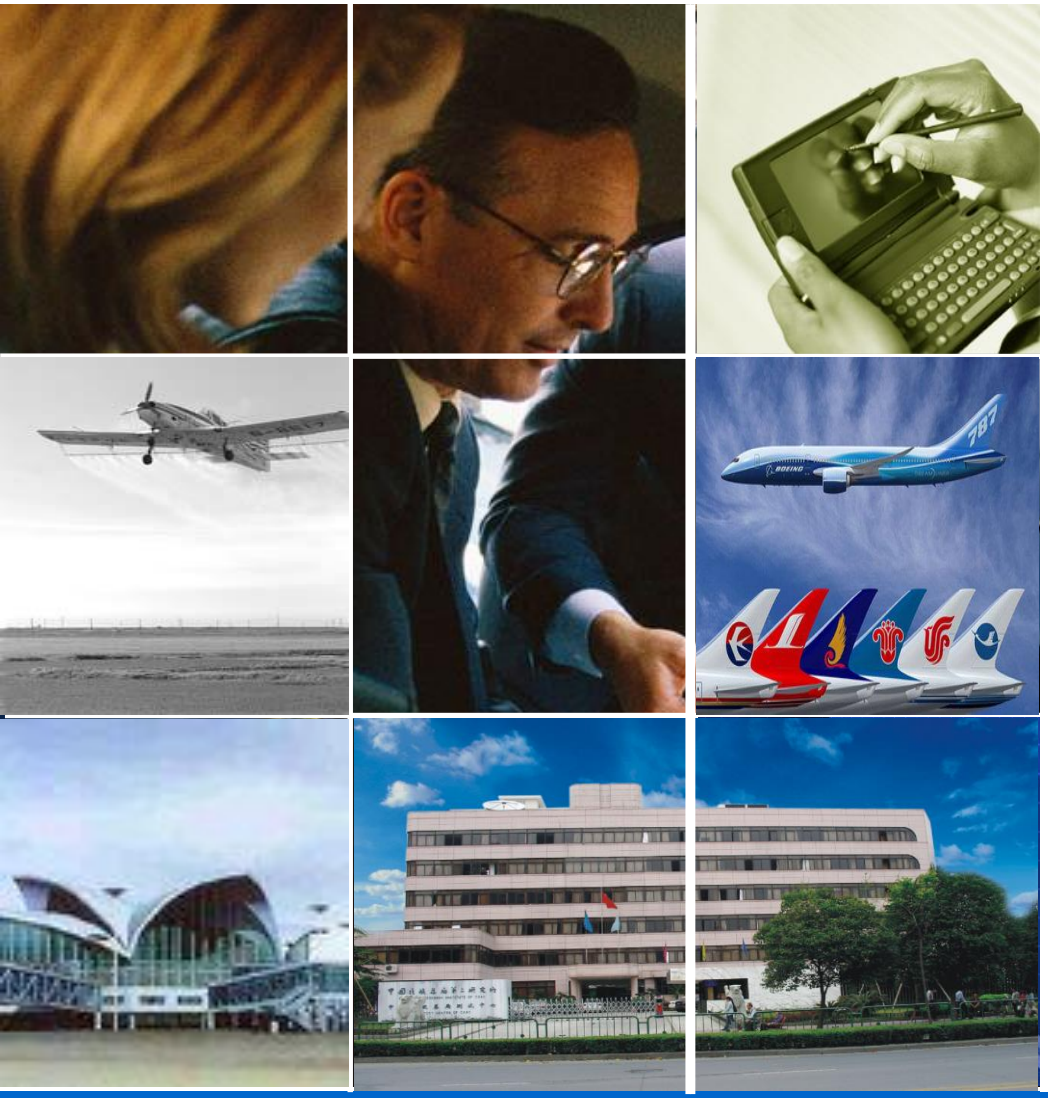

Data Exchange Technology of ATC Automation System

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THE SECOND RESEARCH INSTITUTE OF CAAC

