



International Civil Aviation Organization

**WORKSHOP ON ICAO AIRCRAFT ADDRESS AND TARGET IDENTIFICATION
IN SURVEILLANCE DATA AND FLIGHT PLAN**

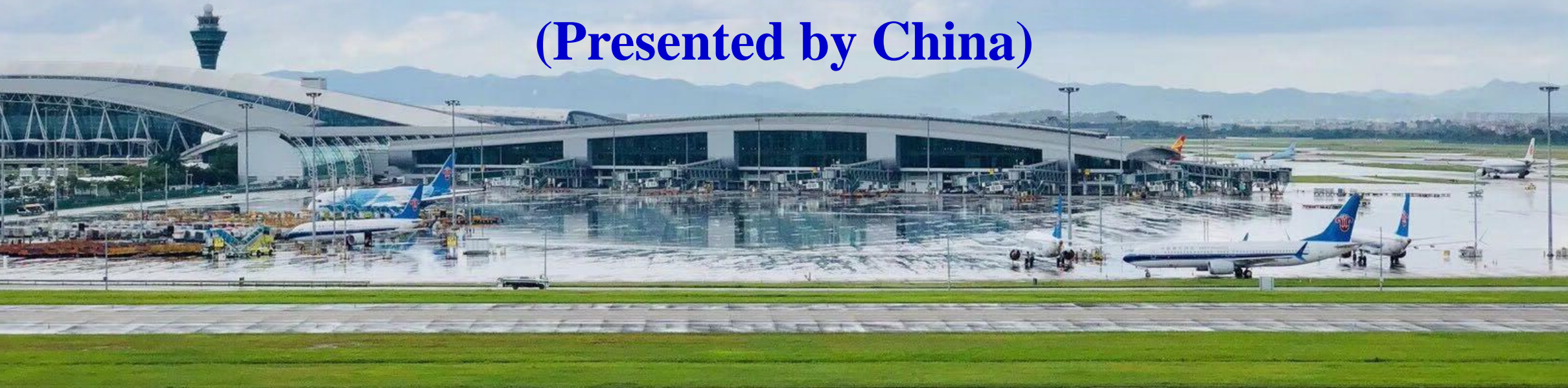
Bangkok, Thailand, 6 Jun 2023



中国民用航空局
空中交通管理局
Air Traffic Management Bureau .CAAC

Aircraft Address and Target Identification Quality Analysis using ADS-B and FPL

(Presented by China)



Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL



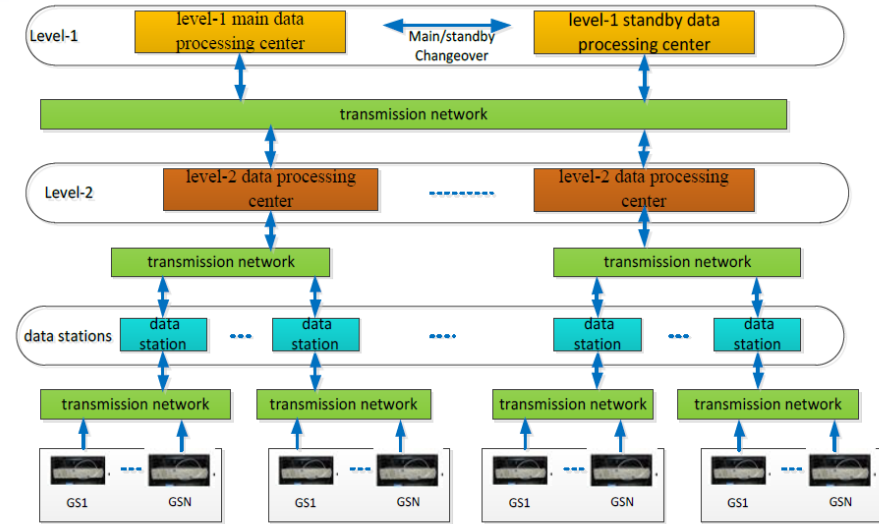
➤ BACKGROUND

➤ ADS-B Implementation in China

- ❑ More than 300 ADS-B Ground Stations
- ❑ 36 Data Stations and 8 Level-2 Data Processing Centers
- ❑ Two Level-1 Data Processing Centers

➤ ADS-B Data Centers/Stations Operation in China

- ❑ **Data Stations** serve to the province sub-ATMB ATC Surveillance
- ❑ **Level-2 Data Processing Centers** provide the ADS-B data to the regional ATMBs and the Surveillance information to the ATC Control Center.
- ❑ **Level-1 Data Processing Center** provides surveillance data information to nationwide non-ATC applications (ATFM, AOC, etc.) and conducts nationwide ADS-B **Data Quality Analysis** work.



Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL

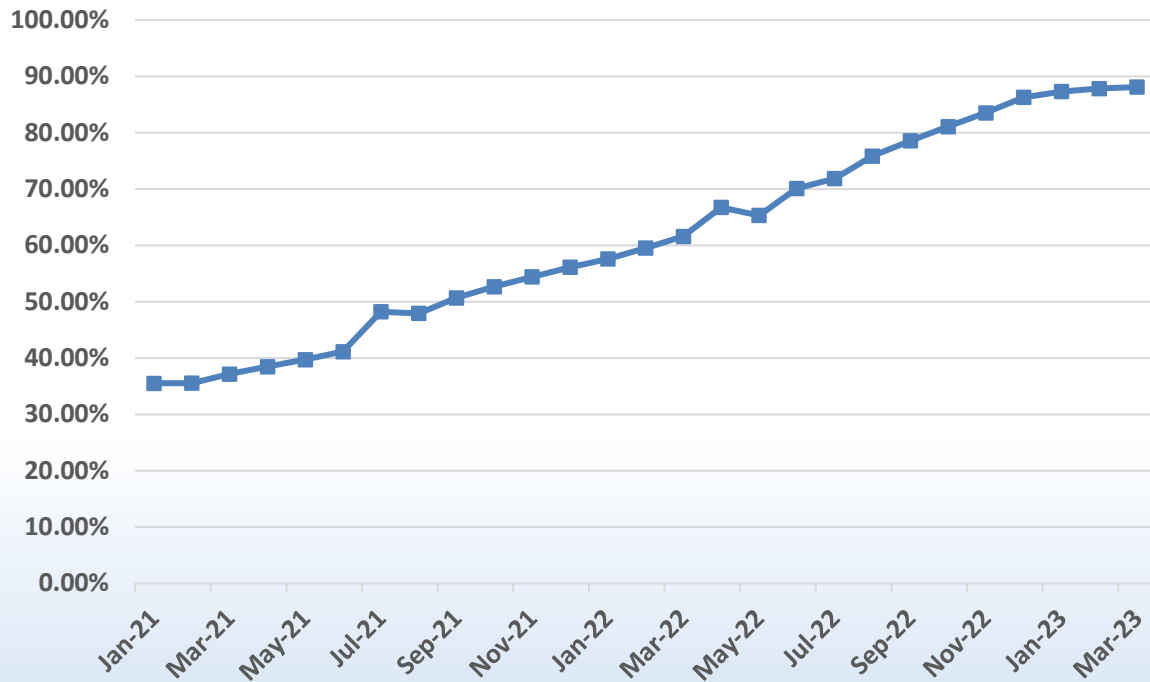


➤ BACKGROUND

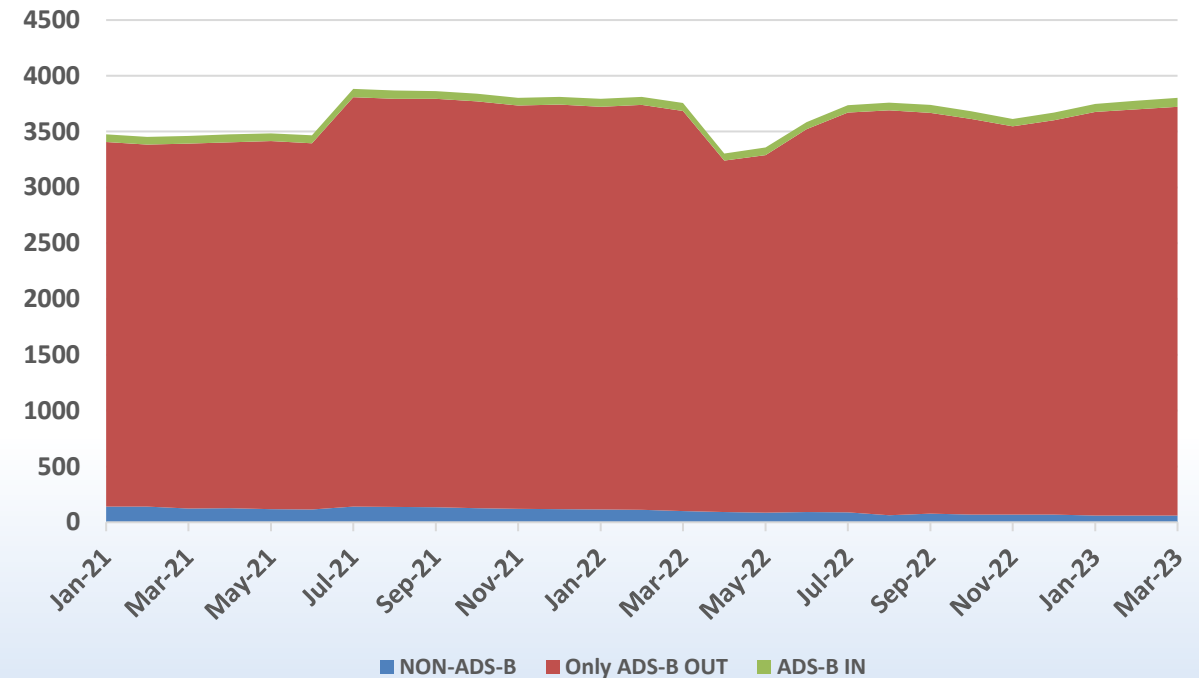
➤ Aircraft ADS-B Equipped in China

- Both ADS-B and DO-260B equipped proportion be increased in this years.

DO-260B EQUIPED PROPORTION



NUMBER OF ADS-B EQUIPED AIRCRAFT



Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL



BACKGROUND

Data Quality Analysis by ADS-B Level-1 Data Processing Centers

