Twenty Ninth Meeting of the Communications/

Navigation and Surveillance Sub-group (CNS SG/29) of APANPIRG

WP/34
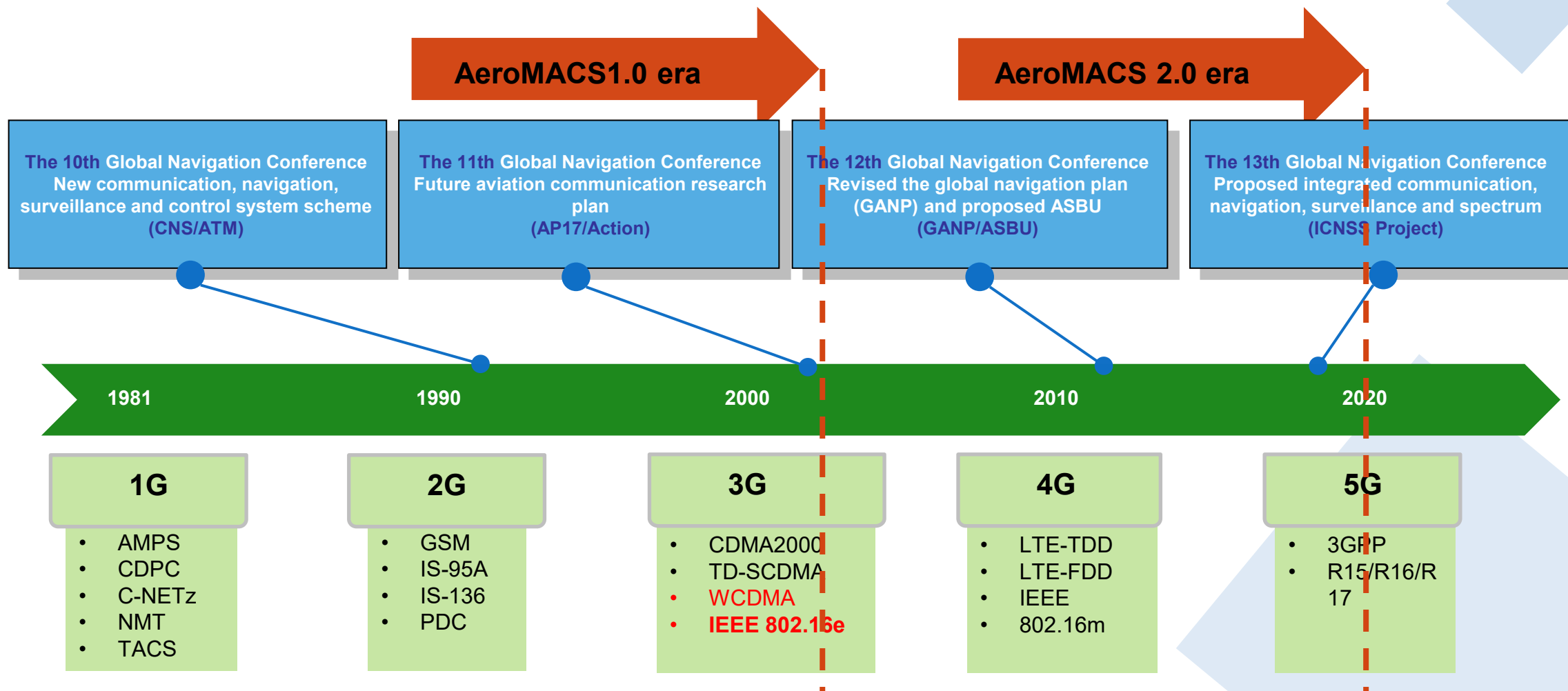
AeroMACS 2.0 Project Progress in China:

