

Development of Metrics and Requirements to Enable Downselection and Evaluation of Commercial Counter-UAS Products

Recent security events involving unmanned aircraft systems (UAS) or Remotely Piloted Aircraft Systems (RPAS) have left many Nuclear Sites wondering if they should implement counter-UAS technologies. Many sites are therefore beginning to assess the security risks and potential impact of UAS threats on security, operations, to determine whether implementing Counter-UAS technology or products is warranted. If the assessments indicate unacceptable levels of risk, operators have a challenging task of determining what kind of CUAS capabilities to select and implement, and how to conduct testing to evaluate product specifications and claims made by manufacturers.

For operators or regulators seeking to incorporate counter-UAS capabilities into their security systems, a critical next step is to generate requirements based on risk, policy, threat and performance trade-offs. This activity is independent of and must be completed prior to searching for or deploying a CUAS technology. Doing so enables more effective technical exchanges, requests for information, development of test plans and procedures, and provides a solid basis for justifying procurements actions. This is best done through multiple discussions involving all security stakeholders, on topics such as:

- What is the anticipated budget for acquisition and deployment, and annual training, operation, maintenance and sustainment, performance testing, and updates?
- What UAS characteristics (type, navigation methods, size, speed, altitude, payloads, behaviors, etc.) were used to determine unacceptable levels of security risk from UAS threats?
- What unmanned aircraft system behaviors or actions will warrant a response or mitigation action from the Counter-UAS technology?
- What physical areas or airspace boundaries, if crossed by a UAS, would be deemed a security threat?
- How far away must the UAS threats be sensed, assessed (to determine whether a true or nuisance alarm), and mitigated, and at what levels of performance and confidence?
- What forms of sensing and tracking are preferred given local environment conditions?
- What kinds of mitigations are acceptable, legal, and effective given local conditions?
- What are the rules of engagement, and are these acceptable from a policy and legal perspective?
- Who will operate the system, how will notifications and alerts be received and assessed, and what is the process for reporting incidents and actions taken?
- Will the system operate in a stand-alone mode, or be integrated into the rest of the security system?
- What approvals will be necessary prior to operating the system?

The results of these discussions will enable development of requirements and metrics that can be used to evaluate the performance of Counter-UAS regardless of the type of technology being considered. This paper will suggest and discuss multiple performance metrics that can be applied to CUAS at nuclear sites. The metrics presented are based on an established methodology that has been applied to detection and neutralization of threats to high security applications for over 40 years. The Performance Metrics feed into an analysis methodology to estimate security effectiveness of CUAS. Creation of CUAS Requirements will build from performance metrics, resulting analysis, and the amount of security risks and non-security risks decision makers are willing to accept. Recommendations presented in this paper are the result of our combined experience in generating metrics and requirements for CUAS based on security risk, policy, legal, and threat trade space, to form a solid foundation for CUAS down-selection and performance testing.

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