## 2013 Integrated Communications, Navigation and Surveillance Conference

# (ICNS 2013)

### Herndon, Virginia, USA 22 – 25 April 2013



IEEE Catalog Number: ISBN: CFP13CNS-PRT 978-1-4673-6251-1

|          | Tuesday April 23, 2013                                         |                                                                                                                                 |                                                                                                                                                            |  |  |
|----------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|          | Session A – Future Advanced Communications Studies             |                                                                                                                                 |                                                                                                                                                            |  |  |
|          |                                                                | Chair: Denise Ponchak, NASA Glenn Re                                                                                            | esearch Center                                                                                                                                             |  |  |
|          | I                                                              | Room: Rivanna A                                                                                                                 |                                                                                                                                                            |  |  |
| Present. | Paper                                                          | Title                                                                                                                           | Authors                                                                                                                                                    |  |  |
| A1p      |                                                                | ATM Communications Beyond NextGen ""P IC                                                                                        | Aloke Roy, Honeywell                                                                                                                                       |  |  |
| A2p      |                                                                | Study of Long Term Candidates for Air-to-Air & Air-<br>to-Ground Communications in the National Airspace<br>System (NAS) ""P IC | Joel Wichgers, Rockwell Collins                                                                                                                            |  |  |
| A3p      |                                                                | An Operator-Oriented Perspective of Future Aviation<br>Datalink Technologies """P IC                                            | Brian Haynes, Daniel Johnson, Rocky<br>Stone, Richard Haendel, XCELAR                                                                                      |  |  |
| A5p      | A5                                                             | Satellite Communication Requirements for 4D Air<br>Traffic Management """3                                                      | Catherine Morlet, Nicholas Lan, European<br>Space Agency; Stefano La Barbera, Thales<br>Alenia Space Italy                                                 |  |  |
| Абр      | A6                                                             | A Survey of Multilink Concepts for Aeronautical Data<br>Link Communications ""34                                                | Barbara Kubera, Max Ehammer, University of Salzburg                                                                                                        |  |  |
| A7p      |                                                                | The German National Project ICONAV""P IC                                                                                        | Michael Schnell, Ulrich Epple, Dmitriy<br>Shutin, Nicolas Schneckenburger, German<br>Aerospace Center (DLR); Thomas Bögl,<br>Rohde & Schwarz GmbH & Co. KG |  |  |
| A8p      | A8                                                             | Modeling of Aerial-to-Aerial Short-Distance Free-<br>Space Optical Links ""46                                                   | Asaad Kaadan, Dayong Zhou, Hazem<br>Refai, The University of Oklahoma; Peter<br>G. LoPresti, The University of Tulsa                                       |  |  |
|          | Session B – Airport Surface Communications and Systems         |                                                                                                                                 |                                                                                                                                                            |  |  |
|          | <b>Chairs: Brent Phillips, Federal Aviation Administration</b> |                                                                                                                                 |                                                                                                                                                            |  |  |
|          |                                                                | Room: Rivanna B, C                                                                                                              |                                                                                                                                                            |  |  |
| B1p      |                                                                | AeroMACS - A Global Standard for Airport Surface<br>Communications ""P IC                                                       | Declan Byrne, WiMAX Forum                                                                                                                                  |  |  |

