection, identification and categorising of vessels of interest (and any associated vessel or target) as well as being used for behaviour monitoring.

2.2.4.4 In case of particular interest RPAS shall be able to engage and provide information to identify the vessel:

- Vessel type, activity, behaviour, length, beam, estimated speed & course occupants, associated gear, attendant vessels etc.
- ID where possible (name, IMO number, call sign, external registration, MMSI, flag, home port etc.).

2.2.4.5 Behaviour Monitoring

2.2.4.6 Users shall be provided with alert notifications in real-time on specific vessel patterns which are derived from specific behaviour monitoring algorithms and or from the observation by the payload operators.

2.2.4.7 Parameters to be collected by the RPAS for behaviour monitoring include inter alia:

- vessel position, vessel course and speed, distance to shoreline, anchorage time pattern, range between vessels, (in a traffic lane - ship domain), vessel constrained by her draft, manoeuvring patterns, very low velocity tracks (under 1.5 knot), determination of possible landing point or port though the vector/course of the vessel
- Sudden changes of course and unusual vessel tracks, changes in the Estimated Time of Arrival, Destination
- detected activities on-board or around a vessel of interest (e.g. rendezvous at sea, transhipment, towage or any fishing or ancillary gear which might be used, etc.), including low radar cross section floating device adrift or undertow (Bluefin tuna cage(s))

- vessels entering or leaving particular areas (e.g. EEZ, area closed to fishing, restricted area, marine protected area)
- Identification of blacklisted vessels (e.g. IUU blacklist).
- Identification of a polluting vessel (e.g. oil, chemicals, litter, illegal discards and discharges, etc.)

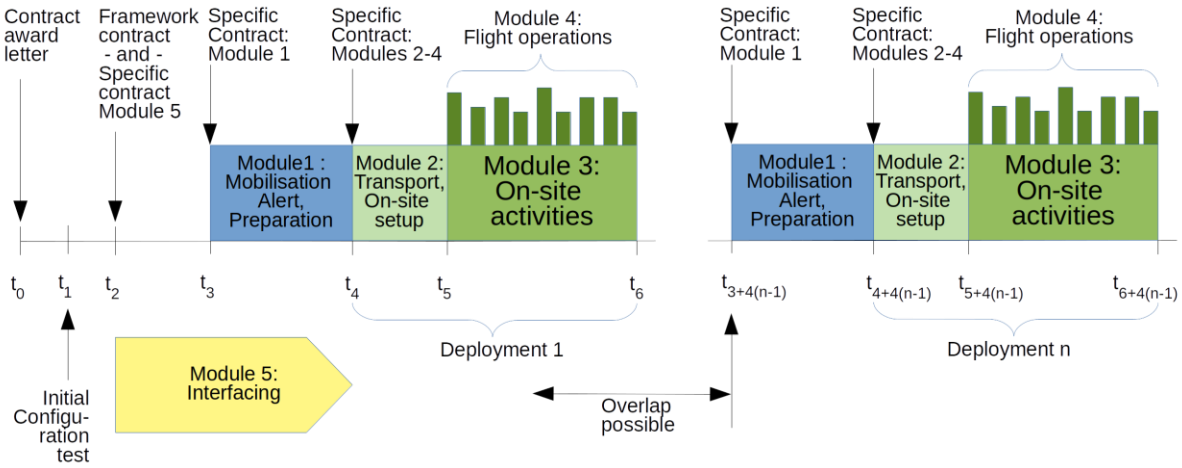
2.2.4.8 RPAS shall be able to provide the parameters that services will use as input into their behaviour monitoring algorithms.

3 Contract modules, timings and associated cost elements

3.1 General Considerations

3.1.1.1 Please note that the term deployment will be used in this document and means a specific "service" which is requested by a user for a specific area for a determined period of time.

3.1.1.2 The following modules and associated cost elements over time will apply. Please be aware that multiple deployments could run in parallel:



Legend (details see text below):

- Configuration test: To enter into the operational phase and for the signature of the Framework contract, an initial configuration test will need to be successfully performed by the successful tenderer.
- Module 1: Mobilisation Alert and Preparation: means all costs associated to the preparations of a deployment, incl. site visits, documentation, getting the permit to fly, and adjustments needed to be ready for a future deployment and operation
- Module 2: Transport and on-site setup: means all costs associated with moving the RPAS vehicle, local ground control segment (LGCS), the staff, etc. to be on-site where the deployment base will be.
- Module 3: On-Site activities: means all costs associated to working staff, etc. associated with the deployment.
- Module 4: Missions/Flight Operations: includes all costs for the flight hours.
- Module 5: Interfacing: the development for interfacing between LGCS and the RPAS-DC will be contracted at the time of signing the framework contract.
- Capability tests: At the beginning of each deployment, a capability test will be performed in order to document if the capabilities offered are available for the deployment. Additional capability tests may be performed as necessary.

With:

- t0: Contract Award letter is sent to the successful tenderer
- t1: Test of the RPAS configuration offered by the successful tenderer (after 45 days of sending the Contract Award letter)
- t2: Signature of the framework contract and the specific contract for Module 5 after successful test of the offered configuration
- t3: Mobilisation alert and signature of the specific contract for Module 1. The mobilisation alert and signature of specific contract can already happen during a previous deployment. It is the intention to sign the first specific contract immediately after t2.
- T4: Signature of the specific contract for Module 2-4. The permit to fly must be available before the specific contract is signed.
- T5: and start of on-site activities and missions
- T6: end of deployment
- n: the number of the deployment

Note: the mobilisation of the second and following deployments might be requested already during the operation of the previous deployment.

3.2 Module 1: Mobilisation Alert and Preparation

3.2.1.1 The specific contract for Module 1 will be signed, when an end user has formally expressed their request for service that corresponds to the framework contract service requirements, followed by a mobilisation alert from EMSA to the contractor. This should be the time when the contractor will tune the RPAS service to meet the requirements of the user and for the requested operation.

3.2.1.2 At the beginning of each Module 1 the contractor has to deliver the (updated) documentation describing the system in detail and supporting the process in getting the permit to fly for that particular operation as further detailed in section 5.

3.2.1.3 This preparation phase will last at least 30 days, but cannot be concluded before the Permit-to-Fly (PtF) is obtained from the requesting State (see 4.1.6.1). The process to obtain the PtF might already have been started earlier.

3.2.1.4 The successful mobilisation alert and preparation including the availability of the PtF is a pre-requisite for Module 2. It will then enable the contracting authority to issue the specific contract for the transport, on-site activities and missions (Modules 2 to 4).

3.2.1.5 The tasks under this module shall include:

- Undertaking of site survey(s) as necessary incl. EMC testing and assessment for safety and health of operation
- assisting activities to achieve the permits to fly and updating the necessary documentation to support the approvals and permits to fly
- adaptation of relevant documentation as required by the user and as needed for the operation
- preparation of a deployment

3.2.1.6 At the end of the module the data provision shall enable the users and the Agencies to have access to the real time data/video streams

- via the EMSA RPAS Data Centre, or if the interfacing has not yet been completed,
- via a stand-alone mobile unit for flight monitoring and data visualisation which could be transferred to the requesting user, if necessary according to section 4.1.8.10.

3.2.1.7 In case a subcontractor will be operating the RPA, this subcontractor has to approve or to be co-author of the flight documentation used for requesting the permit to fly (e.g. safety case, request for the permit to fly).

3.2.1.8 A new mobilisation alert might be requested in parallel during another operation, so that one operation can follow directly another one, or that operations can be performed in parallel in case the contractor can provide multiple systems.

