



ICAO

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Fourth Meeting of the Asia/Pacific Air Traffic Management Automation System Task Force (APAC ATMAS TF/4)

Bangkok, Thailand, 28 – 30 June 2023

Agenda Item 4: ATM Automation System Implementation Experience by States

4.3 Integration with External Systems

VALIDATION OF A-SMGCS SYSTEM INTEGRATING NOTAM DATA

(Presented by China)

SUMMARY

This paper presents the data exchange and main function of NOTAM interface in A-SMGCS test platform at Beijing Daxing International Airport, and also introduces the testing progress, advantages and next step of the interface deployment.

1. INTRODUCTION

1.1 Currently, the Flight Information department at Beijing Daxing International Airport manages the daily NOTAM data through the Daxing Visual NOTAM System (DVNMS), and notifies the controllers of the NOTAM information by telephone and fax. Tower controllers manually designate relevant restricted areas in the A-SMGCS according to the content of the NOTAM.

1.2 In order to solve the inefficiency caused by the manual information input and reduce the workload of controllers, it is planned to integrate the DVNMS interface in A-SMGCS, by displaying the NOTAM information, and making linkage updates of restriction areas in A-SMGCS.

1.3 At present, the function design and software development of this interface has been completed, the interface integration has been deployed in the A-SMGCS test platform, and the main functions have passed site acceptance. Next step, china will arrange the operation assessment, and plan to put the interface into operation by the end of 2023.

2. DISCUSSION

Data Connection Scheme

2.1 The NOTAM data is connected to the A-SMGCS test platform of Daxing Airport for functional application testing. The interface uses the TCP/IP protocol and data flow is set to one-way direction that A-SMGCS receives and processes NOTAM data. The connection between the two systems is shown in the figure below:

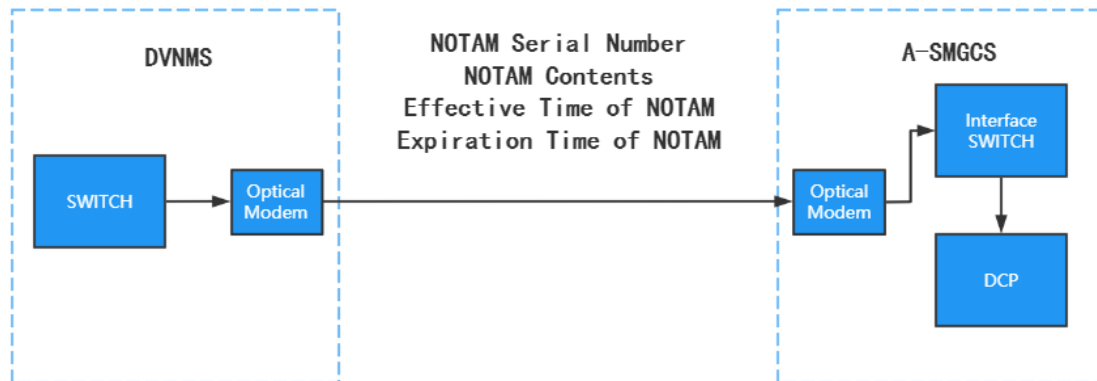


Figure 1-The connection between DVNMS and A-SMGCS

2.2 The NOTAM data is output by the DVNMS switch, and transferred to the interface switch of the A-SMGCS test platform through the optical modem. The optical modem includes a firewall function and is configured with network security measures to protect both systems. The DCP server of the A-SMGCS system is responsible for receiving data and distributing it to corresponding software for processing and display.

2.3 The NOTAM data transmits from DVNMS includes:

- a) NOTAM serial number: the number of NOTAM data within DVNMS, and each NOTAM corresponds to a unique number.
- b) NOTAM content: including FIR, NOTAM code, flight type, etc. NOTAM code includes: identification code, subject code (runway, taxiway) and status code (closed, etc.).
- c) Effective/Expiration time of NOTAM: indicates the planned implementation time range of NOTAM, and within the time range NOTAM can be modified and activated.

Main Function

2.4 After the A-SMGCS system receives the NOTAM data, it performs the following processing.

2.5 State Management

Create and manage the NOTAM state according to the Effective/Expiration time in the NOTAM, the main states include:

- a) NAC: inactive state, which means NOTAM will take effect within 12 hours.
- b) PRE: Pre-activated state, 15 minutes before NOTAM activates. When the NOTAM becomes PRE state, the corresponding runway and taxiway are displayed in blue on the HMI, prompting the controller to clear the relevant area as soon as possible.
- c) ACT: Activated state, the NOTAM changes to the activated state manually. In the ACT state, the corresponding runway and taxiway are displayed in red on the HMI.
- d) OVE: Over state, the controller manually changes the NOTAM to the over state, and cancels the NOTAM restriction in the A-SMGCS.

