

# **2015 Integrated Communication, Navigation, and Surveillance Conference**

**(ICNS 2015)**

**Herndon, Virginia, USA  
21-23 April 2015**

**Pages 1-559**



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## Plenary I - Tuesday, April 21, 2015

### *Plenary Session – Global Harmonization*

**Chairs: Steve Bradford, FAA and Michael Standar, SESAR Joint Undertaking (SJU)**

**Room: Rivanna A,B,C**

Registration and Breakfast (Prefunction and Rivanna D)

Welcome

Conference Keynote: Tackling the Challenges Ahead

Philippe Merlo, Director, Air Traffic Management, EUROCONTROL

[The State of Harmonisation and Key Priorities](#)

Steve Bradford (FAA)

[NextGen SESAR Harmonization](#)

Michael Standar (SESAR Joint Undertaking (SJU))

[Global Harmonization and ICAO's Global Air Navigation Plan \(GANP\)](#)

Richard Macfarlane (ICAO Air Navigation Bureau)

[Comparing European ATM Master Plan and the NextGen Implementation Plan](#)

David Batchelor (SESAR Joint Undertaking (SJU))

Break

[NAS Enterprise Architecture / NAS Segment Implementation Plan \(NAS EA/NSIP\)](#)

Oscar Olmos (MITRE Corp.)

[NextGen/SESAR Harmonization and Collaboration Developing Universal Guidelines](#)

Jerry Hancock (FAA) and Paul Bosman (EUROCONTROL)

Q&A

Lunch (Rivanna D)

Exhibitors Reception & Keynote Address: Mike Harrison, Aviation Evangelist  
**[“From War to Civil Aviation: A Brief History of Transition”](#)**

## Plenary II - Wednesday April 22, 2015

*Plenary Session –UAS/ RPAS Integration in Civil Airspace*

**Chair: Steve Van Trees, Federal Aviation Administration**

**Room: Rivanna A,B,C**

Registration and Breakfast (Prefunction and Rivanna D)

Welcome

[FAA Unmanned Aircraft Systems \(UAS\)](#)

[Overview: UAS and the Proposed Small UAS Rule](#)

Steve George (FAA/AIR-86)

[European RPAS Roadmap RPAS Activities in SESAR 2020](#)

Denis Koehl (SESAR Joint Undertaking (SJU))

[Unmanned Aircraft System \(UAS\) Standards Development: RTCA SC-228 Status](#)

Steve Van Trees (FAA/AIR-130)

Break

[UAS DAA Architecture Considerations](#)

Bruce Eckstein (ITT Exelis)

[UAS Control and Non-Payload Communication \(CNPC\) System Development and Testing](#)

Jim Griner (NASA Glenn Research Center)

Q&A

Lunch (Rivanna D)

**Exhibitor Sponsored Social Event**

## Plenary III - Thursday April 23, 2015

### Plenary Session – Data Communications

Chair: Diana Liang, FAA, and Michael Standar, SESAR Joint Undertaking (SJU)

Room: Rivanna A,B,C

Registration and Breakfast (Prefunction and Rivanna D)

#### Welcome

– Michael Schnell, 16<sup>th</sup> ICNS Conference General Chair

#### Introduction

Diana Liang (FAA)

#### Overview: Technology Evolution and Services

Michael Standar (SJU)

#### Future Now Data COM Architecture

Nikos Fistas (EUROCONTROL)

#### Initial 4D and D-TAXI in SESAR

Jerome Condis (Airbus Industries)

#### Terminal Sequencing and Spacing (TSS)

Jane Thipphavong (NASA Ames Research Center)

#### ATM Network Centric Operations Envisioned in ICAO ASBU and FF-ICE

Charles Chen (Harris Corporation)

#### Q&A and Wrap-up

Diana Liang (FAA) & Michael Standar (SJU)

