INTERNATIONAL CIVIL AVIATION ORGANISATION

REPORT OF

ICAO APAC RADIO NAVIGATION SYMPOSIUM

New Delhi, India, 07-09 April 2025

The views expressed in this Report should be taken as those of the Meeting and not the organization

Approved by the Meeting and published by the ICAO Asia and Pacific Office, Bangkok

PART I – HISTORY OF THE SYMPOSIUM

PART II – SUMMARY OF DISCUSSION

LIST OF ATTACHMENTS

PART I – HISTORY OF THE SYMPOSIUM

1. Introduction

1.1 The **ICAO APAC Radio Navigation Symposium** was held in New Delhi, India, from 07-09 April 2025. The theme of the Symposium was ***GNSS RFI: Collectively Bridging Gaps and Shaping the Path Forward.*** The Symposium aimed to provide a collaborative platform to exchange experiences and insights on GNSS RFI, analyze its impact and challenges, and facilitate in-depth discussion on mitigation measures and future development to build a resilient aviation system. The Symposium developed recommended actions to guide future efforts in managing GNSS RFI. It also addressed the USOAP Radio navigation flight inspection requirements and the latest developments.

2. Attendance

2.1 The Symposium was attended by **157** participants from **10** Member States/Administrations, namely India, Japan, Malaysia, the Philippines, Qatar, Republic of Korea, Saudi Arabia, Singapore, Thailand and the United States of America, **6** International Organizations, namely Eurocontrol, IATA, ICAO, IFALPA, IFATSEA and ITU, and **5** International Industries, namely Aireon, Airbus, Boeing, Collins Aerospace and Thales. The list of participants is provided in **Attachment 1**.

3. Opening Ceremony

3.1 Shri M. Suresh, Member (ANS), Airports Authority of India, delivered a welcome address to all participants and expressed appreciation to the APAC ICAO office and ICAO HQ for organizing the Symposium in India. Mr. Loftur Jonasson, Chief, CNS and Spectrum (CNSS), ICAO Headquarters, shared the significance of the Symposium along with the expected outcomes. Shri Vumlunmang Vualnam, Secretary, Ministry of Civil Aviation (MoCA), inaugurated the Symposium, and Shri Bharat Bhusan, Joint Director General, Directorate General of Civil Aviation (DGCA), India, shared a vote of thanks on behalf of India with all participants.

4. Officers and Secretariat

4.1 Mr. Loftur Jónasson, Chief CNSS, ICAO Headquarters, Ms. Muna Alnadaf, Technical Officer (CNSS) and Dr. Soniya Nibhani, Regional Officer ANS (CNS) Implementation of the ICAO APAC Regional Office, provided secretariat support to the Symposium, assisted by Ms. Chananphorn Sakdanuphap, Administrative Associate, Technical Assistance, from ICAO Asia and Pacific Regional Office.

5. Agenda of the Workshop

5.1 The agenda items for the Symposium can be accessed by this link.

6. Organization, Working arrangement, Language and Documentation

6.1 The *ICAO APAC Radio Navigation Symposium* was organized for three days, per the program in **Attachment 2**. The Symposium included **thirty** (30) presentations from various GNSS experts. All presentation materials are uploaded to the meeting webpage on the ICAO APAC Website.

PART II – SUMMARY OF DISCUSSION

Day 1: 7 April 2025

1.1. Day 1 was divided into three sessions. The first Session, *Setting the Scene*, explored the global radio navigation developments, updates from the ICAO APAC Region, and GNSS vulnerabilities, providing a foundation for understanding current challenges and their implications for the aviation industry.

1.2. The session included three presentations delivered by the ICAO Secretariat team and the ICAO HQ Navigation System Panel (NSP) vice-chair. Ms. Muna Alnadaf shared details about ICAO provisions, relevant global developments and initiatives, and ongoing NSP activities. Dr. Soniya Nibhani, ICAO APAC Office, shared updates on activities done in the ICAO APAC Office on relevant topics. She introduced the ICAO APAC Office structure, its role and responsibilities, and the challenges faced by APAC States/Administrations in handling matters related to GNSS RFI and other navigation issues. Key issues raised in past ICAO APAC meetings under the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) and respective actions taken by the ICAO APAC Office were shared with the participants. The third presentation by Mr. Gerhard Berz, Eurocontrol, provided background information on GNSS vulnerabilities, their impact on both airborne and ground systems, and trends in spoofing incidents.

1.3. The second and third sessions included a panel discussion on the operational and safety impacts of RFI on GNSS-dependent systems, addressed the consequences of flight operation and air navigation service, and highlighted best practices, ongoing efforts, and recommended actions.

1.4. During the second session, the Symposium was apprised of the impact of the GNSS RFI and the associated challenges in India, Japan, Malaysia, the Philippines, and the ROK. It was noted that States have implemented the reporting procedures and form as outlined in the GNSS Manual. However, the main challenges presented include the lack of real-time monitoring and reporting, ineffective management of reported incidents, lack of awareness of GNSS RFI issues, and the proliferation and online sale of jamming devices.

1.5. In the third session, under panel discussion on the industry's perspective, Indigo and Thai Airways shared their airline viewpoints, and IATA shared APAC Airlines' outlooks on GNSS RFI challenges, impact, best practices and recommendations. Boeing presented recommended best Practices in the case of GNSS Interference from an aircraft manufacturer's view, while Eurocontrol presented GNSS RF Interference and Mitigation from an international organization perspective.

