



CNS Solutions in Low-level Airspace

-Meituan Drone Delivery

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687M

Transacting Users per year

9.3M

Active merchants

40.8

Transactions/user/year

Nearly 3,000

Cities and counties

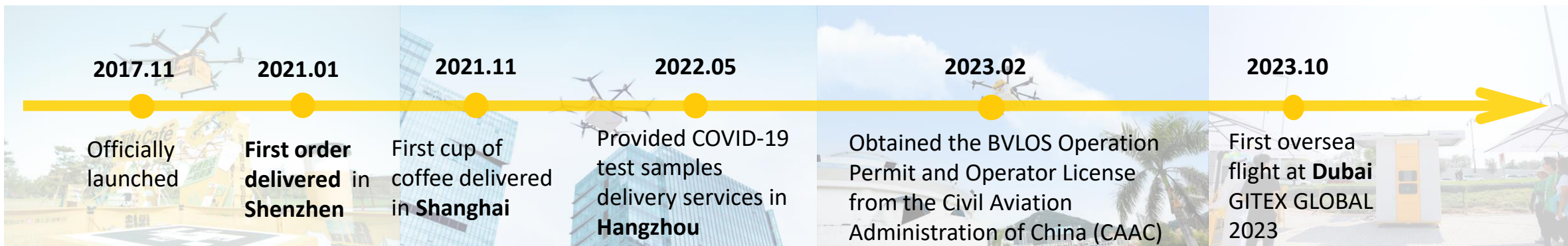
Over 80M

Peak daily order



Meituan UAS

- **Low-altitude airspace, specifically below 120 meters**
- **Densely populated area**
- **Beyond Visual Line of Sight (BVLOS)**

