

Assessing Future Threats from Small Unmanned Aircraft Systems

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The U.S. Department of Homeland Security (DHS) is responsible for protecting and enhancing the resilience of much of the Nation’s critical infrastructure. Although developments are evolving rapidly across all domains, the air domain has become increasingly complex in recent years given the proliferation of the unmanned aircraft system (UAS). In particular, consumer demand and benefits from commercial and private interests for the small UAS (sUAS)—weighing less than 55 pounds (lbs.) and operating at no more than 400 feet above ground—have caused expansion of both sUAS and counter-UAS markets. With new producers vying for market shares, competition is fostering rapidly decreasing prices and innovative technological features intended to garner a comparative advantage.

DHS asked IDA to look 5 years out to identify current and potential technology advances and to characterize development trends in the sUAS and counter-UAS industry. The method IDA researchers devised for this research has sparked interest beyond DHS to other government agencies responsible for aspects of U.S. critical infrastructure. Through its survey of leading technologies and interviews with industry experts, IDA observed the following trends in sUAS development over the next 5 years:

- **General Trends:** sUASs will be able to travel at greater speeds (200 mph+), carry heavier payloads, and engage multiple flight control modes that enhance operational flexibility, battery life, and flight time.



- **Swarming:** The technology required for multiple sUASs to work together in concert will be widely available to the average consumer, rather than only to militaries and major commercial entities.
- **Technology and Functions:** Continual transfer of mobile innovations in sensors and robotics to sUAS platform.
- **Multi-Modal Designs:** Flight capabilities combined with maritime surface, underwater, and ground vehicle modes will be widely available to consumers.

In addition to identifying trends in sUAS development, IDA’s analysis also involved identifying trends in counter-UAS technology. Through its investigation, IDA identified trends in three primary dimensions of counter-UAS technologies:

Detection, Identification, and Tracking	Threat Decision	Threat Response
<p>Sensors and Tracking</p> <ul style="list-style-type: none"> • Capabilities will continue to improve using an array of multiple sensors and microprocessors • New challenges will emerge from smaller sUASs • Cost-effective systems will depend on integration into current critical infrastructure security electronic and physical platforms <p>ID Tagging</p> <ul style="list-style-type: none"> • Development and implementation will occur over the next 5 years; ID tagging is a priority initiative for the Federal Government 	<ul style="list-style-type: none"> • Due to the short time available to employ a threat response mechanism, human-based threat decision-making will continue to be insufficient for addressing most sUAS threats. • Counter-UAS with automated response protocols have not garnered wide investment, but could reduce delays in sUAS threat response 	<p>Threat response products will continue to develop rapidly to meet demand</p> <p>Passive Systems</p> <p>Domestic markets will see growth in passive counter-UASs that are legal and minimize collateral damage</p> <ul style="list-style-type: none"> • Ex: facility nets • Ex: geo-fencing • Ex: sensor-based smart blinds • Ex: police notification systems