

Large Area ATM Automation System Analysis and Optimization

Presented by China
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Team Introduction



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- **Participate in ATMAS Design & Construction**



Yingheng Wang,

- **Senior Engineer**
- **Participate in ATMAS Construction & Maintenance**
- **Presenter**



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- **Participate in ATMAS Construction & Safety management**



Part1: Background

Part2: Advantages

Part3: Disadvantages & Solutions

Part4: Review & Outlook



Part1: Background

Part2: Advantages

Part3: Disadvantages & Solutions

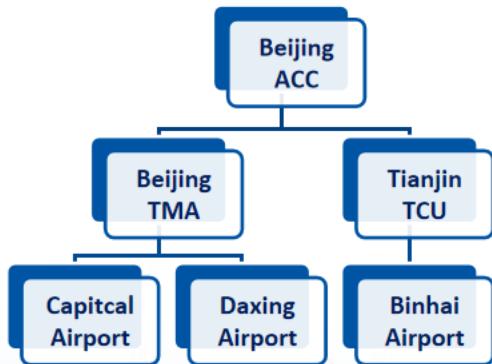
Part4: Review & Outlook



1 Background



1 Background



3 airports of 10-million

100-million of passengers annually

42 Volume sector & 88 Functional sector

1.05 million $[\text{km}]^2$ of controlled airspace

300 Air Traffic Controllers simultaneously



1 Background

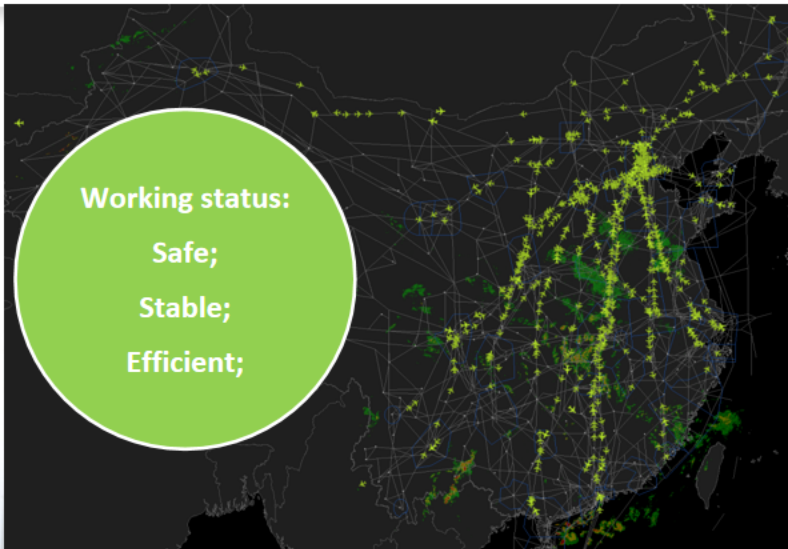
Inherent
Advantages



Valuable
Experience

Working status:

Safe;
Stable;
Efficient;



Part1: Background

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Part4: Review & Outlook



2 Advantages

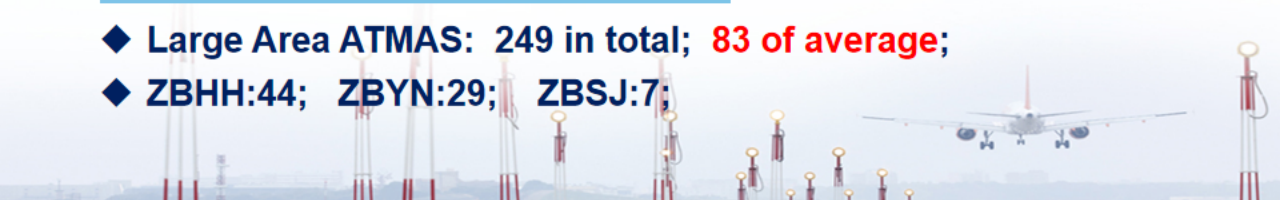
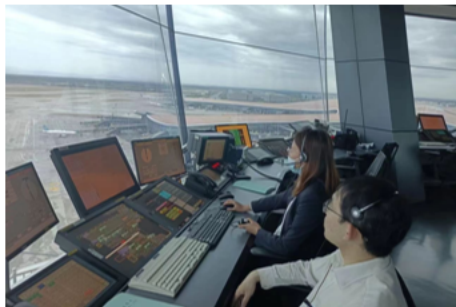
2.1 Convenience for ATCers

Seamless Electronic Transferring

- ◆ Synchronized Key Elements of FDR;
- ◆ Higher Success-ratio;
- ◆ Better Efficiency;

Optimal allocation of SSR Codes

- ◆ Large Area ATMAS: 249 in total; **83 of average;**
- ◆ ZBHH:44; ZBYN:29; ZBSJ:7;



