

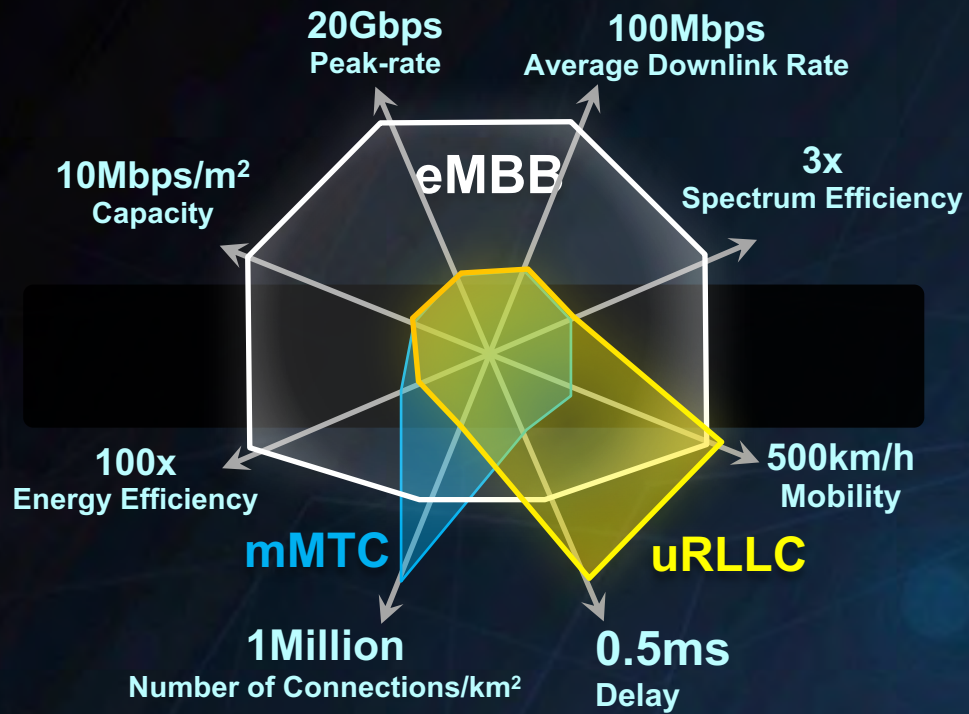
EMERGING TECHNOLOGIES

– the balance between legacy and innovation

Wang Yufeng | HUAWEI Wireless X Labs



5G Will Reshape the World



3GPP Standardization Targets for 5G NR

All HD World

All Linked World

All intelligent World

eMBB



10x Rate
1/10x Cost

uRLLC + mMTC



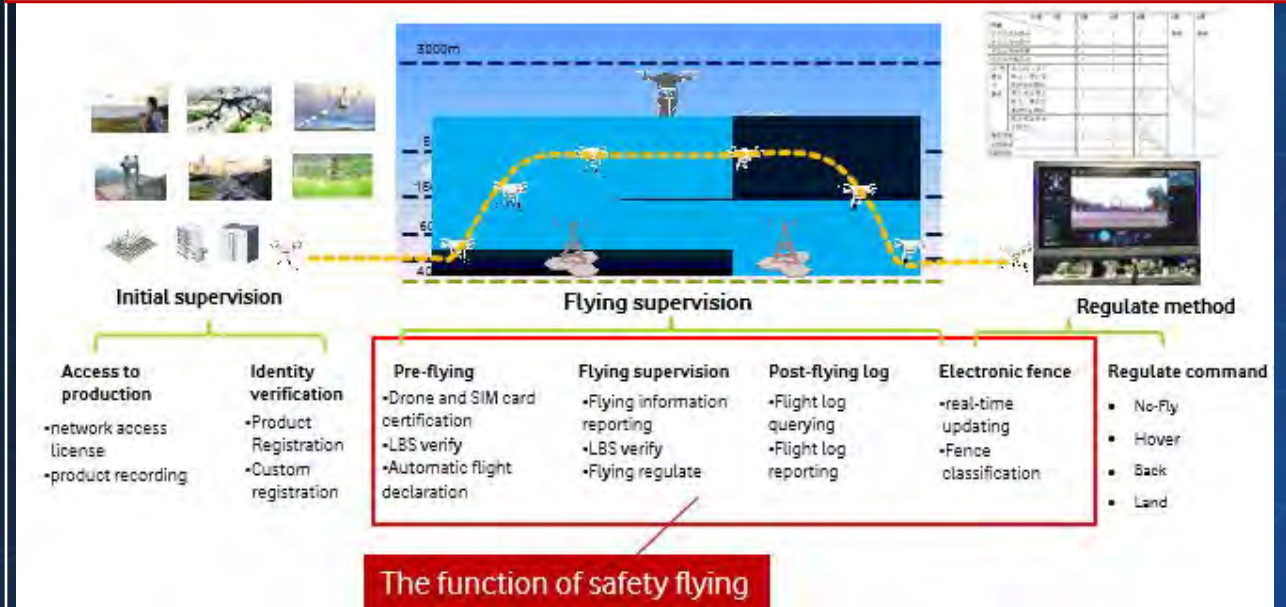
Cellular Network Safe Flight Trial in China