3.2.1.9 If the Contractor fails to mobilise as requested and according to the specifications, the contracting authority may terminate the contract in accordance with Article I.11 and II.18 of the framework contract.

3.3 Module 2: Transport and on-site set-up

3.3.1.1 This phase includes transport of the RPAS, the ground station, and the staff to the relevant location. The home base of the RPAs and equipment should be within the EU to facilitate its transport in case of mobilisation.

3.3.1.2 The contractor will be responsible to ensure that any equipment required for the operation (including the RPAs) is at any time accompanied by the necessary documentation to facilitate its transportation to any place in an EU or EFTA country. It is the contractor's responsibility to ensure that the transport through customs in done without delay and to ensure all efforts are made to ensure the RPAS arrives quickly to the operational location.

3.3.1.3 During one deployment the operation could be moved to another location if necessary for the operation. In this case an additional mobilisation alert and preparation fee will be paid.

3.4 Module 3: On-site activities

3.4.1.1 Each on-site activity will have a minimum duration of 3 months with the possibility of extension if requested by the user.

3.4.1.2 The Contractor must be able to provide services during the day or at night. Below are two operational modes that could be requested for each operation (and would apply to the full duration of the operation, unless otherwise agreed and modified in writing):

Operational modes	Consecutive Flight hours (per sliding 24hour window) the contractor should be available to fly upon user request.	Consecutive days per week the contractor should be available to fly upon user request.	Estimated average Flight hours per week of operation (see 3.5.1.4)
5/7	12 or more if so offered as maximum endurance	5 (may include weekends)	40
7/7	12 or more if so offered as maximum endurance	7	56

3.4.1.3 The above availability target should accommodate for unscheduled tasking (refer to 3.5.1.10).

3.4.1.4 Additional flight hours might be agreed between the user and the contractor.

3.4.1.5 The operations might be interrupted by scheduled maintenance. This shall not exceed more than 4 days per month.

3.4.1.6 It is an advantage if the contractor has more than one RPA and team available and spare parts for each operation. It is up to the Bidder to define the appropriate fleet and teams needed to fulfil the availability requirements in the table above.

3.4.1.7 The on-site operational costs will be paid on a quarterly basis.

3.4.1.8 The actual on-site operational costs will be calculated based on a calendar day.

3.5 Module 4: Flight operations/missions

3.5.1.1 At least one operational briefing on the CONOPS and objectives will be held per deployment on- site. The Mission Commander[3] who is the responsible person from the contractor for the deployment and the EMSA Service Manager will be present at this briefing.

3.5.1.2 Flight hours are calculated from take-off until landing of the RPA considering an airport provided by the requesting user.

3.5.1.3 Only the flight hours flown will be paid by the contracting authority.

3.5.1.4 Different operational scenarios in terms of the average number of flight hours could be foreseen, depending on user requests. The number of hours may vary throughout the month which means flights do not necessarily need to take place every day of the week. All pilot duty regulations should be followed when an estimate of the teams which will be deployed on site are given. However as indicated, it will be the customer or requesting user from the Member State that will decide how many flight hours are needed per day. The contractor shall make the staff available to cover the weekly schedule defined by the user in accordance with the operational modes as per 3.4.1.2.

[3] This role could have a different name depending on the contractor.

3.5.1.5 Tasking time

3.5.1.6 The flights will be tasked based on a weekly schedule. Only in exceptional cases an unscheduled mission might be requested, which the Contractor has to provide as soon as possible on a best effort basis.

3.5.1.7 Operational Readiness for Scheduled tasking:

3.5.1.8 The flight operations can be detailed up to 1 hour before the start of flights.

3.5.1.9 A requesting procedure for Scheduled tasking will be discussed and provided by EMSA during the kick-off meeting.

3.5.1.10 Operational readiness for Unscheduled tasking:

3.5.1.11 In exceptional or emergency situations, the contracting authority may want to request flights on short notice. The goal is to get any mission started (air vehicle airborne) in less than 4 hours from the receipt of the tasking.

3.5.1.12 For these situations, the provider may be requested to go beyond the availability requirements defined in 3.4.1.2 to provide 24/7 operations. This shall not exceed more than 4 days per month.

3.5.2 Unavailability of service during deployments

3.5.2.1 In case of extreme weather conditions exceeding the declared operational performance and limitations (See 4.1.1.3) of the RPAS or in case of force majeure (not including unscheduled maintenance), the Contractor is entitled to receive the on-site costs, but no compensation will be paid for scheduled, but not performed flight hours. The non-performed flight hours may be rescheduled and included in the next weekly flight plan, if possible.

3.5.2.2 Reductions of the on-site costs may apply as per article III.4.1 of specific contract.

3.6 Module 5: Interfacing

3.6.1.1 At the signature of the framework contract, the contracting authority will request by submitting the specific contract for this module, to integrate the RPAS data streams in the maritime surveillance applications of EMSA and in particular into the RPAS Data Centre (RPAS-DC).

3.6.1.2 The data formats and transport mechanisms shall follow the standards described in the Interface Control Document (ICD) [4] (refer to Enclosure 2 attached to these technical specifications[5]).

3.6.1.3 The implementation of module 5 should not last more than 4 months. However the full implementation of module 5 shall not last more than 6 month in total.

3.6.1.4 After module 5 has been completed the Contractor is then obliged to provide the data in the given formats and transport mechanisms.

4 Service requirements

4.1 General Considerations

4.1.1 Requirements

4.1.1.1 The contracting authority wants to build upon RPAS solutions that are already flying the required sensors. In this regard, the bidder shall clearly specify in the bid the configuration that is already in place.

4.1.1.2 The Remotely Piloted Aircraft System (RPAS) should include relevant aircraft (RPA), ground control system, launch and recovery equipment (if needed) and communication systems and any other relevant parts required to provide the services.

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[4] When defining the ICD the following criteria were applied:

- All service video streams and image data shall be made available as georeferenced data to be further processed and visualised.
- All service feature data shall be made available as georeferenced data to be fed into geospatial web services (e.g. OGC WFS-T).
- The Contractor shall implement a solution for the inventory of the metadata within the context of the services.
- For communication purposes between contracting authority, the requesting national users (or European Agency or the European Commission) and the Contractor operational team, a chat interaction shall be established based on JABBER/XMPP.
- The transfer mechanisms shall be based on HTTP(S), FTP, REST.
- The web services will be based on OGC standards.

[5] *Tender Specifications Appendix 1 Technical Specifications Enclosure 2 RPAS-DC ICD*

4.1.1.3 The Bidder shall provide information on general performance and operational conditions of the proposed RPAS. Details provided in *Tender Specifications Appendix 3 Technical tender template*.

4.1.1.4 The service should be based on a mobile unit (s) (LGCS), which can be relocated as needed.

4.1.1.5 The Bidder has to describe in detail the technical capabilities of the RPAS and sensors, and to which degree the requirements in this document are met.

4.1.1.6 Additional equipment/sensors or capabilities that are not available at the moment of the bid could be indicated for future implementation.

4.1.2 RPAS platform and sensors

4.1.2.1 The RPA shall be fully remotely piloted. However the bidder is free to also offer optionally piloted aircraft systems under the condition that the RPA could be flown without the pilot if needed.

4.1.2.2 For the services the contractor must have appropriate insurances in place for third party liability, for his staff and for his equipment.

4.1.2.3 With regards to the liability for any loss or damage caused by the Contractor during or as a consequence of the implementation of the FWC, Article II.6 of the FWC applies. This liability insurance shall be part of the documentation for every deployment/operation delivered prior to obtaining a permit to fly.