- Harmonization of data processing standard based on the ED-129B
- Reduction of ATC system workload handling abnormal data
- Direct access to high-quality ADS-B surveillance for the users
- Detection of systemic issues affecting ADS-B data quality
- Quarterly conducted quality analysis
- 6-month and 12-month reports available to all regional ATMBs

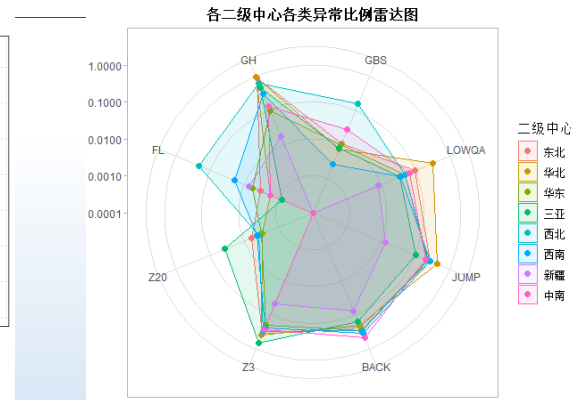
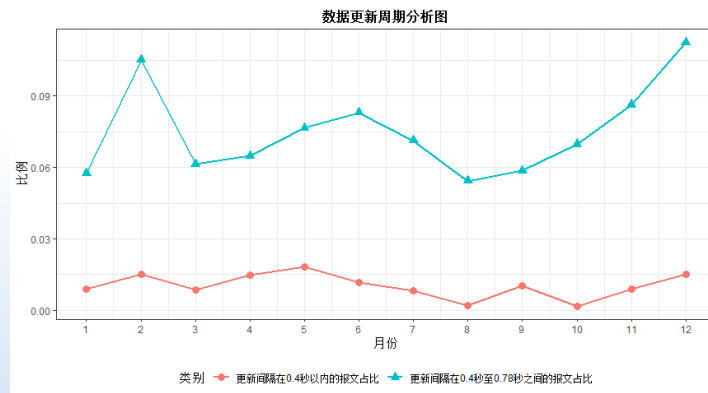
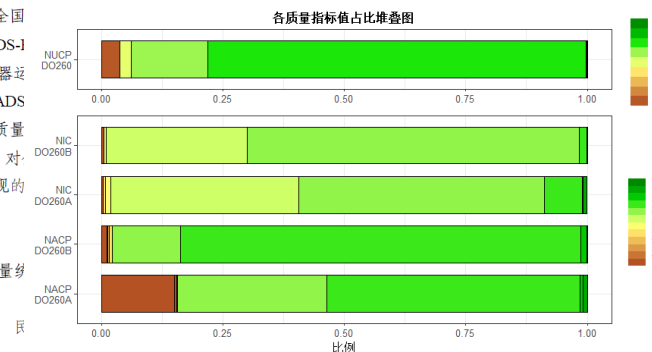
民航空管明传电报