Challenges of Drone Supervision

- Lack of verification in Real-name Registration System
- Inflexibility of Electronic GEO Fence
- Position reported by Drone could be fake
- No Real-time supervision

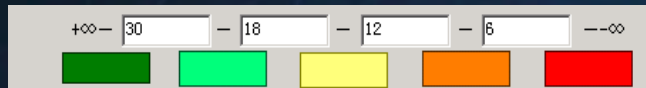
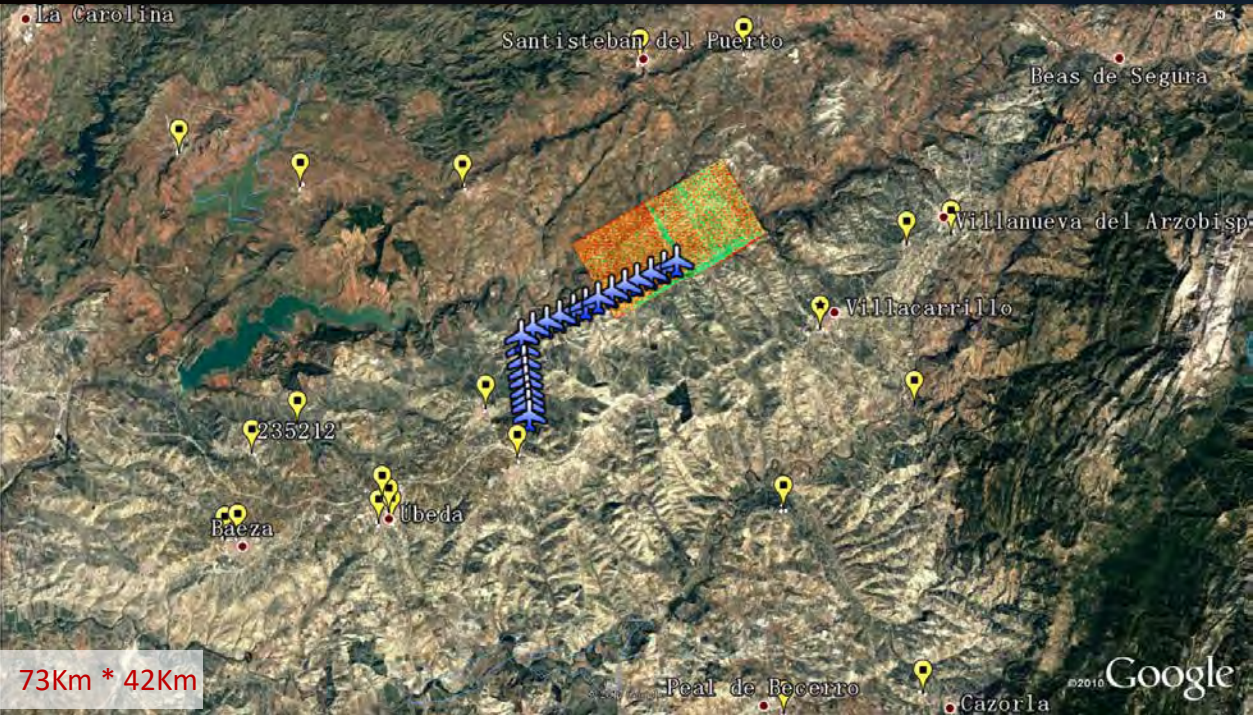


Supervision Solution for *Connected* Drones

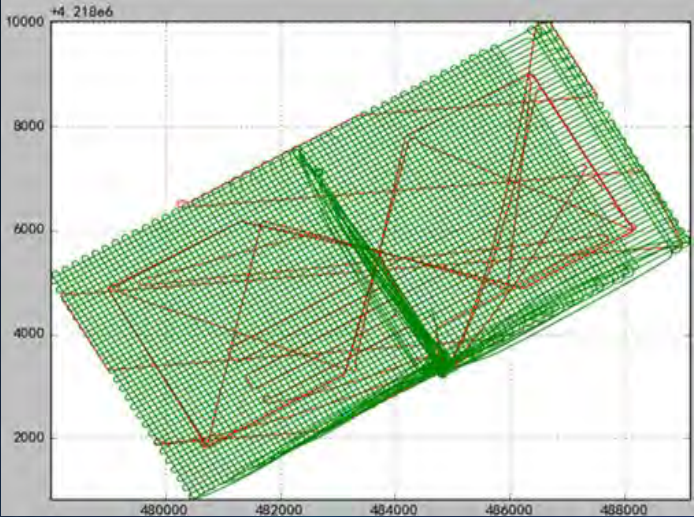


network requirements:
real name verification
position verification
<300m keep online, Location
UL supervision information: 10kbps
DL supervision command: 5kbps