4.1.3 RPAS communication infrastructure

4.1.3.1 The Contractor should include a clear description in his proposal on the communication channels capable of transmitting the payload data. This should include communication from the RPA to the ground segment and from there to the users and the three Agencies (the communication between the aircraft and the ground segment is detailed in section 4.1.3).

4.1.3.2 The contracting authority will request the user/ the hosting entity of the operations to provide an internet connection at the Local Ground Control Station (LGCS) as depicted in Figure 1 (i.e. for distributing the payload data).

4.1.3.3 The radio and satellite communication from the RPAS to the ground segment shall be contracted for the entire area of operation based on the user request formalized between EMSA and the user. As much as possible the Contractor will ensure that they are available for the entire area. This shall be assessed under the activities of module 1 (refer to 3.2).

4.1.3.4 An ATC communication link with the Air Traffic Controller in charge of the sector the RPAS is operated in must be provided. This link must be proven meeting the relevant ATC communication standards.

4.1.3.5 If the frequency bands are not in the aeronautical band and/or the equipment do not have an aviation certification, there is a need to obtain an approval to emit in the frequency band before being allowed to fly.

4.1.3.6 Communication (command and control) between the RPA and the ground segment

4.1.3.7 The RPA and the ground segment should be both able to transmit and receive command and control data under RLOS and BRLOS conditions. A back up Command and Control Link is mandatory, preferably using another set of frequencies than the primary datalink.

4.1.3.8 All communications systems shall provide a bandwidth allowing to transmit all command and control and flight data from the RPA to the ground segment.

4.1.3.9 Communication (payload link) between the RPA and the ground segment

4.1.3.10 The RPA and the ground segment should be both able to transmit and receive payload data under RLOS and BRLOS conditions.

4.1.3.11 The BRLOS and the RLOS communications shall provide a bandwidth allowing for the transmission of all payload and relevant flight data from the RPA to the ground segment. Refer also to 4.1.4 for more details on BRLOS.

4.1.3.12 The communication bandwidth for the payload data shall be enough to be capable of transmitting in parallel:

- Data from the image giving sensors (EO, IR, Radar, still camera) which allows the operation to achieve the DRI (Detection, Reconnaissance and Identification) as specified in section 4.2.3.;
- AIS and distress information
- all flight, housekeeping and metadata needed to fully characterise the data received (e.g. georeferenciation).

EMSA assumes that a bandwidth of at least 4 Mbps is necessary.

4.1.3.13 Communication between the Ground segment and the RPAS-DC or the users

4.1.3.14 The Contractor should provide the payload and relevant flight data from the ground segment via internet communication to

- The EMSA operated RPAS-DC (if module 5 is implemented), or
- To the users in the host country or to European Agencies.

4.1.3.15 The requesting user shall provide the primary internet connection (as stated in paragraph 4.1.12.5), which can be used by the contractor.

4.1.3.16 Backup-internet connection

4.1.3.17 The contractor shall provide a secondary (back-up) internet connection, in case of technical failure in the primary internet connection. The bandwidth should be suitable to transfer all data without any latency delay due to the contractor internet connection.

4.1.3.18 Whether the internet communication is managed by the Contractor or sub-contracted to a telecommunications service provider, it should be a fully managed service including all necessary circuit, hardware and software rental and maintenance for the duration of the contract.

4.1.3.19 The Contractor shall bear all costs (set-up, maintenance, operation and the fee's to the communication service providers) for data transfer to the end point.

4.1.3.20 Use of GEANT

4.1.3.21 EMSA has a connection to the European R&E[6] network GEANT (http://www.geant.net/) via the "National Research and Education Networks" (NREN) which provides a shared bandwidth transfer of up to 1 GBit/s and a guaranteed bandwidth of 250 Mbit/s.

4.1.3.22 With the availability of the guaranteed, high bandwidth and cost effective GEANT solution, the data transmission time contributes only marginally to the overall delivery time.

4.1.3.23 The Contractor may, through the local NREN, connect to the R&E network.

4.1.3.24 The cost of the data transmission over the GEANT network and the transmission from the Portuguese NREN to EMSA will be covered by EMSA.

4.1.3.25 If the Contractor decides to use the R&E network, the Contractor will only need to bear the costs to the next NREN node (set-up, maintenance, operation and communication cost to the next NREN) and potential fees of the local NREN.

4.1.4 BRLOS / satellite communication between RPAS and LGCS

4.1.4.1 The performance of the BRLOS data link must allow both safe command and control communications, and the data link for payload data.

4.1.4.2 All the mandatory criteria as given in chapter 4.1.3 for RLOS communication shall apply to BRLOS communication as well.

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[6] Research and Education

4.1.4.3 A common approach for BRLOS communication is using a satellite based communication infrastructure (Satellite communication – SATCOM). The bidder may propose alternative solutions or different BRLOS communication as long as the minimum requirements listed above are fully met.

4.1.4.4 It is up to the Agency to accept or not accept the altered configuration proposed by the contractor.

4.1.4.5 <u>BRLOS satellite communication provided by EMSA</u>

4.1.4.6 EMSA is in the process of procuring to offer the EMSA RPAS services contractors a SATCOM communication link based on multiple SATCOM providers, where the communication service is being paid by EMSA. EMSA intends to establish FWCs with a variety of SATCOM service providers to ensure the availability of an EMSA contracted SATCOM solution compatible with the same SATCOM terminal chosen by the RPAS service provider for his own BRLOS solution.

4.1.4.7 This allows the contractor and EMSA to have access to SATCOM service providers at a reasonable cost.

4.1.4.8 It is expected that this service becomes available at an early stage during the implementation of the RPAS service or even before. However at the moment it is not guaranteed when the EMSA SATCOM service will be available. Therefore, as part of his offer the bidder is in any case required to propose its own BRLOS solution.

4.1.4.9 It will be the decision of EMSA to evaluate which price is economically more advantageous for one operation: to use the SATCOM link offered by the RPAS service provider (ref price per flight hour offered including the SATCOM service cost- "Pmod 4 flight all") or EMSA's SATCOM Service provider. The contractor is therefore asked to provide the price for flight hour for both scenarios as explained in section 12 of the tender specifications.

4.1.5 RPA approval

4.1.5.1 The RPAS must as much as possible use systems/sensors and/or communication devices that have been approved as part of an RPA which was granted a previous permit to fly. Alternatively, compliance to recognised industry standards shall be demonstrated. The level of compliance to environmental standards should be compatible with the envisaged maritime operations (e.g. salt, humidity, temperature range, high intensity radiated fields, etc.). For example, Eurocae ED14/RTCA DO160 defines environmental qualification tests for equipment used in manned aviation. Equivalent military standards such as for example STANAG 4370 (AECTP 230) or MIL-STD-810-G could also be used.

4.1.5.2 Safe operations shall be ensured by having qualified personnel and risk mitigation measures. This shall encompass all the elements of the operations

from the deployment preparation, the design safety features to the qualification of the RPA pilots and the efficiency of the emergency procedures. Some references are provided in section 4.1.5.3 in order to clarify the expectations.