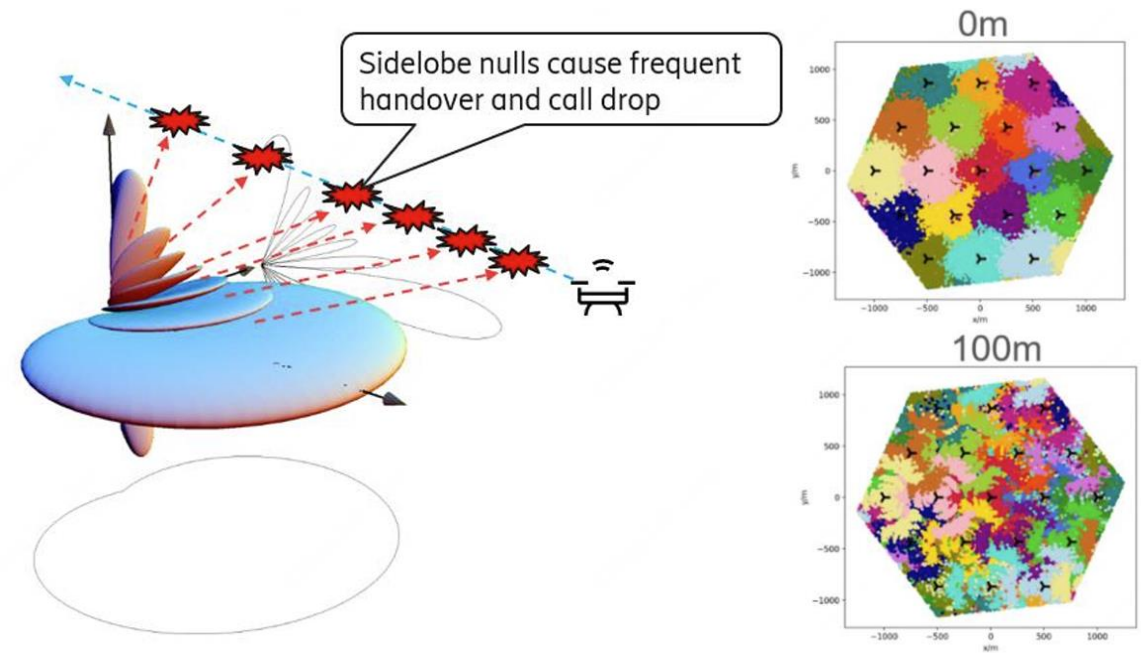


美团 美团·无人机



Low Level Airspace Challenges - Communication

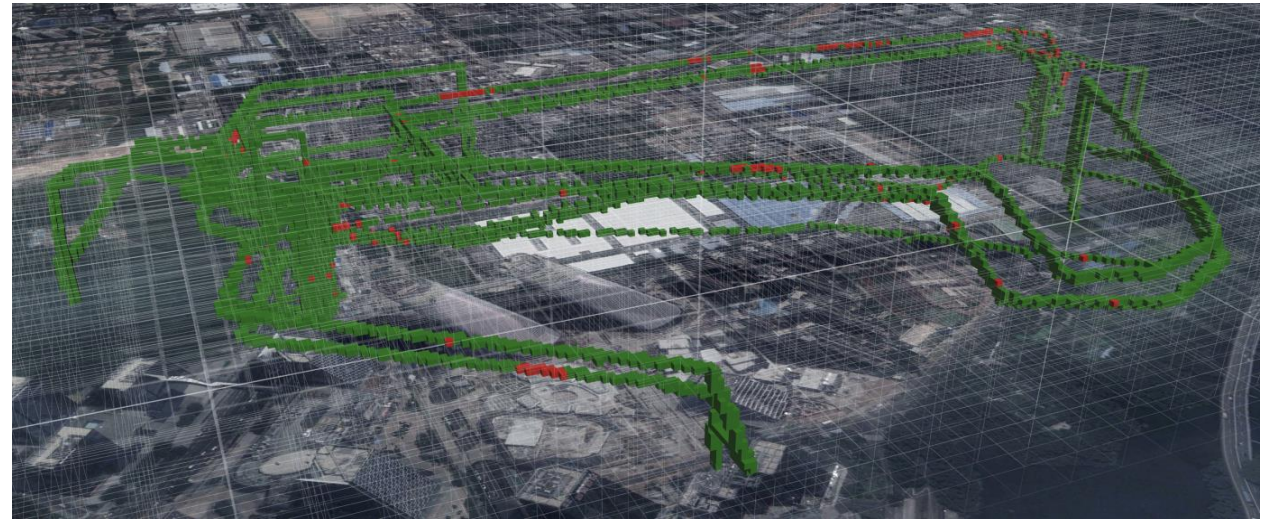
- **Low reliability:** antenna zero-position issues when providing coverage in low-altitude areas, resulting in severe drop-out problems.
- **Occasional fluctuations:** handovers between different communities result in significant communication network jitter.
- **Signal Interruptions:** obstructions like buildings can disrupt communication signals.



Meituan CNS Solution - Communication

Cellular Map

- Assessing the communication quality of each spatial position along the flight path.
- A source of reference information for the emergency handling mechanism in situations where communication is lost.



Low Level Airspace Challenges - Navigation

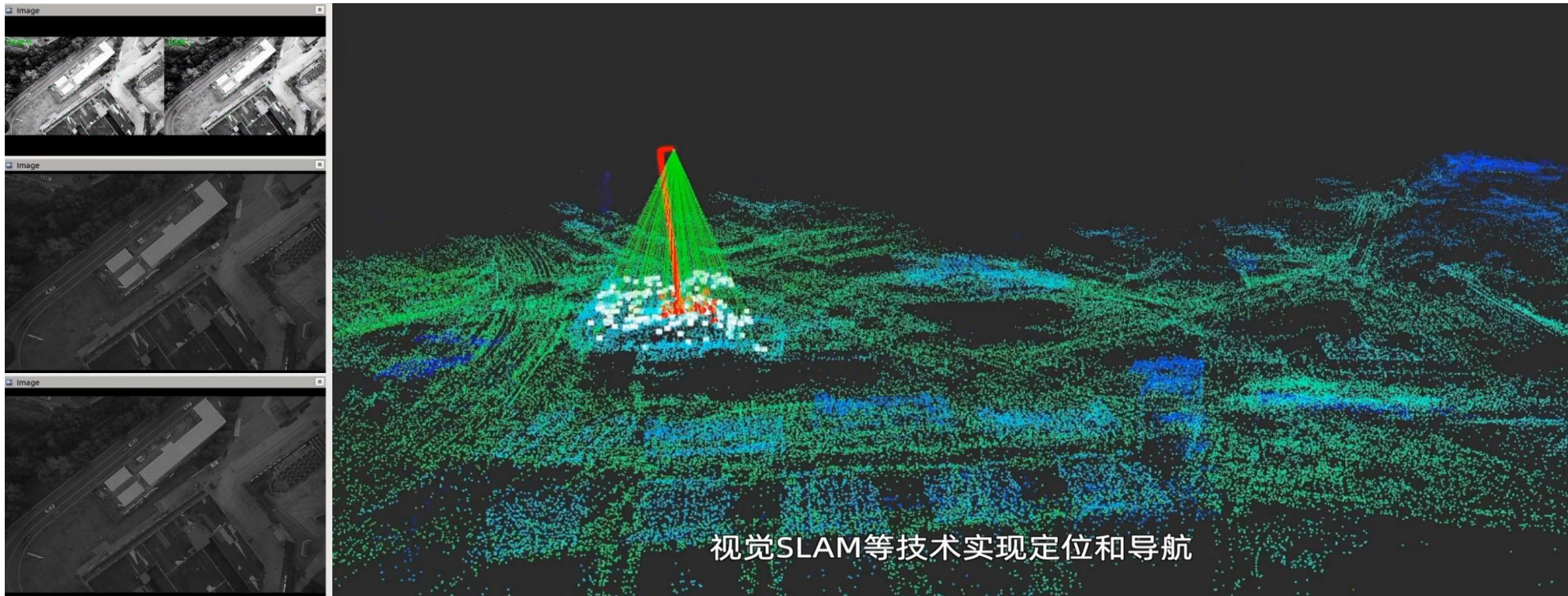
- **GPS Reliability:** numerous high-rise buildings in urban area block the GPS signals.
- **City Obstacles:** gleaming towers, high-rises, trees and dense power lines in downtown city.
- **Confined Space:** the limited space needs precise positioning for avoiding obstacles.