Standardization, Application, and Demonstration

Presented by Jingjing Zhao, China

Agenda

1 Proposal of AeroMACS 2.0

2 AeroMACS 2.0 Empowers Smart Airports

3 Action By The Meeting

Proposal of AeroMACS 2.0

Background & Development

AeroMACS1.0 era

AeroMACS 2.0 era

| The 10th Global Navigation Conference New communication, navigation, surveillance and control system scheme (CNS/ATM) | The 11th Global Navigation Conference Future aviation communication research plan (AP17/Action) | The 12th Global Navigation Conference Revised the global navigation plan (GANP) and proposed ASBU (GANP/ASBU) | The 13th Global Navigation Conference Proposed integrated communication, navigation, surveillance and spectrum (ICNSS Project) |

| 1981 | 1990 | 2000 | 2010 | 2020 |

1G	**2G**	**3G**	**4G**	**5G**
• AMPS • CDPC • C-NETz • NMT • TACS	• GSM • IS-95A • IS-136 • PDC	• CDMA2000 • TD-SCDMA • WCDMA • **IEEE 802.16e**	• LTE-TDD • LTE-FDD • IEEE • 802.16m	• 3GPP • R15/R16/R 17

Proposal of AeroMACS 2.0
Outdated Technology

▶ WiMAX technology over 15 years

▶ Industrial chain still incomplete

▶ The low communication rate cannot meet ubiquitous interconnection
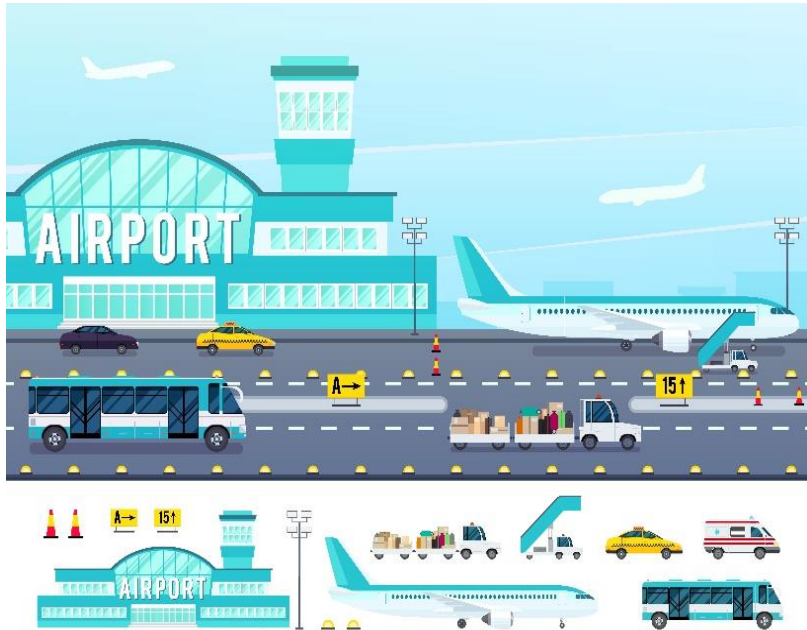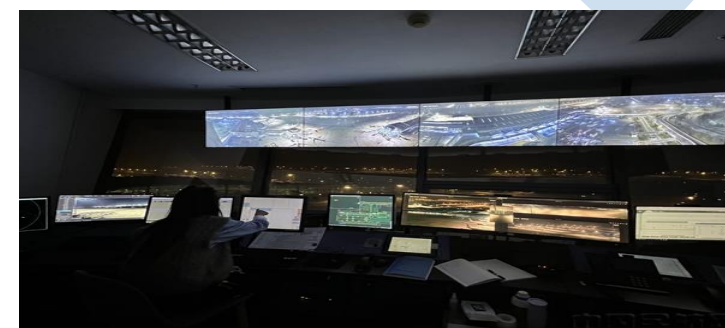
Development of AeroMACS 1.0

New demands

Coordinated operation

One-stop inspection

Unified regulatory

Ultra-high resolution video transmission

Safe operation under low visibility

Multi-stakeholder coordination

Higher rate

Lower latency

Wider accessibility

New applications and demands need Next Generation AeroMACS

Proposal of AeroMACS 2.0
ICAO

Meeting	Time	Contribution
CP-DCIWG/6	2022.10	• CAAC submitted the Job-card for AeroMACS profiles revision • Reactivate WG-M working group for the AeroMACS standard revision
WG-M/1	2023.06	• Revise AeroMACS Job-card to reduce the restrictions to IEEE 802.16 • Suggest to make SARPs focusing on high-level performance requirements
WG-M/2	2023.10	• Enable Next-Generation AeroMACS to support low-altitude operation • Add 5G R15 standard to TM and define specific revision guidelines
WG-M/3	2024.06	• Complete the SARPs revision draft • Revise the TM to update technical content on frequency allocation, etc
WG-M/4	2024.10	• Submit SARPs validation report, and clarify the performance requirements • Revise the TM to update technical content on spectral mask and emissions, etc