1.6. The panel emphasized the need for States to be better prepared by adopting proactive measures rather than reactive ones, as mitigating GNSS RFI has become a critical risk management activity for States and airlines. Moreover, the panel encouraged States and Air Navigation Services Providers (ANSPs) to re-evaluate GBNA infrastructure under their control and follow AN-Conf/14 *Recommendation 2.2/2 – Addressing global navigation satellite system interference and contingency planning* (a) States to maintain a sufficient network of conventional navigation aids to ensure operational safety as well as sufficient airspace capacity during times of global navigation satellite system interference.

Day 2: 8 April 2025

1.7. Day 2 discussion was divided into three sessions under two agenda items. The first two sessions focused on the agenda item *Mitigating GNSS Interference: Current Measures and Gaps to Address*, while the third on the agenda item *Risks Beyond GNSS: Lessons and Broader Threats to Satellite-Based Systems*.

1.8. Two panels were organized under the agenda *Mitigating GNSS Interference: Current Measures and Gaps to Address* to provide a comprehensive overview of existing mitigation strategies,

identify gaps, and offer insights into what more needs to be done to address emerging challenges posed by GNSS RFI in terms of technological, procedural, and human-centric aspects of mitigation.

1.9. The first session focused on technological aspects of mitigation under which industries, including Aireon, Collines Airspace and Thales, shared information about innovative technical developments such as innovation embedded in the new navaids and surveillance systems, GNSS interference monitoring using space-based ADS-B and building resilient GNSS Systems. In addition, Saudi Arabia shared its experience with GNSS Performance Monitoring in Saudi Arabia, and the USA shared details about PNT and Innovation.

1.10. The Symposium noted that new features are being developed for DME, referred to as Enhanced DME (eDME), within the framework of the SESAR project. These enhancements are expected to contribute to more efficient spectrum utilization and enable an increase in the number of available DME channels.

1.11. Furthermore, the discussion emphasized the importance of a robust and resilient time source for both airborne and ground systems to support aviation safety and security. It was recommended that aviation systems adopt independent clocks or oscillators as the primary means to ensure secure and reliable time and frequency synchronization.

1.12. The Symposium was apprised of the Collins GNSS receiver roadmap and noted the ongoing efforts to enhance airborne GNSS resiliency by leveraging advancements in both GNSS sensor technology and antenna techniques.

1.13. During the second session, a panel discussion on procedural and human-centric aspects of mitigation was conducted under which ITU shared ITU regulations and actions to protect the RNSS from harmful interference and IFATSEA shared ATSEP's Role in Detecting, Diagnosing, and Mitigating GNSS RFI for a Human-Centric ATM System.

1.14. The Symposium emphasized that harmonized communication between ATC and pilots, through standardized radiotelephony (RT) phraseology and well-defined contingency procedures, can significantly enhance safety. In support of this, it was recommended that recommendations for improvements in RT phraseology be submitted to the relevant ICAO experts group for consideration and further evaluation.

1.15. The last panel on day 2 focused on the agenda item *Risks Beyond GNSS: Lessons and Broader Threats to Satellite-Based Systems*. This panel discussion explored lessons learned from the challenges faced by GNSS and examined the risks posed to other satellite-based systems that share similar vulnerabilities. Panellists debated what lessons can be applied to safeguard the resilience of other satellite-based systems and what collaborative efforts and proactive steps were necessary to mitigate the growing threats to these vital technologies.

1.16. This panel considered a total of four presentations. Singapore presented ADS-B spoofing and mitigating measures due to GNSS RFI. At the same time, Thales informed about Space-based Surveillance used for delivering a real-time, continuous and safety-certified ATC surveillance data flow whenever the areas. Aireon presented Space-based Surveillance and its experience based on the first 6 years of Global ATC operations and evolution into Satellite Time Difference of Arrival (TDA) to mitigate GNSS interferences, and Japan shared its experience on research activities for investigating onboard electronic magnetic compatibility issues in current radio environments.

Day 3: 9 April 2025

1.17. On the last day, an expert panel deliberated on Key Takeaways, Recommendations, and the Path Forward. The expert panel, composed of five members from Singapore, ICAO, IATA, USA and Collins airspace, reflected on the insights shared during the first two days, considering the major themes and challenges. Panellists provided a synthesis of the most important takeaways related to radio regulatory topics, flight deck, ATC operations, service provision aspects, short-term C-PNT development, and long-

term C-PNT Development. This session offered a collaborative opportunity to chart a path forward, ensuring that the momentum generated throughout the Symposium was translated into recommended action. The list of key recommendations discussed during the symposium can be accessed by this link.

1.18. The last session of this day was dedicated to the agenda item *Radio Navigation Flight inspection*. The panel discussed the critical role of Radio Navigation Flight Inspection in ensuring the safety of air navigation services. It highlighted the ICAO USOAP audit requirements and addressed the latest developments, including the use of UAS-based flight inspection and relevant ICAO provisions.

1.19. A total of four presentations were discussed under this panel. Japan shared flight inspection using drones in Japan and details of ILS drone propeller modulation. Indonesia shared about flight inspection in Indonesia, while the NSP vice chair shared details of ICAO provisions for flight inspection.