| B2p | B2 | Signal Evaluation on Airport Surface<br>in 5.1GHz Band 36                                 | Naoki Kanada, Yasuto Sumiya, Naruto<br>Yonemoto, Akiko Kohmura, Shunichi<br>Futatsumori, Electronic Navigation<br>Research Institute                         |
|-----|----|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B3p | В3 | IEEE 802.16j Multihop Relays for AeroMACS<br>Networks and the Concept of Multihop Gain 44 | Behnam Kamali, Mercer University, Robert<br>Kerczewski, NASA Glenn Research Center                                                                           |
| B4p | B4 | Global Mobile Satellite Service Interference Analysis<br>for the AeroMACS 51              | Jeffrey Wilson, Rafael Apaza, NASA Glenn<br>Research Center; Ward Hall, ITT Exelis;<br>Brent Phillips, FAA                                                   |
| B5p |    | Security Framework for AeroMACS N/A                                                       | Thanga Anandappan, Honeywell                                                                                                                                 |
| Вбр | В6 | Airport Surface Gridlock Analysis: a Case Study of<br>Chicago O'Hare 2007 59              | Saba Neyshabouri, Lance Sherry, Karla<br>Hoffman, Center for Air Transportation<br>Systems Research (CATSR)                                                  |
| B7p | B7 | Verification, Validation, and Demonstration of an<br>Aerodrome Map Information Service 71 | Eduard Gringinger, Harald Milchrahm,<br>Frequentis AG; Marcus Andersson, Efrain<br>Guerrero, LFV/NORACON                                                     |
| B8p | B8 | Taxi Time Variation at Major U.S. Airports 87                                             | Derek Robinson, Daniel Murphy, Federal<br>Aviation Administration                                                                                            |
|     |    | Session C – Network Centric Ope                                                           | rations                                                                                                                                                      |
|     |    | Chairs: Paul Comitz and Alvin Sip<br>Room: Rivanna E, F                                   | e, Boeing                                                                                                                                                    |
| C1p | C1 | Flight Information Exchange via<br>Net-Centric Services 101                               | Charles Chen, Harris Corporation; Midori<br>Tanino, Federal Aviation Administration;<br>Bruce Taylor, Massachusetts Institute of<br>Technology, Lincoln Labs |
| C2p |    | A Domain-Specific Language for Aviation Domain<br>Interoperability N/A                    | Paul Comitz, The Boeing Company                                                                                                                              |
| С3р | C3 | Providing a Flight Object Manager in the National<br>Airspace System 109                  | Tony Ng, Lockheed Martin IS&GS                                                                                                                               |
| C5p |    | Are Aviation Data Models Too Complex? N/A                                                 | Paul Comitz, The Boeing Company                                                                                                                              |
| Сбр |    | Passenger Trip Reliability Metrics: 2011 N/A                                              | Lance Sherry, Center for Air Transportation<br>Research at George Mason University                                                                           |

| C7p |                                         | Graph Time-Series Mixture Models for Air Traffic<br>Prediction N/A                                     | Anthony Vardaro, Cuong Thai Doan,<br>Kavitha Chandra, UMass Lowell; Vineet<br>Mehta, MIT Lincoln Laboratory               |  |  |
|-----|-----------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--|--|
|     | Session D – Trajectory Based Operations |                                                                                                        |                                                                                                                           |  |  |
|     |                                         | Chairs: Ben Levy, Saab Sensi                                                                           | S                                                                                                                         |  |  |
|     |                                         | Room: Rivanna G                                                                                        |                                                                                                                           |  |  |
| D1p | D1                                      | Optimal Profile Descent with 4-D Trajectory 114                                                        | Shih-Yih (Ryan) Young, Kristen Jerome,<br>Rockwell Collins                                                                |  |  |
| D2p | D2                                      | Implementation of Avionics Standards for Time Based<br>Air Traffic Management 129                      | Alan Bell, Systems Enginuity                                                                                              |  |  |
| D3p | D3                                      | Multiobjective 4D Optimization of a Trajectory-Based<br>Air Traffic Management 141                     | Julia Zillies, Angela Schmitt, Ruzica<br>Vujasinovic German Aerospace Center<br>(DLR)                                     |  |  |
| D4p | D4                                      | Determination and Visualization of Uncertainties in 4D-<br>Trajectory Prediction 152                   | Paul Weitz, German Aerospace Center<br>(DLR)                                                                              |  |  |
| D5p |                                         | Near Real-Time Predictive Safety Evaluation N/A                                                        | Rafael Fraga, ISA Software                                                                                                |  |  |
| D6p |                                         | Time Based Metering in Support of<br>Playbook Reroutes N/A                                             | Chris Brinton, Mosaic ATM, Inc.                                                                                           |  |  |
| D7p | D7                                      | Analysis of Aircraft Lateral Path Tracking Accuracy &<br>Its Implications for Separation Standards 161 | Michael Cramer, Laura Rodriguez, The<br>MITRE Corporation                                                                 |  |  |
|     |                                         | Session E – Surveillance and Situation                                                                 | al Awareness                                                                                                              |  |  |
|     |                                         | Chairs: Radhakrishna Sampigethay                                                                       | /a, Boeing                                                                                                                |  |  |
|     |                                         | Room: Luray                                                                                            |                                                                                                                           |  |  |
| E1p | E1                                      | A Study of Primary Surveillance Radar Traffic and Its<br>Utility Via ADS-B Uplink 171                  | Brock Lascara, William Carson, David<br>Edwards, The MITRE Corporation                                                    |  |  |
| E2p |                                         | Locating Aircraft with Space-Based ADS-B N/A                                                           | Jeff Beyer, Clairus, LLC                                                                                                  |  |  |
| E3p | E3                                      | Initial Flight Tests of UAT ADS-B Unit for Suborbital                                                  | Richard Stansbury, Massood Towhidnejad,<br>Embry-Riddle Aeronautical University;<br>Nick Demidovich, FAA Commercial Space |  |  |

