Iris Event '13 Salzburg

HAUMAS

5th February, 2013



All the space you need

THA-PS-AST-018

Agenda

1. Introduction - Reminder

2. Updates on the project

3. Overview of the V&V tools





Rationale of the THAUMAS

 THAUMAS = Tailored and Harmonised satcom for Atm Uses, Maximising re-use of Aero Swiftbroadband

Key objectives

- Demonstrate the value of satellite communication for aviation safety communications in continental airspace while minimizing the risks
- Offering a cost effective services
- Taking benefit of up to date space technologies to be able to implement smoothly the solution up to the operational date

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What is THAUMAS about ?



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Overall THAUMAS schedule/objectives



What has not changed: Partners

Service deployment plan

Dependability and Certification Plan



Astrium Satellites: Prime and coordinator, management of system requirements (consolidation), system verification plan and verification test bed specification, system simulator design and development

Inmarsat: System architecture definition, SwiftBroadband air interface and protocol adaptation, functional test bed design and development, Costing,

DEIMOS: definition and classification of hazards, apportionment of the RTCP







 Logica: dependability analysis to determine the reliability, availability and maintainability of the SB-S against a set of derived dependability requirements. IT security assessment of the system against the defined security requirements.

parameters. Safety assessment as well as the consolidation of the

 SITA: definition of the EATMS architecture by the time needed for enhanced SB-S integration into EATMS.



SITA

 University of Salzburg: review of the Long Term Forecast and refinement of application, creation of traffic scenario for validation activities





What has changed: Schedule and Objectives



THAUMAS phase 1: Main "Technical" improvements/ new items vs SB Oceanic Safety

Random Access MUD & short latency

 New TCDMA waveforms to support highly efficient low latency signalling, transaction-oriented data, and party-line voice services

Fast System Recovery

 Definition of failover scenarios and identify the transient system loads that result in each scenario to determine whether start-up existing mechanisms are sufficient for ATM applications

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ATN/OSI gateway

"VDL-2 like interface"



What has changed: Technical updates



What has changed: "Operational" aspects

Dependability analysis

 a dependability analysis to determine the reliability, availability and maintainability of the <u>Precursor</u> against a set of derived dependability requirements

Costing

- Cost estimation of the SB upgrades and modifications to comply with the <u>Precursor</u> SRD
- Estimation of deployment costs
- Estimation of cost of operations

Service deployment plan

 Definition and maintenance of an end-to-end schedule for deployment of the <u>Precursor</u> system

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Definition of the requirements i4D services

The Precursor SRD is based on "living" documents

- 1. EUROCAE WG-78
 - Currently, Precursor requirements are based on draft documentation (version J), which provides the operational, safety, and performance requirements (SPR) for the implementation of data communication services that support air traffic services (ATS).

"Datalink communications are expected to be used for routine or frequent types of transactions. "

"Datalink communication are expected to be used for communication functions in which the use of voice communication is considered inefficient or unnecessary, thereby reducing voice-channel use and, where resulting controller workload reduction allows increases in sector size, reduction in the number of required voice channels. "

- Final version expected Q3/2013
- 2. NEXUS group
 - Precursor requirements based on Nexus « Class B » requirements

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Nota: oceanic requirements based on ICAO – GOLD document



Current status (part 1)

System Requirements Specification

- Precursor SRD has been created
 - First draft reviewed with ESA
 - First version under internal review
- Once frozen, data traffic scenario will be updated

System architecture definition

- Most of the documents have been delivered
 - under review with ESA

Assessment of the modifications to SBB in the aero context

Required protocols upgrades and new wave forms analyses have been delivered

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- under review with ESA
- System verification plan and verification test bed specification
 - Documents have been updated, reflecting changes in the Precursor SRD
 - under internal review

Costing/ Service Deployment Plan

To be done



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Vérification and Validation activities

- Verification and Validation of the satcom system will be based on:
 - software simulators
 - hardware test bed

	Simulation tools	Emulation tools
Physical layer	Link Budget Simulation Tool (LBST)	BGAN Physical Layer Tester (BPLT) PoC Modems
Access layer	THAUMAS Simulation Tool (TST)	BGAN Reference System (BRS)

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Link Budget Simulation Tool (LBST)

The Waveform Generator includes all aspects of the channel model,

- transmitter non-linearity, antenna gain profiles; fading (as applicable for the environment), uplink noise; satellite cochannel, adjacent-channel, and intermodulation noise; downlink noise and receiver characterisation.
- The test cases will include both fixedwing and rotary wing variants at a range of elevation angles using antenna gain profiles for the proposed antenna configurations

Objectives:

1. The optimisation of the acquisition information

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2. Assessment of the expected performances





BGAN Physical layer tester (BPLT) Modem Proof-of-Concept (PoC)



• Objectives:

1. Implementation of demodulator and decoder algorithms on hardware that closely represents the components to be deployed in the final system

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2. Consolidation of the performances achieved will LBST



THAUMAS Simulation Tool (TST) Software Network Simulator

- Simulations will be focused on signalling & layer 2 aspects
 - Physical layer aspects (i.e. demodulation performances) will be considered from a statistical point of view
- Reference BGAN network scenario will be validated using existing Inmarsat's BGAN test bench
- Once validated, the simulator will be extended with the new Precursor specific functionalities: MUD, short latency mechanisms, system recovery
 - Under full traffic scenario

Objectives:

 Validation of satcom system performances & capacity requirements under full load nominal/ fallback conditions

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2. Prepare/validate a tool for future end-to-end (pilote⇔controler) validation activities





BGAN Reference System (BRS)

 Under the current contract, the BGAN Reference System (BRS) is mainly used for protocol verification of TST



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Objectives

- 1. Confirmation of the representatively of the TST
- 2. First evolution toward complete a physical test tool



Summary

- THAUMAS phase 1 has been reshaped toward a first iteration of the Precursor system
- A "THAUMAS / Precursor SRD" is under preparation
 - Based on Eurocae WG-78 and Eurocontrol Nexus group outcomes
- A consistent set of simulation and emulation tools (for layers 1 & 2) have been defined and will be developed

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- To assess satcom system performances
- Those tools will be compatible with future end-to-end activities that will be part of the Iris Precursor programme



Questions



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Thanks !

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