Next Generation SDAR for CVS

NEXT GENERATION SDAR INTO REAL LIFE

R&D Project

Objectives

- Ensure the coexistence of SDAR & IMA ADS-B system
- Develop the next generation multi-functional SDAR software
- Perform SDAR Certification and Commercialization

Planning

Start: September 2019
Stop: December 2023
Duration: 4 years

Year 1

- Preliminary study of specific and technical challenges
- SDAR V1: Initial development and lab testing

Year 2

- SDAR V2: Development and validation
- Initial validation of integrated Power RF and antenna

Year 3

- SDAR V3: Development and verification of Field validation of integrated Power RF and antenna
- Infrastructure to SDAR V2 and SDAR V3: SDAR Requirement analysis

Year 4

- SDAR V4: Software Verification: SDAR V3 Development and validation
- Final integrated system test and validation
- Performance lane certification
- Test including in-flight scenarios

Next Generation SDAR

SDAR Versions

- SDAR V0: VOR, Loran-C, DME
- SDAR V1: VOR, ILS, RALT, ADS-B
- SDAR V2: VOR, ILS, RALT, ADS-B, DME, TMS & WBR
- SDAR V3: VOR, ILS, RALT, ADS-B, DME, IMA
- SDAR V4: SDAR-IMA: Software Defined, IMA, RALT, TMS & WBR

Benefits

- Minimum Connectors Antennas, Cable length, EMI, Sytem footprint
- Enable the capability to receive functionality during flight
- Maintain Redundancy by reprogramming SDAR when required
- Reduce greenhouse gas emission
- Improve efficiency and maintainability

Challenges

- Network connectivity and signal strength
- Latency reduction and Novel Fusion Algorithm
- Hardware Invariance
- High Resolution and Low SDAR ADC
- Multi-band antennas / Interference
- Independent and Transplantable Software
- Multiple SDAR Certification Process

Definitions

VOR: VHF directional range VOR is an aircraft navigation system operating in the VHF band.

ILS: Instrument landing system is a precision runway approach and expression of this facility means to provide pilots with vertical and horizontal guidance during the landing approach. The ILS provides the aircraft with a vertical guidance, and the glide slope.Includes a glide slope and a localizer.

RALT: The radar altimeter is a navigation system that provides the pilot with the altitude of the plane above the ground. It operates at 3800 and 4800 MHz during takeoff and landing or high in the stratosphere.

ABD-S: The automatic dependent surveillance - broadcast (ABD-S) is an air traffic management (ATM) surveillance system that will replace the traditional radar-based systems. Aircraft reports their own position via the network and receive data, from the ground system, traffic and other information.

DME: The distance measuring equipment (DME) provides distance information on the line-of-sight distance between aircraft and the ground station. The airborne DME equipment operates at 1030MHz to 1150MHz with a bandwidth of 120MHz, which is further divided into 128 channels with a bandwidth of 1MHz, these different measurement schemes called mode X and mode Y doubles the number of possible.

TMS: The transponder modes X Y for selecting has been designed as an evolvable addition to the air traffic control. Radios range system, performs the enhanced surveillance and communication capability required for air traffic control. The airborne device is performing all the function of mode X and C transponders, and has data link capability for control of air-to-ground communications.

WBR: The wideband radio (WBR) will enable 3 airborne communications: air-to-ground, air-to-air and air-to-ground high data rates information exchange. The WBR has an adaptive coding and modulation scheme to ensure a robust bidirectional link.

Observations

- Hardware Redundancy (2 to 4 x)
- Numerous cables, connectors, and complex maintenance
- Heavy and costly (High SWAP-C)

From Hardware Redundancy

To Software Defined

- SDAR-IMA: Software Defined, IMA, RALT, TMS & WBR
- Observations: Minimize connectors, antennas, cable length, EMI, system footprint, network connectivity and signal strength
- Benefits: latency reduction, novel fusion algorithm, hardware invariance, high resolution and low SDAR ADC
- Challenges: network connectivity and signal strength
- Independence and transplantable software
- Multiple SDAR certification process

Partners

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