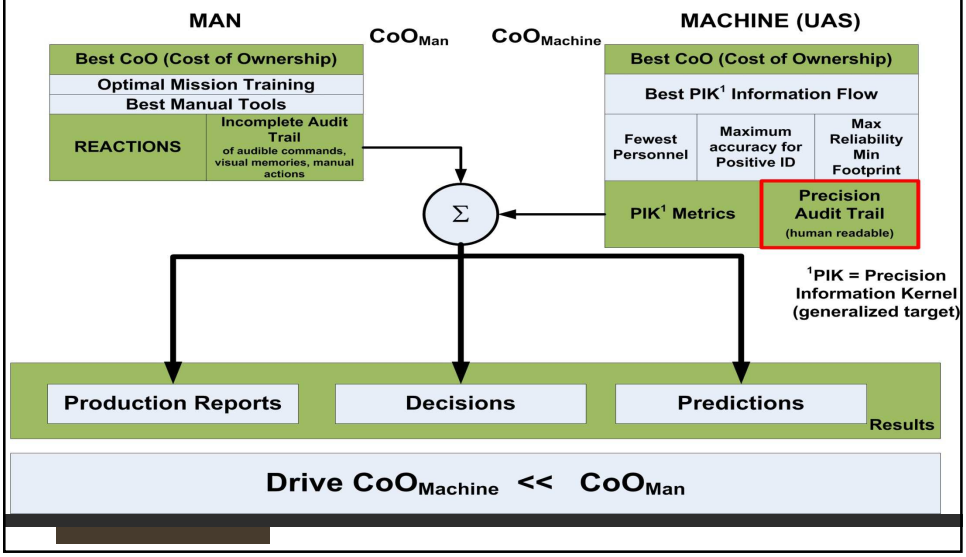
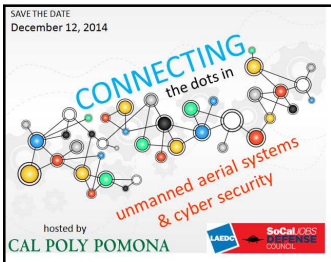
Main Points

INSITU

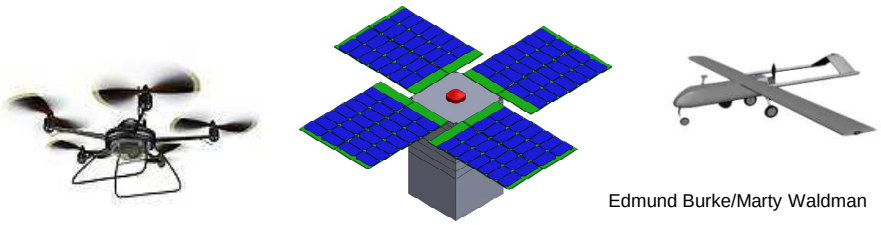
Information Widget Factory ⟷ Autonomy





Marty Waldman
Systems Architect/IP/Business Development
Director, SIL Nevada UAS/Intelli-Navigation Office
Space Information Laboratories

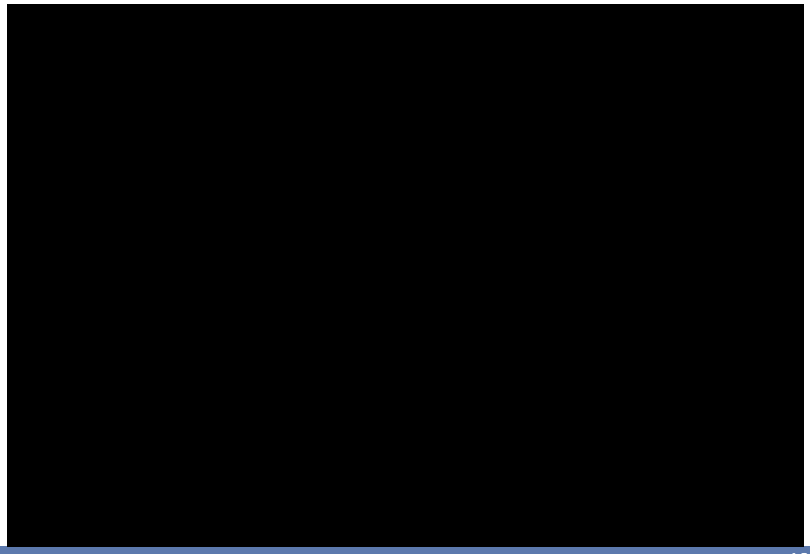
Applying SIL Technology into UAS Intelli-Avionics® (UIA) for SAA