1.20. The Symposium was informed of recently developed guidance material aimed at reducing flight inspection volume, with a particular focus on minimizing the number of inspection runs for ILS procedures. Furthermore, it was noted that ongoing efforts will include a new chapter on GNSS RFI and flight inspection capabilities for geolocating interference sources in the ICAO doc 8071, Vol II.

Q&A Sessions

1.21. Dedicated Q&A sessions were conducted at regular intervals based on available time. In addition, a link to Slido was provided for asking questions. A total of **122 questions** were asked using Slido, and most of them were answered during the Symposium. For some questions, the answers were added to the Slido for the participant's reference.

Key Outcomes of the Symposium

1.22. The final list of recommendations resulting from the Symposium, along with the safety bulletin, will be published by ICAO HQ in due course.

Closing of the Session

1.23. The Symposium recommended organizing such sessions in the future and ensuring that all APAC member States/Administrations participate and contribute in such sessions so that comprehensive regional requirements can be formulated to address GNSS RFI issues in the region.

1.24. In closing, the ICAO Secretariat expressed sincere appreciation and gratitude to the Ministry of Civil Aviation, India, for the excellent organization and smooth conduct of the Symposium. Appreciation was also extended to all participants and panelists for their valuable contributions and active engagement throughout the event. The Secretariat requested continued collaboration and information sharing among States to support ongoing efforts in mitigating GNSS interference and enhancing regional aviation safety and resilience.

SN	State/Administration/ Organization	Name	Administration/Organization	Designation
Member States/Administrations				
1	**India**	Shri Vumlunmang Vualnam	Ministry of Civil Aviation (MoCA)	Secretary
2	**India**	Shri Piyush Srivastava	Ministry of Civil Aviation (MoCA)	Senior Economic Advisor
3	**India**	Shri Asangba Chuba Ao	Ministry of Civil Aviation (MoCA)	Joint Secretary
4	**India**	Shri Padam Lal Negi	Ministry of Civil Aviation (MoCA)	JS&FA
5	**India**	Smt. Rubina Ali	Ministry of Civil Aviation (MoCA)	Joint Secretary
6	**India**	Shri Madhu Sudana Sankar	Ministry of Civil Aviation (MoCA)	Joint Secretary
7	**India**	Shri Pramod Kumar Thakur	Ministry of Civil Aviation (MoCA)	DDG
8	**India**	Shri Rohit Raj	Ministry of Civil Aviation (MoCA)	Director
9	**India**	Ms. Nayonika Dutta	Ministry of Civil Aviation (MoCA)	Joint Director
10	**India**	Shri S.P.R. Tripathi	Ministry of Civil Aviation (MoCA)	Under Secretary
11	**India**	Shri Deepak Nagpal	Ministry of Civil Aviation (MoCA)	Under Secretary
12	**India**	Shri Satish Chandra Tripathi	Ministry of Civil Aviation (MoCA)	Deputy Director
13	**India**	Shri Neeraj Nara	Ministry of Civil Aviation (MoCA)	Section Officer
14	**India**	Shri Punit	Ministry of Civil Aviation (MoCA)	Section Officer
15	**India**	Shri Kaushal Upadhyay	Ministry of Civil Aviation (MoCA)	Section Officer
16	**India**	Shri Varun Tripathi	Ministry of Civil Aviation (MoCA)	Legal Advisor
17	**India**	Shri Kulwant Singh	Ministry of Ports, Shipping and Waterways	Director
18	**India**	Shri Rajesh Kumar Singh	Ministry of Defence	Defence Secretary
19	**India**	Shri Faiz Ahmed Kidwai	Directorate General of Civil Aviation (DGCA)	Director General
20	**India**	Shri Bharat Bhushan	Directorate General of Civil Aviation (DGCA)	JDG
21	**India**	Shri Maneesh Kumar	Directorate General of Civil Aviation (DGCA)	JDG
22	**India**	Shri Ravinder Singh Jamwal	Directorate General of Civil Aviation (DGCA)	Director
23	**India**	Shri Rajesh Nirwan	Bureau of Civil Aviation Security (BCAS)	Director General
24	**India**	Shri Gvg Yugandhar	Aircraft Accident Investigation Bureau (AAIB)	Director General
25	**India**	Shri S.K.G. Rahate	Airports Economic Regulatory Authority of India (AERA)	Chairperson
26	**India**	Shri Vipin Kumar	Airports Authority of India	Chairman
27	**India**	Shri M. Suresh	Airports Authority of India	Member (ANS)