4.1.5.3 Contractors shall support the European Union in its activities to draw European standards on RPAS authorisation and operation. To this extent the Contractor is requested to provide data related to the successful deployments and to voluntarily report incidents. These voluntary reports shall be submitted to the European Aviation Safety Agency[7]. These events will be recorded in the European Central Repository and analysed as part of the Annual Safety Review[8]. The Contractor is asked to make these data available also for the development of a standardised operational environment and risk assessment of RPAS for the "Specific operation" category[9] for maritime surveillance. The extraction and analysis of the data will be performed by the European Aviation Safety Agency.[10]

4.1.6 Air traffic management

4.1.6.1 The contracting authority is aware of the difficulties to operate RPAS in non-segregated air space and getting the permits-to-fly. The users request the services and as such provide an official need for a permit-to-fly. As the requesting users in general have institutional contacts with the civil aviation agency responsible for the national Air Traffic Management (ATM), it will also be the responsibility of the users in cooperation with the contracting authority to facilitate the process to obtain the permits-to fly.

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[7] http://www.easa.europa.eu/

[8] See for example, http://easa.europa.eu/system/files/dfu/203807_EASA_SAFETY_REVIEW_2014.pdf

[9] See EASA: https://easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2015-10

[10] References:

- Safety Assessment & Certification for UAS, Andrew R Evans & Dr Mark Nicholson, JRA Aerospace Ltd / The University of York: http://www-users.cs.york.ac.uk/~mark/papers/BristolUAV07.pdf
- Safety Assessment & Certification for UAS, Andrew R Evans & Dr Mark Nicholson, JRA Aerospace Ltd / The University of York: http://www-users.cs.york.ac.uk/~mark/papers/BristolUAV07.pdf

4.1.6.2 Cross border operations shall be possible. Therefore paragraph 4.1.6.1 will be applicable for all the concerned Member States.

4.1.6.3 The Contractor is obliged to provide all documentation necessary in a timely manner and to support the process of receiving flight approval. Even though the company is formally responsible to submit the request for the permit to fly, the requesting user will be required to support the process and to ensure that the permit-to-fly will be issued by the national authorities.

4.1.6.4 It will be the decision of the national ATM authority to approve or suggest acceptable solutions related to the flight modalities, e.g. flying within the non-segregated or segregated airspace, the flight levels, the restrictions and/or if the segregated airspace is dynamically allocated for the aircraft operations.

4.1.6.5 In order to achieve flight approval, it is an advantage, if the Contractor can:

a) provide previous authorisations for the aircraft and sensors operated
b) have "detect and avoid"[11] technologies, even if international standards are not yet available. This will also enable to gather in-service experience to mature the technologies.
c) document the flight hours carried out so far with this RPA. Since the flight operations will be approved by different Member States, evidence of similar operations with incident rates and consequences is expected to simplify the approval process.

4.1.7 Data analysis

4.1.7.1 The Contractor shall analyse the video streams based on user requests which are defined within the flight plan, but can be updated during the flight. This includes the immediate informing of the users. The analysis could encompass for example and not limited to:

- Vessel identification
- any activity which may be taking place (i.e. fishing, towing, transfer, etc.)
- scanning/sweeping of certain areas for specific targets
- tracking of objects in support to search and rescue operations
- oil spill detection and delineation and

[11] In this document, 'detect and avoid', 'sense and avoid' or 'collision avoidance' system are used loosely; the intent of such a system is to detect aircraft and/or obstacles within the vicinity of the RPA, and support the RPA pilot or automatically execute manoeuvres to restore a safe situation if needed.

- all the relevant parameters as indicated for behaviour monitoring in section 2.2.4 "Maritime vessel monitoring and general surveillance"

4.1.7.2 The data to be analysed will be specified further in the deployment or mission briefing.

4.1.7.3 The contractor could also be required to prepare case files of a specific mission event (incl. analysis, video footage, images and other) upon request by the user or EMSA. This work is expected to be performed post mission. The contractor will have 1 day to prepare and deliver the case file.

4.1.7.4 Any further data product provided by the Bidder shall be listed in the proposal and will be evaluated as an advantage.

4.1.8 Data provision

4.1.8.1 The data should be presented in the shortest possible time from when the data is acquired by the sensor on the RPAS to it being available to the EMSA applications for the user to access via an RPAS viewing system and enabling him to react immediately. There should be no additional delay other than the data transfer between data capture and availability at any of the Agency applications. In case the data products have to be processed and/or are derived from multiple measurements (e.g. an averaged figure) then the data should be made available immediately after the processing has been finalised with no additional delay.

4.1.8.2 Therefore the video data for example should be live streaming so that the user can see in almost real time what the RPAS is seeing or where it is flying or following a specific object at sea. The tenderer is requested to state the latency time of the different data products.

4.1.8.3 <u>Data distribution</u>

4.1.8.4 EMSA is providing an RPAS Data Centre (web-based) which will be the main interface seen by the users of this RPAS service. This interface combines RPAS mission data with data available to EMSA therefore completing the maritime picture available to users.

4.1.8.5 The RPAS service data shall be sent via system to system to the EMSA's RPAS-DC in accordance with the Interface Control Document (Enclosure 2 to this document[12]). This data dissemination mode is implemented by module 5. For radar products EMSA intends to make use of the relevant STANAG standards

[12] *Tender Specifications Appendix 1 Technical Specifications Enclosure 2 RPAS-DC ICD*

which currently are not included in the ICD. This will be further clarified at the kick-off meeting.

4.1.8.6 Additionally as a back-up solution and as long as module 5 is not fully implemented, the data shall be provided by a visualisation system provided by the contractor. EMSA expects that the proposed solution is already available and that no developments/customizations are needed.

4.1.8.7 The service provider shall be able in real time/in the shortest possible time to present via a geospatial information system and video viewer (video/GIS) data captured by all the sensors in the aircraft payload. This video/GIS system shall be made available to the users and to the contracting authority.

4.1.8.8 At least the following data shall be made available to the user in real time/in the shortest possible time (with no more than 5 seconds delay):

a) Live Streaming Video (and recorded video access) of the image sensors on the RPA

b) Compiled Maritime Picture should include at least the following:

- Aircraft position
- Flight Plan
- Executed flight path
- Deployment Map
- Sensor footprint and slant range
- EO, IR high resolution still images, if available
- Radar images
- Identified objects in the radar signal, electro-optical and IR images
- AIS information and track (position, MMSI, …) of the vessels
- Georeferenced objects and incidents of interest in any of the sensor data

4.1.8.9 It is an advantage if this video/GIS is a web based video/GIS application and can be visualised with standard web browsers without requiring special plugins. The following web browsers should be supported (for the specific version of the browsers, please consult the EC "Browser support" web page: http://ec.europa.eu/ipg/standards/browsers/index_en.htm.):

- Microsoft Internet Explorer or EDGE
- Firefox
- Chrome
- Safari

4.1.8.10 In case the Contractor cannot provide a web based video/GIS application as described above and proprietary technology for data dissemination is being used then mobile units (e.g. laptops with the relevant software installed) should be provided for stand-alone data monitoring by users. Enough mobile units should

be provided as needed by the users in different locations to monitor the operations (at least 5 laptops to be provided).

4.1.8.11 These mobile units must allow data export. The data should be made available in agreed formats and exchange protocols to users and the applications of the Agencies.

4.1.8.12 All data shall be at least accessible from the contractor from his servers for a period of 3 months after the data have been obtained.

4.1.9 Data privacy and ownership

4.1.9.1 EMSA shall have full ownership and access to the data collected during operations in the framework of the contract; see Article I.10 of the draft framework contract. As EMSA is providing the services to national authorities and EU bodies, the contracting Agency might decide to forward the ownership to the requesting user.

4.1.9.2 EMSA and the requesting user are entitled to receive all data obtained. If these data are not completely submitted to the RPAS-DC, then EMSA and the requesting user can request to obtain the data in a readable format (standard formats) on an electronic medium. This might also include the data stored on the RPA itself.

