International Civil Aviation Organization

AN-Conf/12-WP/42
9/10/12

WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

Agenda Item 2: Aerodrome operations – improving airport performance
2.1: Airport capacity

PROCEDURES OF REMOTE TOWERS

(Presented by the Presidency of the European Union on behalf of the European Union and its Member States[1]; by the other Member States of the European Civil Aviation Conference[2]; and by the Member States of EUROCONTROL)

SUMMARY

This paper briefly describes the development and early implementation plans for Remote Towers (ASBU module B1-81), highlighting the need to assess the regulatory and standardisation impact, in particular the impact on ICAO provisions.

The provision of remotely operated aerodrome control offers the opportunity to provide improved service levels, reduce costs and improve safety at aerodromes by taking advantage of new technologies and better use of safety nets taking advantage of new technologies.

Developments are now at an advanced stage, with live operational validation trails and early deployments planning underway.

It is therefore necessary to ensure that the required regulation/standardisation needs are identified, including the need to incorporate the provision of remotely operated aerodrome control services in ICAO documentation (e.g. PANS/ATM and Annex 10).

Action: The Conference is invited to agree to the recommendation in paragraph 6.

1. INTRODUCTION

1.1 Remotely operated aerodrome control concerns the provision of ATS to aerodrome(s) from a facility which is not located at the aerodrome itself (ref. ASBU module B1-81).

1.2 Remotely operated aerodrome control can be applied to:

a) a single aerodrome (either ATC or AFIS) where the local tower can be replaced by a remote facility;

[1] Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. All these 27 States are also Members of ECAC.

[2] Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, Georgia, Iceland, Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and Ukraine.

b) multiple aerodromes, where the local towers of several aerodromes can be replaced by a single remote facility; and

c) larger single aerodromes that require a facility to be used in contingency situations.

1.3 In Europe, development and validation activities associated with the three cases listed above are being undertaken primarily through the SESAR programme.

1.4 The key drivers for the developments and implementation planning of remote towers are the ability to increase service levels, to reduce costs and to improve safety through the better use of safety nets.

2. EUROPEAN DEVELOPMENT ACTIVITIES

2.1 The Concept

2.1.1 The concept does not seek to change the air traffic services provided to airspace users or change the levels of those services. Instead it changes the way those same services will be provided through the introduction of new technologies and working methods.

2.1.2 The visual surveillance will be provided by a reproduction of the Out of The Window (OTW) view by using visual information capture and/or other sensors. The visual reproduction can be overlaid with information from additional sources such as surface movement radar, surveillance radar, Multilateration or other positioning and surveillance systems providing the position of moving objects within the airport movement area and its vicinity. The collected data, either from a single source or combined, is reproduced for the ATCO/AFISO on data/monitor screens, projectors or similar technical solutions.

2.1.3 The provision of ATS from a local tower building (as in today's operations) has some constraints at some airports due to the single operational viewpoint from a central, high up perspective, and subject to prevailing viewing conditions at the time (e.g. clear, foggy). This can create some minor limitations in capability, which is accepted in 'traditional' air traffic control. With the use of reproduced OTW views, these limitations can be eliminated. Visual information capture and reproduction can still be used to replicate the operational viewpoint obtained from a traditional tower view, which may ease the transition from current operations to remote operations and provide some common reference points. Alternatively, several operational viewpoints may available, based on information captured from a range of different positions (viewpoints need not be limited to the original tower position). This may provide an enhanced situational awareness. In all cases, the visual reproduction shall enable visual surveillance of the airport surface and surrounding area.

2.1.4 With the digitisation, or computer generation of the relayed information, visual enhancements are possible. These can be used to ensure situational awareness in all visibilities.

2.1.5 With the removal or decommissioning of individual local towers, disparate systems and procedures can be standardised to a greater level in a shared uniform facility.

2.1.6 With many aerodromes operating from a shared facility using common systems, the possibility to share system-wide information (i.e. SWIM) can be increased.

2.1.7 Although not necessary, it will be possible to remove the local control tower as it will no longer be used for the provision of air traffic services. The need to have a single, tall tower building at the aerodrome will disappear. The infrastructure (service, maintenance etc.) that goes along with maintaining such a building will also become redundant. Instead, a local installation consisting of systems/sensors will be maintained by

central maintenance teams. The remote facility will also require maintenance, but it is expected that simpler building using common systems and components will lead to a reduction in overall maintenance costs.

2.2 Procedures (Air and Ground)

2.2.1 The concept aims to maintain as many of the current air and ground procedures as possible. The services provided remain the same and there should be no impact on airspace users.