28	**India**	Dr. Sharad Kumar	Airports Authority of India	Member (Ops)
29	**India**	Dr. H. Srinivas	Airports Authority of India	Member (HR)
30	**India**	Shri Pankaj Malhotra	Airports Authority of India	Member (Finance)
31	**India**	Shri Anil Kumar Gupta	Airports Authority of India	Member (Planning)
32	**India**	Dr. Nikhil K. Kanodia	Airports Authority of India	Chief Vigilance Officer
33	**India**	Shri S.K. Mallick	Airports Authority of India	ED (CNS-O&M)
34	**India**	Shri G.K. Venugopal	Airports Authority of India	ED (CNS-P-I)
35	**India**	Shri Suneel Dutt	Airports Authority of India	ED (CNS-P-II)
36	**India**	Shri C Pattabhi	Airports Authority of India	ED (FIU)
37	**India**	Shri Himanshu Joshi	Airports Authority of India	ED (ATM)
38	**India**	Shri Moosa T F	Airports Authority of India	ED (ASM)
39	**India**	Shri Vikas Bhalla	Airports Authority of India	ED (ATFM)
40	**India**	Shri Ayoob M	Airports Authority of India	ED (CAP)
41	**India**	Shri A.K. Meena	Airports Authority of India	ED(AVS)
42	**India**	Smt. Maya Lavania	Airports Authority of India	ED (Admin)
43	**India**	Shri Tony C. Tharayil	Airports Authority of India	GM (CNS-GNSS)
44	**India**	Shri K. Anbarasu	Airports Authority of India	GM (CNS-GAGAN)
45	**India**	Shri Anil Kumar S	Airports Authority of India	GM (CNS-SQA)
46	**India**	Shri Aniruddh Kumar Sharma	Airports Authority of India	GM (CNS-P-II-Automation)
47	**India**	Shri Rajesh Sinha	Airports Authority of India	GM (RCDU & FIU)
48	**India**	Shri Hemant M. Ramchandani	Airports Authority of India	GM (CNS-O&M)
49	**India**	Shri R.K. Shrivastava	Airports Authority of India	GM (CNS-Delhi)
50	**India**	Shri D. Dilip Kumar	Airports Authority of India	GM (ATM)
51	**India**	Shri Naresh Kumar Chaudhary	Airports Authority of India	GM (ATM-ASM)
52	**India**	Shri Bhupendra Kumar Dhamu	Airports Authority of India	Jt.GM (CNS)
53	**India**	Shri Asit Kumar Sinha	Airports Authority of India	Jt.GM (ATM-ASM)
54	**India**	Smt. Vineeta Upadhyay	Airports Authority of India	Jt. GM (ATM)
55	**India**	Shri Vineet Gera	Airports Authority of India	JGM (CNS)
56	**India**	Shri M.A. Salim	Airports Authority of India	JGM (CNS)
57	**India**	Shri Mohan Lal Malvi	Airports Authority of India	JGM (CNS)

58	**India**	Shri K. U. Rao	Airports Authority of India	DGM (ATM)
59	**India**	Shri Awdhesh Kumar Tiwari	Airports Authority of India	DGM (CNS)
60	**India**	Shri Munish Kumar Mangla	Airports Authority of India	DGM (CNS)
61	**India**	Shri J. K. Goel	Airports Authority of India	DGM (ATM)
62	**India**	Shri Kamlesh Kumar	Airports Authority of India	DGM (CNS)
63	**India**	Shri Jalli Vara Prasad	Airports Authority of India	DGM (CNS)
64	**India**	Shri Anurag Gupta	Airports Authority of India	DGM (CNS)
65	**India**	Shri Surendra Sunda	Airports Authority of India	DGM (CNS)
66	**India**	Smt. Aarti Jain	Airports Authority of India	DGM (CNS)
67	**India**	Shri Gurpreet Singh Bhatti	Airports Authority of India	DGM (ATM)
68	**India**	Shri Sekhar Acharjee	Airports Authority of India	DGM (CNS)
69	**India**	Shri Ashutosh Shukla	Airports Authority of India	AGM (ATM)
70	**India**	Shri Jai Prakash Sah	Airports Authority of India	AGM (CNS)
71	**India**	Shri Umesh Kumar	Airports Authority of India	AGM (CNS)
72	**India**	Smt. Archana	Airports Authority of India	AGM (CNS)
73	**India**	Shri Ajay Kumar	Airports Authority of India	AGM (CNS)
74	**India**	Shri Akhil Gupta	Airports Authority of India	AGM (CNS)
75	**India**	Shri Anoop Kumar	Airports Authority of India	SM (Admin)
76	**India**	Shri Rinku Diwakar	Airports Authority of India	SM (CNS)
77	**India**	Shri Vipin Pandey	Airports Authority of India	Manager (CNS)
78	**India**	Smt. Poonam Agrawal	Airports Authority of India	Manager (CNS)
79	**India**	Shri V. Vamsi Krishna	Airports Authority of India	Manager (CNS)
80	**India**	Shri Sabyasachi	Airports Authority of India	Manager (CNS)
81	**India**	Shri Avula Yashwanth Yadav	Airports Authority of India	AM (CNS)
82	**Indonesia**	Riza Faizal	AirNav Indonesia	Assistant Vice President of Communication Facility Planning
83	**Indonesia**	Dedy Iskandar	AirNav Indonesia	Data Processing and Surveillance Facility Planning Head Office
84	**Japan**	Makoto Fukuda	Japan Civil Aviation Bureau	Special Assistant to the Director
85	**Japan**	Koichi Yagyu	Japan Civil Aviation Bureau	Air Navigation Services Engineer
86	**Japan**	Hiroshi Futakami	Japan Civil Aviation Bureau	Special Assistant to the Director of the Division
87	**Japan**	Shunichi Futatsumori	Electronic Navigation Research Institute, National Institute of Maritime, Port and Aviation Technology	Principal Researcher