Transportation Office; Chuck Greenlow,

John DiNofrio, FAA William J. Hughes

Keisuke Matsunaga, Atsushi Senoguchi,

Tadashi Koga, Electronic Navigation

Research Institute (ENRI)

Technical Center

E4p

E4

Reusable Launch Vehicles

and Evaluation 193

182

SSR Mode S Downlink Aircraft Parameters Validation

| E5p |                                             | Flight Privacy in the NextGen: Challenges and Opportunities N/A                                                              | Krishna Sampigethaya, Boeing Research & Technology                                                                                          |  |  |
|-----|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| E6p | E6                                          | Military Position Source Challenges for Worldwide<br>ADS-B Out Compliance 204                                                | Edward Lester, MITRE Corporation                                                                                                            |  |  |
| E7p | E7                                          | Application of Taguchi Methods to NextGen IntegratedSafety Risk Management216                                                | Alan Bell, Resit Unal, Old Dominion<br>University                                                                                           |  |  |
|     |                                             | Wednesday April 24, 20                                                                                                       | 13                                                                                                                                          |  |  |
|     |                                             | Session F – SANDRA Technology                                                                                                | Briefings                                                                                                                                   |  |  |
|     | C                                           | Chairs: Simon Plass and Michael Schnell, German                                                                              | Aerospace Center (DLR)                                                                                                                      |  |  |
|     |                                             | Room: Rivanna A                                                                                                              |                                                                                                                                             |  |  |
| F1p |                                             | SANDRA - Seamless Aeronautical Networking through<br>Integration of Data Links, Radios, and Antennas N/A                     | Simon Plass, German Aerospace Center<br>(DLR)                                                                                               |  |  |
| F2p | F2                                          | Optimization of Robust Header Compression for<br>Aeronautical Communication 226                                              | Romain Hermenier, Christian Kissling,<br>German Aerospace Center (DLR)                                                                      |  |  |
| F3p | F3                                          | Simulation Results and Final Recommendations of the<br>SANDRA Concept for Integrated IP-Based<br>Aeronautical Networking 237 | Thomas Gräupl, Max Ehammer, University of Salzburg                                                                                          |  |  |
| F4p | F4                                          | SANDRA Fault Analysis and Simulation 250                                                                                     | Muhammad Ali, Y. Cheng, J. P. Li, Yim-<br>Fun Hu, Prashant Pillai, University of<br>Bradford                                                |  |  |
| F5p | F5                                          | ATN/OSI over SANDRA Mobile IP Network 258                                                                                    | Frederic Durand, SITA, Frank O'Connor,<br>Aitel ATN                                                                                         |  |  |
| F6p | F6                                          | AeroMACS Evolution — Extension to Landing, Take-<br>Off, and Approach Phases 269                                             | Paola Pulini, Simon Plass, German<br>Aerospace Center (DLR); Lorenzo<br>Taponecco, Michele Morelli, Luca<br>Sanguinetti, University of Pisa |  |  |
| F7p | F7                                          | Theory and Practice of Advanced Communication<br>Features in Aviation 283                                                    | Max Ehammer, University of Salzburg,<br>Department of Computer Sciences                                                                     |  |  |
| F8p | F8                                          | The SANDRA Testbed for the Future AeronauticalCommunication Network291                                                       | Oliver Lücke, Dirk Gomez Depoorter,<br>Theophile Tordjman, Frank Kühndel,<br>TriaGnoSys                                                     |  |  |
|     | Session G – Unmanned Aircraft Systems (UAS) |                                                                                                                              |                                                                                                                                             |  |  |
|     |                                             | Chairs: Jim Griner, NASA Glenn Rese                                                                                          | earch Center                                                                                                                                |  |  |
|     | Room: Rivanna B, C                          |                                                                                                                              |                                                                                                                                             |  |  |
| G1p | G1                                          | Air-Ground Channel Measurements & Modeling for<br>UAS 306                                                                    | David Matolak, Ruoyu Sun, University of<br>South Carolina                                                                                   |  |  |