2.2.2 Some new operating methods may be required for tasks which are external to the current aerodrome tower. The ATCO/AFISO will not have the ability to perform any tasks that are external to the control facility e.g. physical runway inspection. The aim is that that they will primarily focus on the pure ATS tasks, and other tasks will be secondary and/or performed by personnel local to the aerodrome. It must however be recognised that the ability of the sensors has many other qualities which might prove a positive impact of safety compared to today's operational tools. New fall-back procedures are required in case of full or partial failure of the remote tower system. In cases of complete failure it may not be possible to provide reduced operations. All ATS will be suspended until the system can be at least partially restored and traffic may be diverted to other aerodromes in the meantime.

2.2.3 In cases of partial failure, it is expected that the scenario can be mapped to existing procedures. For example, loss of visual reproduction when operating remotely can be likened to low visibility when operating from a local tower. Therefore LVP could be 'adapted' for use at the remote tower facility in such a case (though there may be other contingency solutions that could be applied locally).

2.3 Technology (Air and Ground)

2.3.1 For remotely operated aerodrome control developments in Europe the main technologies being exploited are:

a) camera and display technologies that create a uniform visual view which is perceived as smooth and delivers the level of quality and information required to provide safe and efficient ATS;

b) radar and Multilateration surveillance technologies, such as those being used in the deployment of A-SMGCS Level 1;

c) data fusion, bringing together heterogeneous data sources (such as surveillance data listed above plus map data, terrain models, 3D satellite data) to provide a coherent representative model of an airport, its surrounding and traffic, enabling an ATCO/AFISO to provide a real time service; and

d) CWP and HMI technologies to create an acceptable method for interaction with the remote tower systems and controller working position as a whole.

2.3.2 Using these technologies situational awareness is addressed by the appropriate placement of surveillance sensors, augmented by means of night vision and image enhancement, with graphical overlay such as tracking information, weather data, visual range values and ground light status etc.

2.3.3 In addition, suitable communication capabilities between the airports and the remote tower facility are also required. These needs will be addressed through the SWIM developments of SESAR.

2.4 Planned or On-going validation trials

2.4.1 In support of deployment and further developments, several validation trials are taking place during the 2011 to 2014 period. The SESAR operational validation trials involve a range of typical ATS operational environments in Sweden, Norway, and Germany.

3. DEVELOPMENT ACTIVITIES OUTSIDE EUROPE

3.1 It is known that there is considerable development activity being undertaken in other ICAO States and regions, in particular the USA, Canada and Australia. Whilst these developments are not known in detail, it is understood that although there may be some differences, the overall concepts are compatible with those of Europe (i.e. there is scope for a global approach to remotely operated aerodrome control).

4. EUROPEAN DEPLOYMENT STATUS

4.1 There is no current operational use of remotely operated aerodrome control in normal operations. Some aerodromes have contingency facilities, but none of these include a reproduction of the OTW view.

4.2 An implementation project in Sweden began in 2011 (Sundsvall and Örnsköldsvik aerodromes). The system is expected to be installed and tested in 2012 and to become operational in 2012/2013. Air traffic at Sundsvall and Örnsköldsvik airports will then be controlled from a joint remote tower centre located in Sundsvall.

5. REGULATORY/STANDARDISATION NEEDS

5.1 In order to allow the competent Authorities to issue the appropriate authorisations to remotely operate aerodrome control, while ensuring global interoperability, there is a need to have in place ICAO provisions and Industry standards which do not currently exist, and which will serve as the basis for national regulatory frameworks on this topic. This regulatory aspect will therefore need assessment and further development before deployment of the remote tower operations.

5.2 Aspects that should be addressed at ICAO level should include:

a) requirements for the use of sensors, and display technologies to replace visual observation of traffic in the provision of air traffic control and flight information services;

b) additional requirements for surveillance and ground/ground communications systems to adapt to the above;

c) new operational procedures, where relevant, both at the remote ATC facility and at the airborne side; and

d) new requirements for ATCO/pilot training and eventually licensing if necessary.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 This paper briefly describes the development and early implementation plans for remote towers, highlighting the need to assess the regulatory and standardisation impact, in particular the impact on ICAO provisions.

6.2 The provision of remotely operated aerodrome control offers the opportunity to provide improved service levels, reduce costs and improve safety at aerodromes by taking advantage of new technologies and better use of safety nets taking advantage of new technologies.

6.3 Developments are now at an advanced stage, with live trails and early deployments in various places in the world.

6.4 It is therefore necessary to ensure that the required regulation/standardisation needs are identified, including the need to incorporate the provision of remotely operated aerodrome control services in ICAO documentation (e.g. PANS/ATM and Annex 10).

6.5 The Conference is invited to:

a) note the content of the paper; and

b) request ICAO to urgently initiate the necessary actions to update ICAO provisions to provide for:

1) requirements for the use of sensors, and display technologies to replace visual observation of traffic in the provision of air traffic control and flight information services;

2) additional requirements for surveillance and ground/ground communications systems to adapt to the above;

3) new operational procedures, where relevant, both at the remote ATC facility and on the airborne side; and

4) new requirements for ATCO/pilot training and eventually licensing if necessary.

— END —