#### Break

#### Workshop:

Future Satellite Systems as Enabler for CNS

#### Chair:

Aloke Roy, Honeywell Advanced Technology

- [Nikos Fistas, EUROCONTROL](#)
- [Paolo Burzigotti, ESA](#)
- [Ann Heinke, Stellar Solutions](#)
- [Dale Irish, INMARSAT](#)
- [Michael Hooper, IRIDIUM](#)
- [Chen Chung Hsin, ATMRI](#)

Lunch (Rivanna D)

**Tuesday April 21, 2015**

***Session A – Cyber Security 1***

**Chair: Mike Olive, Honeywell**

**Room: Rivanna A**

<b>Present.</b>	<b>Paper</b>	<b>Title</b>	<b>Authors</b>
A1p	A1	FAA Aircraft Systems Information Security Protection Overview	Peter Skaves, DOT / FAA
A2p		Aviation Information Sharing and Analysis Center (A-ISAC)	Faye Francy, Boeing
A3p		Filling the Security Management Void of SESAR and NextGen	Rainer Koelle, Lancaster University
	A4	Security vs. Safety: Why Do People Die Despite Good Safety?	Nicolai Kuntze and Carsten Rudolph, Fraunhofer Institute for Secure Information Technology SIT; Brooke Brisbois, Megan Boggess, and Barbara Endicott-Popovsky, University of Washington

***Session B – Future Communications 1***

**Chair: Denise Ponchak, NASA Glenn Research Center**

**Room: Rivanna B, C**

	B1	Study to Identify Future Aeronautical Communications Candidates for the Far-Term National Airspace System	Joel Wichgers, James Mitchell, Rockwell Collins
	B2	Why NAS Systems Need a Telecommunications Overhaul	Krishnan Balakrishnan, Steven Bodie, Darrow Leibner, Keith Mangino, Kimberley Weese, The MITRE Corporation
	B3	On Proper Selection of Multihop Relays for Future Enhancement of AeroMACS Networks	Behnam Kamali, Mercer University School of Engineering; Robert Kerczewski and Rafael Apaza, NASA Glenn Research Center
	B4	Robust Timing Synchronization for AC-OFDM Based Optical Wireless Communications	Bilal Ranjha, Mohammadreza Aminikashani, Mohsen Kavehrad, Peng Deng, The Pennsylvania State University

***Session C – Surveillance and Situational Awareness 1***

**Chair: Rafael Apaza, NASA Glenn Research Center**

**Room: Rivanna E, F**

	C1	A Novel Big Data Architecture in Support of ADS-B Data Analytic	Erton Boci, Susan Thistlethwaite, Exelis
	C2	Aireon Space Based ADS-B Performance Model	Michael Garcia, Aireon, James Stafford, Exelis, Jay Minnix, Exelis, John Dolan, Regulus
C3p		The Research of Airborne ADS-B-Based Procedures Using Fast-Time and Real-Time Simulation	Daria Skavinskaya, FGUP "GosNIIAS"
	C4	A Multi-Target Track Generation Method Based on ADS-B Data	Siyuan Zhang, Xiaoyun Shen, Min Chen, Xianying Li, Civil Aviation University of China; and Linsheng Zheng, China Electronics Technology Corp

***Session D – Performance Based ATM 1***

**Chair: Bernd Korn, German Aerospace Center**

**Room: Rivanna G**

D1p		Leantrack: An In-Flight Aid to Negotiate a More Efficient Flight Path	Karl Rein-Weston and Colette Posse, Boeing Research and Technology
	D2	Quantifying the Benefits of Pre-emptive Rebooking: A Case Study for a Network Carrier (Jan 12, 2012)	Lance Sherry and Sanja Avramovic, Center for Air Transportation Systems Research at George Mason University
	D3	AIRM-Based, Fine-grained Semantic Filtering of Notices to Airmen	Felix Burgstaller, Dieter Steiner, Michael Schrefl, Johannes Kepler University of Linz; Eduard Gringinger, Frequentis AG; Wilson Scott, EUROCONTROL
	D4	Integration of Dynamic Weather Routes Automation with Air/Ground Data Communications	David McNally, Chester Gong, NASA Ames Research Center; Scott Sahlman, University Affiliated Research Center

