Resilient Embedded GPS/INS (EGI) Prototype Pilot and virtual Systems Integration Laboratory (vSIL)

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Overview

• virtual Systems Integration Laboratory (vSIL)
• Open R-EGI Test Harness
• Resilient EGI Plug Fest
• FACE PCS Data Model Development
• FACE PCS R-EGI App Development
• Alt-Nav App Development
• Resilient EGI Plug Test
• Summary
Resilient EGI Project Overview

• 3 Teams will collaborate to explore using the FACE standard for avionics systems development

• Teams will collaborate to create the initial common applications space data model and baseline Alt-Nav application

• Each team will then explore a different Alt-Nav technique and create an appropriate app and modification of the baseline common application space App and Data Model

• Results will be evaluated embedded in test vehicles and in a virtual Systems Integration Lab (vSIL) hosted at the Hanscom milCloud
Open EGI Plug Fest Kickoff

Team 1
QuNav & NG (ES)

Team 2
Rockwell Collins
Infinite Dimensions Integration

Team 3
BAH & Securboration

Phase I: FACE Data Modeling

Phase II: EGI App Design & Development

Phase III: Alt-Nav Extensions

Open EGI Plug Test/SME Evaluation
vSIL

• Implemented primarily at the Hanscom Air Force Base milCloud
• In theory any reasonably secured cloud space could be integrated
• Existing infrastructure to be augmented with an IBM Power Architecture system
• Secure team cloud team spaces implemented with Secure Multi-Tenant Cloud technology
vSIL Composition
R-EGI Conceptual
R-EGI Logical
Alt-Nav App Development

- Link-16
- Magnetometer
- Vision Nav
- Celestial Nav
Resilient EGI Plug Fest/Plug Test

• 3 Teams will collaborate to explore using the FACE standard for avionics systems development
• Teams will collaborate to create the initial EGI FACE Data Model and baseline EGI App
• Each team will then explore a different Alt-Nav technique and create an appropriate app and modification of the baseline EGI App and Data Model
Resilient EGI Plug Fest/Plug Test

• In general, the appropriate level of effort and detail for a truly competitive Plug Test will be developed in this phase

• Initially a group of SME will review the artifacts created (FACE Data Model and Apps) and a running demonstration of the Apps

• Ultimately the artifacts would be demonstrated in a live vehicle guidance demonstration
Modified BALSA Data Flow Phase II

N.B. 14a, 15a Steering Servo
Modified BALSA Data Flow Phase IV

N.B. Servos: 14a, 15a Elevator; 14b, 15b Rudder; 14c, 15c Right Aileron; 14d, 15d; Left Aileron; 14e, 15e Right Flap; 14f, 15f Left Flap ; 14g, 15g Electronic Speed Control (Throttle)
Modified BALSA Data Flow Phase V

N.B. 21a, 22a Steering Servo; 21b, 22b Throttle Servo
Modified BALSA Data Flow Phase VI

N.B. Servos: 21a, 22a Elevator; 21b, 22b Rudder; 21c, 22c Right Aileron; 21d, 22d; Left Aileron; 21e, 22e Right Flap; 21f, 22f Left Flap; 21g, 22g Electronic Speed Control (Throttle)
Lessons Learned

• Very easy to work with FACE compared to other DoD standards
• Joint Unmanned Autonomous Systems
• High Level Architecture
• Very good factorization of the software
• Clever usage of DIS messaging to rapidly prototype the TSS
• Concise reference implementation of the FACE standard made it easy for our project to get to the productive work of EGI/At-Nav design
Summary

• First time through the goal is to create the Open R-EGI Plug Test Harness and fully debug the system
• The approach and infrastructure for the Plug test will also be developed and debugged
• A report with recommendations on the R-EGI interfaces will be assembled for the EGI-M program