THIRTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 9 to 19 October 2018

COMMITTEE A

Agenda Item 3: **Enhancing the global air navigation system**
3.5: Other ATM issues

DIGITISATION OF AERODROME AIR TRAFFIC SERVICES

(Presented by the Civil Air Navigation Services Organisation (CANSO)
the International Federation of Air Traffic Controllers' Associations (IFATCA)
and
the International Federation of Air Traffic Safety Electronics Associations
(IFATSEA))

EXECUTIVE SUMMARY

This paper provides information regarding remotely provided aerodrome air traffic services (ATS), commonly known as remote or digital air traffic control towers, and requests ICAO to take steps to develop globally harmonised guidelines on the implementation of these services by States or air navigation services providers (ANSPs).

Action: The Conference is invited to:
   a) note the information on the use and development of remote towers presented in this paper;
   b) request ICAO to take advantage of provisions developed in Europe and elsewhere that support remotely provided aerodrome ATS;
   c) request ICAO to encourage other States and standard development organisations to collaborate on global provisions for digital ATS;
   d) request ICAO to initiate the development of a common set of guidance material to ensure the availability of high quality and secured digital ATS information in a timely manner; and
   e) recommend that ICAO coordinates the development of guidance material with relevant industry stakeholders.

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1.   **INTRODUCTION**

1.1   The provision of aerodrome air traffic services (ATS) from remote locations is receiving more and more attention. Remote operational services have been provided at airports open for commercial aircraft operations since April 2015 and several new services are being deployed. The concept of 'remote provision of aerodrome air traffic services' (commonly known as remote tower operations) enables the provision of aerodrome ATS from locations where direct visual observation is not available. Instead, provision of aerodrome ATS is based on a view of the aerodrome and its vicinity through means of technology.

1.2   A remote (or digital) tower module is equipped similarly to a conventional air traffic control tower. Systems and equipment at the airport are connected to the remote digital tower module, i.e. a 'tower' where aerodrome ATS are based on digital information only. Cameras located at the airport provide a visual presentation of the airport and its vicinity that is displayed on screens located in the digital tower module, thus providing air traffic control officers (ATCOs) and aerodrome flight information service officers (AFISOs) with a watch over their area of responsibility, either fully or partially. Depending on the equipment used, aerodrome ATS could be provided in the same way as from a conventional tower with no particular change in the service provided. However, the technology is flexible in a way that it can be configured to provide a subset of air traffic control tower (ATCT) services for potential cost savings. For example, a remote tower can be used next to a conventional tower when one of the runways is located at a great distance of the conventional tower. ATCOs/AFISOs will use working methods similar to those which they are used to. Some adjustments will have to be made due to potential distortion or compressed displayed images that affect the perception of distances for operations, when it comes to separating departures and arrivals, for instance. This can be addressed by considering cognitive processes and human factors in the development of remote towers.

1.3   Several tower modules may be located in a remote tower centre (RTC), a centralised facility where aerodrome ATS are provided to one or more aerodromes. This can be compared to an area control centre (ACC) where ATC is provided to many sectors or approach functions.

1.4   This paper provides an overview of the provision of remote aerodrome ATS as an example of how digital ATS information can support provision of ATS in a more flexible and cost efficient way. It proposes that ICAO develops guidance material to ensure availability of high quality and secured digital ATS information in a timely manner.

2.   **BACKGROUND**

2.1   **ICAO Global Air Navigation Plan (GANP)**

2.1.1   The current edition of the ICAO *Global Air Navigation Plan* (GANP, Doc 9750,) is designed to guide complementary and sector-wide air transport progress over 2016–2030. The aviation system block upgrades (ASBUs) are organised in non-overlapping six-year time increments starting in 2013 and continuing through 2031 and beyond. The ICAO ASBU B1-81 covers Remotely Operated Aerodrome Control with the objective of providing safe and cost-effective ATS from a remote facility to one or more aerodromes where dedicated, local ATS are no longer sustainable or cost-effective, but there is a local economic and social benefit from aviation operations.

2.1.2   Remotely operated towers can offer a cost-effective alternative to traditional solutions and would provide increased flexibility as well as the possibility to extend opening hours, maintain or increase capacity and safety through the use of digital enhancements in low visibility. It could offer air navigation services providers (ANSPs) the flexibility of selecting the locations of the facility providing aerodrome control service. What was before constrained to be installed in a physical tower that needed to have clear line-of-sight to the runway and manoeuvring area, could now be replaced by a remote facility situated anywhere. Its application enables the ability to control airports from one central location and facilitates the gain of operational synergies and to provide a contingency solution for airports.

2.2   **Provision of remote aerodrome ATS**

2.2.1   The first remote tower implementation, providing aerodrome ATS as defined in the *Procedures for Air Navigation Services — Air Traffic* Management (PANS-ATM, Doc 4444) was approved and introduced into operation in Sweden in April 2015. Further operational tests and implementations are underway and expected in several European States as well as throughout the world in

the near future. In North America several companies are installing and testing several remote tower operations within North America and around the world.

2.3   **Support to remote aerodrome ATS in regulation and Standards**

2.3.1   The ICAO Air Traffic Management Operations Panel (ATMOPSP) has started reviewing the ICAO provisions in Annex 11 – *Air Traffic Services* and the PANS-ATM with a view to examining the provisions to identify shortcomings, if any, and develop new provisions as necessary to accommodate remotely provided aerodrome ATS. In some instances, there may be a need to develop new provisions to completely cover all aspects. Amendment 8 to PANS-ATM, applicable in November 2018, introduces the possibility to achieve indirect visual observation utilising a visual surveillance system. New provisions, addressing the specifics of the visual surveillance system are being proposed.