88	**Japan**	Yasuyoshi Nakatani	Japan Radio Air Navigation Systems Association (JRANSA)	Director
89	**Malaysia**	Mohd Fitri Bin Ishak	Civil Aviation Authority of Malaysia (CAAM)	Deputy Director, Air Navigation Services Technical Division
90	**Malaysia**	Ahmad Tarmizi Bin Ahmad Zaman	Civil Aviation Authority of Malaysia (CAAM)	Navigation Services Technical Division
91	**Philippines**	Michael Rizada	Civil Aviation Authority of the Philippines	Division Chief, Project Implementation
92	**Philippines**	Erwin Rey Dela Cruz	Civil Aviation Authority of the Philippines	Senior CNFS Flight Inspector
93	**Republic of Korea**	Kyung Won Lee	Ministry of Land, Infrastructure and Transport	Assistant Director
94	**Republic of Korea**	Min Hyuk Son	Korea Aerospace Research Institute (KARI)	Researcher
95	**Saudi Arabia**	Eng. Mohammed Mandora	Saudi Air Navigation Services	Communication/Navigation Engineering Manager
96	**Saudi Arabia**	Eng. Khalid Alhazmi	Saudi Air Navigation Services	CNS Project Manager
97	**Singapore**	Eugene Tan	Civil Aviation Authority of Singapore (CAAS)	Airworthiness Engineer
98	**Singapore**	Gerard Peacock	Civil Aviation Authority of Singapore (CAAS)	Flight Operations Inspector
99	**Singapore**	Shu Gao	Civil Aviation Authority of Singapore (CAAS)	Head (Navigation and Specialised Systems)
100	**Singapore**	Wee Jui Chua	Civil Aviation Authority of Singapore (CAAS)	Senior Chief (Operations Technology)
101	**Singapore**	Ho Wee Sin	Civil Aviation Authority of Singapore (CAAS)	Deputy Director (Air Traffic Management) / Deputy Director (Standards and Capability Development)
102	**Sri Lanka**	Haritha Rangana Kerawgoda Kankanamalage	Airport and Aviation Services (Sri Lanka) (Private)Ltd.	Electronics Engineer
103	**Thailand**	Treekun Treeriya	Thai Airways International Public Company Limited	Pilot Management Operations Department
104	**Thailand**	Sorawat Prasongdee	Thai Airways International Public Company Limited	Pilot Management Operations Department
105	**Thailand**	Chainan Chaisompong	Aeronautical Radio of Thailand Ltd.	Air Traffic Engineering Manager
106	**Thailand**	Punyawee Phatthanakitworarak	Aeronautical Radio of Thailand Ltd.	Air Traffic Systems Engineer
107	**USA**	Ken Alexander	Federal Aviation Administration	Chief Scientist for Satellite Navigation
		International Organisations		
108	**Eurocontrol**	Gerhard Berz	Eurocontrol	Head of Navigation and spectrum
109	**IATA (International Air Transport Association)**	John Moore	International Air Transport Association (IATA)	Assistant Director, Flight & Technical Operations, IATA ASPAC
110	**IATA (International Air Transport Association)**	Sunil Prasad	International Air Transport Association (IATA)	Vice President, SpiceJet
111	**IATA (International Air Transport Association)**	Wee Kiat Tang	International Air Transport Association (IATA)	Fleet Safety Pilot, Singapore Airlines
112	**IATA (International Air Transport Association)**	Junichiro Tsubaki	International Air Transport Association (IATA)	Manager, Japan Airlines
113	**IATA (International Air Transport Association)**	Pieter Elbers	International Air Transport Association (IATA)	CEO, IndiGo
114	**IATA (International Air Transport Association)**	Capt. Hemant Kumar	International Air Transport Association (IATA)	Vice President and Chief of Flight Safety, IndiGo
115	**IATA (International Air Transport Association)**	Capt. Akhil Mittal	International Air Transport Association (IATA)	Deputy Chief Pilot Flight Safety, IndiGo