| G2p | G2 | Security Risk Assessment Process for UAS in the NAS<br>CNPC Architecture 315              | Dennis Iannicca, NASA, Daniel Young, DB<br>Consulting Group, Inc.; Suresh Thadhani,<br>Gilbert Winter, Verizon Federal Network<br>Systems                                |
|-----|----|-------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| G3p |    | UAS Control and Non-Payload Communication<br>(CNPC) System Prototype Status N/A           | James Griner, NASA - Glenn Research<br>Center                                                                                                                            |
| G4p |    | NASA GRC UAS Project Communications Modeling<br>and Simulation Status N/A                 | Gregory Kubat, Vantage Partners, LLC.                                                                                                                                    |
| G5p | G5 | Multiple-Trajectory-Prediction Algorithm for UAS's<br>Sense And Avoid (SAA) Operation 324 | Yan Zhang, Gerard Fairley, U.S. DOT<br>Volpe National Transportation Systems<br>Center                                                                                   |
| G7p | G7 | A Secure Communication Framework for Large-scale<br>Unmanned Aircraft Systems 335         | Jiang Bian, University of Arkansas for<br>Medical Sciences, Remzi Seker, Embry-<br>Riddle Aeronautical University, Mengjun<br>Xie, University of Arkansas at Little Rock |
| G8p | G8 | Controlling UAS Flight Operations in a Mixed-Mode<br>Environment Today 347                | Christopher Smith, Serco Inc., Noel Taylor,<br>Serco Management Services, Inc.                                                                                           |

#### Session H – Performance Based Navigation and Management

#### Chairs: Suzanne Porter and Dr. Thomas Becher, The MITRE Corporation

#### Room: Rivanna E, F

|     | , , , , , , , , , , , , , , , , , , , |                                                                                                                            |                                                                                                                                                        |  |  |
|-----|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| H1p | H1                                    | Toward a Performance-Based NAS: Airports for<br>Potential Application of PBN-Enabled Departure<br>Separation Standards 355 | Ralf H. Mayer, Matthew R. Pollock,<br>Jonathan T. Schwalbe, Graham K. Glover,<br>Remi L. Gottheil, The MITRE Corporation                               |  |  |
| H2p | H2                                    | Voice Communication Benefits From RNAV/RNP in<br>En Route and Terminal Environments 371                                    | Travis Gonzalez, Genki Kondo, The<br>MITRE Corporation                                                                                                 |  |  |
| Н3р | Н3                                    | Agent-Based Modeling for Performance Management in Air Navigation 385                                                      | Rainer Koelle, EUROCONTROL /<br>Lancaster University                                                                                                   |  |  |
| H4p | H4                                    | A Methodology for Airport Arrival Flow Analysis using<br>Track Data - A Case Study For MDW Arrivals 395                    | Akshay Belle, Lance Sherry, Center for Air<br>Transportation Systems Research, GMU;<br>Michael Wambsganss, Anastasia Mukhina,<br>Crown Consulting Inc. |  |  |
| H5p | Н5                                    | Big Data Analysis of Irregular Operations: Aborted<br>Approaches and Their Underlying Factors 405                          | Lance Sherry, Zhenming Wang, Houda<br>Kourdali, John Shortle, Center for Air<br>Transportation Systems Research at George<br>Mason University          |  |  |