AeroMACS 2.0 Empowers Smart Airports
Field

1 Surface operation safety

2 Surface operation efficiency

3 Emergency rescue service

Dedicated Civil Aviation Network, Exclusive Spectrum, Dedicated Network Operations	→	Support for Collaborative Communication in Civil Aviation Air Traffic Control, Airports, Airlines, and Other Operations
High Bandwidth	→	Effectively support high-bandwidth applications for video and image transmission scenarios
Low Latency	→	Effectively support collaborative operations for air traffic control and vehicle coordination scenarios
Massive Connectivity	→	Effectively support scenarios with a large number of simultaneous online user terminals

AeroMACS 2.0 Empowers Smart Airports
Safety

① Runway incursion prevention systems

AeroMACS 2.0 + Beidou Navigation: High-accuracy and real-time position reporting

☐ Enhance vehicle management ability

☐ Improve surface status awareness

BeiDou Satellite

Onboard AeroMACS Antenna

5G AeroMACS Base Station

High-definition Camera

AeroMACS 2.0 Empowers Smart Airports
Safety
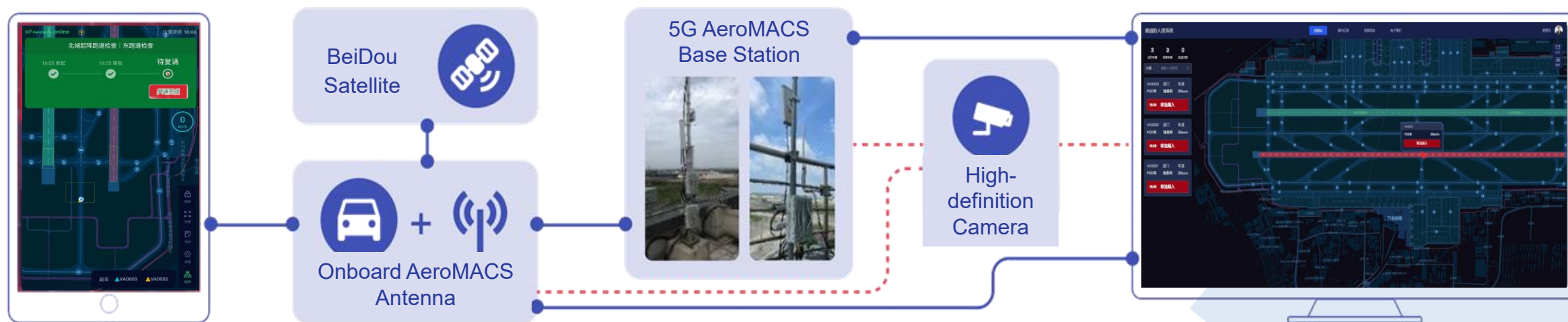
② Runway status light control

- ☐ **The average communication delay** of approach lights within 1.8 km is **20 ms**
- ☐ Runway status lights (multiple lights turning on and off simultaneously)
- ☐ Pathway guide lights (centerline lights turning on and off sequentially)

