

## **Contingency Preparedness**

Presented by PLC

### **SUMMARY**

At the 14<sup>th</sup> Air Navigation Conference held in Montreal from 26 August to 6 September 2024, it was agreed that ICAO, together with States and Industry, would develop guidance on air traffic contingency management to support the implementation of Annex 11. As a recognised industry organisation, this information paper constitutes IFATCA's first submission in progressing this recommendation.<sup>1</sup>

Establishing exact and detailed contingency management procedures for each situation may not be possible for States depending on several factors. However, ensuring the safety of operations during disruptions of the air traffic services or potential disruptions is paramount and air traffic services authorities are required to develop and promulgate contingency plans<sup>2</sup>.

This working paper considers possible changes to the guidelines presented for contingency preparedness presented in ICAO Annex 11 and provides information regarding the need for a holistic approach to contingency planning.

## **1. INTRODUCTION**

- 1.1. As a result of working paper 75 presented by the International Air Transport Association (IATA) and the International Business Aviation Council (IBAC) at the 14<sup>th</sup> Air Navigation Conference held in Montreal from 26 August to 6 September 2024,<sup>3</sup> the conference agreed to the following recommendation:

### **Recommendation 1.1/2 – Resilience of the air navigation system**

That States:

<sup>1</sup> 14<sup>th</sup> Air Navigation Conference, Recommendation 1.1/2.

<sup>2</sup> ICAO Annex 11 2.32

<sup>3</sup> 14<sup>th</sup> Air Navigation Conference, WP75.

- a) implement airspace optimization initiatives covered by ICAO provisions, such as air traffic flow management, flexible use of airspace and civil-military cooperation;
- b) share advance information related to anticipated disruptions; and  
that ICAO:
- c) together with States and industry, develop global guidance on air traffic management contingency management, including the recovery phase, as well as regional frameworks, to support the implementation of Annex 11 — Air Traffic Services.

- 1.2. This information paper will constitute IFATCA's first submission to give effect to this recommendation.
- 1.3. The purpose of the guidelines for contingency planning presented in ICAO Annex 11 is to assist in providing for the safe and orderly flow of air traffic in the event of disruptions of air traffic services and related supporting services and in preserving the ability of major world air routes within the air transportation system in such circumstances.<sup>4</sup> The guidelines for contingency measures were first approved by the Council on June 27, 1984 following a study by the Air Navigation Council and in consultation with States. With the passage of time and experience gained with the application of contingency measures in various parts of the world, the guidelines were subsequently amended.
- 1.4. States have a responsibility to provide air traffic services and supporting services in particular portions of airspace. They are also responsible for instituting measures to ensure the safety of international civil aviation and *where possible* for ensuring that adequate provisions for alternate facilities and services are provided. As such, States are required to develop, promulgate and implement contingency plans. How States develop these contingency plans will relate directly to their level of preparedness for certain events which may preclude the provision of the air traffic services thereby causing disruptions to air travel over the affected areas.
- 1.5. A key component in contingency planning and preparedness is the level of stakeholder engagement which occurs during the development stage. ICAO recommends that international coordination is required for contingency planning given the fact that disruptions in services in certain portions of airspace will likely result in significant impact to the services being provided in adjacent airspace. It is important if contingency preparedness is to exist at a high level that the relevant stakeholders be identified and engaged at the appropriate time in the development of contingency plans. Two key industry stakeholders namely the International Air Transport Association (IATA) and the International Federation of Airline Pilots' Associations (IFALPA) are also

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<sup>4</sup> ICAO Annex 11 Air Traffic Services Attachment C *Material Relating To Contingency Planning*

recommended as valuable advisors on the practicability of overall contingency plans in Annex 11. Other international organisations such as IFATCA, the International Federation of Aeronautical Information Management Associations (IFAIMA), the International Flight Information Services Association (IFISA) and the International Federation of Air Traffic Safety Electronics Associations (IFATSEA) should also be involved and equip themselves adequately to assist and advise States in the development of contingency plans.

- 1.6. Contingency plans are meant to *reasonably* mitigate and lessen the consequences to air navigation in circumstances where there is degradation of facilities and services. These plans must be acceptable to the providers and users of contingency services<sup>5</sup>. The framework for contingency planning presented in ANNEX 11 (Attachment C) is the same that was developed and documented in the ATS Planning Manual (ICAO Doc 9426)<sup>6</sup>. The scope of contingency planning and preparedness has evolved over the years as various circumstances resulting in significant disruption of services have had global impact. This paper will examine a few of those situations having global impact and for which appropriately contextualise the need for enhancements to the contingency guidelines.

