GSMA

IoT WebTalk

Utilising Mobile Connectivity for
Drones Remote Identification

Wednesday, 15 July 2020 | 10:00 EDT | 15:00 BST | 16:00 CEST

- Don't forget to submit your questions for the panel discussion

Attendee View
(David Lee)

Entry banner alerts Attendee that nobody will be able to see or hear them.

Sales Kickoff

The event is live - You are in a view only role and can not be seen or heard   DISMISS

Event title

Speaker Volume

Mute Speaker

Full Screen
1

RED
BLUE
GREEN
YELLOW

100%
75%
50%
25%
0%

2004 2005 2006 2007 2008 2009 2010 2011

2 Slider bar – drag to change the size of video and content

Exit the event
Main (roster) view
Raise Hand *   **3**
Chat w/ everyone
Chat w/ Moderator   **4**
Polls   **5**
Questions & Answers   **6**
Expand side navigation (display Presenter roster)
Settings (choose which speaker to use)

* Attendees raise their hand to go interactive in the event (i.e., talk and be seen)

- There will be 2 polls during today's IoT WebTalk

Agenda

5 min	**Welcome and Introduction**	Barbara Pareglio, Executive Director for Aviation and Drones, **GSMA Internet of Things**
10 min	**Introduction to Remote ID: The Principles, Current Regulations and Future Plans in the USA**	Jay Merkle, Executive Director, UAS Integration Office, **FAA**
10 min	**European Regulations and Future Plans**	Natale Di Rubbo, Drone Project Manager, **EASA**
10 min	**Skyward's Initiatives (USA)**	Eric T. Ringer, Co-founder and Director of Aviation Technology, **Skyward, A Verizon company**
10 min	**Vodafone's Initiatives (Europe)**	Dr Eric Murray, Principal Engineer, **Vodafone Group Technology**
15 min	**Interactive Panel** **Q&A** **Poll Results** **Closing**	• Jay Merkle. Executive Director, UAS Integration Office, **FAA** • Natale Di Rubbo, Drone Project Manager, **EASA** • Eric T. Ringer, Co-founder and Director of Aviation Technology, **Skyward** • Dr Eric Murray, Principal Engineer, **Vodafone** **Moderator:** Barbara Pareglio, Executive Director for Aviation and Drones, **GSMA Internet of Things**

Standard Methods of Identification and Registration

Cars

Airplanes

Smartphones

Since 1903-04

Since 1919

IMEI

Since the late 1990's

- The GSMA is actively working with the **mobile and aviation industries** to maximise the use of beyond-visual-line-of-sight capabilities of UAS, develop new use cases and help create an open and trusted regulatory environment.

- To find out more, visit https://www.gsma.com/iot/connectedskies/

Internet of Things

> Home

Internet of Things

Mobile IoT (LPWA)
Mobile IoT Developers
Beyond Connectivity: Transformative IoT Solutions
IoT Security
Connected Skies
Connected Vehicles
5G IoT for Manufacturing
Smart Cities
IoT Policy & Regulation
Industry News

