International Civil Aviation Organization

Eighteenth Meeting of the ICAO Aeronautical Information Services − Aeronautical Information Management Implementation Task Force (AAITF/18)

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Agenda Item 4: AIS-AIM Updates

NOTAM SYSTEM IN THE US: JANUARY 11, 2023, OUTAGE AND SUBSEQUENT IMPROVEMENTS

(Presented by United States of America/Federal Aviation Administration)

SUMMARY

This paper discusses events associated with the NOTAM system outage on January 11, 2023, in the US, and the steps that the FAA took to improve NOTAM management going forward.

1. INTRODUCTION

1.1 The FAA defines a Notice to Air Missions (NOTAM) as "a notice containing information essential to personnel concerned with flight operations but not known far enough in advance to be publicized by other means."

1.2 Late on January 10, the NOTAM system became unreliable in the US National Airspace System (NAS). At approximately 7:15 a.m. EST on January 11, as the morning air traffic started increasing in volume on the East Coast, the FAA issued a nation-wide ground stop to maintain safety and preserve predictability of operations. The ground stop paused all departures in the United States except military, medical and law enforcement flights. At 9:07 a.m., the FAA completed updating and testing the database, and cancelled the ground stop.

1.3 This information paper discusses events associated with the NOTAM system outage, including steps that the FAA took to improve NOTAM management in weeks following the outage.

2. DISCUSSION

About the NOTAM System

2.1 FAA's NOTAM system is a dynamic system that communicates recent changes to conditions in the NAS. For example, NOTAMs provide pilots and operators with information about an anomaly with a particular navigational aid, airport runway, taxiway or airspace, such as closed runways, large flocks of birds, volcanic ash movement or ice on a runway.

2.2 The FAA's overall NOTAM system consists of two systems—an older U.S. NOTAM System (legacy system) and a newer Federal NOTAM System. The older portion of the system relies on 30-year-old software and architecture to collate NOTAM data from all sources and distribute it to some airspace users. The newer portion serves as part of the foundation for the FAA's ongoing NOTAM modernization effort; it provides a platform for initiation of majority of NOTAMs and a primary interface for their public distribution.

2.3   NOTAM information can be initiated by airport or air traffic control personnel who observe local changes, or FAA technicians servicing a system. Airspace users can access the information from applications sitting on both portions of the FAA's NOTAM system. Most airlines download NOTAMs from the FAA into their internal databases for dispatching aircraft. Users can also get NOTAMs from third party providers who get it from the FAA, or they can go to the primary source for specific NOTAM information, by calling a flight service station.

About the Incidents

2.4   Late on January 10, 2023, the NOTAM system became unreliable. Technical experts worked 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.

2.5   While technical experts worked through the night, the FAA engaged all affected stakeholders through its Collaborative Decision-Making (CDM) process with a goal of communicating, collaborating and mitigating the impacts of the event. The FAA Air Traffic Control System Command Center (ATCSCC) activated a hotline and conducted several conference calls with all stakeholders to provide real-time status updates to system users, including all Area Control Centers (ACCs), flight operators and adjacent Air Navigation Service Providers (ANSPs). NAS Aeronautical Information Management Enterprise System (NAIMES) specialists provided real-time updates, answered questions and provided periodic updates at the top of each hour. As fixes were implemented and various applications that relied on the NAIMES system were restored, flight operators were able to provide feedback on what they were seeing. The hotline lasted for the duration of the event. During this time, there were no reports of operational impacts.

2.6   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 rebuild of the databases. One of the flight operators requested a two-hour ground stop for their fleet while the NAIMES system validation continued. The ATCSCC conducted another stakeholder conference, which revealed that most of the flight operators were not in favor of a nationwide ground stop.

2.7   As work on the system continued and the morning air traffic rush along east coast of the US approached, at approximately 7:15 a.m. EST on January 11, acting Administrator Nolen ordered a ground stop in the interest of maintaining safety and preserving predictability. The ground stop paused all commercial flight departures in the United States. Military, medical and law enforcement flights were exempt from the nationwide ground stop.

2.8   The ATCSCC also coordinated with the 20 domestic ACCs to increase a timeout parameter in the Air Traffic Control (ATC) automation system to preserve existing flight plans during the nationwide ground stop.

2.9   While the ground stop prevented early morning departures from taking off, aircraft that were already airborne when the nation-wide ground stop was issued continued flying to their destinations. As the airborne aircraft started landing, surface congestion increased and, at some airports, even required additional airport-specific ground stops to assist with the recovery. Moreover, to prevent surface gridlocks, some flights had to be diverted and later recovered to their intended destinations—after congestion issues were resolved.

2.10   As the validation work continued, individual arrival airports started getting released from the nationwide ground stop about 46 minutes after its implementation.

2.11   By 9:07 a.m. EST, the NOTAM database was fully rebuilt, its resiliency testing was completed, and the nationwide ground stop was lifted less than two hours after its implementation.

About the Investigation

2.12   A preliminary FAA review of the NOTAM system outage determined that contract personnel unintentionally deleted files while working to correct synchronization between the live primary database and a backup database.

2.13   The agency has found no evidence of a cyber-attack or malicious intent.

Actions Taken by the FAA

2.14   The FAA made the necessary repairs to the NOTAM system, and has taken steps to update database management procedures and make the system more resilient.

2.15   After the incident, the FAA implemented a synchronization delay to safeguard against corrupt data transferring from one database to another. The FAA also established a protocol that requires more than one individual to be present and engaged in oversight when work on the database occurs.

2.16   The FAA worked on adopting lessons learned and collaborated with air carriers to ensure the continued safety of the U.S. national aerospace system.

Lessons Learned

2.17   One hotline for coordination with all stakeholders is likely to be inadequate. The hotline activated by the ATCSCC was quickly overwhelmed with numerous interested parties, many of whom were only seeking updates but did not actively participate in coordination. Establishing two hotlines, one for releasing public advisories and another for active coordination between CDM members, would support more efficient and effective exchanges with those who act on such information in real-time.

2.18   Active coordination with neighboring ANSPs, including use of their Operational Information Systems (OIS), is hugely helpful with reducing the number of questions for flights inbound to the FAA controlled airspace. In addition to the FAA OIS distributing critical information, Nav Canada, SENEAM and CADENA OISs did the same in a timely manner too, resulting in a reduced need to coordinate impacts to individual flights arriving from neighboring FIRs.

2.19   The exit strategy for a nationwide ground stop needs to consider surface flows at the impacted airports and the recovery of diverted flights.

2.20   Open and timely communications and coordination are critical tools for managing wide-reaching incident. While flight operators and other CDM members were not happy with the consequences of the NOTAM outage or the resulting ground stop, they appreciated the FAA decision and proactively supported each other throughout the duration of the outage. The FAA ATCSCC received thanks for the communication efforts.

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 matters as appropriate.

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