



ICAO

**Twenty First Meeting of the Africa-Indian Ocean Planning and Implementation Regional Group  
(APIRG/21)  
(Nairobi, Kenya, 9 – 11 October 2017)**

**Agenda Item 5: Regional Air Navigation Deficiencies**

**5.2.3 Industry initiatives and other air navigation matters**

**CYBER SAFETY AND RESILIENCE OF THE AIR NAVIGATION SYSTEM**

*(Presented by the Secretariat)*

**SUMMARY**

This paper presents the threat and challenges encountered in the area of Safety and Resilience of air navigation systems in the AFI Region and calls upon for the establishment of preventive and mitigating policies and the identification and conduct of appropriate actions aimed at minimizing the impact of this threat.

**Action by the meeting is at paragraph 3:**

**REFERENCE(S):**

- Annex 17 — *Security — Safeguarding International Civil Aviation against Acts of Unlawful Interference to the Convention on International Aviation*
- Doc 9750, *Global Air Navigation Plan 5<sup>th</sup> Edition*
- Doc. 9854, *Global Air Traffic Management Operational Concept*
  - Doc 8973–Restricted, *Aviation Security Manual*
- Circ. 330, *Civil/Military Cooperation in Air Traffic Management*
- Doc 9855, *Guidelines on the Use of the Public Internet for Aeronautical Applications*

**Related ICAO Strategic Objective(s) and ASBU Performance improvement Areas and ASBU B0 Modules:**

**Strategic Objective(s):** A – *Safety*, B – *Air Navigation Capacity and Efficiency*, C – *security*

**ASBU PIAs & B0 Modules:** All applicable to AIM, ATM & MET and CNS systems

**1. INTRODUCTION**

1.1 The continuous global growth of air traffic requires the provision of more and more complex infrastructure and systems with an increased sharing of information amongst various stakeholders.

1.2 ATM infrastructure and systems are being brought on board taking advantage of the flexibility and cost effectiveness of available emerging open technologies based on internet protocols. However these emerging open technologies also increases the vulnerabilities to cyber-attacks associated to connected air navigation systems.

1.3 It is therefore important for States in the AFI Region to ensure that the risks and threats of cyber-attacks to air navigation systems are minimized through the establishment of an adequate regulatory framework and the identification and conduct of appropriate actions by all parties involved in the provision or operation of air navigation services.

## 2. DISCUSSION

2.1 The efficient provision of the future air navigation services is based on a worldwide exchange and management of information used by the different ATM processes and services.

2.2 The Global Air Navigation Plan (GANP Doc. 9750) was developed under the concept of ICAO Aviation System Block Upgrades (ASBUs) framework comprising threads with several elements, the implementation of some of which gives high priority to information sharing:

- a) **B0-FICE Increased interoperability, efficiency and capacity through ground-ground integration** in support to the coordination of ground-ground data communication between ATSU's, based on ATS interfacility data communication (AIDC) defined by ICAO Document 9694;
- b) **B0-DATM: Service improvement through digital aeronautical information management** with the introduction of digital processing and management of information by the implementation of AIS/AIM making use of AIXM, moving to electronic AIP and better quality and availability of data;
- c) **B1-DATM : Service improvement through integration of all digital ATM information** to increase information integration and to support a new concept of ATM information exchange, foster access via *internet-protocol-based tools Exchange models such as AIXM, FIXM, IWXXM ;*
- d) **B1-SWIM: Performance improvement through the application of system-wide information management (SWIM)** with the intention to create an aviation *intranet* based on standard data models, and *internet-based protocols* to maximize interoperability

2.1 This worldwide information exchange, while enhancing efficiency, capacity and flexibility of the operations and raising productivity, increases vulnerabilities to cyber-attacks since the trend is to use open available and emerging technologies.

2.2 The cyber threats associated to the vulnerabilities of the air navigation system will increase since current and future systems to be implemented, require more information sharing through increased use of *public available information technology, shared network* and computing infrastructures.

