NASA SBIR/STTR Technologies

A3.02: A Robust Separation Assurance (SA) Architecture using Integrated Airborne and Ground SA Concepts

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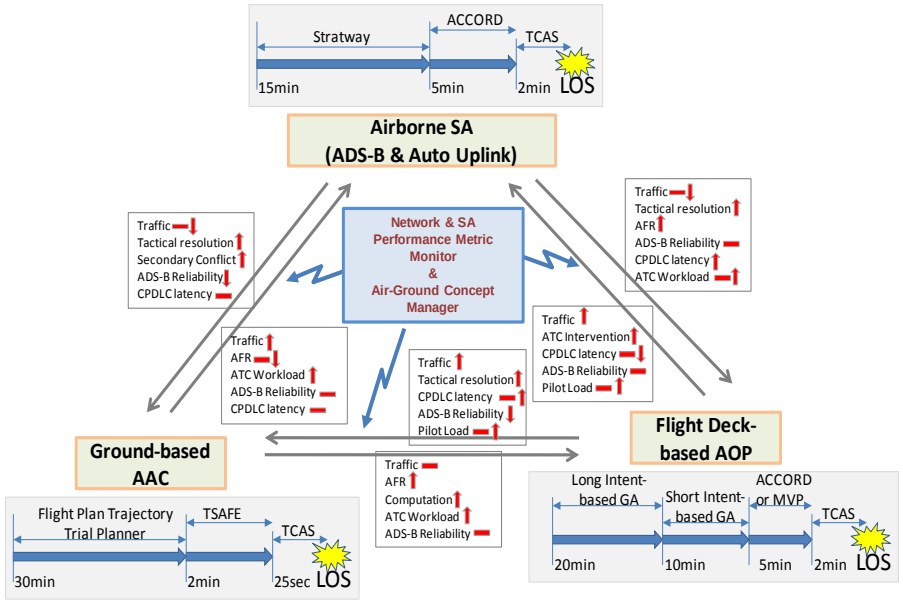
Identification and Significance of Innovation

Intelligent Automation, Inc. proposes to develop a robust SA architecture by using integrated airborne and ground-based SA concepts such that SA functions are dynamically switched between airborne or ground-based components as traffic, time to LOS, and network characteristics change (i.e., data drop rates and latency). The uniqueness of the research is that, unlike current concepts which focus only on ground or airborne SA, we propose an integrated air-ground SA concept where the responsibility of separation assurance is changed as network conditions are changed, with the goal to maintain the robustness of SA functions. The proposed approach consists of dividing the airspace into SA (not ATC) sectors, where SA activity in each sector is managed based on a single SA concept. The approach delineates the SA functions or roles between the stakeholders (i.e., ATC, Pilot and service providers) for each SA sector and addresses the transfer of control between the SA stakeholders. The outcome of the integrated SA architecture is that multiple (not just one) SA concepts are applied to a given airspace managed by a single ATC.

Estimated TRL (1 – 9) at beginning and end of contract:
Beginning of Contract: TRL level 1, End of Contract : TRL level 2



Technical Objectives

Objective 1: Perform a performance trade-off study to compare and evaluate different SA concepts under varying traffic and CNS system characteristics.
Objective 2: Develop an integrated air-ground SA architecture using existing SA concepts and a 'Network and SA' Performance Metric Monitor and Concept Manager.
Objective 3: Implement and demonstrate a prototype of the integrated air-ground SA concept using a simulation testbed.

Work Plan

Task 1: Set up Simulation Models and Identify Traffic Scenarios
Task 2: Develop a set of SA Performance Metrics
Task 3: Identify and Analyze the Network Characteristics of NextGen CNS Systems that are critical to Performance of SA Concepts
Task 4: Perform a Trade-off Study to analyze the effect of SA Performance Metrics under varying Level of CNS System Performance
Task 5: Develop an Integrated Air-Ground SA Concept using enhanced ACES-SA Framework
Task 6: Demonstrate operation of integrated SA Architecture
Task 7: Develop Phase II and transition plans

NASA and Non-NASA Applications

Potential NASA Commercial applications

- Model and framework enhancement to ACES, ATOS and MACS for NASA researchers
- Results of SA performance trade-off studies between different airborne and ground-based SA concepts under varying level of traffic densities, complexities and communication and surveillance characteristics.
- Potential transition into NASA programs such as Center-terminal Automation System (CTAS) and En-route Descent Advisor (EDA).

Potential Non-NASA Commercial applications

- FAA's "Trajectory Management - Conflict Resolution Advisories" program.
- DOD's initiative on study of safe UAV operation in the NAS for national security.

Firm Contacts

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