Edmund Burke/Marty Waldman

SIL Technology Video

Duration 2 Minutes



UIA 3 Major Components

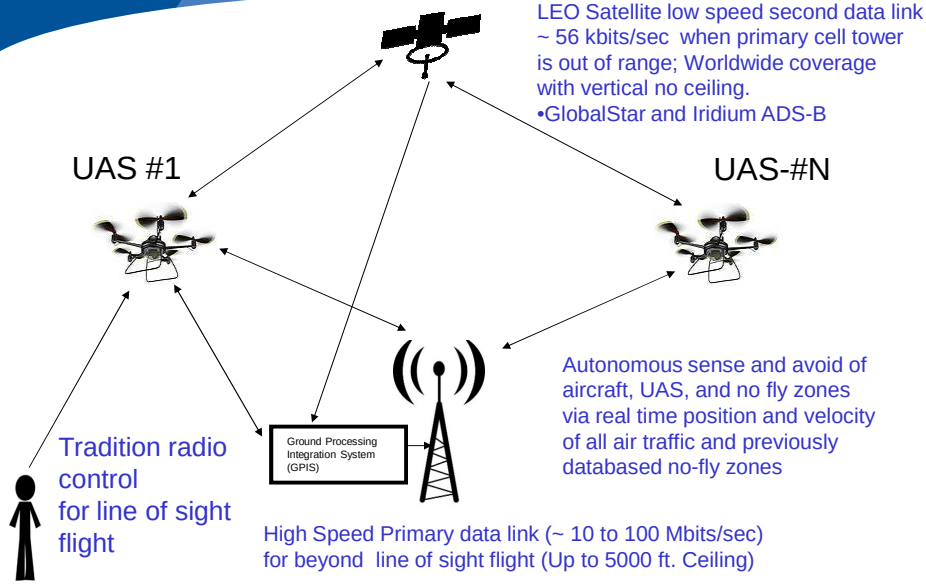
Sense & Avoid (SAA) is BUT A PIECE of the end goal of an integrated UAS Intelli-Avionics® (UIA) approach, *consisting of* :

1) Airborne: Small inexpensive box weighing approximately 3 pounds with Li-Ion Polymer battery and ~10 cubic inches containing GPS L1/WAAS RX, Cellular Tower Comm, 9DOF IMU and LEO Satellite transceiver
2) Ground/Space Based: 3-D emulation infrastructure containing a dynamic library of all fixed and moving objects within its area of interest, dynamically interacting with airborne capability
3) Ground Comm Infrastructure: Use of Cellular Network where available, and go Space-Based to Iridium/Globalstar for BLOS Data

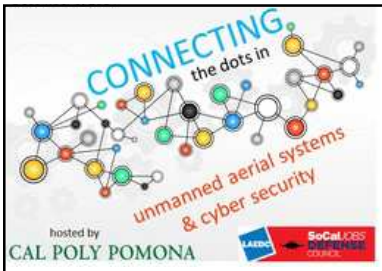
Providing an actionable dynamic real-time interactive 3-D picture to each vehicle within Class G Airspace (roughly 0 -1000 feet). When the SAA puzzle is solved for Class G (the most difficult), it's solved for all altitudes