发电单位 民航局
等级 平急·明电
签发盖章 文学正
民航空管明传电报 [2023] 48号

关于下发 2022 年度全国 ADS-B 数据质量统计报告的通知

各地区空管局，空管分局（站）：
我局现已组织编制完成《全国（2022 年度）》，该报告基于 ADS-I 全国 ADS-B 数据，从面向航空器运行向空管运行等三个方面，围绕 ADS 器识别标志填写情况、ADS-B 质量精度及完好性情况等八个维度，对计和分析，并针对统计分析发现的下发，请参阅研究及时反馈。

附件：全国 ADS-B 数据质量统计



Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL



➤ BACKGROUND

➤ Contributing elements

- ❑ Duplicated ICAO Address in ADS-B
- ❑ Aircraft Identification in ADS-B
- ❑ ICAO Address in FPL
- ❑ Surveillance Capabilities in FPL

Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL



➤ ADDRESS AND TARGET IDENTIFICATION QUALITY ANALYSIS

➤ 1. Duplicated ICAO Address in ADS-B

□ In certain period of time

- Same ICAO Address identified in continuous CAT021 report, while flight numbers are different
- Abnormal calculation distance and speed in continuous CAT021 report
- Persistent Data Abnormal

Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL



➤ ADDRESS AND TARGET IDENTIFICATION QUALITY ANALYSIS

➤ Duplicated ICAO Address in ADS-B

- ❑ **NINE** aircrafts from **FIVE** operators have been identified with duplicate ICAO address.
- ❑ In coordination with CAAC, the related operators change the avionic equipment to assure the correctness of the ICAO address.
- ❑ **SEVEN** events caused by duplicate address are possibly caused by general aviation and/or flight academies. Further investigation is underway.

Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL



➤ ADDRESS AND TARGET IDENTIFICATION

➤ 2. Aircraft Identification in ADS-B

- ❑ Compare the flight ID item of ADS-B to FPL for the single flight

- ❑ Four abnormal Categories:
 - Length: Flight ID with more than seven digits or shorter than four
 - ICAO Code: First three digits contain number(s)
 - Same ICAO Code but different Flight ID (Especially for the numeric digits)
 - Others

Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL

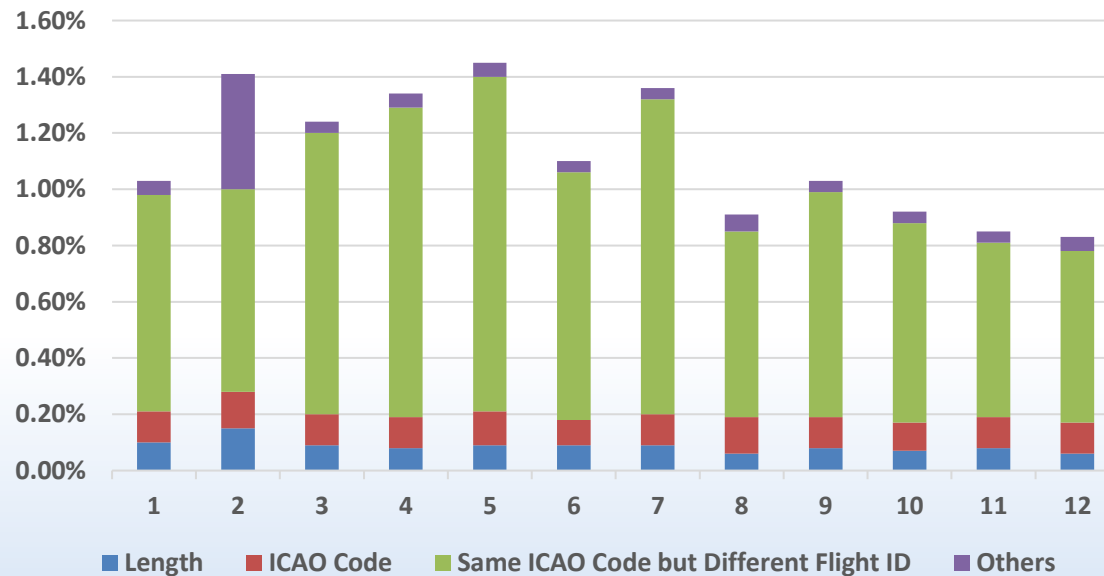


➤ ADDRESS AND TARGET IDENTIFICATION QUALITY ANALYSIS

➤ Aircraft Identification in ADS-B

- ❑ majority of the causes leading to this issue are attributed to incorrect cockpit settings by the flight crew.
- ❑ And in some cases, it could also be due to avionics device issue.