***Session E – Aviation, Weather, and Climate Change***

**Co-Chairs: Terrrence Thompson, LMI and Akshay Belle, Booz Allen Hamilton**

**Room: Luray**

E1p		Climate Impacts Upon Aviation and Data Needs for Effective Adaptation	Terence Thompson, LMI
E2p		Climate Change and the Impact of Extreme Temperatures on Aviation	Ethan Coffel, Radley Horton, Columbia University
E4p		WTIC Program - Deriving a Minimum Weather Service	Gary Pokodner, Steve Abelman, FAA

***Session F – Cyber Security 2***

**Chair: Ed DeMello, Boeing  
Room: Rivanna A**

F1p		AATS Security: Risk Assessment to Ensure Aviation Safety	Robert Klein, FAA, Kevin Niewoehner, North Star Group LLC
F2p		Broadband Connected Aircraft Security	Javier Garcia, Boeing Research and Technology Europe
F3p		ICAO Air-Ground Security Standards Strategy	Vic Patel, FAA
F4p		Airborne Multilateration (AMLAT)	Pedro Taboso, Javier Garcia, The Boeing Company

***Session G – CNS System Architectures and Interfaces/SWIM 1***

**Chair: Shoichi Hanatani, Hitachi  
Room: Rivanna B, C**

	G1	SWIM Optimization Methodology	Alexe Leu, Richard Snow, Leone Monticone, The MITRE Corporation
G2p		A Holistic Approach to the Provision of Communications, Navigation, and Surveillance Services in the 21st Century National Airspace System	Mitch Narins, Federal Aviation Administration; Sherman Lo, Yu Hsuan Chen, and Per Enge, Stanford University
	G3	Novel Flight Management System for Improved Safety and Sustainability in the CNS+A Context	Subramanian Ramasamy, Roberto Sabatini, Alessandro Gardi, RMIT University

***Session H – Airport Surface Operations 1***

**Chair: Ben Levy, Consultant  
Room: Rivanna E, F**

H1p		Operational Resilience Performance of European Airports	Rainer Koelle, EUROCONTROL
	H2	Runways Detection Based on Scattering Similarity and Structural Characteristics	Ping Han, Ling Chang, Qingyan Shi, Jingyi Qu, Tianjin Key Lab for Advanced Signal Processing
H3p		A Method for Determining Excess Track Distance in Terminal Airspace	David Gouldey, The MITRE Corporation
	H4	An Assessment of Wind Farms' Electromagnetic Impact for the Aerodrome	Xiaoliang Wang, Yuzhao Ma, Weikun He, Wenyi Wang, Renbiao Wu, Civil Aviation University of China

*Session I – Performance Based Navigation 1*

**Chair: Thomas Becher, The MITRE Corporation**  
**Room: Rivanna G**

I1	Fuel-Efficient Optimized Profile Descents with Time Control	Shih-Yih (Ryan) Young, Kristen Jerome, Rockwell Collins
I2	Development and Operational Transition of the First PBN-Enabled Departure Separation Standard	Ralf H. Mayer, Dennis J. Zondervan, The MITRE Corporation; Brian M. Crow, James K. Allerdice, Jr., H. Madison Walton, Jr., Federal Aviation Administration
I3	Operational Feasibility Analysis of Steep Segmented Approaches	Bernd Korn, Vilmar Mollwitz, Christian Hanes, DLR - Institute of Flight Guidance
I4	Designing Segmented Independent Parallel Approach Procedures for a Mixed Equipage Environment	Christian Hanes, Bernd Korn, German Aerospace Center (DLR)

*Session J – Unmanned Aircraft Systems 1*

**Chair: Andrew Lacher, The MITRE Corporation**  
**Room: Luray**

J1	An Onboard UAS Visual Privacy Guard System	Radu Babiceanu, Petr Bojda, Remzi Seker, Mohammed Alghumgham, Embry-Riddle Aeronautical University
J2	Mitigating Functional Complexity Failures: Designing the Operator Inside the Vehicle OODA-Loop	Lance Sherry, Center for Air Transportation Systems Research at George Mason University, Robert Mauro, University of Oregon
J3	Framework for Incremental Development of Complex Unmanned Aircraft Systems	Martin Selecky, Milan Rollo, Czech Technical University; Paul Losiewicz, John Reade, Nicholas Maida, Quanterion Solutions Incorporated
J4	Hardware and Software Considerations for Unmanned Aircraft Systems	Laurence Mutuel, CGH Technologies, Inc.