116	**IATA (International Air Transport Association)**	Capt. Sahil Verma	International Air Transport Association (IATA)	Fleet Supervisor Safety, IndiGo
117	**IATA (International Air Transport Association)**	Aakash Bhatnagar	International Air Transport Association (IATA)	Vice President Flight Ops, IndiGo
118	**IATA (International Air Transport Association)**	Ravi Bajaj	International Air Transport Association (IATA)	Director Flight Ops Engineering, IndiGo
119	**IATA (International Air Transport Association)**	Capt. Harish Vasan	International Air Transport Association (IATA)	Fleet Supervisor Technical, IndiGo
120	**IATA (International Air Transport Association)**	Satyajit Dutta	International Air Transport Association (IATA)	Senior Manager Flight Safety, IndiGo
121	**IATA (International Air Transport Association)**	Capt. Abhas Gupta	International Air Transport Association (IATA)	Assistant Chief Pilot-Flight ops, IndiGo
122	**IATA (International Air Transport Association)**	Surinder Pal Singh Narli	International Air Transport Association (IATA)	Director Air Traffic Management, IndiGo
123	**IATA (International Air Transport Association)**	Nicolas Roisne	International Air Transport Association (IATA)	Assistant Manager Operations Development, Cathay Pacific
124	**IATA (International Air Transport Association)**	Campbell Wilson	International Air Transport Association (IATA)	CEO & MD, Air India Ltd
125	**IATA (International Air Transport Association)**	Ajay Singh	International Air Transport Association (IATA)	Chief Executive Officer, SpiceJet
126	**IATA (International Air Transport Association)**	Virendra Malhotra	International Air Transport Association (IATA)	Vice President – Flight Operations, SpiceJet
127	**IATA (International Air Transport Association)**	Sunil Prasad	International Air Transport Association (IATA)	Vice President - Flight Dispatch (Pax & Cargo), SpiceJet
128	**ICAO Headquarters, Montreal, Canada**	Loftur Jonasson	ICAO Headquarters, Montreal, Canada	Chief, CNS and Spectrum (CNSS)
129	**ICAO Headquarters, Montreal, Canada**	Muna Alnadaf	ICAO Headquarters, Montreal, Canada	Technical Officer, Communications, Navigation And Surveillance
130	**ICAO APAC Office, Bangkok, Thailand**	Soniya Nibhani	ICAO APAC Office, Bangkok, Thailand	Regional Officer, Air Navigation Systems (CNS) implementation
131	**ICAO APAC Office, Bangkok, Thailand**	Chananphorn Sakdanuphap	ICAO APAC Office, Bangkok, Thailand	Admin Associate, Technical Cooperation
132	**IFALPA (International Federation of Airlines Pilots Association)**	Niklas Ahrens	IFALPA (International Federation of Airlines Pilots Association)	Line-Pilot
133	**IFATSEA (International Federation of Air Traffic Safety Electronics Associations)**	Dr. Chilaka Mahesh	IFATSEA (International Federation of Air Traffic Safety Electronics Associations)	Deputy General Manager
134	**ITU (International Telecommunication Union)**	Jorge Ciccorossi	ITU (International Telecommunication Union)	Head of the Space Strategic & Sustainability Issues Division (SSSI), ITU Radiocommunication Bureau
		International Industries		
135	**Aireon**	Diego Albert	Aireon	Director of APAC Sales
136	**Aireon**	Michele Carandente	Aireon	Deputy VP Air Traffic Services
137	**Airbus**	Rémi Maillard	Airbus Group India Private Limited	President
138	**Boeing**	Shri Ravinder S Bhatia	Boeing/Jeppesen	Account Director Government & Military Aviation
139	**Boeing**	Shri Ashanand Hans	Boeing	Lead Systems Architect
140	**Boeing**	Shri Ajit Mate	Boeing	Lead System Engineer, Air Traffic Management
141	**Collins Aerospace**	Dr. Sai Kalyanaraman	Collins Aerospace	Principal Technical Fellow
142	**Collins Aerospace**	Shri Sunil Raina	Collins Aerospace	Director

143	**Collins Aerospace**	Ajay Dhiraaj	Collins Aerospace	Director
144	**Thales**	Massimiliano Ferla	Thales	Product Line Manager Navigation aids and Non Radar Surveillance, Marketing & Product Policy, Airspace Mobility solutions / Land and Air Systems / Italy
Indian National Organisations/Industries				
145	**IGRUA**	Prof (Dr.) Bhrigu Nath Singh	Indira Gandhi Rashtriya Uran Akademi (IGRUA)	Director
146	**Pawan Hans Limited (PHL), India**	Shri Sanjiv Razdan	Pawan Hans Limited (PHL)	CMD
147	**India**	Shri Daljit Singh Chawdhary, IPS	Border Security Force (BSF)	Director General
148	**India**	M. Revathi	Department of Telecommunications (Wireless Planning and Coordination)	Joint Wireless Adviser
149	**India**	Manish Sheelwant	Department of Telecommunications (Wireless Planning and Coordination)	Dy. Wireless Adviser
150	**India**	M. Kannan	Defence Research and Development Organisation (DRDO)	Scientist-G
151	**India**	Shri Smit Shah	Drone Federation of India	President
152	**India**	Air Chief Marshal AP Singh	Indian Air Force	Chief of the Air Staff
153	**India**	General Upendra Dwivedi	Indian Army	Chief of the Army Staff
154	**India**	Shri Sajith P	Indian Space Research Organisation (ISRO)	Scientist-SG
155	**India**	Colonel Ajay Pandita	National Security Guard (NSG)	Group Commander(operations)
Indian Educational Institutes				
156	**India**	Prof. Balaji Devaraju	Indian Institute of Technology Kanpur (IIT)	Prof. Dept. of Civil Engineering
157	**India**	Dr. Shweta N. Shah	Sardar Vallabhbhai National Institute of Technology (SVNIT)	DoECE, SVNIT