2.3 The threat is both very real, serious and may emanate from various internal and/or external sources since the air navigation systems infrastructure includes people, procedures, information, resources, facilities (*air traffic services units and airports*), equipment (***communications, navigation, and surveillance (CNS)***). Therefore in the framework of their National Civil Aviation Security Programme, States and Operators should develop and execute security strategies and plans to ensure continued mission operations despite cyber threats that can jeopardize safety and resilience of the air navigation system.

#### **National coordination**

2.4 The issue on ATM security is addressed in various ICAO documents. ATM Security is defined in ICAO Circular 330, Civil/Military Cooperation in Air Traffic Management as: ***“The contribution of the ATM system to civil aviation security, national security and defense, and law enforcement; and the safeguarding of the ATM system from security threats and vulnerabilities.”***

2.5 Aviation security remains a national responsibility. In this regard Annex 17 (3.1.1) provides that ***“States shall establish and implement a written national civil aviation security programme to safeguard civil aviation operations against acts of unlawful interference, through regulations, practices and procedures which take into account the safety, regularity and efficiency of flights.”***

2.6 In the framework of their above National Civil Aviation Security Programme it is recommended to States (Annex 17- 4.9.1 & 4.9.2) ***“to ensure that appropriate measures are developed in order to protect the confidentiality, integrity and availability of critical information and communications technology systems and data used for civil aviation purposes from interference that may jeopardize the safety of civil aviation and to encourage entities involved with or responsible for the implementation of various aspects of the national civil aviation security programme to identify their critical information and communications technology systems and data, including threats and vulnerabilities thereto, and to develop and implement protective measures to include, inter alia, security by design, supply chain security, network separation, and remote access control, as appropriate.”***

2.7 ICAO Air Traffic Management Security Manual (Doc 9985-AN/492 – Restricted) indicates that ***“ATM system infrastructure protection refers to the protection of the ATM system infrastructure through information and communication security, physical security, and personnel security. It also includes the provisions for continuity of service during an emergency or disasters.***

***Therefore, an ATM security programme for infrastructure protection should have the following components:***

a) *Physical security;*

b) *Personnel security;*

c) ***Information and communication technology (ICT) security;***

d) *Security contingency planning to address security issues for disaster recovery and continuity of operation.”*

2.8 Having multidisciplinary stakeholder's air navigation safety and resilience require a strong collaboration between national entities. Although the national aviation security is fully addressed in the Framework of the AVSEC there is a lack of visibility in the establishment of national policies and strategies to address the specific issue on ATM Security in particular its cyber safety and resilience component in the AFI Region.

It is therefore advisable to clearly develop a national framework (Regulation, policy strategy and plan) in this matter to be included in the national Civil Aviation Security Programme.

### **International coordination**

2.9 A seamless ATM operation in the AFI Region requires interconnexion and interoperability of systems resulting in possible cyber vulnerabilities that requires a high level of cooperation among States although aviation security remains a national responsibility.

2.10 The appropriate authority for civil aviation security should establish coordination procedures with corresponding authorities in adjacent States, and agreements should be established concerning the exchange of information. ATS units should already have established Letters of Agreement (**LOAs**) with adjacent ATS units within one State or in other States, detailing the communications and coordination procedures. If these LOAs do not already address procedures related to cyber safety and resilience, they should be updated as part of the planning for implementation of ATM security procedures.

2.11 This collaborative and cooperative approach is necessary to ensure that safety and resilience policies and provisions will be able to successfully counter a whole range of acts which may represent a threat to facilities and systems that could result in the disruption of the ATM system's ability to provide services.

## **3 ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) Take note of the information presented in this working paper, highlighting the importance of the issue on ATM security in particular cyber threats in the AFI Region;
- b) Encourage States who have not done so to develop a national framework (Regulation, policy strategy and plan) in this matter to be included in the national Civil Aviation Security Programme ;
- c) Encourage States to establish and maintain coordination procedures with their neighboring States in order to ensure that safety and resilience policies and provisions will be able to successfully counter a whole range of threats in particular those related to cyber-attacks;
- d) Request ICAO to continue its support through the provision of guidance material, training, Workshop/Seminars on ATM Security in particular on cyber safety and resilience.

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