CDATC

成都民航空管科技发展有限公司

Contents

Data Exchange Technology of ATC Automation System

Backgrounds

Current Situation：

1. Auto control systems for air(e.g. ATC, A-SMGCS,…) have been built in many places.

2. Poor Information Share and Data Exchange.

3. Collaborative decision making requires more in data exchange.

Backgrounds

Aims：

1. Unified data exchange standards between systems, solve the problem of poor data synchronization and delay;

2. Meeting needs of the information sharing and data exchange among multi-control centers/multi-system;

3. Improve the cooperation among systems;

4. Reduce the overall operational risk of ATC system, and improve safety 。

Contents

Data Exchange Technology of ATC Automation System

Connection Solutions

- **Protocol**

Interface	Protocol	Advantages & Disadvantages	Explanation
Network	TCP, UDP, ActiveMQ	Good：high data transfer speed Bad：need network access control to ensure network security	The choice depends, but TCP is recommended。
COM	Synchronous , Asynchronous	Good：low security cost Bad：low data transfer speed	The choice depends

P.S. The prime and standby ATC systems are all internal network systems , and the network mode is recommended.

Connection Solutions

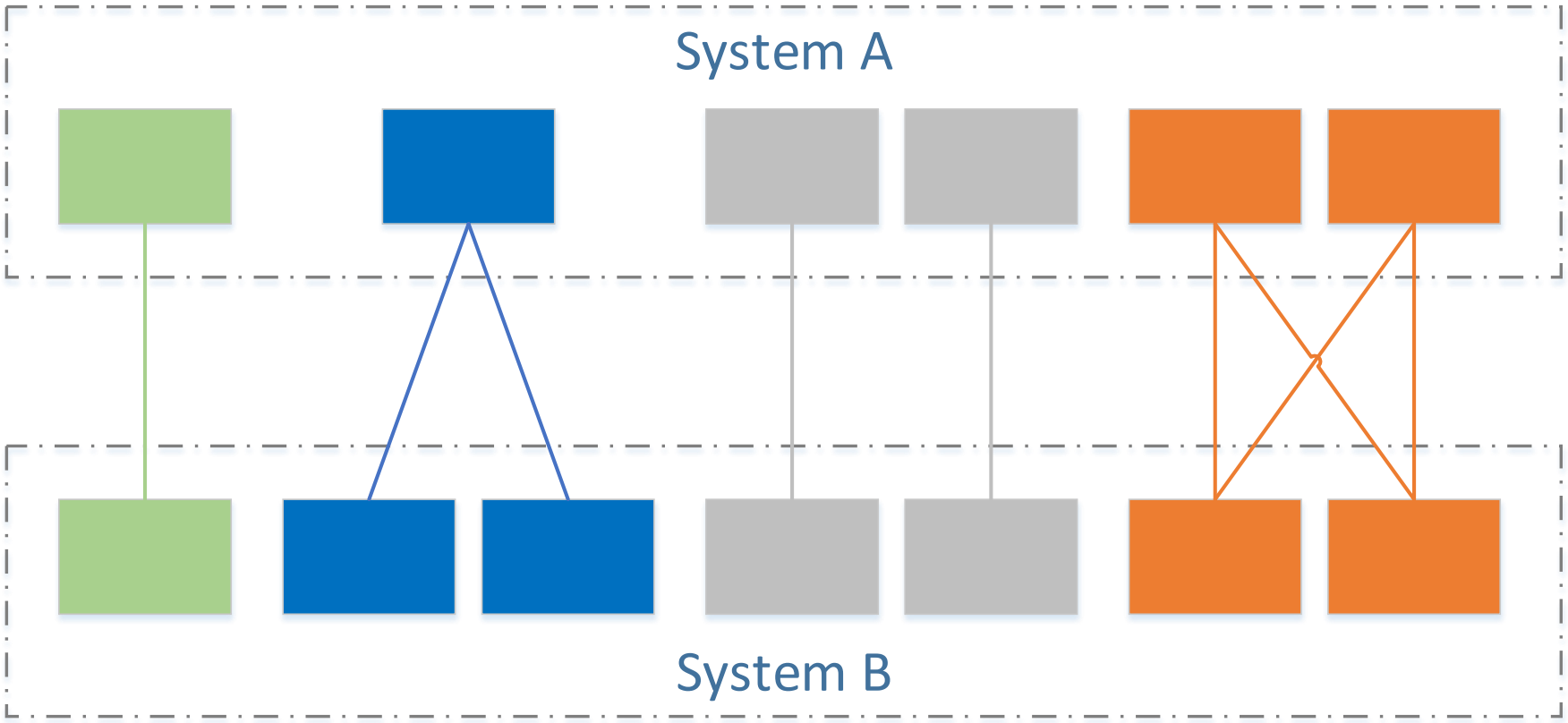
- **Hardware**

Using network mode, the network security configurations such as VLANs, ACLs and so on, need to be set in the devices(e.g. switches, routers, firewalls, etc.).