4.1.9.3 The service provider is not entitled to use the data for his own purposes beyond what is defined in the framework contract.

4.1.9.4 EMSA or the requesting user can ask all data obtained and generated to be destroyed/deleted and have this documented by a certified institution. This request for deletion will be communicated by EMSA to the service provider.

4.1.9.5 The requesting user (at a national level) shall have the possibility to limit/stop the payload data feed to other users.

4.1.10 Data security and Storage

4.1.10.1 The Contractor shall perform standard virus checking, anti-hacking and network security procedures on all messages to prevent malicious attacks.

4.1.10.2 For data security reasons the Contractor shall at minimum use firewalls in conjunction with the encryption of data for data security.

4.1.10.3 The contractor shall provide mechanisms, procedures and systems to ensure resilient against cyber-attacks against the RPAS operation.

4.1.10.4 Data shall be stored and managed under European law in order to ensure data privacy as required in the European Union. Therefore either:

a) all the data derived from the RPAS are processed and stored in the premise of the contractor, which shall be located in the EU under a legal regime of an EU Member State.

b) Or if the contractor processes and/or stores any data in the cloud, the cloud has to be physically hosted within the European Union and the cloud provider has to operate under a legal regime of an EU Member State (it is not sufficient that the cloud is hosted in Europe and the hosting company is under the legal regime of a non EU country).

4.1.11 Experts and operational personnel

4.1.11.1 The agencies and/or Member State requesting the service would like the possibility to have operational control of the missions. This means that the requesting user is able to communicate with the RPAS provider team to tell them where to fly, where and what to zoom into, and what to analyse.

4.1.11.2 The Contractor shall provide:

4.1.11.3 - Mission Commander

a) will be the responsible person on-site;

b) will be interfacing with the requesting user and the EMSA service manager;

c) Shall have the relevant experience to manage RPAS operations on-site;

d) shall demonstrate a good command of English;.

4.1.11.4 - Remote pilot(s):

a) shall be authorised to deliver the surveillance flights during day/night;

b) shall be trained to relevant standards and should be authorised to pilot the RPAS vehicles/platforms;

c) should at least be previously qualified on another aircraft or should hold a qualification of knowledge of the rules of the air;

d) all RPA pilots shall demonstrate that they underwent a full RPA training program;

4.1.11.5 - Sensor/payload operators:

a) Shall have a proven record on sensor operation and data analysis;

b) must have the knowledge and experience to operate the payload, to analyse the data and to report to the users;

c) shall demonstrate a good command of English to be able to communicate with the requesting user.

the potential contribution of the payload operator actions to safety issues has to be mitigated;

4.1.11.6 - Ground crew:

experienced staff to ensure the availability, operation and reliability of the service (technician(s) - for maintenance, payload management, communications, etc.).

4.1.11.7 Any security clearance of staff shall be mentioned in the bid and will be evaluated as an advantage.

4.1.11.8 In case an expert will be replaced during the lifetime of the contract, a person with at least similar qualifications shall take over the duties. The contracting authority has to approve the changes and a new CV has to be provided.

4.1.12 Logistics

4.1.12.1 The user requests the services and as such provides an official need for operations. It will also be the responsibility of the users or hosting entity to provide the following:

- the base airport facilities, taking into account the operational suitability, working hours and the existence of adequate logistical services.
- a storage location for the RPAS. However the hosting entity or EMSA cannot take responsibility for the security of the storage location.

4.1.12.2 The contractor shall provide an external power supply (generator) to be used if necessary and in case of power failures.

4.1.12.3 This facility will normally be located in the near vicinity of the airport and the requesting Member State, which will provide the infrastructure like power, cable, phone lines, internet, water and sanitation and will cover the associated costs.

4.1.12.4 In case the requesting Member State cannot provide some of the above mentioned items, it will be up to the contractor to either bear the costs or to reject the specific mobilisation for RPAS services.

4.1.12.5 The hosting entity will aim to provide an internet connection capacity necessary to upload all the data to the RPAS-DC. However in case the Member State cannot make an internet connection on site, the contractor is obliged to use its backup internet connection to connect the LGCS to the CGCS, respectively to the users and the RPAS-Data Centre. This backup solution shall have the bandwidth to the RPAS-DC without degradation.

4.1.12.6 The Contractor shall manage logistical issues including:

- Ground support for the RPAS including the mobile unit (LGCS) at the location of operation;
- Deployment support to staff (transport, accommodation, etc.);
- Set up the link to the ATC authorities;
- Set up the local communication links to operate the RPA as needed and described above;

- Diplomatic clearance (when required).

4.1.12.7 It is an advantage during evaluation, if the RPAS system offered is free from International Traffic on Arms Regulation – ITAR restrictions.

4.1.12.8 There shall be no restrictions to

- operate the RPAS offered in any of the sea areas surrounding the European Union Member States, or the EFTA countries
- provide the RPAS documentation (refer to section 5) to EMSA, other European and the national aviation authorities.

4.1.12.9 The service could be extended outside EU adjacent seas upon common agreement. The Contractor must support the preparation of these operations, that restrictions or constraints

- from customs in the countries in which they are operating or transporting their RPAS through
- due to export licenses and also
- imposed in terms of the ITAR

do not hinder them.

4.1.13 Quality control

4.1.13.1 A quality management plan or system for the services provided should be shown or alternatively an ISO certification or an aviation organisation approval for the services provided.

4.1.13.2 The Contracting Authority can request calibration certificates of the sensors and the on-board housekeeping equipment

4.2 Long endurance, long range and large size RPAS services

4.2.1.1 The expected services are explained in section 4.1.

4.2.1.2 For immediate services after signature of the framework contract, the *mandatory* configuration (as used in the following tables) shall be already available and provided by the Contractor as a minimum.

4.2.1.3 RPAS characteristics which are marked as "advantageous" will be evaluated as part of the entire airframe resp. payload set. The entire system is linked to award criteria in section 15 of the tender specifications. Consequently, the more advantages a company can offer and the earlier these advantages can be provided, the better the scoring will be for the particular award criteria.

4.2.1.4 If the performance of the individual devices is going beyond the minimum requirements, that will be evaluated as an advantage.

4.2.1.5 Aircraft which are optionally piloted could be an asset in the process of getting the permit to fly. Therefore bids offering optionally piloted RPAS will be admitted for evaluation. However these optionally piloted RPAS must have the mode to fly fully remotely controlled without a pilot on board.

4.2.1.6 The Bidder is required to state the flight hours the RPAS has already undertaken in this *mandatory* configuration (as used in the following tables). It will be an advantage if the Bidder can prove that this configuration was already in operational use beyond the requested flight hours above.