**Wednesday April 22, 2015**

*Session K – Cyber Security 3*

**Chair: Krishna Sampigethaya, University of Maryland**  
**Room: Rivanna A**

K2	A Low-Complexity Spoofing Detection and Suppression Approach for ADS-B	Wenyi Wang, Geng Chen, Renbiao Wu, Dan Lu, Lu Wang, Civil Aviation University of China
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	K3	Jamming Suppression for ADS-B Based on a Cross-Antenna Array	Renbiao Wu, Geng Chen, Wenyi Wang, Dan Lu, Lu Wang, Civil Aviation University of China
K4p		Software-Defined Networking in Aviation: Opportunities and Challenges	Krishna Sampigethaya, University of Maryland
<p><i>Session L – Future Communications 2</i></p> <p><b>Chair: Chris Wargo, Mosaic ATM</b> <b>Room: Rivanna B, C</b></p>			
	L1	Integrated Direct RF Sampling Front-End for VHF Avionics Systems	Omar Yeste-Ojeda, René Landry, LASSENA Labs
L2p		DME-Compliant LDACS1 Cell Planning: Initial Steps	Mohamad Mostafa, German Aerospace Center (DLR)
	L3	Efficient Aviation Spectrum Management through Dynamic Frequency Allocation	Ponnu Jacob, Madhukumar A. S., Vinod Prasad, Nanyang Technological University
	L4	DME Interference Mitigation for LDACS1 Based on Decision-Directed Noise Estimation	Muthalagu Raja, A. P. Vinod and A. S. Madhukumar, Nanyang Technological University
<p><i>Session M – Surveillance and Situational Awareness 2</i></p> <p><b>Chairs: Ann Tedford, Retired, formerly FAA</b> <b>Room: Rivanna E, F</b></p>			
	M1	Air Traffic Surveillance Method Using an Existing Network of DME Navigation System	Petr Bojda, Embry-Riddle Aeronautical University
	M2	ACAS X Safety Analysis in the Current RTCA Environment	Todd Kilbourne, Systems Enginuity, Inc.
	M3	A Message Structure to Communicate Current/Predicted Surveillance Service Status	Steve Bellingham, David Scarlett, NAV CANADA
		Progress in Dual Frequency ADS-B Payload Flight Experiments on Stratospheric Balloons	Nickolas Demidovich, FAA Office of Commercial Space Transportation, Paul Purcell, CNS Aviation Services Corporation
<p><i>Session N – Performance Based ATM 2</i></p> <p><b>Chair: Mark Klopfenstein, AvMet</b> <b>Room: Rivanna G</b></p>			
	<u>N1</u>	Real-Time Predictive Analytics To Estimate Air Traffic Flow Rates	Carol Kelly, Keith Craig, Michael Matthews, MIT Lincoln Laboratory
	<u>N2</u>	Estimation of Aircraft Performance Parameters from ADS-C EPP Data	Róbert Šošovička, Petr Veselý, Jiří Svoboda, Honeywell International s.r.o.