Using COM mode, devices such as are MPDC, NPORT, data distributor, and so on are needed. And appropriate rate should be configured according to the data on these devices.

Connection Solutions

- **Solutions**



Contents

Data Exchange Technology of ATC Automation System

Standard Data Format Used

- **Flight Data Exchange**

  MH/T 4029.3

  Civil Aviation Air Traffic Control Automation System, Part 3: Flight Data Exchange.

  Latest version: MH/T 4029.3-2015. Release date: 2015-4-8.

- **Surveillance Data Exchange**

  CAT 062

  EUROCONTROL STANDARD DOCUMENT FOR SURVEILLANCE DATA EXCHANGE, Part 9 : Category 062 SDPS Track Messages。

  Latest version: 1.17. Release date: 2014.

Standard Data Format Used

- **Others**

ADEXP格式

EUROCONTROL Specification for ATS(Air Traffic Services) Data Exchange Presentation (ADEXP)。

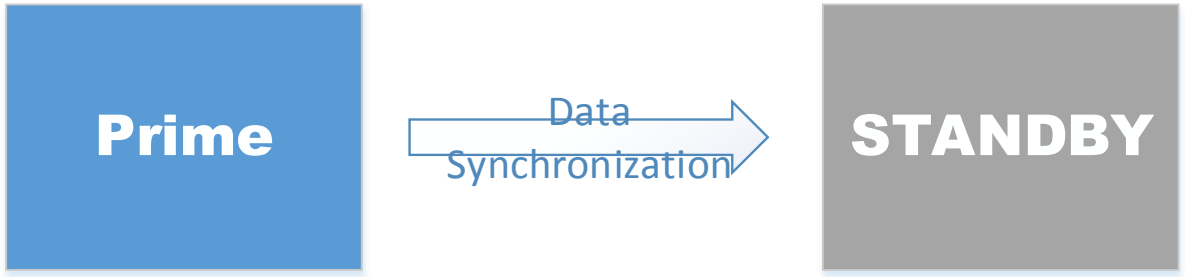
Latest version: 3.2. Release date: 2017-12-18.

Contents

Data Exchange Technology of ATC Automation System

Data Exchange between Systems

- **Data exchange between prime and standby systems**



The ATC system supports prime and standby mode. Data is only transmitted from the prime system to the standby system. The transmitted data includes synthesized track, flight data, and control operations, to make sure data in the standby system is the same with in active system .

Using Data Format：MH/T4029.3、ADEXP、CAT062

Data Exchange between Systems

- **Data exchange between systems in different ATC unit**

Traditional： Voice、AIDC

Current：follow MH/T4029.3

Four operations：

Handover Request, Handover Cancel, Handover Accept, Handover Reject

Five messages：

CFPL; CHRQ; CHRP; CLAM; CLRM

Message Transmit by network/AFTN network.

Data Exchange between Systems

- **Data exchange with Tower**

Exchange Data: Flight Data, Synthesized Track, Others

Flight Data: Support functions such as handover and reception between systems, Go-around reminders, and displaying of departing flights queue.

Synthesized Track: Tower use this for watching the inbound target and coupling auxiliary; ATC use this to watch the target and runway situation.

Other Info: Runway Status, BSEC, Restricted Area Status.

Data Exchange between Systems

- **Data exchange with A-SMGCS**

Exchange Data: Flight Data, Synthesized Track, Others

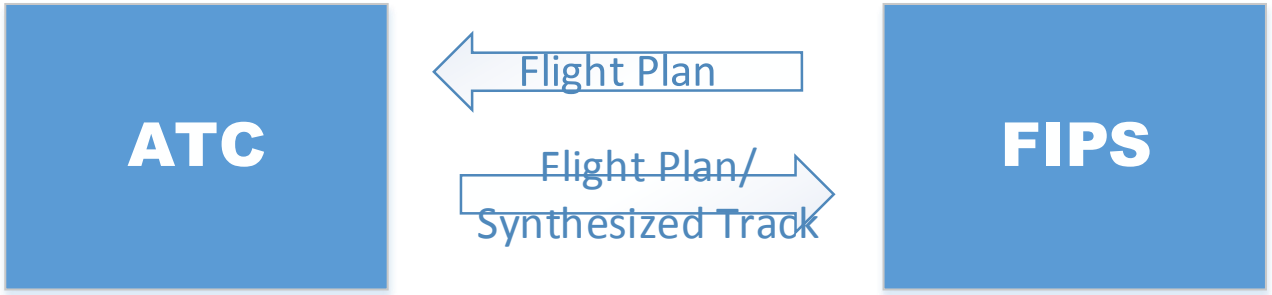
Flight Data: A-SMGCS use data for flight coupling.

