

Questions in Response  
To  
FA9451-18-S-0006 Amendment 003 (Special Topic)

- 1) What is the CONOPS that AFRL has in mind for this topic?
  - a. What are the targets? Drones, generic missiles, RF-guided missiles that might be confused by a HPM at high duty factor, or otherwise?
    - i. The initial focus of the special topic is protecting high value airborne assets (HVAA). Overall, for the special topic, the larger the target set that can be addressed the more interest.
  - b. Are you envisioning in-band or out-of-band (back door) HPM attack?
    - i. The attack can be through any coupling mechanism, but an important aspect is that AFRL wants to negate the threat as far from the protected asset as possible.
  - c. Would an airborne version of Vigilant Eagle be in line with AFRL's needs?
    - i. AFRL is interested in exploring HVAA protection while they are airborne and performing their operational mission. If an airborne version of Vigilant Eagle can be shown to provide the protection required against relevant threats, then it would be a concept of interest.
  - d. Does AFRL have specific HPM effects against specific threats that can be exploited by designing an HPM system to deliver a specific HPM pulse train?
    - i. AFRL has effects data that can help guide the optimal waveform solution. However, the focus of this special topic is on an antenna design that can be made conformal to the aircraft while exploring size and weight considerations for a full-integrated system.
  - e. Would the aircraft being protected be alone or in a squadron of other aircraft?
    - i. The most likely scenario will be that the aircraft will be flying alone with UAVs acting as loyal wingmen.
- 2) Irradiating a fast moving target from an airborne platform will be challenging. What is the relative importance of the following capabilities to AFRL's CONOPS?
  - a. High rep rate,
  - b. Beam steering for aiming, or
  - c. Irradiance on target.
    - i. All of the 3 above capabilities are important to AFRL. For the initial focus of this special topic, antenna design will be of vital importance so that would place the beam steering for aiming as the most critical capability, followed by irradiance on target being provided by the gain of the antenna concept.
- 3) What is the lower limit on the range for target engagement and defeat?
  - a. The further away from the protected asset the threat can be engaged and neutralized the greater the interest. That range could be provided by high power levels, specialized waveforms, unique coupling mechanisms, forward placement of the HPM system, or some other novel concept.

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- 4) What is the frequency band of greatest interest?
  - a. Conventional HPM back-door electronic attack most frequently relies on high power, relatively low duty factor narrowband sources; are arrays of high duty factor mesoband sources like NLTs of interest?
    - i. Any concept that can produce effects at extended ranges from the protected asset are of interest. That can include narrowband, mesoband, or wideband sources.
- 5) Are aircraft hardening solutions to self-irradiation from back and side lobes of interest?
  - a. AFRL/RD is working with AFRL/RX for the aircraft hardening solutions so they are not of interest in this special topic.
- 6) Is there a CONOPS currently associated with this task that can be shared?
  - a. There are several potential CONOPS that are currently being explored. AFRL/RDH is looking for innovative ideas to utilize HPEM for protection of both aircraft and airbases. The focus of the airborne HPEM capability is on protection of high value airborne assets (HVAA). The initial concept is to utilize a wingman for the HVAA protection mission, but AFRL/RDH will also consider concepts that put the HPEM system on the HVAA for self-protection.
- 7) Is there currently a set platform for the associated task, if so can that be shared?
  - b. AFRL/RDH is exploring attritable UAVs that could be used as a host platform for the airborne mission. The important considerations for the white papers include: an antenna design that has a radome that can be made conformal to an aircraft structure and determining the correct CONOPS for the concept, whether that is a single higher power HPEM on a platform, many smaller platforms acting in coordination, or some other novel concept. The design considerations are more flexible with the airbase defense mission.
- 8) If there is not a platform set for the associated task, should the author write proposing a platform?
  - c. Proposing a particular platform is not necessary. The important consideration is the payload size and weight of a representative platform and your proposed methodology for developing the antenna design. If there is any flight-testing involved, AFRL will provide the platform and the specific design constraints.
- 9) In the announcement, it says funding is currently available, is this funding the full 5 million dollars or just some portion of the funding proposed in the PoP?
  - d. The funding currently available is the FY21 portion of the proposed funding. Based on the funding profile, the government won't have FY22-FY25 funding available until those fiscal years. AFRL may award zero, one, or multiple awards utilizing this funding based off this special topic.