	<u>N3</u>	4-Dimensional Trajectory Functionalities for Air Traffic Management Systems	Alessandro Gardi, Roberto Sabatini, RMIT University; Trevor Kistan, THALES Australia, Yixiang Lim, Imperial College London, Subramanian Ramasamy, RMIT University
<p><i>Session O – Simulation and Analysis</i></p> <p><b>Chair: Frederick Wieland, Intelligent Automation, Inc.</b></p> <p><b>Room: Luray</b></p>			
	O1	SWIM Performance Visualization Capability	Krishnan Balakrishnan, Steven Bodie, Duncan Thomson, The MITRE Corporation
	O3	NAS-Wide Simulation of Air Traffic with ATC Behavior Model	Premysl Volf, Czech Technical University
	O4	Simulating RCS of the Parameterized Blades of a Wind Turbine	Yuzhao Ma, Jun Sun, Xiaoliang Wang, Weikun He, Wenyi Wang, Civil Aviation University of China
<p><i>Session P – Cyber Security 4</i></p> <p><b>Chairs: Ed DeMello and Paul Comitz, Boeing</b></p> <p><b>Room: Rivanna A</b></p>			
	P1	Federated Multi-Agency Credentialing	Samet Ayhan, Paul Comitz, Gary Gerberick, Boeing Research & Technology
	P2	Challenges in Federated Identity Management in the Aviation Domain	Victor Brown, IBM, Paul Comitz, The Boeing Company
	P3	Key Distribution Mechanism in Secure ADS-B Networks	Thabet Kacem, Duminda Wijesekera, Paulo Costa, George Mason University; Márcio Monteiro, Alexandre Barreto, Instituto de Controle do Espaço Aéreo
<p><i>Session Q – CNS System Architectures and Interfaces/SWIM 2</i></p> <p><b>Chairs: Leila Ribeiro, The MITRE Corporation</b></p> <p><b>Room: Rivanna B, C</b></p>			
	Q1	Pilot Use of Voice and Datalink Communications for Interval Management	Randall Bone, Kevin Long, The MITRE Corporation
	Q2	Challenges and Current State of Implementation of an IP Platform for Brazil's ATM Communications	Nadia Nassif, Luciano Martins, Fernando Silva, CPqD; Marcos Pacitti, Marcos Belchior, DECEA
	Q3	Performance Verification of VoIP for Terrestrial Communications and IP Surveillance Data for Air Traffic Management	Fernando Silva, Nadia Nassif, Luciano Martins, CPqD; Marcos Pacitti, Marcos Belchior, DECEA

Q4p	Q4	Aircraft Access to Swim – A Collaborative ATM Pathfinder to Support a TBO Environment	Robert Klein, Biruk Abraham, Angel Morales, FAA; Kevin Niewoehner, Farid Aknine, North Star Group LLC
<p><b><i>Session R – Airport Surface Operations 2</i></b></p> <p><b>Chairs: Mohamad Mostafa, German Aerospace Center (DLR)</b>  <b>Room: Rivanna E, F</b></p>			
R1p		AeroMACS Minimum Operational Performance System (MOPS) Compliance Field Trials for Hitachi Prototype	Rafael Apaza, NASA Glenn Research Center, Toshihide Maeda, Hitachi, Ltd.
R2p		AeroMACS the Next Generation Standard in Air Traffic Management	Declan Byrne, WiMAX Forum
	R3	Basic Characteristic Evaluation of AeroMACS Prototype System in Sendai Airport	Kazuyuki Morioka, Naoki Kanada, Shunichi Futatsumori, Akiko Kohmura, Takeshi Tomita, Electronic Navigation Research Institute
R4p		Service Considerations for an AeroMACS Network Reference Model	Brian Crowe, Hitachi Communication Technologies
<p><b><i>Session S – Performance Based Navigation 2</i></b></p> <p><b>Chairs: Bernd Korn, German Aerospace Center (DLR) and Ralf Mayer, The MITRE Corporation</b>  <b>Room: Rivanna G</b></p>			
	S1	Initial Operational Experience with CAT I Ground Based Augmentation System (GBAS)	Dieter Guenter, Joseph Dennis, Pragmatics
	S2	A Configurable Simulation Environment to Test Nonlinear Non-Gaussian Estimator in Navigation Systems	Petr Bojda, Embry-Riddle Aeronautical University, Jan Leuchter, University of Defence
	S3	A Flight Profile Clustering Method Combining TWED with K-Means Algorithm for 4D Trajectory Prediction	Xinmin Tang, Junwei Gu, Zhiyuan Shen, Nanjing University of Aeronautics and Astronautics; Ping Chen, Electronic Technology Group Corporation
	S4	Workload-Based Congestion Prediction	Francis Sutton, Kenneth Lindsay, The MITRE Corporation
<p><b><i>Session T – Unmanned Aircraft Systems 2</i></b></p> <p><b>Chair: Andrew Lacher, The MITRE Corporation</b>  <b>Room: Luray</b></p>			
T1p		Recent UAS Work in the NAS	Robert Stamm, Raytheon Company
	T2	Preliminary Investigation of Data Communications Usage for Unmanned Aircraft Systems	Omar Atia, Omar E. Atia, Leone C. Monticone, Dr. Leila Z. Ribeiro, John C. Gonda, III, Dr. Dongsong Zeng; The MITRE Corporation