2 Advantages

2.2 Convenience for Technician

**Synergetic
Management
Experience
Sharing**

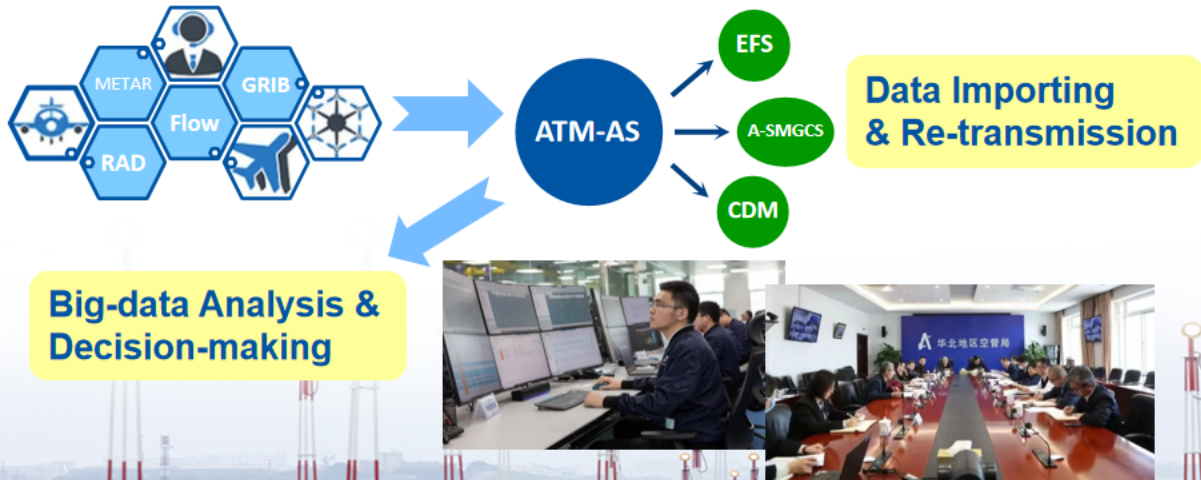


- ◆ Unified Software-version;
- ◆ Unified Global-database;

- ✓ Optimize Human-resources;
- ✓ Promote Team-building;
- ✓ Improve whole Support-capability;

2 Advantages

2.3 Convenience for Expanding Use



Part1: Background

Part2: Advantages

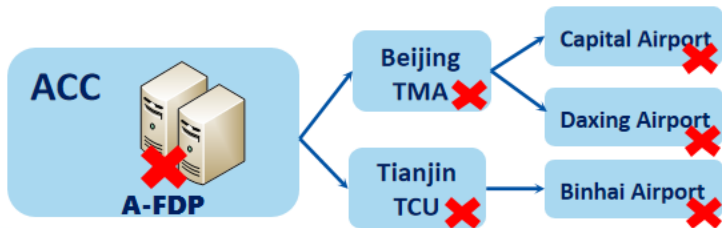
Part3: Disadvantages & Solutions

Part4: Review & Outlook



3 Disadvantages & Solution

3.1 Risk of Centralized FDP



After AFDP fails:

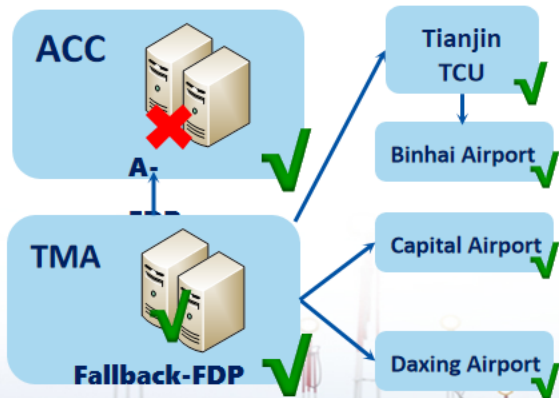
- ☐ FDR management
- ☐ Telegram processing
- ☐ Handover & Acceptance
- ☐ CLAM & RAM & FPCF

- ◆ Critical functions lost;
- ◆ Wide range influenced;