AeroMACS 2.0 Empowers Smart Airports
Safety
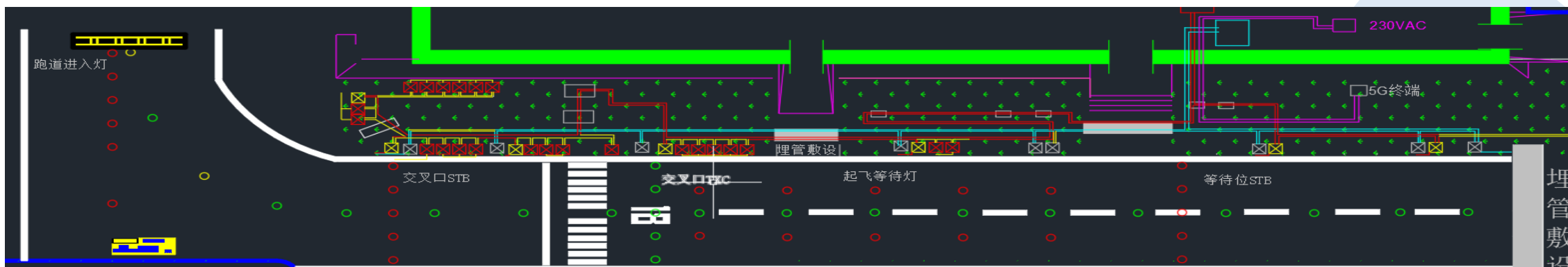
③ Low-visibility vehicle operation and collision prevention

☐ **Safely operation under low visibility**, improved flight service support capability