## 2. DISCUSSION

- 2.1. ICAO Annex 11 Attachment C presents the steps which are to be taken by States to prepare action which will facilitate the timely introduction of contingency arrangements<sup>7</sup>. The guidelines include, inter alia:
  - Preparation of contingency plans in respect of risk assessment of the impact of military conflict, unlawful interference, natural disasters and public health emergencies
  - Monitoring of developments that may trigger contingency arrangements to be developed and applied
  - Establishment of a central agency which would be able to provide 24 hours a day, up-to-date information on the situation and associated contingency measures until the restoration of normality.
- 2.2. ICAO is also available to assist with contingency arrangements and “for monitoring the developments that might lead to events requiring contingency arrangements”. A key feature of the preparedness framework is the role of ICAO in coordinating the development of contingency plans through cooperation of States. Invariably, contingency arrangements will need multi-State collaboration and agreements based on scenarios which present challenges to adjacent airspaces when there are service disruptions. Accordingly, contingency plans which constitute a temporary deviation from regional air navigation plans are an important component of State collaboration.

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<sup>5</sup> ICAO Doc 9426 ATS Planning Manual Section 1, Chapter 1, 1.3.5 *Coordination*

<sup>6</sup> Section 1, Airspace and Traffic Management, Chapter 1, Air Traffic Flow Management and Flow Control 1.3

<sup>7</sup> ICAO ANNEX 11 ATTC-2 Part 4. *Preparatory Action 4.1*

- 2.3. The contingency preparedness framework outlines the pillars of creating a collaborative system between States and ICAO to facilitate the safe continuance of air travel during service disruptions. However, there is room for greater specificity in the documentation to assist States in developing their contingency arrangements. In 2023, an analysis of regional compliance for the States within the North America (NAM) Central America and Caribbean (CAR) region indicated that 48% of states were compliant with having contingency arrangements and the issue of compliance remained a challenge for several of those states.<sup>8</sup> If procedures (specific step by step guidance) for the development of contingency plans were presented in ANNEX 11, or in an ICAO document there could be an improvement in compliance from the States.
- 2.4. The framework contained in ICAO ANNEX 11 is the same as is documented in the ATS Planning Manual (ICAO Doc 9426); the framework is forty (40) years old. The applicability and relevance of this approach to contingency planning should be investigated by ICAO, given the current demands of the aviation industry and the technology being used to facilitate these demands. States may have difficulty in applying the existing framework given their current infrastructure, scope of operations and resources.

### **THE AIR TRAFFIC CONTROL PERSPECTIVE**

- 2.5. The purpose of the guidelines provided by ICAO for contingency arrangements is

...to assist in providing for the safe and orderly flow of international air traffic in the event of disruptions of air traffic services and related support services and in preserving the availability of major world air routes within the air transport system in such circumstances<sup>9</sup>.

ICAO Annex 11 Air Traffic Services Attachment C Material Relating to Contingency Planning.  
Introduction 1.2

It can be deduced that this statement refers to all personnel involved in the provision of air traffic services as well as users of the airspace. As such, the guidelines developed should incorporate input from all key stakeholders and end users. It is important to identify all the stakeholders who should be involved in the development of, implementation and training in contingency arrangements and obtain their input.

- 2.6. A detailed template for the development of contingency plans should be provided for guidance in ICAO ANNEX 11, Attachment C. This template should include guidance for a collaborative approach to be utilised by the States in the development of holistic plans that include the input of the personnel providing air traffic services as well as the related support services. States may encounter challenges in adapting the existing ICAO framework because all the

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<sup>8</sup> ICAO Requirements for Contingency Planning: Third NAM/CAR Regional Contingency and Emergency Planning and Response Meeting

<sup>9</sup> ICAO Annex 11 Air Traffic Services Attachment C Material Relating to Contingency Planning. Introduction 1.2, Fifteenth Edition, July 2018

stakeholders are not identified and their respective roles considered in the contingency planning.

