2.4.8. EDF-2022-DA-AIR-AEW: Airborne electronic warfare

Budget

The Union is considering a contribution of up to EUR 40 000 000 for this topic under the call EDF-2022-DA

Number of actions to be funded: Up to one action may be funded for this topic

Objectives

The proliferation of advanced long-range Integrated Air Defence Systems (IADS), incorporating threats that can operate across different frequency bands and attack aircraft at ranges up to 400 km, could create Anti Access/Area Denial (A2/AD) areas. In such A2/AD areas, which could equally affect EU Member States' and associated countries' airspace, air operations including projection of forces by air would not be possible in case of emergence of a crisis.

General objective

As European forces increasingly face sophisticated long range IADS and A2/AD systems, airborne electronic attack (AEA) capabilities become essential to create safe bubbles around formations of aircraft. From the operational perspective, the AEA capability must be able to mitigate Electro Magnetic (EM) threats in the largest possible Radio Frequency (RF) spectrum used in military operations. The effects should be coordinated with stand-in, stand- off, self-protection of manned and unmanned platforms. This implies to operate in a consistent and a synergetic way all the assets of the electronic warfare (transmitter, receiver) that would be in motion and in different places.

Specific objective

The main challenge is therefore to enable any platform involved in AEA missions to adapt to the latest in electronic warfare (EW) requirements, which include (soft) suppression of enemy air defences, escort role, electronic attack, self-protected/time-critical strike support, and continuous capability enhancement.

Currently the EU Member States and Norway capabilities in countering these threats are limited and when needed, most of the required capability is provided by NATO allies. Moreover, AEA has been identified by the Council as a main CSDP military capability shortfall (High Impact Capability Goal) to be addressed in the medium term. The EU Capability Development Plan (CDP) also identifies electronic attack as one of the priority areas for development.

Against this background, the objective of this call is to carry on the development of a set of building blocks to be installed in different platforms and systems leading to reduce the operational risks related to EU Member States and Norway air force engagements within European territories as well as the force-projection in other potential areas of operations.

Scope and types of activities

Scope

The objective must be the development of complementary building blocks technologies and components addressing the electronic warfare challenges and the development and the production of a prototype as an airborne electronic attack capability demonstrator by the end of 2027, which would validate this conceptual approach, help decision-making and reduce risks for

possible further investments.

In addition, a feasibility assessment is required regarding the creation of a digital environment system capable to reduce development risks, costs and length, minimizing experimental tests at the test range and carrying out system performance checks even in "flight line".

Threat identification and tracking should be addressed, as the prerequisite for effective electronic counter measure (ECM).

Proposals should also define requirements for an electronic warfare mission planning/report system in order to:

- Dimension the complexity and heterogeneity of the platforms that can be part of AEA capability.

- Identify near real-time reconfiguration capability and the mechanisms to be implemented to manage the need for adaptability during the mission.

Potential synergies and complementarity with ongoing projects at national, multinational or EU level must be given due consideration. In any case, proposals must not duplicate the work requested in the call EDIDP-ACC-AEAC-2019 Airborne electronic attack capability

Types of activities

The following types of activities are eligible for this topic:

Types of activities (art 10(3) EDF Regulation)		Eligible?
(a)	Activities that aim to create, underpin and improve knowledge, products and technologies, including disruptive technologies, which can achieve significant effects in the area of defence (**generating knowledge**)	No
(b)	Activities that aim to increase interoperability and resilience, including secured production and exchange of data, to master critical defence technologies, to strengthen the security of supply or to enable the effective exploitation of results for defence products and technologies (**integrating knowledge**)	Yes (optional)
(c)	**Studies**, such as feasibility studies to explore the feasibility of new or upgraded products, technologies, processes, services and solutions	Yes (optional)
(d)	**Design** of a defence product, tangible or intangible component or technology as well as the definition of the technical specifications on which such design has been developed, including partial tests for risk reduction in an industrial or representative environment	Yes (mandatory)
(e)	System prototyping of a defence product, tangible or intangible component or technology (**prototype**)	Yes (mandatory)
(f)	**Testing** of a defence product, tangible or intangible component or technology	Yes (mandatory)
(g)	**Qualification** of a defence product, tangible or intangible component or technology	Yes (optional)
(h)	**Certification** of a defence product, tangible or intangible component or technology	Yes (optional)

(i)	Development of technologies or assets **increasing efficiency** across the life cycle of defence products and technologies	Yes (optional)

The proposals must include the development of building block technologies and component demonstrators to support de-risking and decision-making during design phases.