☐ Anti-collision capability for surface vehicles
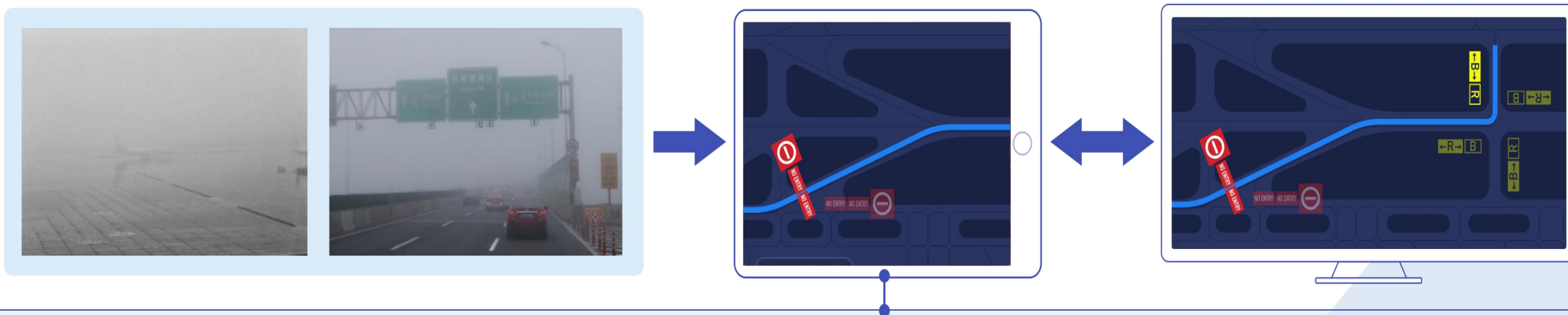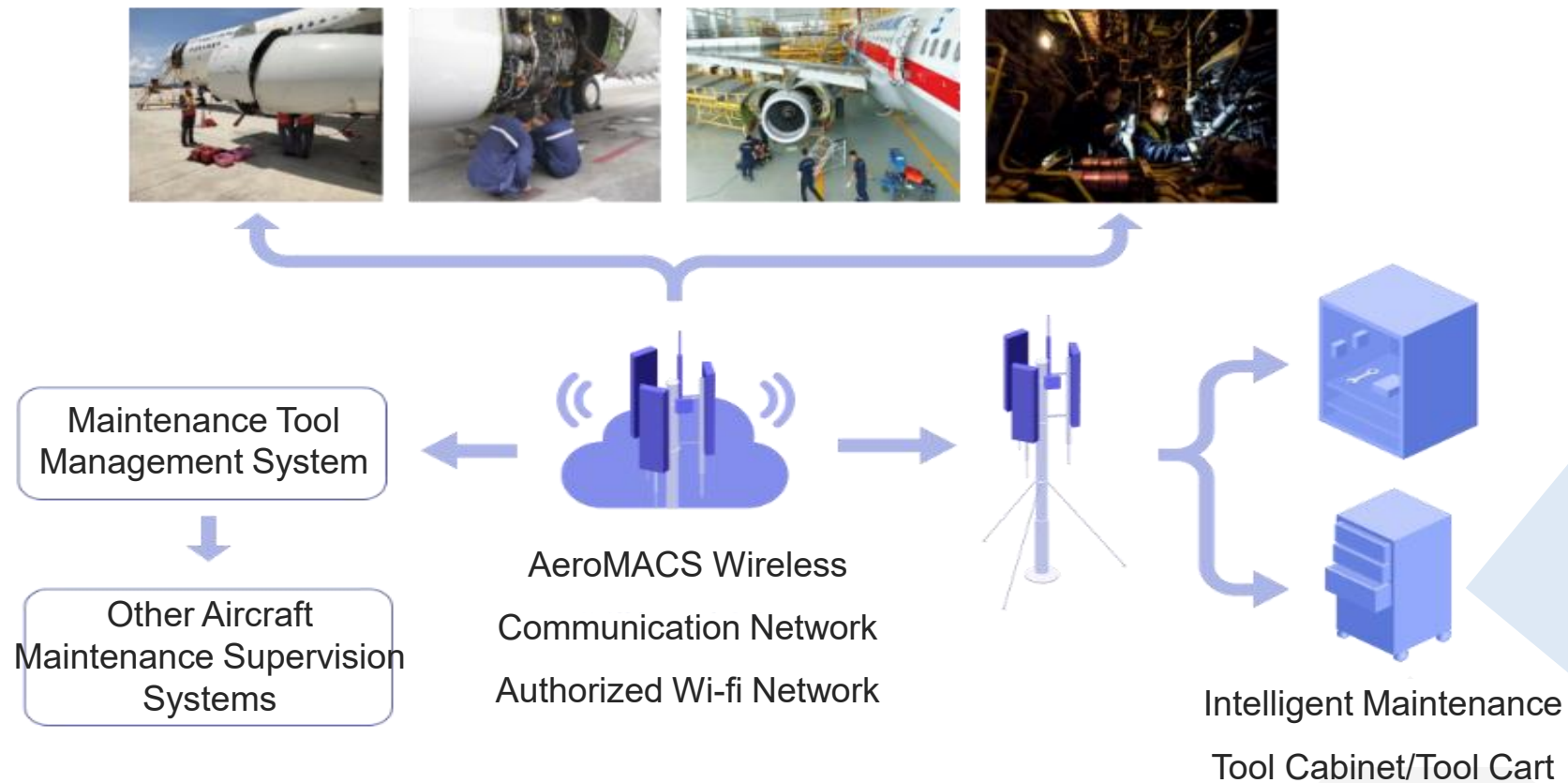
AeroMACS 2.0 Empowers Smart Airports
Efficiency