3 Disadvantages & Solution

3.1 Solution-A



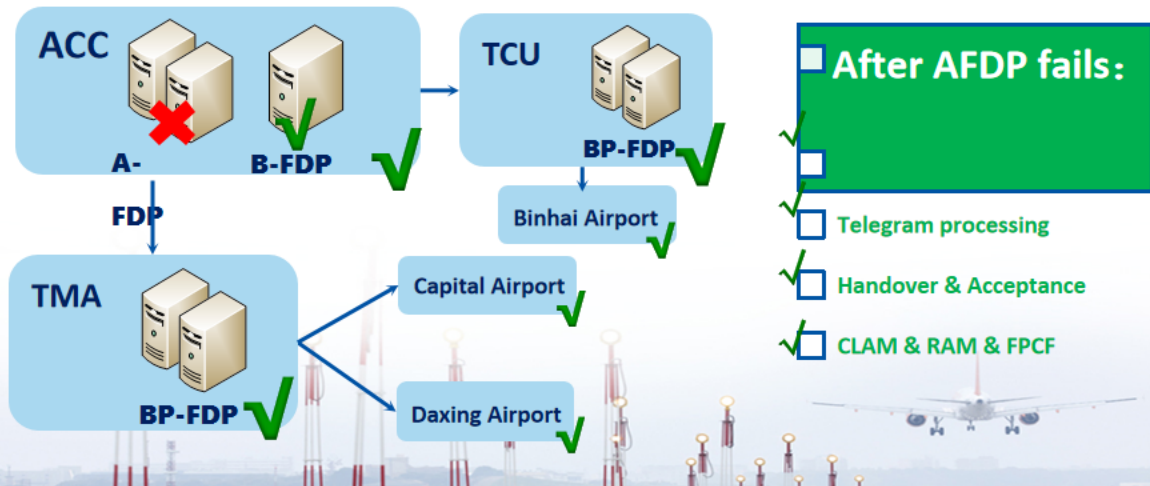
After AFDP fails:

- ☐ Telegram processing
- ☐ Handover & Acceptance
- ☐ CLAM & RAM & FPCF



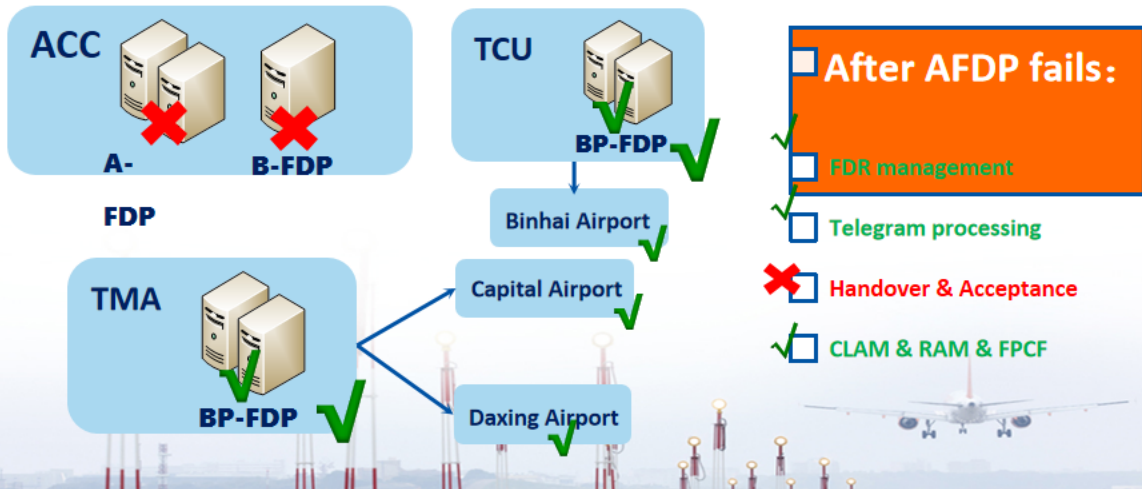
3 Disadvantages & Solution

3.1 Solution-B



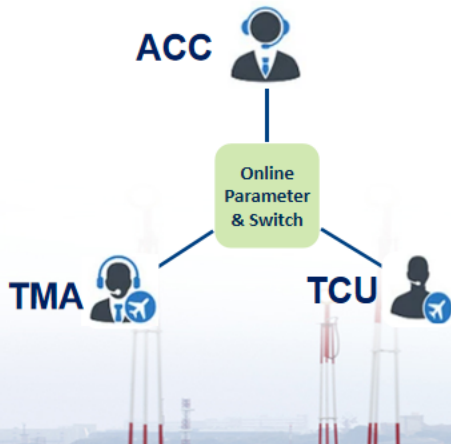
3 Disadvantages & Solution

3.1 Solution-B



3 Disadvantages & Solution

3.2 Risk of Interaction



Cause of risk:

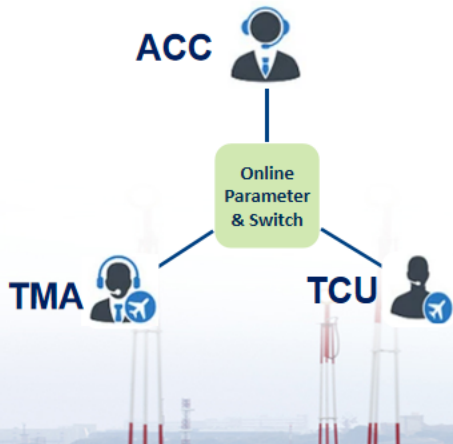
- ◆ Online parameters & switch access sharing;