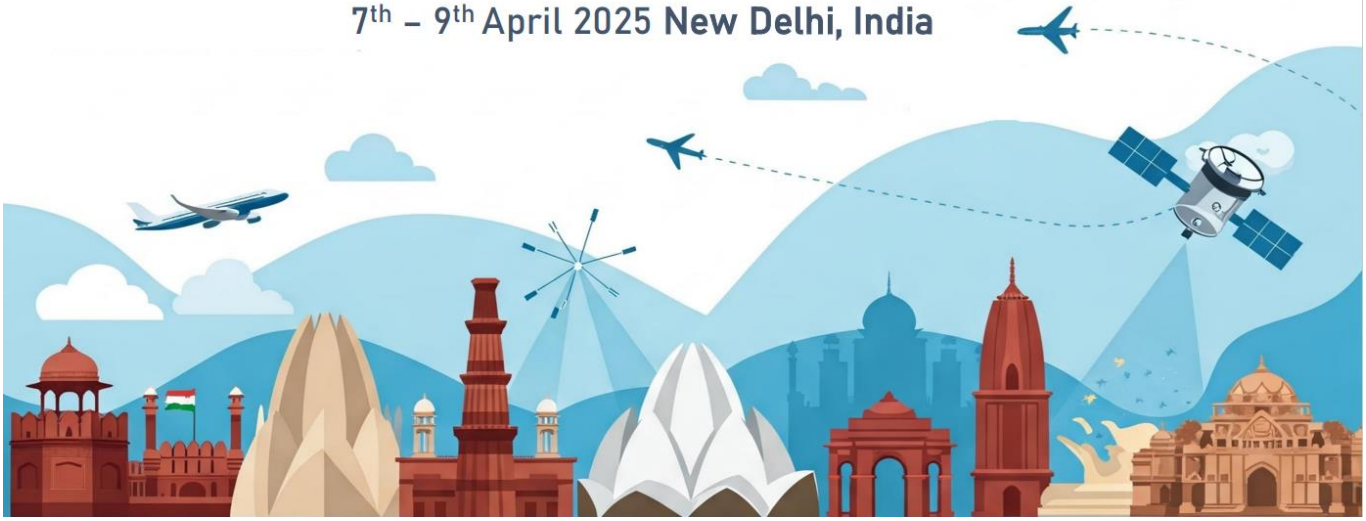
Tentative Program

नागर विमानन मंत्रालय
MINISTRY OF CIVIL AVIATION

ICAO APAC RADIO NAVIGATION SYMPOSIUM

GNSS RFI: Collectively Bridging Gaps and Shaping the Path Forward

7th – 9th April 2025 New Delhi, India



Monday 7th April 2025	
08:00- 09:30	Registration
09:30-10:30	Inauguration Session
10:30-11:00	***Group Photo and Networking Break***
1. Setting the Scene *This session will explore global radio navigation developments, updates from the ICAO APAC Region, and GNSS vulnerabilities, providing a foundation for understanding current challenges and their implications for the aviation industry.*	
Session 1 11:00 -12:00	- **SP01-** ICAO provisions and global developments – ***Ms. Muna Alnadaf****, ICAO HQ* - **SP02-** Updates on activities done in the ICAO APAC Office on relevant topics – ***Dr. Soniya Nibhani****, ICAO APAC Office* - **SP03-** GNSS vulnerabilities and emerging threats – ***Mr. Gerhard Berz*** *Eurocontrol*
12:00 -13:00	***Lunch Break***

2. Addressing GNSS RFI – Challenges, Impact, Insights Gained, Best Practices and Recommendations *Two panels will examine the operational and safety impacts of RFI on GNSS-dependent systems, address the consequences of flight operation and air navigation service, and highlight best practices, ongoing efforts, and recommended actions.*	
Session 2 13:00 – 14:45	**2.1 Panel Discussion on States and Regulators' Perspectives** - **SP04-** GNSS RFI in India: Challenges, Regulations, and Analysis thereof – ***Mr. A K Tiwari and Mr. Vipin Pandey****, India* - **SP05-** GNSS RFI monitoring activity and information sharing in JAPAN – ***Mr. Fukuda Makoto****, Japan* - **SP06-** GNSS RFI in Malaysia: Challenges and associated regulations –***Mr. Mohd Fitri Bin Ishak****, Malaysia* - **SP07-** GNSS RFI in Philippines – ***Mr. Michael C. Rizada****, Philippines* - **SP08-** GNSS RFI in ROK: Challenges and associated Regulations – ***Mr. Kyung Won Lee and Mr. Min Hyuk Son****, ROK* ***Moderator:*** *Ms. Muna Alnadaf, ICAO HQ*
14:45 – 15:15	***Networking Break***

Session 3 15:15 – 17:00	**2.2 Panel discussion on aviation industries perspective** - **SP09-** GNSS RFI issues, challenges and mitigations in IndiGo Airlines – ***Capt. Abhas Gupta and Mr. Surinder Pal Singh Narli,*** *IndiGo* - **SP10-** GNSS RFI issues, challenges and mitigations in Thai Airways – ***Capt. Treekun Treeriya***, *Thai Airways* - **SP11-** Airline Perspectives on GNSS RFI challenges, impact, best practices and recommendations – ***Mr. John Moore,*** *IATA* - **SP12-** Recommended Best Practices in Case of GNSS Interference- ***Mr. Ajit Mate***, Boeing - **SP13-** GNSS RF Interference and Mitigation – Mr. Gerhard Berz Eurocontrol ***Moderator****: Dr. Soniya Nibhani, ICAO APAC Office*
End of Day 1	