① Level V visual taxiing guidance

- ☐ **Improve aircraft taxiing efficiency**
- ☐ Reduce taxiing errors
- ☐ Reduce voice command and readback time

Management Command System

Aviation 5G AeroMACS System

Onboard — Aviation 5G AeroMACS Onboard Terminal Equipment

Onboard — Onboard Portable Aviation 5G AeroMACS Terminal Equipment

Path Indication

Unavailable Areas

Alarm

Routing

AeroMACS 2.0 Empowers Smart Airports
Efficiency
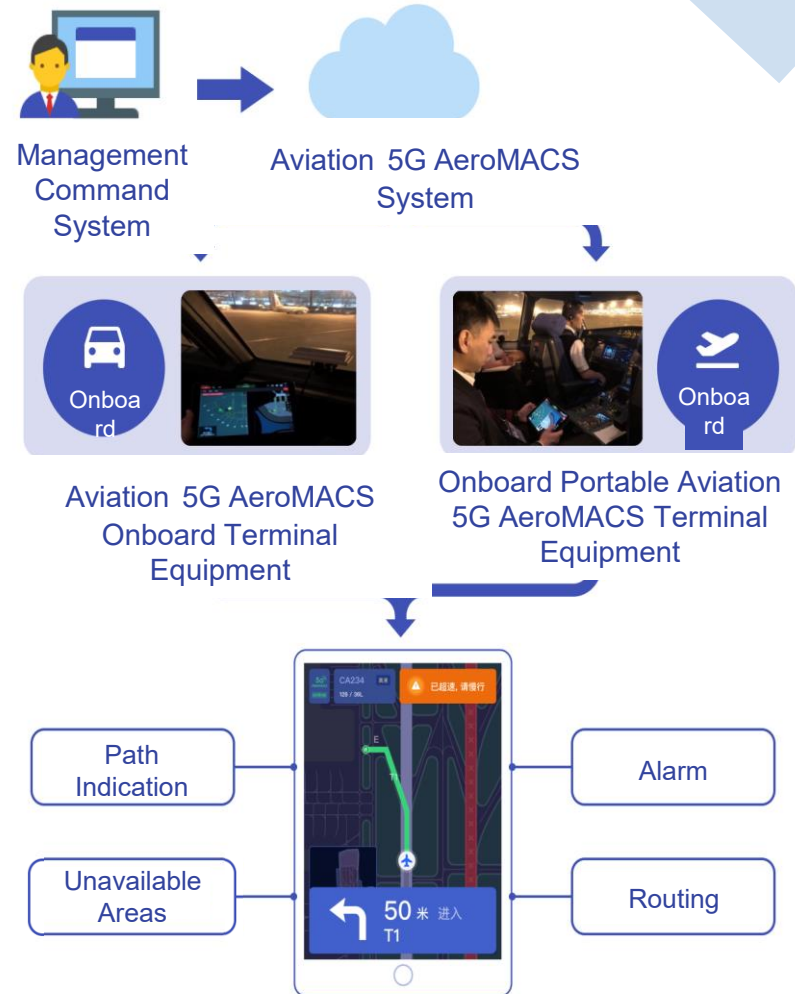
② Airport surface resource management

☐ **Real-time connection between maintenance tools and management system**

☐ Multiple real-time identity authentication methods

Maintenance Tool Management System

Other Aircraft Maintenance Supervision Systems

AeroMACS Wireless Communication Network Authorized Wi-fi Network

Intelligent Maintenance Tool Cabinet/Tool Cart

AeroMACS 2.0 Empowers Smart Airports
Emergency

① Emergency rescue communication services

☐ **Intelligent interconnection of sensing devices, agile response to sudden emergencies**

☐ Realize integrated control of on-site and backstage command and disposal

AeroMACS 2.0 Empowers Smart Airports

Hongqiao Airport

▶ Constructed **20** sets of AeroMACS 2.0 ground stations

▶ **Application systems**: runway anti-vehicle intrusion, visual taxiing guidance, vehicle operation under low visibility, and runway status light control

More information can be found in IP/11

Huahu Airport
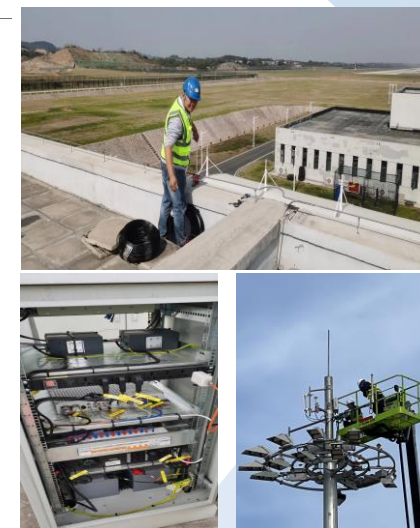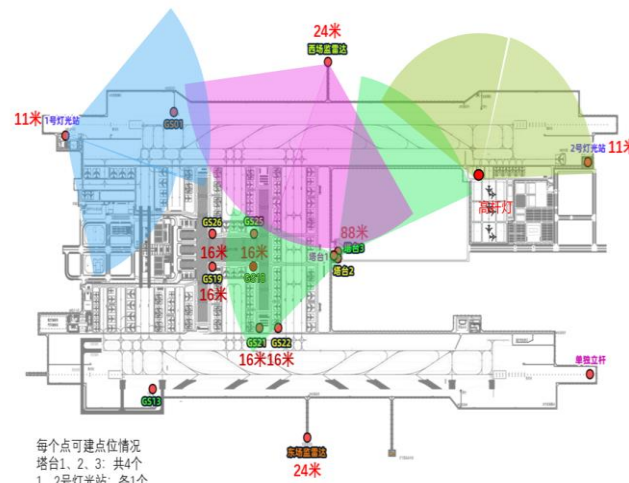
▶ Constructed **8 base stations** (airport tower and the west field surveillance radar station), covering takeoff and landing areas of the west runway as well as the apron