11

UIA NEXT GEN NAS CONOPS

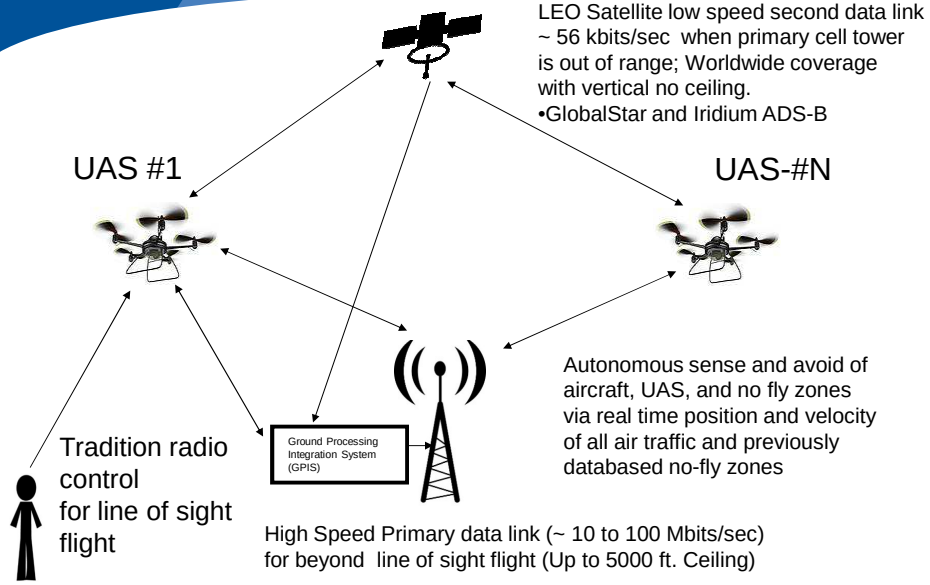


12



Edmund Burke
CEO/Chief Engineer
Space Information Laboratories

UIA NEXT GEN NAS CONOPS



14

Cell Tower and LEO Satellite Datalink

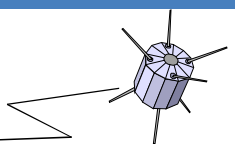
Intelli-Avionics®

4G/5G Cell Tower
High Speed Data Link for UAS Avionics

LEO Satellite ADS-B and Comm. Datalink
1-2W

GPS L1/WAAS—ADS-B

Size: ~ 10 cubic inches
Weight: ~ 3 lbs with Li-Ion Polymer battery
Power: 12Vdc @ ½ Amp



GPS Satellites

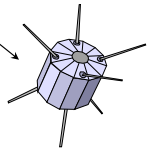
LEO Satellite Low speed IP Secure Datalink

Universal GPS Rx/LEO Satellite/Cell Tower Active Patch Antenna Datalink System Mateable to UAS vehicles

Tx: 1610 – 1626 Mhz (GlobalStar)
Rx: 2485.5-2500 MHz (GlobalStar)
TX/RX: 1610-1626 Mhz (Iridium)

56 kbits/sec full duplex, NG GlobalStar
9.6 kbits/sec, NG Iridium

LEO GlobalStar and Iridium NG LEO Broadband on Horizon

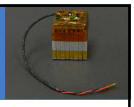


High Speed IP Secure Data link

Cell Phone Tower IP Secure Data
~ 10 to 100 Mbits/sec

15

Current UAS Commercial Li-Ion Battery Concerns



- **Commercial UAS using Li-Ion and Li-Ion Polymer batteries with no cell protection on-board (safety concern)**
- **No undervoltage automatic cell cut-off, thus not maximizing energy delivery and also a safety concern**
- **No individual cell balancing and/or real-time monitoring on-board that is a safety concern**
- **Commercial UAS using Li-Ion Polymer batteries sold for recreational RC Aircraft and extremely cheap, Cells have defects and there is no cell test screening prior to building the battery that is a safety concern**
- **UAS nascent commercial industry does not need a Dreamliner Li-Ion battery incident**

16

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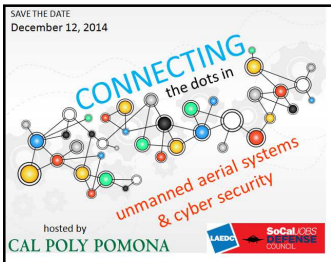

Panel 1: Unmanned Aerial Systems: Current State-of-the-Art and Technological Challenges

Q&A