Meituan CNS Solution - Navigation

Visual Positioning System

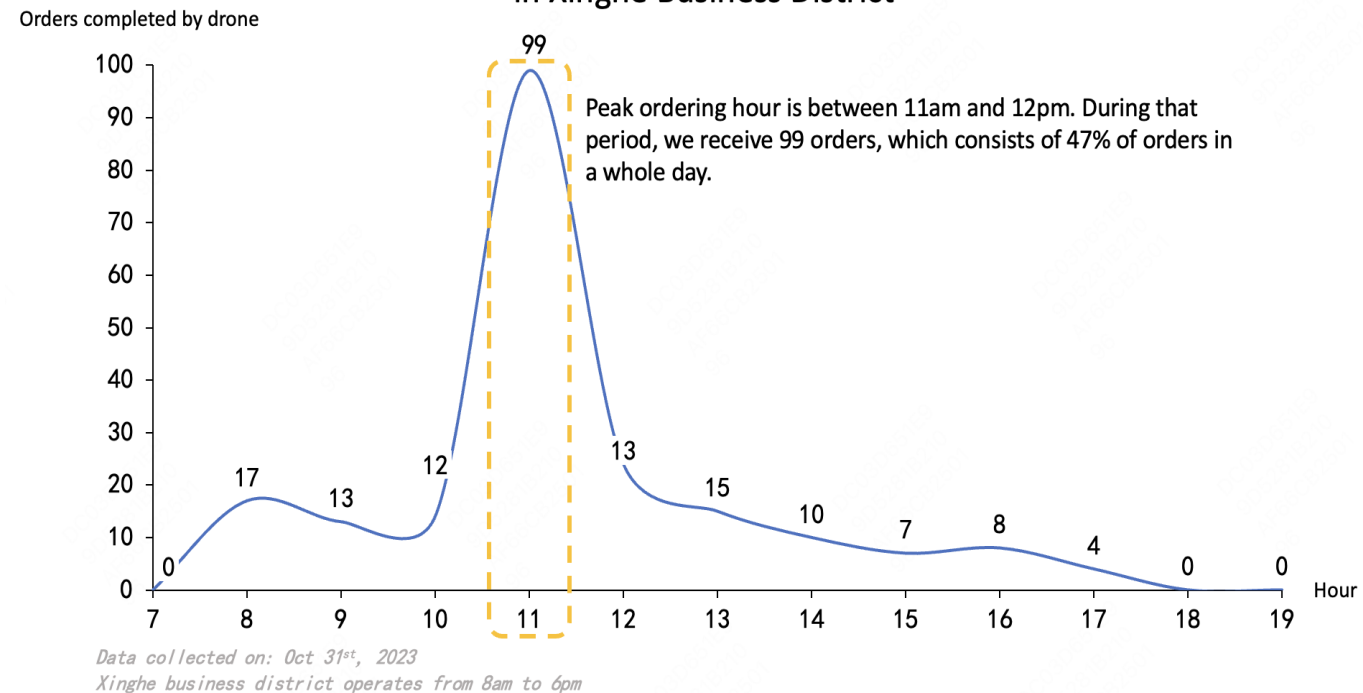
- Leveraging urban infrastructure like buildings and landmarks as navigation aids.
- Combining Visual-Inertial Odometry (VIO) for local positioning and VPS for global positioning.
- Ensures safe and accurate operation of a fleet of over 100 unmanned aircrafts.