| Н6р |    | Benefits of a Collaborative Pre-Departure Rerouting<br>Process at IAH Airport ""P IC  | Michael Carpenter, Saab Sensis<br>Corporation                                                                                                             |
|-----|----|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| H7p | H7 | End-to-End RNP Procedures 415                                                         | Adam Pusateri, The MITRE Corporation                                                                                                                      |
| Н8р |    | Performance Based Navigation:<br>Analysis and Reporting N/A                           | Thomas Becher, MITRE Corporation                                                                                                                          |
|     |    | Session I – CNS Computational A                                                       | nalysis                                                                                                                                                   |
|     |    | Chairs: Chris Wargo, Mosaic A                                                         | ATM                                                                                                                                                       |
|     |    | Room: Rivanna G                                                                       |                                                                                                                                                           |
| I1p | I1 | Modeling Weather in Simulation and Analysis 425                                       | Jessica Young, Andrew Crowell, Andrew<br>Fabian, Federal Aviation Administration                                                                          |
| I2p | 12 | MITRE Data Communication Laboratory Initiative for<br>Departure Clearance (DCL) 436   | Dongsong Zeng, John Gonda, Juliana Goh,<br>Mike Bernock, Jon Salisbury, MITRE                                                                             |
| I3p | 13 | Methodology for Collision Risk Assessment of Flow<br>Corridor Concept 449             | Yimin Zhang, John Shortle, Lance Shrry,<br>George Mason University                                                                                        |
| I4p | I4 | Queue Management Techniques for Avoiding Gridlock<br>in NAS-Wide Simulations 457      | Tim Myers, Ali Tafazzoli, Metron Aviation                                                                                                                 |
| I5p | 15 | Determining Seasonal Delay Curves 465                                                 | Al Meilus, Federal Aviation<br>Administration, Office of Performance<br>Analysis                                                                          |
| Ібр |    | NAS-Wide Simulation Applied to Reduced Oceanic<br>Separation Scenarios N/A            | Joseph Post, James Bonn, Sanjiv Shresta,<br>Federal Aviation Administration                                                                               |
| I7p | Ι7 | Modeling the Impact of Fuel Price on the Utilization of<br>Piston Engine Aircraft 475 | Tao Li, Antonio Trani, Department of Civil<br>and Environmental Engineering, Virginia<br>Tech                                                             |
| I8p | 18 | Predictive Analytics with Aviation Big Data 487                                       | Samet Ayhan, Paul Comitz, Gary<br>Gerberick, The Boeing Company; Steve<br>Bliesner, Avaliant LLC; Johnathan Pesce,<br>Embry Ridle Aeronautical University |

|     |    | Session J – NextGen Concepts and Te                                                                                                            | echnologies                                                                                                |
|-----|----|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|     |    | Chairs: Dr. Lance Sherry and Akshey Belle, Geo                                                                                                 | orge Mason University                                                                                      |
|     |    | Room: Luray                                                                                                                                    |                                                                                                            |
| J2p | J2 | Evolution of First Come, First Served to Best Capable,<br>Best ServedEvolution of First Come, First Served to<br>Best Capable, Best Served 500 | Al Secen, Lockheed Martin IS&GS                                                                            |
| J3p | J3 | Capability-Aware Traffic Flow Management for<br>Metroplex Environments 506                                                                     | Shervin Ahmadbeygi, Emily Bromberg,<br>Matthew Elliott, Taryn Lewis, Metron<br>Aviation Inc.; Ved Sud, FAA |
| J4p | J4 | PLANET-2: Providing in-Flight Weather Services and<br>Observations to and from Business and Regional<br>Aircraft 519                           | Oliver Lücke, Eriza Hafid Fazli,<br>TriaGnoSys; Jean-Marc Gaubert, Remy<br>Gallois, ATMOSPHERE-F           |
| J5p |    | Revolutionizing Air Travel Through Aireon's Global<br>Space-Based ADS-B Surveillance N/A                                                       | Om Gupta, Aireon, LLC                                                                                      |
| J6p | J6 | ATN Ground to Ground Applications to Provide Air<br>Traffic Services in Colombia 531                                                           | Oscar Pico Ortiz, Jorge Ortiz, National<br>University of Colombia                                          |
| J7p | J7 | Comparison of High Reliability Organizations<br>(HROs) 541                                                                                     | Paula Lewis, Federal Aviation<br>Administration (FAA)                                                      |
| J8p |    | CNS Availability and NAS Performance: Data<br>Communications System N/A                                                                        | Aleksandar Bauranov, Jasenka Rakas,<br>University of California Berkeley                                   |
|     |    | Thursday April 25, 201                                                                                                                         | 3                                                                                                          |
|     |    | Session K – Safe and Secure Air Tran                                                                                                           | nsportation                                                                                                |
|     |    | Chairs: Robert Kerczewski, NASA Glenn                                                                                                          | Research Center                                                                                            |
|     |    | Room: Rivanna A                                                                                                                                |                                                                                                            |
| K1p | K1 | Robust Parametric Empirical Bayes Based Anomaly<br>Detection for Flight Safety Events 551                                                      | Anil Yelundur, Keith Campbell,<br>MITRE/CAASD                                                              |
|     |    | Semantic Driven Security Assurance for System                                                                                                  | Rainer Koelle EUROCONTROL Walter                                                                           |