Consequence:

- ◆ Misoperation impacts the work of adjacent units;
- ◆ Increasing uncertainty of ATMAS during control;

3 Disadvantages & Solution

3.2 Solution



Functionally:

- ◆ Optimize the authority allocation mechanism;

AIDC

EST

AGDL

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managerial:

- ◆ Clear the responsibility assignment;

SSR MGT

Sys Mod

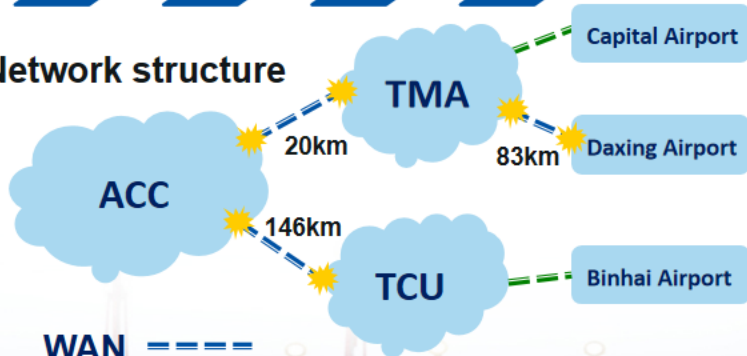
SAVE FPL

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3 Disadvantages & Solution

3.3 Risk of Cyber-threats

Network structure



WAN Access Ports May Provide Pathway for Cyber Attacks !!!



3 Disadvantages & Solution

3.3 Solution

Standards & Guidelines

MH/T 0069

MH/T 0076

MH/T 4018.2

MH/T 4029.2

Level Classification

ATMAS should satisfy the demand of level-3 among 5

Level Protection

Protection

Detection

Response

Recovery



Part1: Background

Part2: Advantages

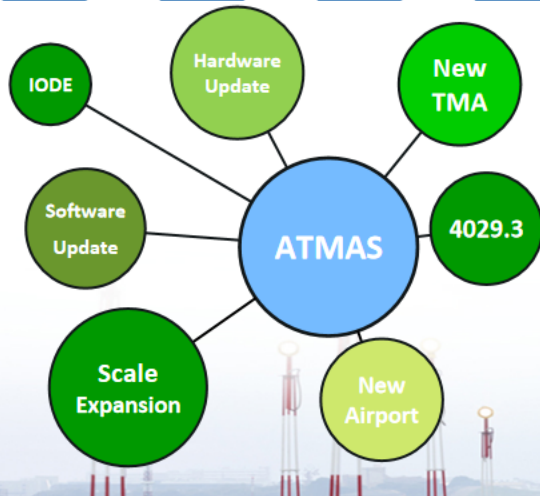
Part3: Disadvantages & Solutions

Part4: Review & Outlook



4 Review & Outlook

4.1 Review



The development of civil aviation in China

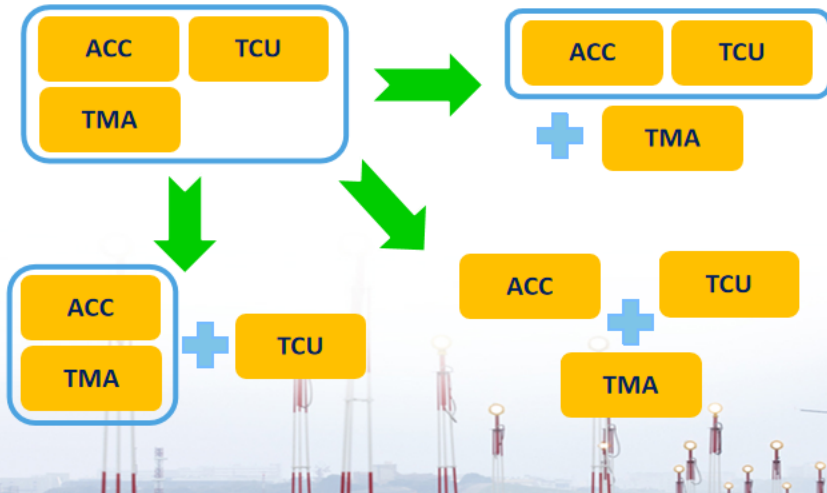


Mutual promotion

The development of Large Area ATM automation system

4 Review & Outlook

4.1 Outlook



Flexible Splitting & Combining

- ◆ High adaptability of interface protocols;
- ◆ High reliability of data exchange ;

Thanks for your attention!

