INTERNATIONAL CIVIL AVIATION ORGANIZATION

WESTERN AND CENTRAL AFRICA OFFICE

Twenty-fifth Meeting of the AFI Satellite Network Management Committee (SNMC/25)
(Freetown, Sierra Leone, 18-22 December 2017)

Agenda Item 5: Outcomes of APIRG 21st Meeting

Cyber Safety and Resilience of ATM Systems

(Presented by the Secretariat)

SUMMARY
This paper presents the discussion of APIRG 21st meeting on 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**:
REFRENCE(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 5th 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 APIRG 21st Meeting held in Nairobi Kenya from 9 to 11 October 2017 discussed under its Agenda Item 5-*Regional Air Navigation Deficiencies*, issues of cyber safety and Resilience for the air navigation system in the AFI Region.

1.2 It was recognized that the continuous global growth or air traffic requires the provision of more and more complex infrastructure and systems with an increased sharing of information amongst various stakeholders.

1.3 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 increase the vulnerabilities to cyber-attacks associated to connected air navigation systems.

1.4 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 **s**upport to the coordination of ground-ground data communication between ATSUs, based on ATS Interfacilities 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, increase

2.2 s vulnerabilities to cyber-attacks since the trend is to use open available and emerging technologies.

2.3 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.

2.4 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

2.5 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***."

2.6 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***."

2.7 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.*"

2.8 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."

2.9 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

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

2.11 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 (**LOA**s) 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.

2.12 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.

2.13 In view of the above APIRG/21 formulated the following draft conclusion

DRAFT CONCLUSION 21/XX: CYBER SAFETY AND RESILIENCE OF THE OF THE AIR NAVIGATION SYSTEM

That, in order to address the emerging issues related to cyber security, safety and resilience of the air navigation systems in AFI Region:

a) States should develop national frameworks including regulations, policy strategy and Plan linked to the National Civil Aviation Security Programme in collaboration with all concerned stakeholders;
b) States should as a matter of urgency establish and maintain coordination procedures with their neighbouring States in order to share information on cyber events and ensure that safety and resilience policies and provisions will apply counter the increasing threats in particular those related to cyber-attacks; and
c) ICAO in collaboration with industry stakeholders should endeavour to support to States through the provision of guidance material, training, Workshop/Seminars on ATM Security in particular on cyber safety and resilience of the air navigation service.

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 SNMC members to take the appropriate internal and external actions in order to implement the above APIRG Conclusion by duly:

- Conducting a safety risk gap analysis of AFISNET in the matter and identifying mitigating measure;
- Considering the issues on Cyber Threats, Cyber Safety and Resilience in the re-engineering process of AFISNET.