Synthesized Track: A-SMGCS use data for watching the flights arrival and coupling assistance;

Other Info: Runway status, BSEC、Restricted Area Status .

Data Exchange between Systems

- **Data exchange with FIPS**

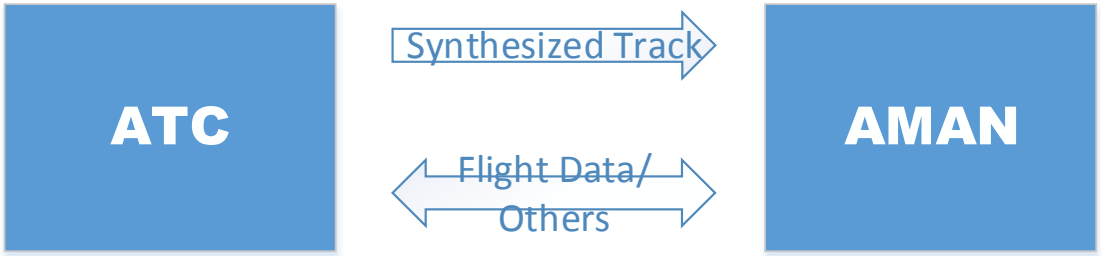


Exchange Data: Flight Data

Date Exchange bidirectionally, the ATC receives accurate flight plan information from the FIPS, and also sends its own flight plan information to the FIPS.

Data Exchange between Systems

- **Data exchange with AMAN**



Exchange Data: Flight Data, Synthesized Track, Others

Flight Data: AMAN receives the flight plan data to keep data the same with ATC system; ATC system receives the sort results of AMAN to display and info the customs.

Synthesized Track: AMAN use synthesized track to get more accurate result of fight trajectory prediction.

Others：Runway status, etc.

Data Exchange between Systems

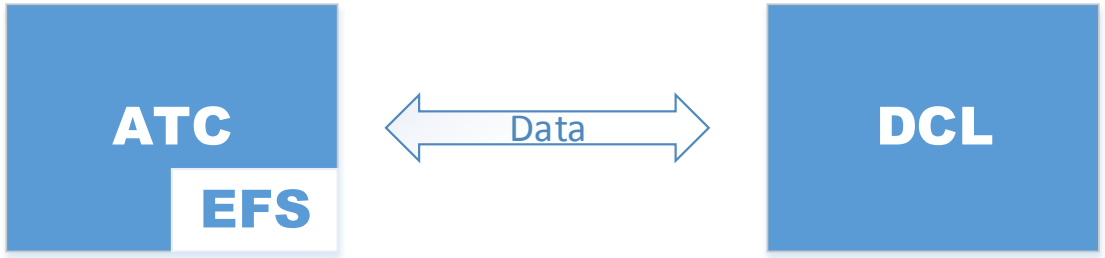
- **Data Exchange with CDM**

Exchange Data: Flight Plan

ATC system receives and processes data from CDM system, to get various types of time information, such as CTOT, EOBT, and COBT, and output warnings according to the corresponding rules and the specified time.

Data Exchange between Systems

- **Data Exchange with DCL system**



Exchange Data: Release Message

When ATC system contains EFS, Data exchanged with DCL to support the digital release function of EFS.

Data exchange is recommended to follow the "data link pre-flight release system integration interface control file" of Civil Aviation Data Communication Co., Ltd.

Data Exchange between Systems

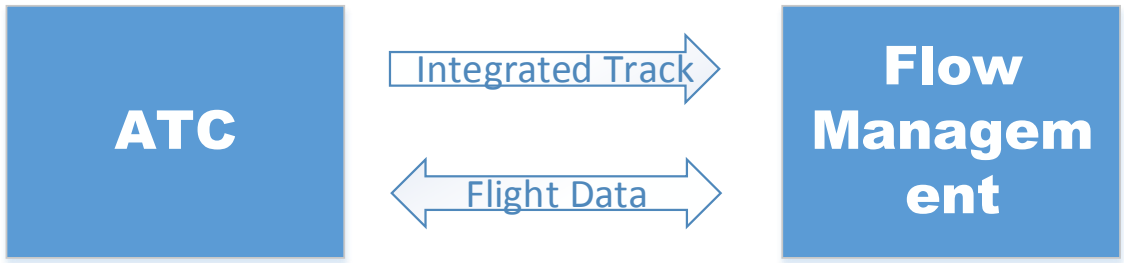
- **Data Exchange with Parking System**

Exchange Data: Parking Info

ATC system receives the flight parking information. The information is used by controller via ATC to do command and dispatch of the on/off flight.