T3p		Location Based Communication Services for UAS in the NAS	Dieter Eier, Frequentis USA, Inc., Wolfgang Kampichler, PhD, Frequentis AG
	T4	A Lightweight Communication Architecture For Small UAS Traffic Management (sUTM)	Yoochwan Kim, Juyeon Jo, Monetta Shaw, University of Nevada Las Vegas
<b>Thursday April 23, 2015</b> <i>Session U – Safe and Secure Air Transportation System</i> <b>Chairs: Karl J. Rein-Weston, Boeing</b> <b>Room: Rivanna A</b>			
	U2	Software Reliability Analysis in Air Traffic Control System	Jingyi Qu, Renbiao Wu, Jun Yang, Wenyi Wang, Civil Aviation University of China
	U3	Analysis of the Wind Turbine RCS and Micro-Doppler Feature Based on FEKO	Weikun He, Yuzhao Ma, Yuluo Shi, Xiaoliang Wang, Siyuan Zhang, Civil Aviation University of China
	U4	Wind Turbine Clutter Detection in Scanning ATC Radar	Weikun He, Qiuping Zhai, Xiaoliang Wang, Siyuan Zhang, Renbiao Wu, Civil Aviation University of China
<i>Session V – Future Communications 3</i> <b>Chair: Brent Phillips, Federal Aviation Administration</b> <b>Room: Rivanna B, C</b>			
		Mitigation of Impulsive Interference for LDACS1 - Potentials of Blanking Nonlinearity	Ulrich Epple, Michael Schnell, German Aerospace Center (DLR)
		Time-Domain Channel Estimation for Aeronautical OFDM System with Pulse Blanking	Jinlong Luo, Beihang University
	V3	Time Domain Interleave for Mitigating Impulsive Noise in Aeronautical OFDM Systems	Jinlong Luo, Tao Zhang, Jindong Xie, Beihang University
	V4	From Dispatch to Air Traffic Control Operations — Innovation in Wind Data Uplink	John Gonda, Dongsong Zeng, Bill Flathers, MITRE CAASD
<i>Session W – Surveillance and Situational Awareness 3</i> <b>Chairs: Robert Kerczewski, NASA Glenn Research Center</b> <b>Room: Rivanna E, F</b>			
	W2	Power Line Detection Using Spatial Contexts for Low Altitude Environmental Awareness	Haotian Shan, Jun Zhang, Xianbin Cao, Beihang University
	W3	Airspace Risk Management Using Surveillance Track Data: Stabilized Approaches	Zhenming Wang, Lance Sherry, John Shortle, Center for Air Transportation Systems Research at George Mason University

*Session X – Unmanned Aircraft Systems 3*

**Chair: Andrew Lacher, The MITRE Corporation and Ray Young, Nuair  
Room: Luray**

	X1	Initial Results for Airframe Shadowing in L- and C-Band Air-Ground Channels	Ruoyu Sun, David Matolak, University of South Carolina
	X2	Parameter Impact on Sharing Studies between UAS CNPC Satellite Transmitters and Terrestrial Systems	Robert Kerczewski, Jeffrey Wilson, NASA Glenn Research Center; William Bishop, Jacobs Engineering