Low Level Airspace Challenges - Surveillance

- **Spatial Density:** high spatial density during take-off and landing.
- **Confined Airspace:** supply-side take-off platforms near shopping malls, only a few square meters.
- **Possible Conflict and deviation:** detecting potential conflicts and hazards.

Time Distribution of Meituan UAS Daily Order in Xinghe Business District



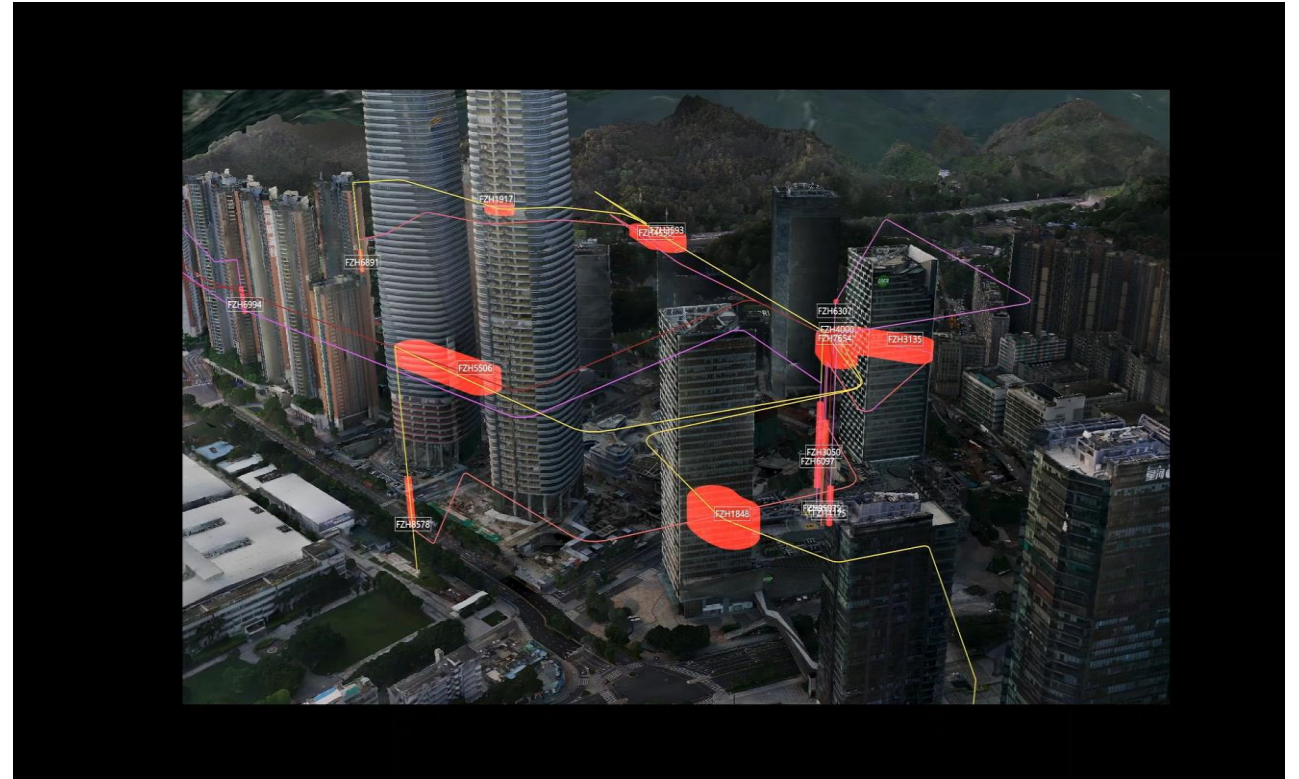
Meituan CNS Solution - Surveillance

Advanced Flight Management System

- 4DT (Four-Dimensional Trajectory) interval control strategy
- Pre-flight 4DT flight plan generation
- Spatiotemporal capsule concept for risk assessment
- Automated conflict resolution strategies
- Emergency alert mechanism

BVLOS Remote Operation Center

- Remote cockpit monitoring
- Intelligent planning and scheduling
- Real-time data display



Meituan CNS Solution - Surveillance

Sensory Integration Base Station

- 5G R17 protocol
- 4.9GHz frequency (centimeter-wave)

Mode 1: Cooperative UAVs

- Equipped with 5G Redcap module.
- Achieves precise localization (0.5m accuracy).

Mode 2: Non-Cooperative UAVs

- Uses Doppler radar mode.
- Provides approximate positioning (10m accuracy).
- Enables continuous tracking.



Moving Forward

Operation Data

7 Business Districts

16 Parks & Offices & Communities

22 Routes

210k+ Orders



THANK YOU
