International Civil Aviation Organization

The First Meeting of Air Traffic Management Automation System Task Force of APANPIRG (ATMASTF/1)

Web-conference, 28 – 30 October 2020

Agenda Item 5: Issues and Challenges in implementation

5.1 Architecture of ATM Automation System

DIFFERENT ATM AUTOMATION SYSTEM IMPLEMENTED IN INDIA

(Presented by India)

SUMMARY

This paper presents the various types of ATM Automation System implemented in India at different airports. This paper intends to highlight the similarities and differences among the different Automation system.

1. INTRODUCTION:

1.1 Airports authority of India (AAI) is the Air Navigation Service Provider (ANSP) in India. AAI has implemented a network of surveillance systems across Indian subcontinent to provide safe, orderly and efficient ATS across the entire airspace managed by India. AAI has also put up multiple automation systems of various capabilities across the Indian airports to utilize the large network of sensors. Since each of the automation system was put in at a different stage, AAI has a combination of Automation systems from various vendors having different capabilities and varied experience.

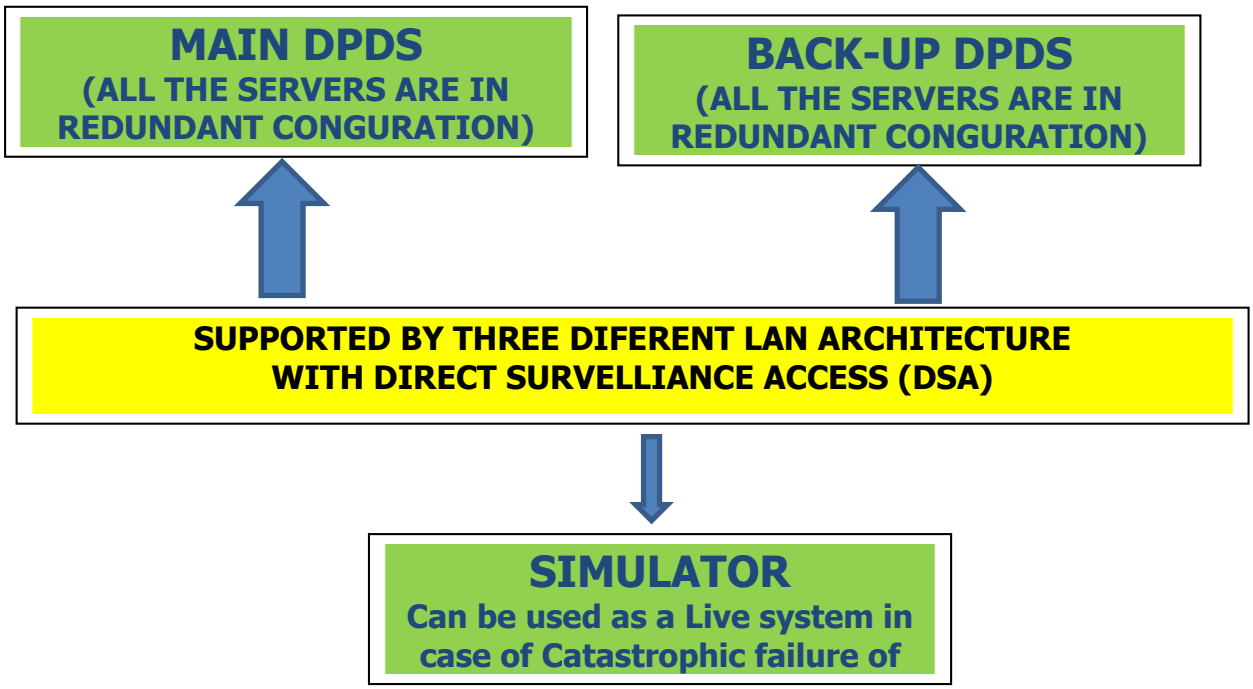
1.2 The ATM Automation System Task Force while finalizing Guidance Material for ATM Automation system may like to include the points detailed in this paper about common features and differences between various Automation System architecture installed in India. This will provide necessary guidance to ANSPs looking forward to deploy/ upgrade ATM Automation systems about the features in the system to seek and the issues for which they need to be cognizant of.

2. DISCUSSION

2.1. Common features of All Automation features

1) Redundancy - Every Automation system has been designed to provide multiple layers of redundancy as the prime requirement. Each of the system has a backup system running as hot standby supported by redundant data lines. The redundancy level has been taken care up to the sub-component level including power and data exchange lines. New ATM Automation systems have the capability to provide

additional redundant backup system as hot standby in addition to the main redundant system. Thus AAI has achieved five level of redundancy which includes the DRA facility to the above quoted system, as depicted in the following diagram.



2) Simulator - Every Automation system has a Simulator system integrated in the system as a prime requirement for training of ATC personnel's as well to test new software builds, adaptation data modifications etc. The simulators are limited string having similar working environment so as to simulate the actual working conditions for training.

3) Ability to integrate multiple sensors -Each Automation system have the ability to integrate a wide range of sensors such as PSR, SSR. MSSR, ADS-B, ADS-C etc over a wide range of protocols. Sensors overlapping common area are taken care by the Multiple Sensor Tracker (MST) of the system which improves positional accuracy of the track data using all such information. This has resulted in better information to the controllers and safer and more efficient airspace utilization.

4) Safety Nets -Each Automation system has basic Safety Net features built in to alert the controllers for taking appropriate steps to separate the aircrafts. The most prominent of these are Short Term Collision alert(STCA), Medium Term Collision detection(MTCD), Area Proximity Warning(APW), Minimum Safe Altitude Warning (MSAW) and Approach path Monitoring (APM). Other normal alerting tools are SSR Code change, special Squawk code (7X00), multiple use of same SSR code, non-RVSM Flights etc. Some newer systems have additional monitoring tools such as Route deviation warning, Level burst, clearance monitoring, special flight status etc.

5) Communication -All the above automation systems have information exchange model built in. All systems are capable to exchange information through AFTN and AIDC. However, there have been issues integrating different systems over AIDC due to difference in implementation tactics of AIDC. Efforts were required to do the necessary integration with the help of different vendors to sort out the issues.

2.2. Variable features across ATM Automation System

1) Architecture -AAI has incorporated several different system architectures over the last years at different airports to suit its requirement. Some major airports have an integrated model of Automation system having Tower, Approach, Area FIC/OCC workstations with advanced features such as AMAN, DMAN, DCL etc. While there are systems having limited featuring small airports with in the coverage of bigger Area control centers having limited capabilities to interact with adjoining centers and provide basic surveillance capabilities.

2) Communication protocols -As observed over years, it is found that almost each provider has varying idea of interoperability between systems. This has been a serious issue faced by AAI while trying to integrate the adjacent Automation systems. There has been instances of AIDC communication failure due to technical implementation procedures. Similarly, Exchange of Data between C-ATFM and other system had similar issues.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate

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