Tuesday 8th April 2025	
3. Mitigating GNSS Interference: Current Measures and Gaps to Address *Two panels will be organized under this agenda to provide a comprehensive overview of existing mitigation strategies, identify gaps, and offer insights into what more needs to be done to address emerging challenges posed by GNSS RFI in terms of technological, procedural, and human-centric aspects of mitigation.*	
Session 4 09:00 – 11:00	**Panel discussion on Technological aspects of mitigation** - **SP14-** Innovation embedded in the new Navaids and Surveillance systems: a priority to sustain the safety, resilience, reliability and accuracy of aviation – ***Mr. Massimiliano FERLA,*** *Thales* - **SP15-** It's All About Time, Resilient Time—What, Why, and How– ***Mr. Ken Alexander****, USA* - **SP16-** Evolving GNSS Resilience in Saudi Arabia: From Monitoring Limitations to a Future-Ready Mitigation Strategy–***Mr. Mohammad Mandora & Mr. Khalid Alhazmi,*** *Saudi Arabia* - **SP17-** GNSS Interference Monitoring – Technology Capabilities in the Context of the Asia Region – ***Mr. Diego Albert****, Aireon* - **SP18-** Building Resilient GNSS Systems: Collins Aerospace – ***Dr. Sai Kalyanaraman****, Collins Aerospace*

	***Moderator**: Mr. Gerhard Berz, Eurocontrol*
11:00 – 11:30	***Networking Break***
Session 5 11:30 – 13:00	**Panel discussion on procedural and human-centric aspects of mitigation** - **SP19-** ATC phraseology and reporting in APAC – ***Dr. Soniya Nibhani,*** *ICAO APAC Office* - **SP20-** ITU Regulations and Actions to Protect the RNSS from Harmful Interference – ***Mr. Jorge Ciccorossi,*** *ITU* - **SP21-**ATSEP's Role in Detecting, Diagnosing, and Mitigating GNSS RFI for a Human-Centric ATM System – ***Dr.Chilaka Mahesh,*** *IFATSEA* ***Moderator:** Ms. Muna Alnadaf, ICAO HQ*
13:00 – 14:00	***Lunch Break***
4. Risks Beyond GNSS: Lessons and Broader Threats to Satellite-Based Systems *This panel discussion will explore lessons learned from the challenges faced by GNSS and examine the risks posed to other satellite-based systems that share similar vulnerabilities. Panelists will also debate what lessons can be applied to safeguard the*	

resilience of other satellite-based systems and what collaborative efforts and proactive steps are necessary to mitigate the growing threats to these vital technologies.	
Session 6 14:00 – 16:00	- **SP22-** ADS-B spoofing and mitigating measures – ***Mr. Ho Wee Sin,*** *Singapore* - **SP23-** Space-based Surveillance: delivering a real-time, continuous and safety-certified ATC surveillance data flow whenever the areas –***Mr. Massimiliano FERLA,*** *Thales* - **SP24-** Space-based Surveillance: First 6 years of Global ATC operations and evolution into Satellite Time Difference of Arrival (TDA) to mitigate GNSS interferences – ***Mr. Michele Carandente,*** *Aireon* - **SP25-** Research activities for investigating on-board electronic magnetic compatibility issues in current radio environments – ***Mr. Shunichi Futatsumori,*** *Japan* ***Moderator:*** *Mr. Loftur Jonasson, ICAO HQ*
End of Day 2	

Wednesday 9th April 2025

5. Expert Panel: Key Takeaways, Recommendations, and the Path Forward

The expert panel will reflect on the insights shared during the first two days, discussing the major themes and challenges. Panelists will provide a synthesis of the most important takeaways. This session offers a collaborative opportunity to chart a path forward, ensuring that the momentum generated throughout the symposium is translated into recommended action.

Session 7 09:00-10:30	**Expert Panel:** - **Mr. Loftur Jonasson**, ICAO HQ - **Mr. John Moore**, IATA - **Mr. Ho Wee Sin**, CAAS, Singapore - **Mr. Ken Alexander**, FAA, USA - **Dr. Sai Kalyanaraman,** Collins Aerospace ***Moderator:*** *Mr. Gerhard Berz, Eurocontrol*
10:30 – 11:00	***Networking Break***

6. Radio Navigation Flight inspection *The panel will discuss the critical role of Radio Navigation Flight Inspection in ensuring the safety of air navigation services. It will also highlight the ICAO USOAP audit requirements and address the latest developments, including the use of UAS-based flight inspection and relevant ICAO provisions.*	
Session 8 11:00 – 12:45	- **SP26-** ICAO USOAP Requirments– ***Ms. Muna Alnadaf, ICAO HQ*** - **SP27-** ICAO Provisions on Flight Inspection – ***Mr. Gerhard Berz,*** *EUROCONTROL* - **SP28-** Flight inspection using drones in Japan and Details of ILS drone propeller modulation – ***Mr. Hiroshi FUTAKAMI****, Japan* - **SP29-** Flight Inspection in Indonesia: Ensuring Accuracy and Reliability – ***Mr. Riza Faizal and Mr. Dedy Iskandar,*** *Indonesia* ***Moderator:*** *Ms. Muna Alnadaf, ICAO HQ*
12:45 - 13:15	Presentation of the Recommendations & Closing Ceremony
13:15 - onwards	***Lunch and Farewell***
End of the Symposium	

नागर विमानन मंत्रालय
MINISTRY OF CIVIL AVIATION

ICAO APAC RADIO NAVIGATION SYMPOSIUM

GNSS RFI: Collectively Bridging Gaps and Shaping the Path Forward

7th – 9th April 2025 New Delhi, India

Please ask your questions using this QR code (Slido)

Thank you for your questions!