Data Exchange between Systems

- **Data Exchange with Flow Management System**



Exchange Data: Flight Data, Synthesized Track, Others

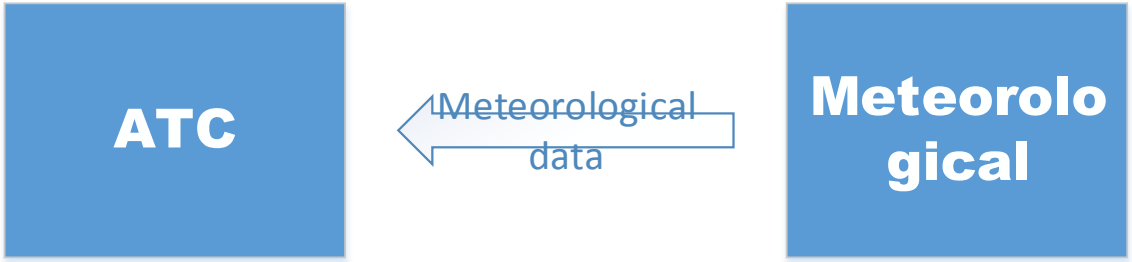
Synthesized Track: The flow manage system receive the synthesized track for real-time correction of the 4D trajectory, and to get more accurate traffic prediction resulte;

Flight Data: Data exchanged bilateral, to keep the data consistent；ATC system get real-time traffic prediction results for doing command and dispatch.

Other Info: Runway status, BSEC、restricted area status .

Data Exchange between Systems

- **Data Exchange with Meteorological System**



Exchange Data: Meteorological Data

ATC system receives and processes data from the meteorological system, to get QNH, wind and other information. And use the information to correct the flight height in the QNH area and calculate 4D trajectory more accurately.

Contents

Data Exchange Technology of ATC Automation System

Application Examples

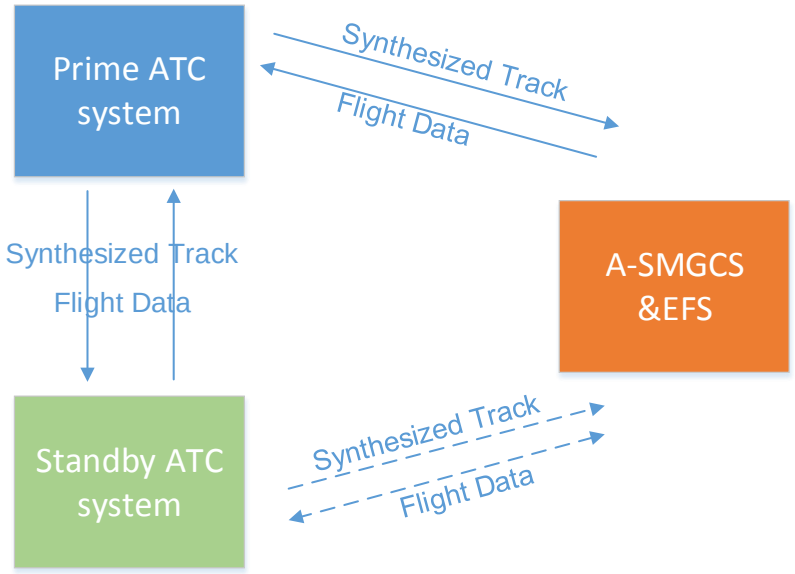
The synchronization between prime and standby air traffic control automation system has already been in using in Chengdu, Xi'an, Chongqing, Kunming, Guiyang, Changsha and Harbin.

As well as data exchange between air traffic control automation system and other system.