By achieving a technological maturity, the envisioned prototype must have to positively qualify against environmental and EMI/EMC (electromagnetic interference/electromagnetic compatibility) requirements in order to perform airborne flight tests on the selected platforms according to the constraints of the project and the functional requirements.

Functional requirements

The research to be conducted should meet the following functional requirements:

- It should consist of:

  - Adjustable high power signal jammer in the largest possible but at least the S- band and X-band radio frequency spectrum used in military operations, able to break the acquisition cycle of radar installations since the search or early- warning phase of detection.
  - An enhanced on-board EWC2 for fast and networked electronic attack with the following capabilities:
    - Find, locate, and track electromagnetic threats.
    - Gather and merge information coming from different platforms. Integrated Situation assessment and Data collection (real-time).
    - Exploit and share information on radar bands for AEA and ESM applications.
    - Data Link transmission for exploitation in real time should be possible.
    - Develop electronic collaborative operations in near real time through either own Data Link or platform DL.

- Ensure interoperability with a modular building block architecture that facilitates later adaptation to future combat systems as well as integration into NATO and national structures. These architectural building blocks should be:

  - Scalable by design as well as composed of modular and low SWaP-C enabling payloads with a swarming approach.
  - Adaptable to different operational roles with manned and unmanned platforms.
  - Composed of (without being limited to):
    - AESA Antenna with GAN technology Beam Forming
    - Digital Receiver
    - DRFM (Digital Radio Frequency Memory)
    - Processing Unit (Multi-Function-Unit) able to collect the data signals in output of each phase array unit

- Capable to be autonomous in terms of power supply and cooling system.
- Capable to be installed either internally in a platform or externally carried through a pod configuration.

- Be modular and using an open system architecture (OSA) approach as a reference to enable the building block architecture to be compatible with different platforms (manned and unmanned) of interest for the Member States and Norway, including pod mounted solutions. UAVs equipped with such a payload should be able to cooperate in a resilient network, utilising all advantages of swarming, e.g., abundance and its geometrical dispersion, redundancy, detection and recognition hardiness, destruction vulnerability etc. It should minimise the impact on flight envelopes, altitude restrictions and flight time reduction on high endurance missions.

- It should be interoperable with the existing and planned Member States and Norway assets and systems in order to be used in joint operations, including ESM.

- It should use phased array technology for both receiving and transmitting purposes, able to generate instantaneous multi-beam with the aim to monitor the whole array spatial coverage. In particular, it should implement a highly efficient phased array based jamming system with powerful, efficient and wideband technology, with the possibility to operate in the radar band and capability to growth to communication band with cutting edge hardware to enhance the integration flexibility for a wide range of airborne platforms.

- It should either use synthetic digital modelling (Digital Twin) or create a digital environment system contributing to reduce the risks associated with the development of new complex systems, such as an electronic warfare (EW) suite.

- It should be adaptable to new and changing threats, with a high degree of reliability and efficiency, allowing to mask an entire fleet of aircraft from medium to long range, when performing different missions such as:

- Stand-In jammer (SIJ): Small sizes and in swarms coordinated UAVs or ALD (decoys).
- Escort jammer: Installed on a platform which guides or is part of an attacking A/C strike.
- Stand-Off jammer (SOJ): Secure distance jamming with high Effective Radiated Power (ERP) and high sensitivity.

- It should implement specific training functions that should be used without affecting the operation of the system.

- It should allow for an easy management and development of electronic warfare libraries.

- It should feature a growth capability to perform specific cyber-attacks.

Additionally, the following functionalities should be considered:

- Development in near real time of EOB
- Analysis and Mission Planning and restitution (off-line)
- Distributed and coordinated approach to the mission
- Multi-platform cooperative jamming
- Multi-asset distributed tasks for IADS disruption

Expected impact

The research should contribute to:

By developing a European airborne electronic attack capability, the action should contribute to:

- Allow EU Member States and Norway air forces to conduct operations in contested EM environment, with an acceptable level of operational risk, to deal with low- frequency radars and to counter new sophisticated threats.

- Identify key strategic components for this capability for EU and set the conditions for keeping them under the EU sovereignty.

- The development and competitiveness of EU and Norway industries worldwide by incorporating key EW components and systems currently leaded in the market by non- associated third-country industries.

- Minimize the design and development efforts that would need to be spent separately by EU and Norway industries, hence allowing for better market exploitation as well as the fulfilment of Member States and Norway armed forces requirements in the field of electronic attack.

- Boost the interoperability of electronic warfare systems among Member States and Norway armed forces, in the area of electronic attack.