Drone Track&Tracing with Cellular Network Spain VF



Database Density: 11.33 samples /50m*50m.



Green Line:
Construct the database
Red Line:
Random flights for test

Total Accuracy	@67%	@95%
RPS Baseline	2117	4948
BestCellasServing Cell	2149	5060
SpeedEstimation_2Points	3000	6257
SpeedEstimation_3Points	2290	4579
LowCell(>10km)Priority	2445	5079
LowCellPriority_MachineLearning	1067	2398
Machine Learning & KalmanFilter	892	2082
triangulation	13732	17991

Cellular Communication Network Airspace Coverage Analysis

3GPP Definition

Low-altitude Airspace Coverage Target :

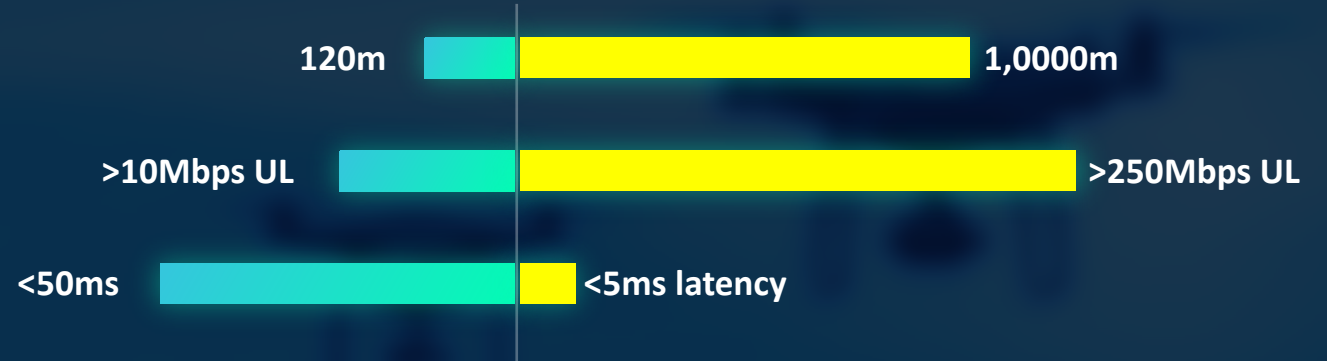


300_m
Coverage Altitude
>50 Mbps
Uptrate
<50 ms
Delay

4.5G Current Network



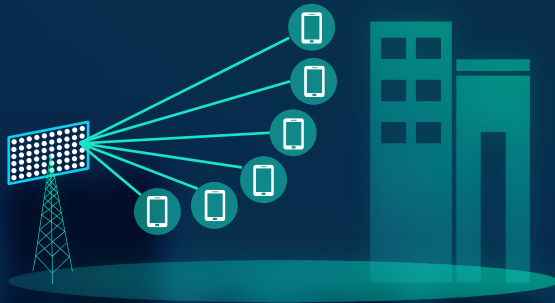
5G Target Network



Result from report – <http://www.wirelessxlabs.com>

5G Enhancement for Low-altitude Airspace Coverage :