2.3.2   Furthermore, a note in the forthcoming PANS-ATM will reference the guidance material on implementing the remote tower concept for single mode of operation that can be found in the Annex to European Aviation Safety Agency (EASA) Executive Director Decision 2015/014/R (3 July 2015)[1]. This EASA guidance material is being revised to also include advanced functionalities and multi-mode of operations providing remote aerodrome ATS to multiple airports from one tower module. The new version of the guidance material will reference the industry standards developed by the European Organisation for Civil Aviation Equipment (EUROCAE).

2.3.3   EUROCAE has published the first industry standard on the technical aspects of remote aerodrome ATS, ED-240 - Minimum Aviation System Performance Specification (MASPS) for Remote Tower Optical Systems. ED-240 includes requirements related to the optical system used in remote tower installations. EUROCAE is now working on updating ED-240 to include remote tower target tracking technologies, including assessing the applicability of MASPS already produced for surface movement guidance and control systems (SMGCS). The updated ED-240 is planned to be published in 2018.

2.4   **Development of Remote Tower Operations (RTO)[2]**

2.4.1   As the technological pillar of the Single European Sky (SES) to modernise Europe's air traffic management (ATM) system, the Single European Sky ATM Research (SESAR) project is developing solutions (i.e. deliverables including concept definitions, validation results and material supporting implementations) that are now being deployed in Europe. One example is remote tower operations (RTO), the provision of aerodrome ATS, including air traffic control (ATC) and aerodrome flight information services (AFIS) based on digital ATS data, including presentation of out-of-the-window view on screens and information sharing. Results from the first phase of SESAR (SESAR 1) development of RTO are published.

2.4.2   Development of RTO continues in the second phase of SESAR (SESAR 2020) and will focus on the provision of airport control services or airport flight information services for more than one airport by a single controller from a remote location. It includes further development of the controller working position (CWP) and meteorological (MET) information from multiple airports. These concepts have significant human factor issues to consider; the provision of multiple distinctly separate services at a time has the potential to present hazards to the system that have yet to be experienced with conventional operations.

2.4.3   The SESAR deliverables are important inputs to the on-going industrialisation phase that includes early development of supporting standards and regulation, product development and early operational deployment.

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[1] https://www.easa.europa.eu/document-library/agency-decisions/ed-decision-2015014r
[2] https://www.canso.org/sites/default/files/Images/CANSO%20Position%20on%20RTO%20-final.pdf

2.5   **Future Development of Digital ATS**

2.5.1   The initial concept of the remote tower focused on a particular set of use cases, predominantly small airports in remote communities in Scandinavia, with the primary aim of reducing costs. Provision of aerodrome ATS from a remote location is based on the availability of all necessary information in a digital format. Modern technology has the capability to capture very accurate visual images, transport the information from the airport to a remote ATC facility and present it to the ATCO/AFISO in near real time. The initial concept copied into the remote facility the existing services provided from the tower located at the airport, thus reducing the need for regulatory changes.

2.5.2   Further developments indicate that the word 'remote' might be misleading as the technology is being used in many other cases. While a remote aerodrome service may be provided using a digital tower, as seen today, the technology may equally be utilised within an existing tower to enhance the service, or provide service from the tower facility to a remote runway. Digital ATS may also be part of contingency solutions to ensure continuity of services in case of unavailability of the conventional tower; in solutions to avoid building a tower at an airport; provide complementary functions in a conventional tower to increase field of view etc. In this context, the use of digital ATS in place of remote in standards and regulatory documents therefore helps to clarify the applicability of the technology in specific uses and services. From having been a concept of its own, the remote tower has become part of a wider concept, building on the availability of digital ATS information.

2.5.3   Digital ATS is likely to evolve further into new concepts and use cases that are not known today. Availability of accurate and secure digital ATS data in real time will allow ATS to be provided in a more flexible and cost efficient way, provided that cybersecurity issues are properly addressed through the development of system monitoring and control tools. It has the potential to meet some of the expectations of lowering ATM costs, while also delivering higher levels of service and safety. Digital towers do not have some of the constraints of conventional towers, e.g. cameras can be located in multiple locations, giving a view which may be different to a traditional panoramic single view site, providing air traffic controllers with more specific information. In this context therefore, it is important to apply a performance-based regulatory approach, allowing the technology to develop to support safety and service enhancements that overcome limitations associated with conventional concepts.

3.   **CONCLUSION**

3.1   Complete digital ATS information is now available to support all types of ATS opening up new possibilities to provide ATS. Remote aerodrome ATS is one example; working positions with electronic flight strips is another. Collaborative decision-making (CDM) is based on the principle that everyone on all levels have access to information in time so they can take their own informative decisions. With common access to the digital ATS information about a particular situation, erroneous actions can be avoided. The availability of a complete set of ATS information may enable the development of new air traffic services as well as new ways of providing traditional ATS. The timely availability of quality assured secure information will become more and more important as the possibility to revert back to traditional working methods might eventually not be possible anymore. Availability of information is not only about securing the information itself; it also includes transmissions, storage, access management, quality assurance, technical system monitoring and control etc.

3.2   The Conference is invited to agree to the actions in the executive summary.

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