2.6 Visual Display

A-SMGCS will visually display the opening or closing of relevant runways or taxiways according to the NOTAM state, and mark the runways by snow conditions.

a) Runway and taxiway

When the NOTAM contains runway or taxiway closing information, the ASMGCS displays the corresponding runway or taxiway in blue in the PRE state, and turns red in the ACT state.

After the OVE state, the corresponding runway and taxiway will return to normal. The display is shown in the figures below:



Figure 2 - Runway Close in PRE State

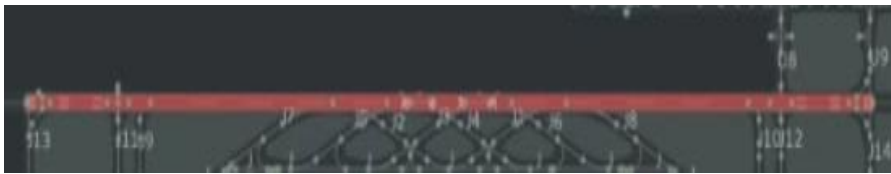


Figure 3 - Runway Close in ACT State

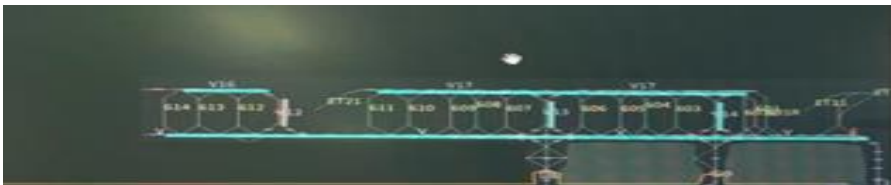


Figure 4 - Taxiway Close in PRE State



Figure 5 - Taxiway Close in ACT State

b) SNOWTAM

After the system receives SNOWTAM, the content of SNOWTAM can be viewed in the snow window. At the same time, the runway visual range and the release time of the SNOWTAM will be marked on HMI, and the current runway snow status level (1/2/3) will be marked on the electronic flight strip and HMI.

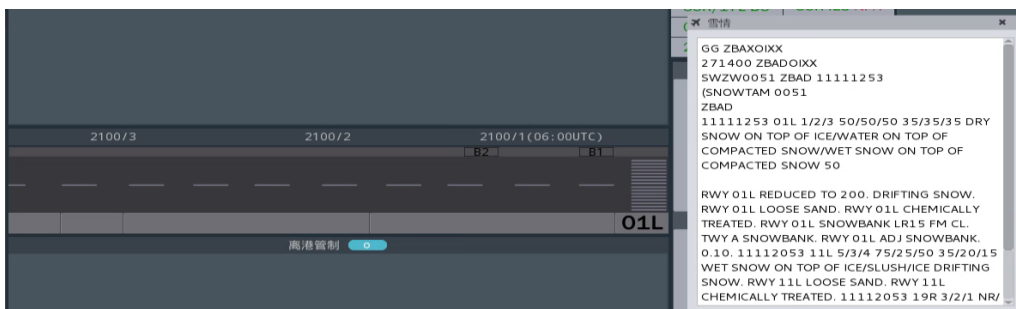


Figure 6 - SNOWTAM Display on Electronic Flight Strip and Snow Window

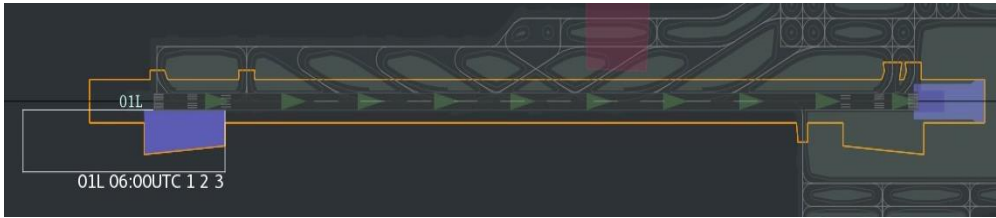


Figure 7 - SNOTAM Display on HMI

2.7 System processing

a) When the NOTAM contains the runway closing message and is in the ACT state, the runway will be set to be closed in A-SMGCS. For departure and arrival flights, the system will not allocate this runway for takeoff and landing. When the NOTAM is over, the runway becomes open and the system performs normal runway assignment.

b) When the NOTAM contains the taxiway closing message and is in the ACT state, the taxiway will be set to be closed in A-SMGCS. When planning a taxi route for a flight, the system will select other unrestricted taxiways. When the NOTAM ends, the taxiway will be open and the system will normally use this taxiway for taxi route planning.