AeroMACS 2.0 Empowers Smart Airports

Shuangliu Airport
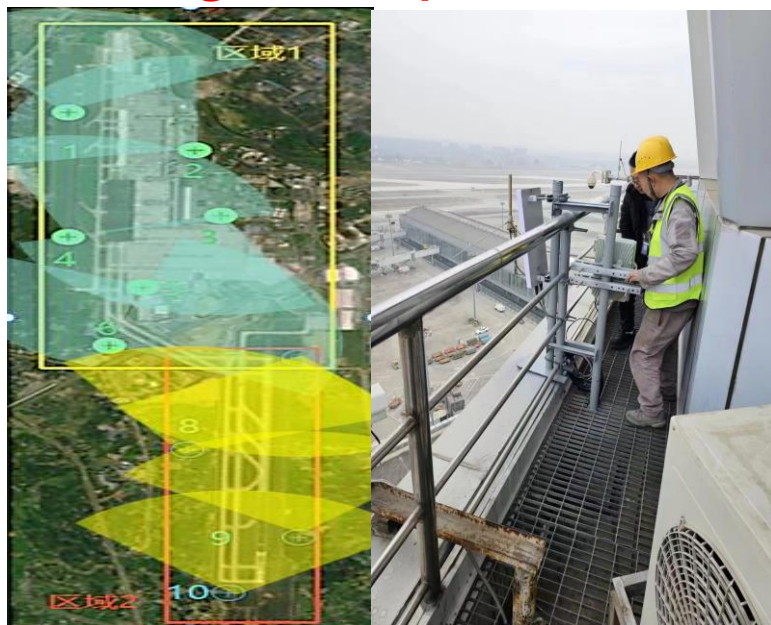
▶ **6 base stations** (completed)

10 base stations (planning)

▶ Covered 2 runways, all taxiways and liaison roads, etc.

Baiyun Airport
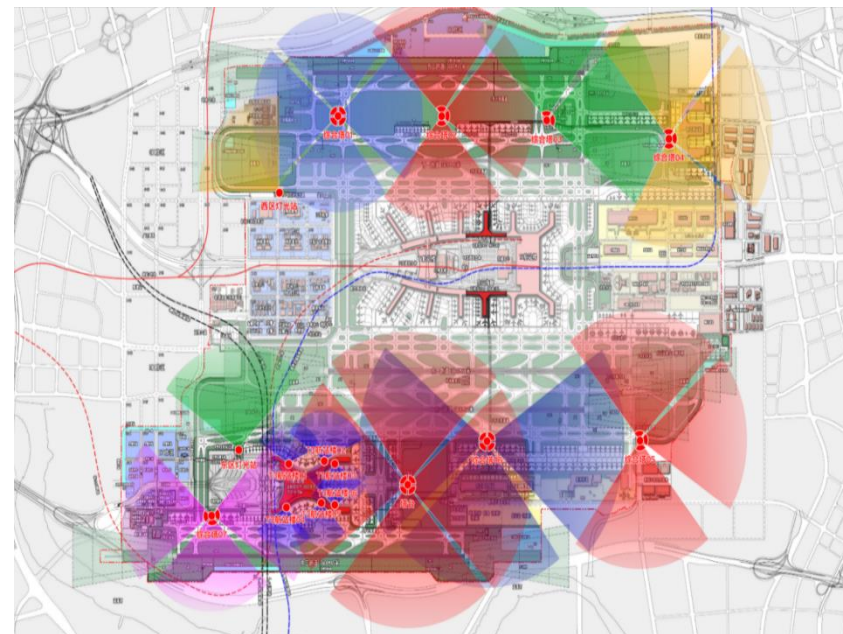
▶ Plan to construct **33 outdoor base stations** and **14 tunnel base stations**

▶ Cover the aircraft operation area, aircraft inspection and maintenance area, etc.

Actions By The Meeting

The meeting is invited to:

a) Review and note the status of AeroMACS 2.0 project progress in China.

b) Actively support and participate in the CP-DCIWG-WG-M AeroMACS subgroup to update the respective standards.

Q&A

Thank you !