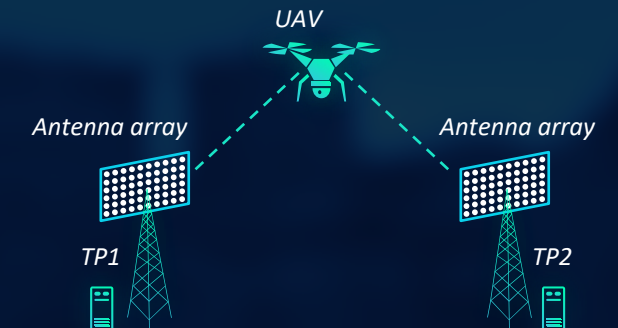
Beamforming



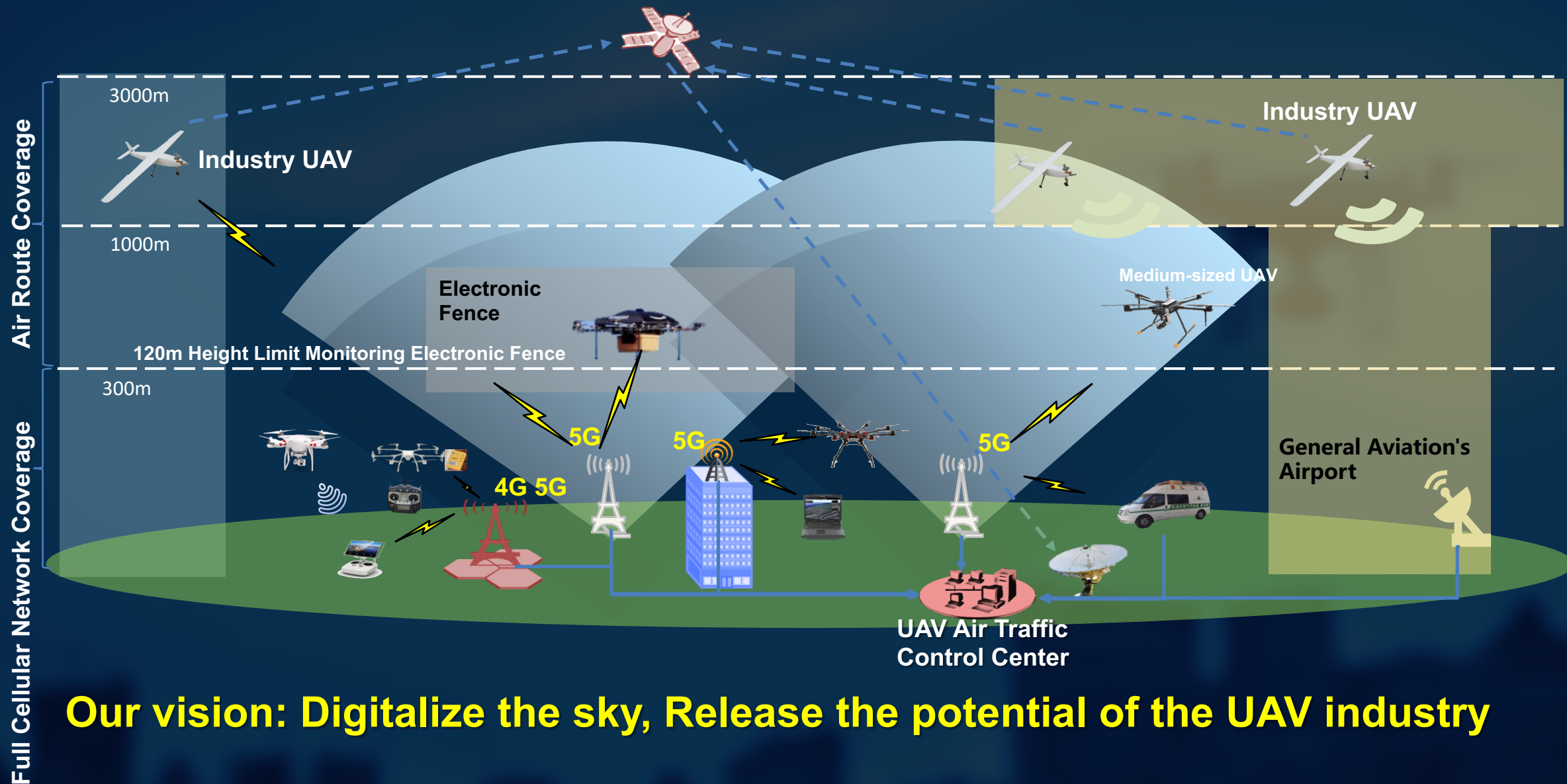
AI Automatic Elimination of Interference



Multi Base Station Collaboration



Wide Cellular Networks Enable Continuous Coverage of Airspace



Our vision: Digitalize the sky, Release the potential of the UAV industry

Digital Sky, Innovation Drives Industrial Upgrading

Digital Sky Plan Initiative Release

- Realize the Low altitude network coverage
- Drive new application of connected drones
- Starting Digital Sky industry



Digital Sky 1.0

Demonstration application
Standardization Promotion



Agricultural &
Plant Protection

10m



Grid &
Infrastructure
Inspection

50m

2017 – 18'

Digital Sky 2.0

Small-scale commercial
5 countries to achieve
the application



Safe City &
Low Altitude
Logistics

100m



Professional
Inspection

150m

2019 – 20'

Digital Sky 3.0

Low-altitude digital
network
Commercial coverage 30%
+



Flight Rental &
Trunk Logistics

>500m



2020+



Digital Sky

THANK YOU