- 2.7. The guidance provided by ICAO in ANNEX 11 also recommends that contingency scenarios are analysed against existing contingency arrangements if they are available. For ATCOs and air navigation services personnel, this would require the development of robust simulations and procedures to facilitate the provision of alternative facilities and services during contingency situations. The scope of the ICAO guidelines in this regard is too wide and does not consider the input required from the air traffic services and related support services during the phases of reducing the level of service being provided (entering contingency mode) and the resumption of normal services. The guidelines also lack the framework for the specific steps which should be utilized by States in considering the input of the air traffic services and support services personnel.
- 2.8. There have been several disruptions to the provision of services globally that have been published by mass media. Although emphasis in the public domain is usually focussed on the impact of delays and the resulting passenger discomfort, these publications serve as useful data which can be incorporated in contingency planning at the local and regional level. Stakeholders, such as ATCOs could benefit from the development of procedures and specific steps to take based on actual data of failures and other temporary service disruptions in their respective airspace or adjoining airspaces. For the air traffic services personnel and support services personnel, knowing what actions to take and when to act, is vital in managing contingency situations safely as they emerge. Balancing the mandate of continuity and throughput with safety should be a clear objective of the guidelines presented by ICAO in ANNEX 11 and any other contingency documentation. Mandating the contribution and collaboration of the key stakeholders in the analysis and development of contingency plans should be included in the ICAO guidance provided in ANNEX 11. States that do not have abundant resources and personnel, should be encouraged to leverage their stakeholder engagement to enhance their contingency preparedness.
- 2.9. It is important, for the development of appropriate contingencies, that the framework assists states with step-by-step guidance. There are several factors to be considered in looking at contingency preparedness, which can be a difficult undertaking. These factors include:
- the size and location of the airspace being considered,
  - traffic volume and complexity,
  - equipment and technology utilised in the provision of services,
  - numbers of personnel and their respective training (including refresher training),
  - funding available for contingency programmes,
  - state legislation

- 2.10. There are numerous variables to consider which may result in disruptions to the provision of services. These variables present several challenges for States in the development of mitigating strategies to manage temporary outages which impact airspace capacity. Sharing information regarding failures, outages and disruptions to the provision of services becomes vital to end users in enhancing their level of preparedness.

### **Lessons Learnt**

- 2.11. There have been several recent and well publicised disruptions which could be analysed to enhance contingency preparedness at all levels. A recommended strategy that can be used in updating the ICAO ANNEX 11 guidelines could be to examine contingency measures that were implemented during the failures against the recommendations contained in the framework. This analysis could point to gaps in the framework or assist with updating the framework to provide a template for the development of the contingency procedures required. Using the following four scenarios, enhancements to ICAO ANNEX 11 should be considered:

- Global IT Outage – July 19, 2024
- ATC Flight Plan Failure – August 23, 2023
- NOTAM Service Interruption – January 10, 2023
- Total ATC Systems Failure – September 8, 2017

### **Brief Summary of Scenarios**

#### *Global IT Outage*

- 2.12. On July 19, 2024, a global IT outage resulted in flights being grounded and delayed, impacting thousands of passengers and cargo operations. Approximately 3000 flights into and out from the United States were cancelled because of the outage. The Cybersecurity company CrowdStrike said that a sensor configuration update to its Falcon platform “triggered a logic error” and led to computer crashes. Falcon is a cloud-based system used to block cyberattacks. This outage was not reported to have affected Air Traffic Control automation systems, which operate independently from the systems utilised by airlines globally.

#### *ATC Flight Plan Failure*

- 2.13. On August 28, 2023, significant disruption was experienced across UK airspace following an incident affecting part of the technical infrastructure that supports NATS controlling of aircraft. It is estimated that this disruption resulted in more than 1500 flight cancellations by airspace users on that day, with more cancelled on the following day as the airlines strived to recover their schedules. These numbers are in addition to the delays to flights on 28th August; of the 5,500 flights that did operate in UK airspace around 575 were delayed because of the incident. The incident was apparently caused by duplicate waypoints

presented to the automation system in a flight plan which resulted in the automation system encountering a critical exception and shutting down<sup>10</sup>.