|     | Room: Rivanna A |                                                                                        |                                                                                                                                            |  |  |
|-----|-----------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| K1p | K1              | Robust Parametric Empirical Bayes Based AnomalyDetection for Flight Safety Events551   | Anil Yelundur, Keith Campbell,<br>MITRE/CAASD                                                                                              |  |  |
| K2p | K2              | Semantic Driven Security Assurance for System<br>Engineering in SESAR/NextGen 559      | Rainer Koelle, EUROCONTROL, Walter<br>Strijland, 42 Solutions                                                                              |  |  |
| K3p | К3              | Quantifying Collision Potential in Airport Surface<br>Movement 571                     | Timothy Waldron, Andrew Ford, Saab<br>Sensis Corporation; Sherry Borener,<br>Federal Aviation Administration, Office of<br>Aviation Safety |  |  |
| K4p | K4              | Towards Mathematical Modeling in Security Risk<br>Management in System Engineering 583 | Rainer Koelle, John Hird,<br>EUROCONTROL; Denis Kolev, Lancaster<br>University                                                             |  |  |
| K5p | К5              | Benefits of Commercial Data Link Security 596                                          | Paul Storck, Everett Ayers, ARINC, Inc                                                                                                     |  |  |

| K6p | K6                                                                     | Data Link Requirements for Air-to-Air Collision<br>Avoidance 602                                         | Niklas Peinecke, DLR (German Aerospace<br>Center); Maarten Uijt de Haag, Pengfei<br>Duan, Ohio University; Nico Franzen, DLR<br>(German Aerospace Center)                       |  |  |
|-----|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| K7p | K7                                                                     | An Initial Safety Concept for Segmented Independent<br>Parallel Approaches 609                           | Christian Hanses, German Aerospace<br>Center (DLR)                                                                                                                              |  |  |
| K8p |                                                                        | Time Based Flow Management as a Service - with NextGen SOA N/A                                           | Kiran Chittargi, Lockheed Martin IS&GS<br>Civil                                                                                                                                 |  |  |
|     |                                                                        | Session L – Advanced CNS Commu                                                                           | nications                                                                                                                                                                       |  |  |
|     |                                                                        | Chair: Michael Schnell, German Aerospac                                                                  | ce Center (DLR)                                                                                                                                                                 |  |  |
|     |                                                                        | Room: Rivanna B, C                                                                                       |                                                                                                                                                                                 |  |  |
| L1p | L1                                                                     | Distributed-MILS: A Novel Approach to Advanced<br>ATM Communication Services 622                         | Wolfgang Kampichler, Frequentis AG;<br>Dieter Eier, Frequentis USA, Inc.; Wilfried<br>Steiner, TTTech Computertechnik AG                                                        |  |  |
| L2p | L2                                                                     | Doppler-Aided Channel Estimation in Satellite 630<br>Communication base on frequency-domain equalization | Chengkai Tang, University of Virginia<br>Charlottesville; Baowang Llian,<br>Northwestern Ploytechnical University;<br>Lingling Zhang, University of Virginia<br>Charlottesville |  |  |
| L3p | L3                                                                     | Wavelength Agile FSO Transceiver 635                                                                     | Wei Yi, Peter LoPresti, University of Tulsa;<br>Hazem Refai, University of Oklahoma                                                                                             |  |  |
| L4p | L4                                                                     | Interference Assessment of Future Satellite<br>Aeronautical Communications 644                           | Jan Erik Haakegaard, SINTEF, Alessandro<br>Di Stefano, Thales Alenia Space Italia                                                                                               |  |  |
| L5p | L5                                                                     | Assessing the Capacity Breakeven Performance of VDL2 in Europe 652                                       | Max Ehammer, Carl-Herbert Rokitansky,<br>University of Salzburg, Department of<br>Computer Sciences                                                                             |  |  |
| L6p |                                                                        | Spectrum for UAS Control and Non-Payload<br>Communications N/A                                           | Robert Kerczewski, NASA Glenn Research<br>Center                                                                                                                                |  |  |
| L7p | L7                                                                     | Dual Priority SDMA in Aeronautical<br>Communications 661                                                 | Jindong Xie, Lin Bai, Jun Zhang, Beihang<br>University                                                                                                                          |  |  |
|     |                                                                        | Session M – Modeling, Simulation an                                                                      | d Analysis                                                                                                                                                                      |  |  |
|     | Chairs: Dr. Max Ehammer and Dr. Thomas Gräupl, Universioty of Salzburg |                                                                                                          |                                                                                                                                                                                 |  |  |
|     | T                                                                      | Room: Rivanna E, F                                                                                       |                                                                                                                                                                                 |  |  |
| M1p |                                                                        | The Airspace Concepts Evaluation System: Recent<br>Improvements and Analysis Results N/A                 | Sapna George, Frederick Wieland,<br>Intelligent Automation Inc.                                                                                                                 |  |  |