AIRCRAFT IDENTIFICATION ISSUES



Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL



➤ ADDRESS AND TARGET IDENTIFICATION QUALITY ANALYSIS

➤ 3. ICAO Address in FPL

- ❑ Lack of Address
- ❑ Address Conflict (Same registration number but different ICAO Address)

➤ 4. Surveillance Capabilities in FPL

- ❑ Surveillance capabilities conflict (Same registration number but different Item 10/b in different FPL)
- ❑ Surveillance capabilities abnormal

Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL



➤ ADDRESS AND TARGET IDENTIFICATION QUALITY ANALYSIS

➤ Surveillance Capabilities in FPL

- ❑ Surveillance equipment and capabilities (FPL Item 10/b)

- ❑ PANS-ATM Doc 4444

SSR Modes A and C

- A Transponder — Mode A (4 digits — 4 096 codes)
- C Transponder — Mode A (4 digits — 4 096 codes) and Mode C

SSR Mode S

- E Transponder — Mode S, including aircraft identification, pressure-altitude and extended squitter (ADS-B) capability
- H Transponder — Mode S, including aircraft identification, pressure-altitude and enhanced surveillance capability
- I Transponder — Mode S, including aircraft identification, but no pressure-altitude capability
- L Transponder — Mode S, including aircraft identification, pressure-altitude, extended squitter (ADS-B) and enhanced surveillance capability
- P Transponder — Mode S, including pressure-altitude, but no aircraft identification capability
- S Transponder — Mode S, including both pressure altitude and aircraft identification capability
- X Transponder — Mode S with neither aircraft identification nor pressure-altitude capability

ADS-B

- B1 ADS-B with dedicated 1 090 MHz ADS-B “out” capability
- B2 ADS-B with dedicated 1 090 MHz ADS-B “out” and “in” capability
- U1 ADS-B “out” capability using UAT
- U2 ADS-B “out” and “in” capability using UAT
- V1 ADS-B “out” capability using VDL Mode 4
- V2 ADS-B “out” and “in” capability using VDL Mode 4

Example:

ADE3RV/HB2U2V2G1



Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL



➤ ADDRESS AND TARGET IDENTIFICATION QUALITY ANALYSIS

➤ Surveillance Capabilities in FPL

- ❑ Surveillance equipment and capabilities (FPL Item 10/b)
- ❑ PANS-ATM Doc 4444

- ❑ Can only be inputted one of A、 C、 E、 H、 I、 L、 P、 S、 X. **If more than one of these were inputted, then it's a mistake.**
- ❑ Only **E** or **L** can combine with **B1** or **B2**.
- ❑ **B1** and **B2** cannot be inputted at the same time.

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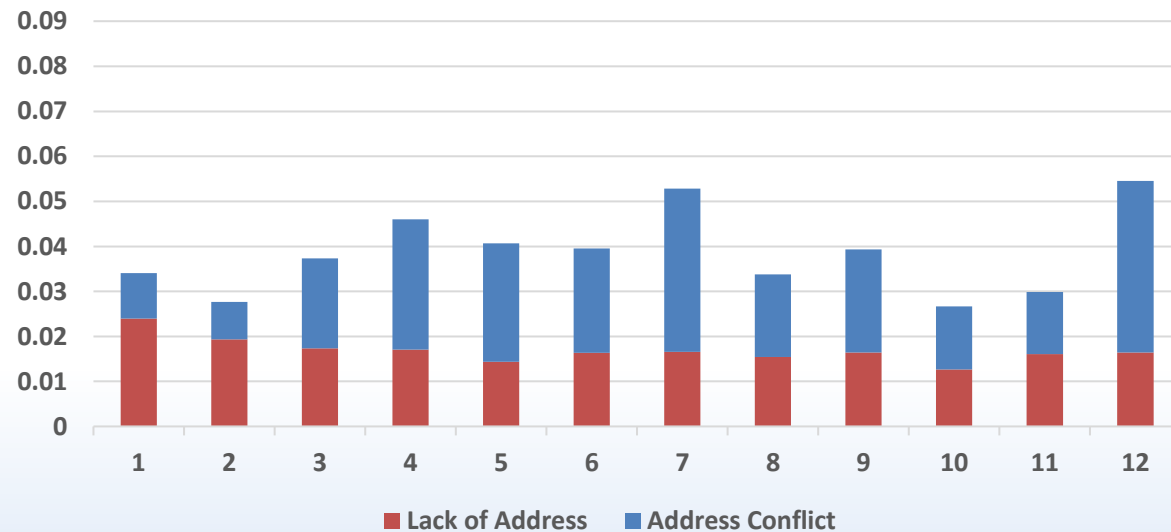