Application Examples

- **Chongqing**

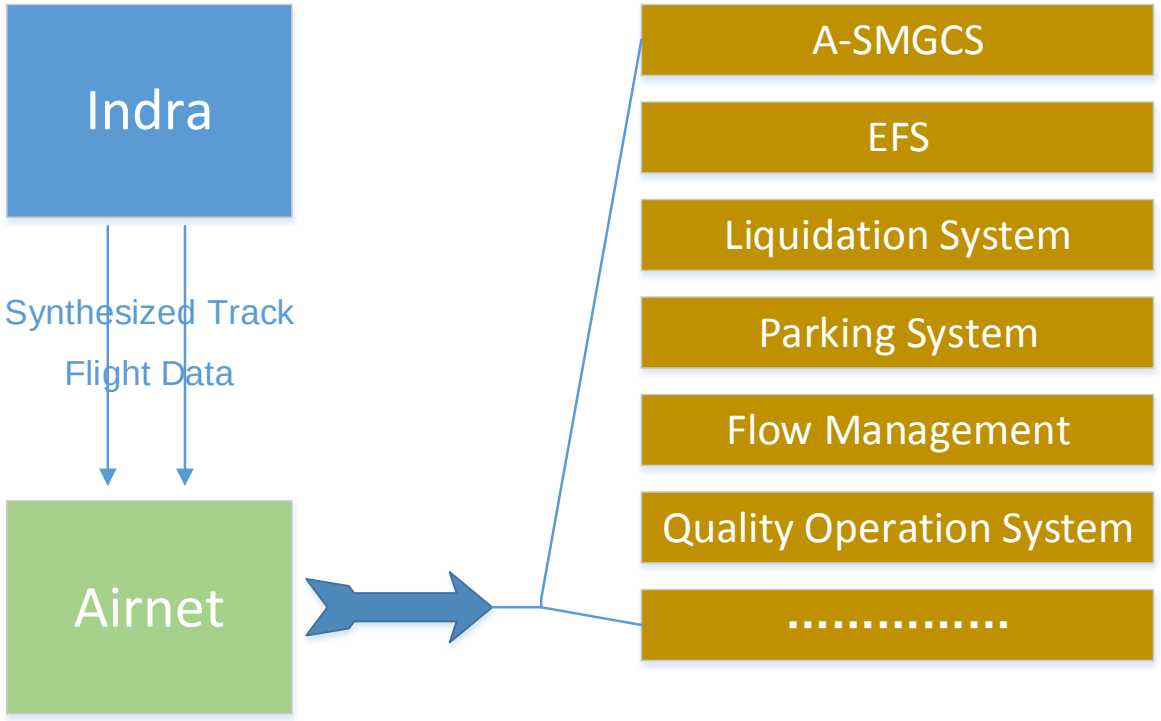
There are mainly three system， prime, standby ATC system and A-SMGCS with EFS.



These systems together supports fight handover via screen, go-around info and departure flight sort and display. Also switchover of prime and standby systems have no effect to other systems.

Application Examples

- **Chengdu & Xian**



Exchange Data: Flight Data, Synthesized Track, Basic Info

The AirNet system outputs data to other systems through network and COM.

Contents

Data Exchange Technology of ATC Automation System

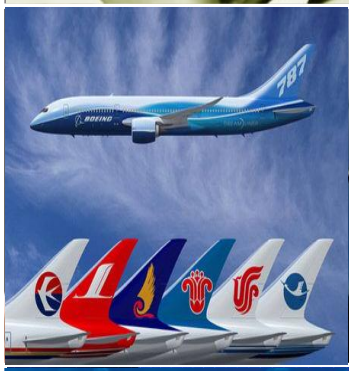
Summarize

- Data sharing and exchange among systems require more with developing.
- Build data exchange platform based on SWIM, can meets the needs of air-to-air, ground-to-ground and ground-to-air information exchange.
- Which can reduces the overall operational risk of the air traffic control system, improves the safety, the overall efficiency of the system.

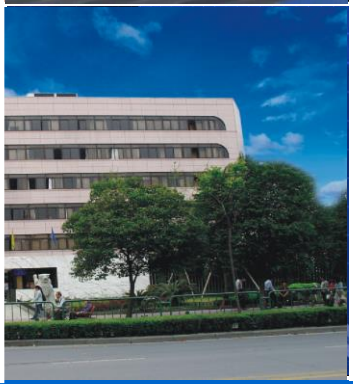
This is crucial to the future development of China and the global aviation industry.









Goal:

Leading civil aviation and famous high-tech enterprises in China

First-class civil aviation and domestic advanced science and technology innovation base

Thank You !

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