4.2.2 Aircraft and operational flight requirements

4.2.2.1 The principal requirements on the aircraft and the operational flight performance are listed below:

Area (see 4.1.6.1 and 4.1.6.2)	Areas of operation can be all sea areas surrounding the European Union with an EU or EFTA country. Cross border operations will be included. Starting point can be any EU/EFTA country.	Mandatory
	If requested by governmental users, the service could be extended outside EU adjacent sea basins.	Advantage
Range in BRLOS operation (satellite communication)	500 km (approx. 270 nm)	Mandatory
	A range of more than 700km is a key advantage.	Advantage
Endurance with the full payload configuration under nominal flight speed (time between take-off and landing)	12 hours	Mandatory
	A longer endurance above 12 hours is a key advantage of the system	Advantage
Maximum flight speed	120 km/h or more	Mandatory
Nominal flight speed	100 km/h	Mandatory
	A nominal flight speed above 150 km/h is a key advantage	Advantage
Flight mobilisation	Scheduled tasking (see 3.5.1.7)	Mandatory

time	Unscheduled tasking (see 3.5.1.10).	Advantage
Fleet	If more than one RPA system can be made available for operations	Advantage
Daytime	Day and night operation capability	Mandatory
Environmental conditions / Flight stability	Operation in strong and turbulent weather conditions incl. crosswind (> Bft. 6 or 22-27 knots)	Mandatory
	Operation in heavy precipitation situations and reduced visibility. (please detail the capabilities in the bid)	Advantage
	Operation in icy conditions (please detail the capabilities in the bid)	Advantage
Flight modes	Travelling/taxi mode: travel to the AoI	Mandatory
	Monitoring mode: Flying in order to detect vessels, pollution, humans in distress, and other human activity at sea	
	Loitering: Supporting actions (e.g. pollution response, search and rescue, rendez vous at sea) at different flight levels	
	Adaptation of the flight track and sensor operation according to last user request upfront and during the flight operation	
Flight altitude	Up to 5000m (or approx. 17000 feet)	Advantage

Communication RLOS and BRLOS with satellite Data Down Link capabilities for command-and-control and payload data	All data generated by the payload must be downloaded in real time at least following the quality in 4.1.3.12.	Mandatory
Autopilot, automatic take-off and landing	The RPAs shall allow automatic flight operations and fully automatic take-off and landing. This includes the availability of fully redundant inertial navigation systems.	Mandatory
Payload carriage capabilities	The RPAS should be capable to carry all offered payload at the same time for a flight duration equal to the declared endurance.	Mandatory
	Additionally 50kg spare carriage capability shall be available for future sensors or for carrying objects to be dropped at sea (e.g lifesaving devices/services, refer to 2.2.2.14).	Advantage
Detect and avoid systems	Even, if no international standards are yet available, detect and avoid systems on the RPA would support the safety of operations	Advantage
Safety issues / authorisations/ safeguards-pilot licenses	Operational risk management file and mitigation means for the flight authorisation (see 4.1.5.2);	Mandatory
	Reporting of incidents (see 4.1.5.3).	Mandatory
	Transponder (mode S preferred)	Mandatory
	Other safety features on board	Advantage
Pilots, payload operator issues	See a) and 4.1.11.5.	Mandatory
Ground station	Operational risk management file and mitigation means for the flight	Mandatory

/segment issues	authorisation (see 4.1.5.2);	
	Hand-over procedure for RPA pilots as applicable (see 4.1.5.2);	Mandatory
	Reporting of incidents related to ground station (see 4.1.5.3).	Mandatory

Table 1 *Operational requirements*

4.2.2.2 The characteristics that make the RPAS detectable by potential targets is a key operational parameter. EMSA understands that the proper assessment of this balance is always conditioned by multiple parameters (atmospheric/visibility conditions, background noise etc.) however requests the bidder to provide:

a) The acoustic signature of the RPA. Tables or diagrams for different engine regimes and different aircraft orientations showing the acoustic dBs versus distance can be used.

b) The visual signature of the RPA. Distance from where the RPAS can be visually detected by an observer.

4.2.2.3 If the bidder can further extend the range and endurance by proposing a multi-RPAS/multi-ground station setup, it will be evaluated as an advantage, see section 3.4.1.6. In both cases it is up to the tenderer to define the most appropriate fleet of RPASs/ground stations which could be of the same kind or a combination of different RPAS. In any case they must meet all the minimum requirements indicated in Sections 3 and 4. However this system will be evaluated as <u>one</u> Remotely Piloted Aircraft <u>System</u>.

4.2.3 Minimum Payload requirements

4.2.3.1 The following minimum capabilities shall be achieved by the System's payload sensors offered. Capacities exceeding the minimum requirements listed below would be considered as an advantage.

4.2.3.2 Payloads indicated as an advantage throughout this document will be evaluated as part of the entire payload set. There are no preferred payloads and there are no fixed weightings for them. The more advantages a company can offer and the earlier these advantages can be provided, the better the scoring will be for the particular award criteria.

4.2.3.3 The bidder shall provide a comprehensive description of the capacities of the payload sensors fitted into the RPA, such as EO and IR camera and Radar, and their ISTAR capabilities in terms of detection, recognition and, when applicable, identification (DRI).

4.2.3.4 The three DRI levels can be summarised as:

- Detection: ability to distinguish an object from the background

- Recognition: ability to classify the object class (type of vessel and object in the sea …)
- Identification: ability to describe the object in details (the ship name, number of persons on a vessel, distinction of human arm/head, …)

4.2.3.5 The minimum DRI requirements for the radar device are:

Long range target detection (day and night)	**Range (Km)**
Large vessel (metallic, bigger 100m)	120
Small boat (metallic, 10m to 30m)	40
Non-metallic small craft (e.g. rubber boat)	12

4.2.3.6 The minimum DRI requirements for the combination of optical and infrared devices are:

DRI (during daylight operations)	Range (Km)		
	Detection	Recognition	Identification
Small Boat	20	15	8 by reading a ship name with the letters being 30cm in size
Human	8	4	1.2 - by counting the number of people on board from a distance - Distinction of arm/head, etc. of a human

DRI (during night operations)	Range (Km)		
	Detection	Recognition	Identification
Small Boat	25	10	5
Human	6	3	1

4.2.3.7 The DRI requirements given in the above tables are minimum requirements. Better DRI (longer ranger, smaller objects) are an advantage and will be evaluated better.

4.2.3.8 In addition to the above-mentioned minimum capacities, the System shall be able to:

a) track the position of collaborative vessels within 30 km range or more in 360 degrees;
b) detect and provide an image of oil spills at night and during the day with a maximum resolution of 5 m and range (in one direction) of 20 km; and
c) receive multi-standard distress signals such as Emergency Position-Indicating Radio Beacons (EPIRB).

4.2.3.9 The capacity for the System to detect mobile signals, which could help direct the RPAS to an area where Search and Rescue operations are needed, is considered an advantage.

4.2.4 Payload configuration

4.2.4.1 The targeted configuration of the payload sensors is provided in the table below. The bidder is requested to provide a System with such a configuration and characteristics or better. The bidder may propose alternative solutions or different sensor characteristics as long as the minimum DRI requirements listed above are fully met. In this case, the bidder has to:

a) explicitly describe the rational;
b) indicate which payload devices are altered by the configuration offered by the bidder;
c) provide the specification of the proposed payload devices;
d) detail how the proposed changes will impact the conduction of the requested maritime surveillance activities (see 2.2).