➤ ADDRESS AND TARGET IDENTIFICATION QUALITY ANALYSIS

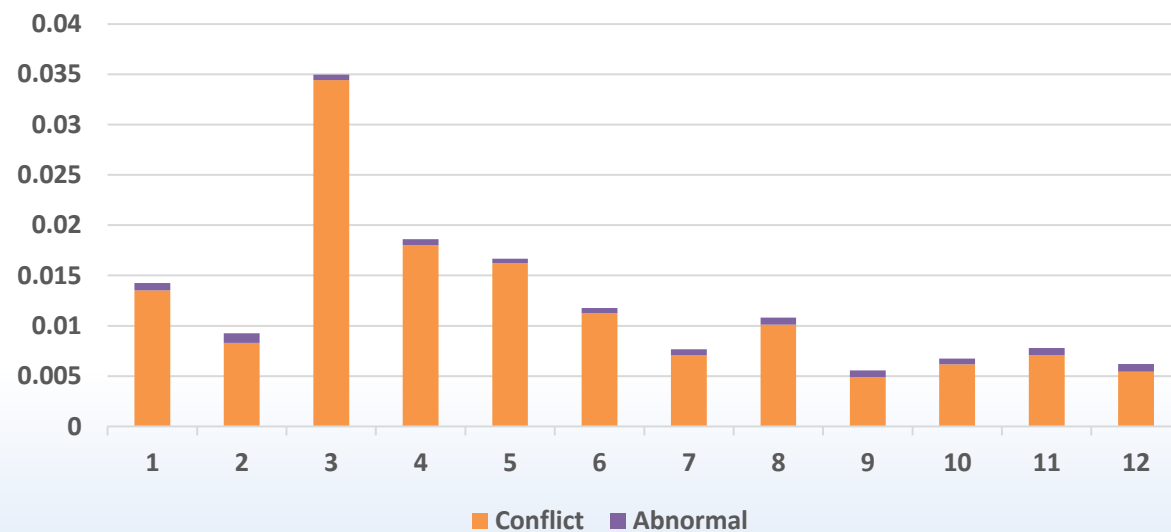
➤ ICAO Address and Surveillance Capabilities in FPL

- majority of the causes leading to these two issues are attributed to incorrect FPL submitted by the operators.

ICAO ADDRESS ISSUES FOR DOMESTIC FLIGHT PLAN



SURVEILLANCE CAPABILITIES (ITEM/10b) FOR DOMESTIC FLIGHT PLAN



Aircraft Address and Target Identification Quality Analysis Using ADS-B and FPL



➤ ADDRESS AND TARGET IDENTIFICATION QUALITY ANALYSIS

➤ ICAO Aircraft Address and Target Identification in Surveillance Data and Flight Plan

- ❑ China has published ***THE GUIDANCE MATERIALS FOR ADS-B AND MODE S OPERATIONS ON AIRLINES***
- ❑ According with ICAO and Civil Aviation Administration of China regulations, Operators need:
 - Ensure the correct configuration of ICAO address,
 - Standardize the setting of Target Identification on flight, and
 - Verify and accurately represent the capabilities of onboard Mode S transponders and ADS-B equipment to avoid discrepancies between FPL messages and actual aircraft capabilities.
- ❑ Currently, the operational environment and these mentioned issues about the Aircraft and Target Identification have been significantly improved during these years.
- ❑ ATMB China will keep the periodical quality analysis of the ADS-B continuity to improve the operational environment performance.



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Thank You