2.8 Human-Machine Interaction

a) Controllers can perform manual operations and inquiries in the NOTAM window. For NOTAM of runway/taxiway close, the system will prompt the closing message 10 minutes in advance on the supervisor, as shown in the figure below:

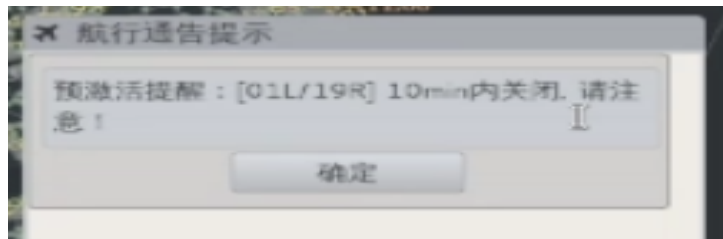


Figure 8 - NOTAM prompt

b) Controllers can query historical NOTAM based on the serial number, event, keyword, state and other conditions in the system, as shown in the figure below:

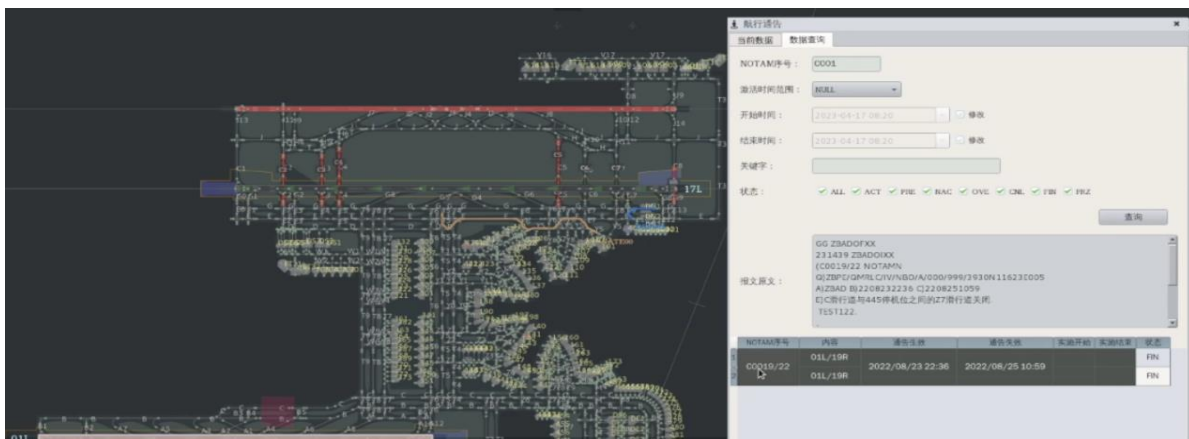


Figure 9 - Historical NOTAM Search

c) When the NOTAM is selected in the NOTAM window, the system will highlight it in white on the HMI, and controllers can manually modify the start and end time of NOTAM, as well as activate, freeze, unfreeze or end the NOTAM. As shown in the figure below, the NOTAM with serial number C0116/22 is selected, which involves the runway 01L/19R.



Figure 10- NOTAM highlighted in white

Test Progress

2.9 In March 2023, functional tests of the interface in the ASMGCS test platform have been completed.

2.10 Test items include: data reception and processing, manual modification and activation, linkage display of NOTAM data in ASMGCS, etc. All the tests above are generally passed, which verifies that the NOTAM interface can be put into operation.

2.11 The following problems were found during the test and will be adjusted in the future:
a) According to "Guidance on the Issuance of SNOWTAM" issued by ICAO, SNOWTAM is valid for eight hours. The system should automatically end SNOWTAM and cancel the corresponding runway status after 8 hours of activation.
b) Currently, A-SMGCS has not yet completed the development of the NOTAM function dealing with airport stands. System software is going to be modified, and updated software will be tested before operation use.

Summary

2.12 The advantages of integrating the NOTAM interface in A-SMGCS are as follows:

- a) As an independent NOTAM system terminal is no longer needed, the number of equipment in the tower and economic costs will be reduced.
- b) Compared with the traditional paper and telephone notification methods, A-SMGCS will display the NOTAM information on the HMI in real time, ensuring the timeliness and accuracy of receiving data, and reducing the manual load and human errors by avoiding repeated operations and confirmations on different systems.
- c) The controller can flexibly modify the NOTAM status according to the on-site situation. In special cases, it can improve the efficiency of emergency response.

2.13 Nest step
a) Combining on-site operation and functional requirements, china will improve and optimize A-SMGCS processing and display functions for NOTAM data.

b) After the operation assessment is completed, the NOTAM interface can be officially integrated and put into use in the A-SMGCS operation system.

c) Share the deployment and test experience of A-SMGCS's integrating NOTAM data, and provide references for other operating sites.

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