4.2.4.2 The targeted configuration of the payload sensors is provided in the table below:

All sensors	Specification of the environmental conditions for operations and for storage (e.g. humidity, stable wind and gusts, salt concentrations, etc.) shall not be limiting the RPA as specified in 4.2.2.	Mandatory
Gimble, including the following	Forward looking and steerable in all directions (2D)	Mandatory
	Optical axes of all sensors aligned	Mandatory

devices: - EO sensor - thermal IR sensor - laser illuminator	Forward looking and steerable in all directions and horizon stabilisation (3D)		Advantage
Electro optical (EO) sensor (visible range)	Max. field of view > 40 degrees Optical zoom more than 10 At least HD resolution (1920 x 1025 pixel)		Mandatory
	Low light capability		Advantage
Still camera	Optical zoom more than 5 At least 16 Megapixel resolution Low light capability		Advantage
IR,	Noise equivalent temperature resolution better 0.1K (if no thermal IR nadir scanner is available) Temperature range 0 to 2000 degrees Celsius At least 700 pixels in one dimension		Mandatory
	Temperature calibration		Advantage
applicable to either MWIR or LWIR	**MWIR** (4 μm band)	**LWIR** (10 μm band)	Only one IR sensor necessary
	Max. field of view > 30 degrees Optical zoom more than 10	Max. field of view > 30 degrees If not optical zoom available, a two camera approach has to be chosen with a narrow field of view < 5 degrees	Mandatory
		Optical zoom more than 5	Advantage

Laser illuminator in the NIR (1 μm band)	Allows illumination at a distance of 2 km and reading a ship name with 30 cm letters Forward looking and steerable in synchronisation and in an spectral range covered by the EO (the visible range has to be attenuated) and/or IR	Advantage
Maritime radar	360º coverage with multimode capabilities: Maritime modes: • Detection and tracking of vessels according to the long range detection capabilities given above • Detection and localization of aircraft • Detection and localization of rainy zones • Interrogation/Detection of Search and Rescue beacons	Mandatory
Radar in Synthetic aperture radar (SAR) mode (could be a combined device with the maritime radar)	X or C band Preferably 360 degree sweeps or otherwise each side of the aircraft With detection and recognition capability of oil on water, wakes and vessels Available modes: - ScanSAR - SpotSAR	Mandatory
	With a max. resolution of 1 m	Mandatory
	With a max. resolution of < 50 cm	Advantage
	Range (one direction) of 20 km	Mandatory
	A range (one direction) of more than 40km is a key advantage.	Advantage
AIS	AIS receiver with capabilities to relay the data	Mandatory

	Range: 30 km in 360 degrees	
Distress sensors (The RPAS shall be equipped with at least one sensor allowing the homing based on EPIRB signals.)	EPIRB: EPIRB with 06 and 121.5 Mhz signals allow homing to itself being a significant aid to search and rescue activities.	406 Mhz: mandatory 121.5 Mhz: advantage
	RARAR-Search and rescue transponder (SART): X-band radar signals allow homing to itself. It is expected that the RPAS maritime radar already can detect and interpret these radar pulses	Advantage
	EPIRB-AIS, AIS Man Overboard (MOB), AIS-SART: An AIS device is a mobile equipment mounted on an EPIRB, MOB or SART, to assist homing to itself (i.e. life boats, life raft) by transmitting a text broadcast. The reception and interpretation of the AIS messages should be supported by the RPAS by using and interpreting the messages received from the AIS receiver	Advantage
Telephone mobile unit detections	Terrestrial mobile frequencies	Advantage
	Satellite mobile frequencies	Advantage

Table 2 *Sensor requirements*

4.2.4.3 The data collected by the System shall comply with the requirement described in the table below:

Aircraft housekeeping data	The System shall provide aircraft housekeeping data as defined in the ICD (Module 5, Enclosure 2 to this document[13]), e.g. position, altitude, aircraft principal axes, viewing geometry of the sensors, health of the	Mandatory

[13] *Tender Specifications Appendix 1 Technical Specifications Enclosure 2 RPAS-DC ICD*

	system and sensors, bandwidth of communication links	
Geolocation	The data provided shall all be geo-referenced with an accuracy of better 25 m within a range of 5 km.	Mandatory
Data quality	The sensors shall be calibrated. See section 4.1.13.	Mandatory
Data latency	The time between the observation and the time it reaches the RPAS-DC for further visualisation shall not exceed 5 seconds. This also applies to the RPAS providers own solution as per 4.1.8.6.	Mandatory
Data delivery and formats	See section 4.1.8.	Mandatory
	See section 3.6 (Module 5: Interfacing) and ICD (Enclosure 2 to this document[14])	Mandatory
Data exploitation in the LGCS	All data collected by the on-board sensors will be delivered and accessible for data exploitation	Mandatory
	Image enhancing capabilities should be available in the LGCS in order to be able to apply the corrective measures/filters to the images collected	Advantage
	The Payload operator should be able to extract dimensions of objects of interest from images	Advantage

Table 3 *Data collection requirements*

4.2.4.4 The bidder is requested to provide all the evidence that supports and confirms compliance with the requirements indicated in these technical specifications.

[14] *Tender Specifications Appendix 1 Technical Specifications Enclosure 2 RPAS-DC ICD*

4.2.4.5 In this regard, "evidence" should be understood as any ground and/or flight test (logfiles, videos, images etc.) conducted by the bidder that validates a specific performance or capability of the RPAS in real operational conditions.

4.2.4.6 Any evidence provided going beyond the minimum requirements will be considered as an advantage in the evaluation of the bid.

5 Documentation

5.1.1.1 The contractor has to provide the documentation necessary to achieve the Permit-to-fly from the national aviation authorities and/or from EASA during the module 1 activities. This includes the documentation for air worthiness and air traffic management.

5.1.1.2 In order to facilitate, standardise and speed-up the process of achieving the permit to fly, a detailed table of contents of the documentation to be delivered is given in Enclosure 3 to this document[15], called "RPAS passport". The contractor can either structure its documentation according to this table of contents or he is requested to provide a mapping table identifying in detail (document, chapter, page), where this information can be found in the company documentation provided.

5.1.1.3 For the planning of each deployment/operation the following documentation has to be provided by the contractor:

- RPAS portfolio for requesting users (summary document on the RPAS characteristics and on-site requirements)
- Operational Procedures on-site

6 Testing of services

6.1 Initial Configuration test (before Signature of the Framework Contract)

6.1.1.1 Before entering into the operational phase and signature of the Framework contract an initial configuration test will be required. This shall ensure that only mature systems already equipped with standard minimum payload will be selected for the framework contract.

[15] *Tender Specifications Appendix 1 Technical Specifications Enclosure 3 Template - RPAS Passport*

6.1.1.2 This configuration test can take place at a location which can be chosen by the contractor.

6.1.1.3 The initial configuration test is defined in *Tender Specifications Appendix 2 Initial Configuration evaluation*. The four main objectives of the test are to check that the following elements of the proposal are met:

- The RPAS Configuration;
- The ability to fly with the minimum endurance;
- That the payload is operated as expected and the data is exploited in the LGCS;
- That the crew is available to operate the system.

6.2 Capability tests (in situ for each deployment)

6.2.1.1 At the beginning of each deployment, before the start of operations (module 3) ground and flight tests shall take place at the deployment site with the presence of representatives of the user and of EMSA in order to assess and document if the capabilities as offered and requested for the specific operation are available for the deployment.

6.2.1.2 Before the initial capability test, the following documents have to be provided by contractor:

- Capability Test plan including the description of the test cases in-line with the test guidelines provided by EMSA in enclosure 1 to this document[16].
- Test Readiness Review for the Capability Test, which shows that the pre-tests performed by the contractor have been successful

6.2.1.3 The first capability test will be concluded with an evaluation of the operational service capabilities (see enclosure 1 to this document[17]). Additional capability tests in case of change of configuration may be performed as necessary. Article I.15 of the framework contract[18] applies in case the contractor does not fully provide the requested and offered operational capabilities.

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[16] *Tender Specifications Appendix 1 Technical Specifications Enclosure 1 Template - Capability evaluation*

[17] *Tender Specifications Appendix 1 Technical Specifications Enclosure 1 Template - Capability evaluation*

[18] Annex 2 to the invitation to tender: *Framework Service Contract*

7 Service Reports and Invoicing

7.1 Mobilisation alert and preparation Reports

7.1.1.1 For each module 1, the Contractor has to produce a mobilisation alert and preparation report including activities performed according to Section 3.3.