CONNECTED SKIES

The Unmanned Aircraft Systems (UAS) market is one of the most quickly growing and innovative sectors of the IoT and presents a huge commercial and strategic opportunity for operators and their technology partners.
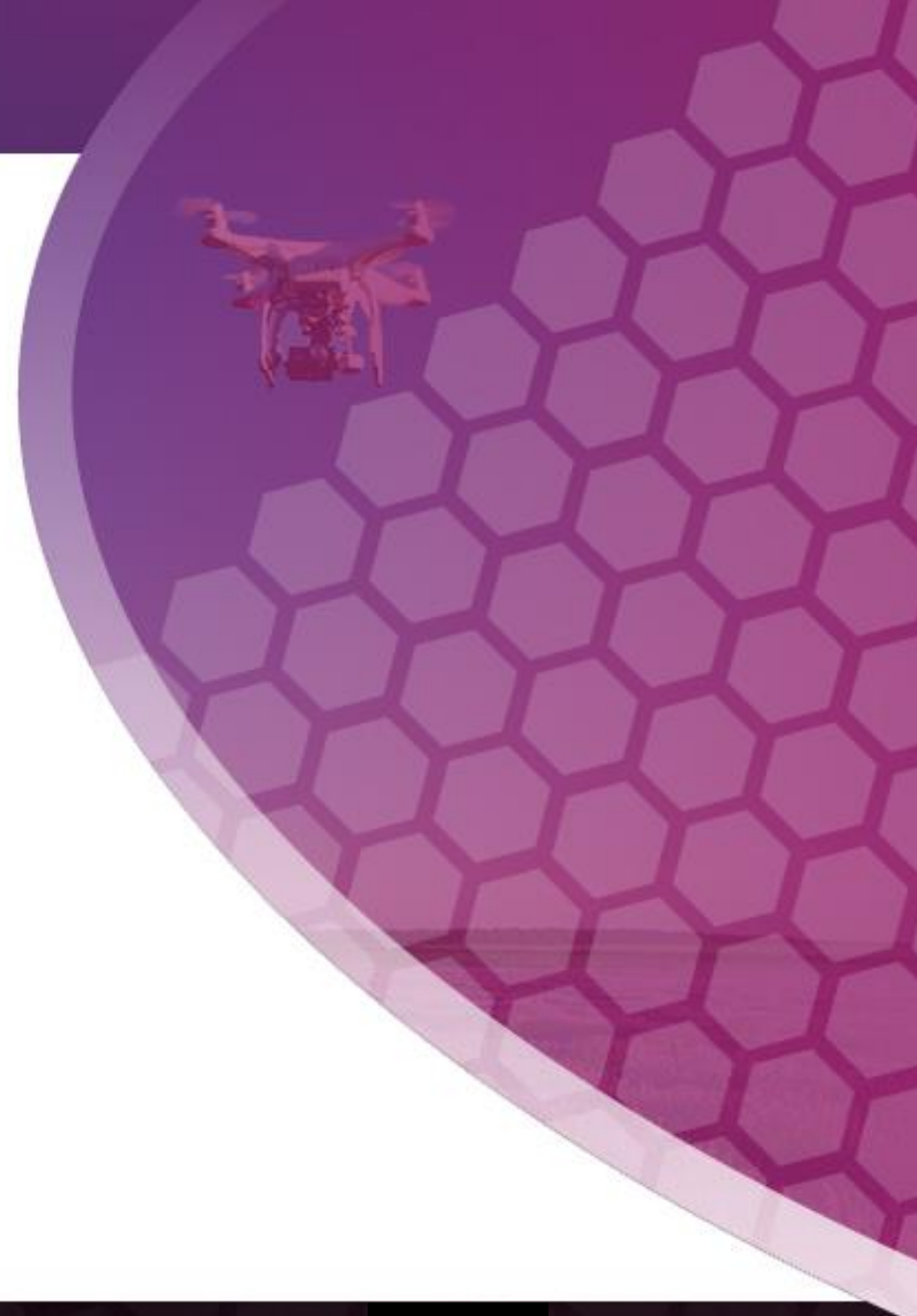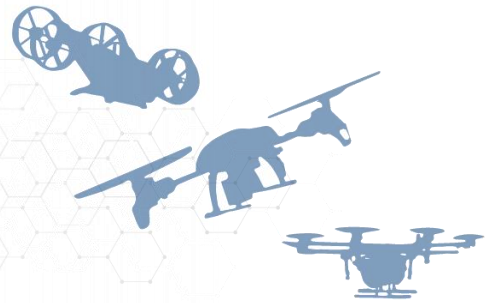
UAS Remote Identification
Jay Merkle, Executive Director
FAA UAS Integration Office

July 15, 2020

Principles of Remote ID in the U.S.