| M2p |    | Developing a Quantitative Framework for<br>Implementing Traffic Management Initiatives in the<br>National Airspace System N/A | Nina Mohleji, The MITRE Corporation/The<br>George Washington University, Thomas<br>Mazzuchi, Shahram Sarkani, The George<br>Washington University                      |
|-----|----|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| М3р | M3 | An Improved runwaySimulator - Simulation for<br>Runway System Capacity Estimation 670                                         | Peter Kuzminski, The MITRE Corporation                                                                                                                                 |
| M5p | M5 | Potential Wake Turbulence Encounters Analysis in<br>Current and NextGen Flight Operations 681                                 | Zheng Fan, Nataliya Schroeder, Douglas<br>Swol, Antonio Trani, Virginia Polytechnic<br>Institute and State University                                                  |
| М6р |    | A NAS-Wide Shadow Mode<br>Development Environment N/A                                                                         | Benjamin Boisvert, Saab-Sensis                                                                                                                                         |
| M7p | M7 | Inferring Complete Demand and Actual Capacity<br>Information from the Airline Origin and Destination<br>Survey 688            | Tao Li, Department of Civil and<br>Environmental Engineering, Virginia Tech,<br>Hojong Baik, School of Air Transportation<br>and Logistics, Korea Aerospace University |
| M8p |    | Modeling Requirements for Integrated Networks and<br>Information Flow in the Future NAS N/A                                   | Matthew Blake, Crown Consulting, Inc.                                                                                                                                  |
|     |    | Session N – Aircraft/Airline Operations                                                                                       | for NextGen                                                                                                                                                            |
|     |    | Chair: Bernd Korn, German Aerospace                                                                                           | Center (DLR)                                                                                                                                                           |
|     |    | Room: Luray                                                                                                                   |                                                                                                                                                                        |
| N1p |    | Implementation of a Nationwide Wide-Area<br>Multilateration System for Austrian Airspace N/A                                  | Werner Langhans, Austro Control GmbH                                                                                                                                   |
| N2p | N2 | DataComm Trials Automation Platform 699                                                                                       | Frank Matus, Thales                                                                                                                                                    |
| N4p |    | Optimized Itinerary Generation for NAS Performance<br>Analysis N/A                                                            | Feng Cheng, Bryan Baszczewski, John<br>Gulding, FAA                                                                                                                    |
| N5p | N5 | Cross-Platform Aviation Analytics Using Big-Data<br>Methods 706                                                               | Tulinda Larsen, masFlight                                                                                                                                              |