7.2 Service Reports

7.2.1.1 For each deployment (modules 3 and 4), the Contractor has to produce a weekly service report indicating what happened during the operations. A template will be provided at the Kick-Off meeting which includes relevant information for invoicing purposes and flight observations.

7.2.1.2 In case the Contractor was not able to perform the service, a non-flight report shall be issued per deployment, indicating

- User who requested the deployment
- Reference made to the Tasking Form
- Description of the planned missions
- Reason for cancelling the flight or for reduced flight hours compared to the agreed flight plan

7.2.1.3 Templates may be provided during the lifetime of the contract depending on the requesting user.

7.3 Interfacing Report

7.3.1.1 A report indicating what has been undertaken during the development of the system interfaces (module 5) including acceptance of the interfacing based on relevant testing must be produced by the Contractor.

7.4 Invoicing

7.4.1.1 The Contractor shall request the payment of the services delivered and agreed by the parties on a periodic basis as defined in the framework contract and/or specific contracts. The above mentioned reports in chapters 7.1 to 7.3 will be used as supporting evidence for the invoices.

8 Contact point

8.1.1.1 The Contractor shall provide a contact person for the contracting authority to be able to address any enquiry. Enquiries shall be resolved in a timely manner.

8.1.1.2 A contact person for planning of deployment shall also be provided by the Contractor. This will be the focal point for any planning issue with regards to the missions.

9 Project management, operational, emergency, and quality plans

9.1 General

9.1.1.1 All documentation and communications during project implementation shall be in the English language.

9.1.1.2 The Contractor shall be available for a monthly tele-conference.

9.2 Project Management Plan

9.2.1.1 The project will require the highest standards of project and operational management.

9.2.1.2 The Project Management Plan for the implementation of the whole contract shall be provided for the bid and updated by the contractor as needed and shall contain the following elements:

- Work breakdown structure;
- Proposed team composition and organisation: including the involvement and interaction of each team member within the different modules of the FWC including within a deployment. The proposed staff training plan shall also be described including pilots, operators and other experts;
- Risk Assessment: identification of risks including their severity and likelihood;

9.2.1.3 For the preparation phase the Project Management Plan the contractor shall also include:

- Work Packages identifying inputs, outputs, list of tasks and staff involved;
- Gantt chart defining the project timeline including milestones, meetings and deliverables;

9.2.1.4 For project management the EMSA web based tool TEAMFORGE will be used by both parties for the duration of the contract.

9.3 Operational Plan

9.3.1.1 The Operational plan is related to Module 3 and 4 and must clearly indicate how to comply with the proposed frequency of flights in terms of number of aerial vehicles available in the field, spare parts, crews, working shift hours, etc.

9.3.1.2 This document should also cover how the RPA system is operated during deployments, including command and control procedures and communication with pilots, ATM authorities, etc.

9.4 Emergency /Contingency Plan

9.4.1.1 A plan should be provided which includes any emergency and contingency plans should an operation not go according to planned. This should be provided to the contracting authority during the mobilisation alert and preparation phase (module 1).

9.5 Quality Management Plan

9.5.1.1 The contractor shall apply a stringent quality management which includes specific quality related measures to be followed during the lifetime of the contract (i.e. ISO certification, etc.).

10 Working procedures

10.1.1.1 If operations are performed by subcontractors or partner companies, EMSA requires an excerpt of the subcontracting contract showing the clear roles and responsibilities of the subcontractor. This document has to be duly signed by both parties.

11 Abbreviations

11.1.1.1 The terms in the table below, appearing either in a complete or in an abbreviated form, when used in this document and its enclosures, relating to the Technical Proposal, Financial Proposal and Draft Contract shall have the following meaning:

Term	Abbreviation	Meaning
Area of Interest	AoI	The geographical area where information that will satisfy an information requirement can be collected. Areas of Interest are inside the Service Deployment Area.
Base Airport		Is the airport, provided by the Host country of the operation, where the deployment will be done.
Beyond Line of Communication	BLOC	Equivalent to BRLOS, please see there.
Beyond Line of Sight	BLOS	A related term used to describe that the object is too distant or obscured by terrain to be visually detectable.
Beyond Radio Line of Sight	BRLOS	A related term used to describe radio communications capabilities that link personnel or systems to objects, which are too distant or fully obscured by terrain for Line of Sight communication (LOC or RLOS).
Broadband Link		A high-capacity transmission technique using a wide range of frequencies, which enables a large number of messages to be communicated simultaneously using a single telecommunication link.
Central Ground Control Station	CGCS	A fixed station, served by the service provider to operate the RPA, to monitor the payload, to process the data and to disseminate the information to the users and the Agencies.
Data Link		A telecommunication link over which data is transmitted.
Deployment		A deployment is composed of the transport, the on-site activities and a number of flights called missions, each of these missions is carried out in a specific Areas of Interest, defined within the Service Deployment Area.
Emission Control Area	ECA	Sea areas in which stricter controls are established to reduce or minimise emissions from ships.
EU, EEA and EFTA		European Union, European Economic Area and European Free Trade Association.
Ground Segment		The segment which receives the payload data from the RPAS via satellite communication or via the Local Ground Control Station (LGCS), processes the payload data and make them available to the users and the Agencies. Could be the LGCS itself or dislocated at the Contractor premises (CGCS).
High Intensity Radiated Fields	HIRF	Standard test specified in Eurocae ED14/RTCA DO160 section 20 or equivalent standard test
Hazardous and Noxious Substances	HNS	

Term	Abbreviation	Meaning
Host Country	HC	The country of the requesting user, where the Coordination Centre and the base airport are situated.
Infrared wavelength	IR	
Line of Communication	LOC	Equivalent to RLOS, please see there.
Line of Sight	LOS	A related term used to describe that the object is visually detectable without any sort of obstacle between the observer and the object.
Local Ground Control Station	LGCS	A deployed station, served by the service provider crew, capable operate the RPA including take-off and landing. Can also act as CGCS, depending on the set-up of the RPAS.
Long Wavelength Infrared	LWIR	8 - 15 micron spectral band
Mean Take Off Mass	MTOM	
Mid Wavelength Infrared	MWIR	3 - 5(8) micron spectral band
Deployment		An assignment, within by a specific contract, for a certain number of weeks in which RPAS operations will take place.
Near Infrared	NIR	0.75–1.4 micron spectral band
Operation		The operation of the RPAS during a mission
Payload		The load carried by the asset, consisting of sensors, necessary to the purpose of the flight: i.e. Electro-Optical, Infrared, Radar, GPS and AIS receiver with capabilities to relay the data.
Radio Line of Sight	RLOS	Type of communication that can transmit and receive data only when transmit and receive stations are in view of each other without any sort of obstacle between them.
Satellite Communications	SATCOM	When a signal is transferred between the sender and receiver with the help of satellite. In this process, the signal which is basically a beam of modulated microwaves is sent towards the satellite. Then the satellite amplifies the signal and sent it back to the receiver's antenna present on the earth's surface.
Search and Rescue	S&R	
Sulphur Emission Control Area	SECA	Sea areas in which stricter controls are established to reduce or minimise SOx emissions from ships.
Service		It is the subject of a specific contract.
Sulphur oxides	SOx	
Synthetic Aperture Radar	SAR	
Short Wavelength Infrared	SWIR	1.4 - 3 micron spectral band
Thermal Infrared	TIR	Covering the range of MWIR and LWIR, please see there.
Vertical-Take-Off-and-Landing	VTOL	