#### *NOTAM Service Interruption*

- 2.14. Late on January 10, 2023, NOTAM applications and services in the US became unreliable. Technical experts attempted to address the issue by, among other things, switching to a backup database. There are three NOTAM backup databases—one in Oklahoma City and two in Atlantic City. While technical experts worked through the night, the FAA activated a hotline to provide real-time status updates to system users. During this time, there were no reports of operational impacts. In the early morning hours of January 11, 2023, the system appeared to have been restored, but formatting issues persisted. To resolve this, FAA's air traffic leadership directed the rebuilding of the databases. The FAA's preliminary findings are that contract personnel unintentionally deleted files while working to correct synchronisation between the live primary database and a backup database. Approximately 10,000 flights were delayed or cancelled due to the failure. The FAA NOTAM system was also undergoing modernisation which is slated to be completed in mid-2025.

#### *Total ATC System Failure*

- 2.15. On the 8th of September 2017, the Kingston Air Traffic Control Centre in Jamaica suffered a lightning strike which caused a catastrophic failure of its automation system. The system being used at the time was 20 years old since its development and obsolete. No spare parts were available to carry out repairs to the damaged systems and air traffic controllers in the ACC had no communication, navigation or surveillance equipment with which to provide services. Another facility, co-located with the ACC with a new automation system was still being developed and operations were eventually transferred to that facility within 48 hours. 90% of the Air Traffic Control staff were not trained on the new automation system at the time of the failure and several contingency measures were implemented for an initial period of three months.
- 2.16. A comparative analysis of the outages reveals several similarities that should be reviewed in developing contingency preparedness guidance material:
- The heavy reliance and use of modern automation system technology to provide services, played a significant role in the loss of efficiency and significantly reduced airspace capacity during failures
  - Adjacent airspaces and in some cases, entire networks were significantly impacted by the outages.
  - Failures were often caused by unprecedented circumstances and external factors outside of the control of the service providers

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<sup>10</sup> NATS Major Incident Preliminary Report Flight Plan Reception Suite Automated (FPRSA-R) Sub-system Incident 28th August 2023

- There were no significant air traffic services incidents reported during these major outages; internal contingency mechanisms and control procedures worked
  - Major outages will have a significant and immediate impact on air travel, including delays and flight cancellations
  - Tools such as the Collaborative Decision Making (CDM) model and Air Traffic Flow management (ATFM) systems may be incorporated in contingency preparedness activities
  - Safety is enhanced with the implementation of ground stops during outages or loss in normal services. There is the risk of loss of efficiency during contingency situations which may also have significant financial implications.
  - Human error plays as much a role in disruptions as does computer-based systems errors.
  - Collaboration with stakeholders is vital during contingency circumstances
  - Failures often increase operational cost
- 2.17. There have been several contingency scenarios affecting flights globally from which there are many lessons that can be derived to influence the development of more robust and relevant documentation. There are also several lessons which should be adopted from the COVID-19 pandemic to enhance contingency preparedness. ICAO ANNEX 11 encourages States to consider the impact of public health emergencies on the provision of services.<sup>11</sup> Given the wealth of information now available from real-world contingency scenarios, adopting ICAO's framework for contingency preparedness should enhance States' abilities to plan and develop the required documentation for contingency planning. However, the information regarding disruptions and contingency measures used by service providers should be collected, organised and studied and shared to enhance stakeholder input.

### 3. CONCLUSION

- 3.1. ICAO's framework for the development and promulgation of contingency procedures for States is decades old. The guidelines that were developed are broad in their scope and do not outline the steps necessary for States to develop a holistic contingency framework. While the guidelines remain applicable even with today's modernised and complex air navigation infrastructure, further refinement of the approach to contingency preparedness could assist States with "landing" their own robust procedures.
- 3.2. ICAO ANNEX 11, Attachment C should be further enhanced with suggested templates and the steps which can be incorporated by States in the preparation of their respective risk analysis, procedures and guidelines. Regional cooperation and collaboration initiatives suggested by ICAO should also be structured and the framework for this level of stakeholder engagement

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<sup>11</sup> ICAO ANNEX 11 ATT C2 4. Preparatory Action 4.2



incorporated in ICAO ANNEX 11 or in a separate document developed as guidance material for States to enhance their contingency planning.

#### **4. RECOMMENDATIONS**

- 4.1. It is recommended that this paper be accepted as information and submitted to the ICAO secretariat as IFATCA's first submission in response to recommendation 1.1/2 of the 14<sup>th</sup> Air Navigation Conference.

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