LAW ENFORCEMENT

REMOTE ID UAS SERVICE SUPPLIER

GENERAL PUBLIC

DRONE BROADCASTS REMOTE ID VIA RADIO FREQUENCY (PUBLICLY AVAILABLE)
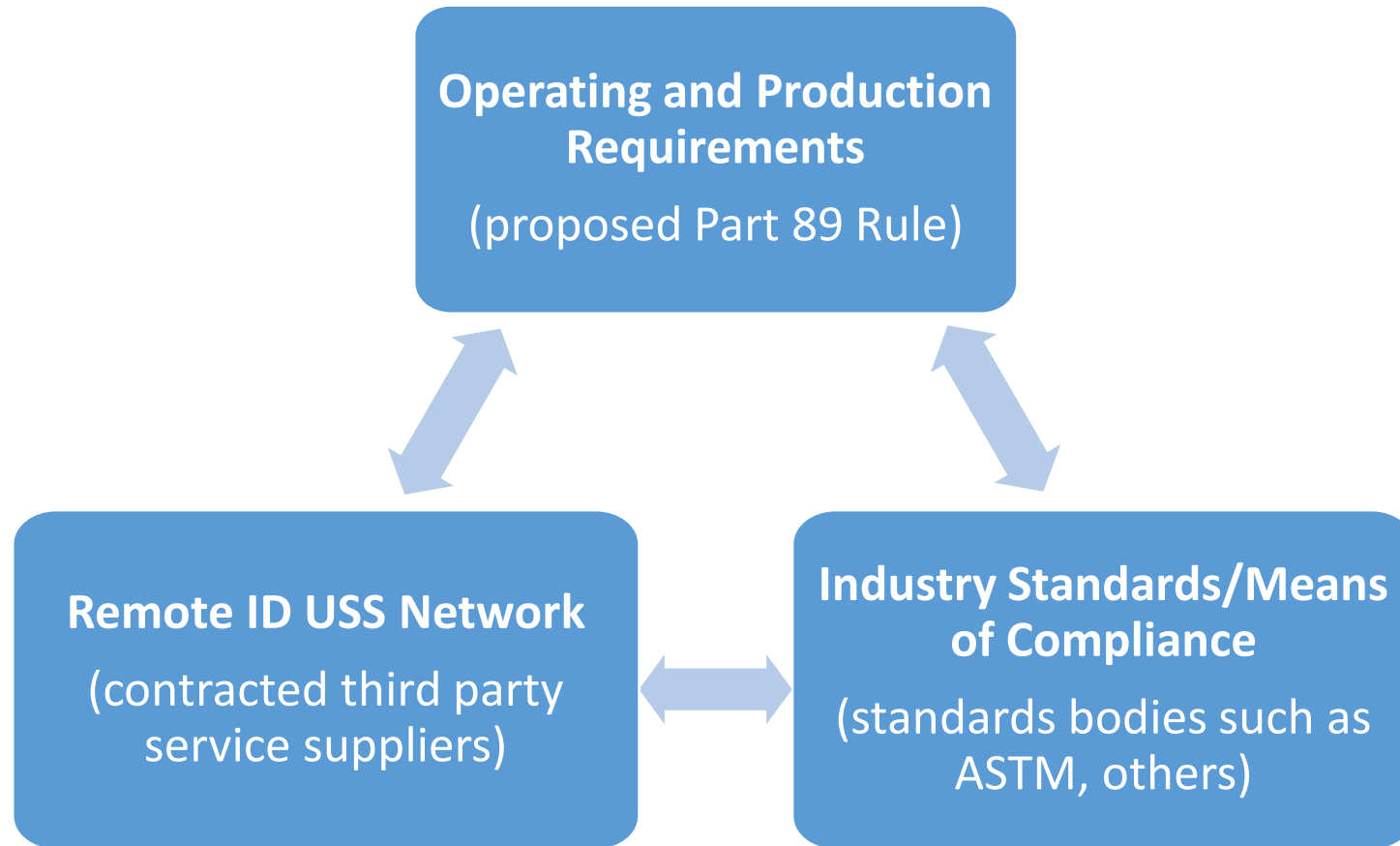
ID

ID

INTERNET

1. Every UAS broadcasts a signal that includes a UAS ID (its "license plate") and operator location

2. Key information is also available through the internet for every operation

3. Authorized individuals can look up UAS ID to find the UAS owner

4. Compliance is easy, and non-compliance stands out clearly

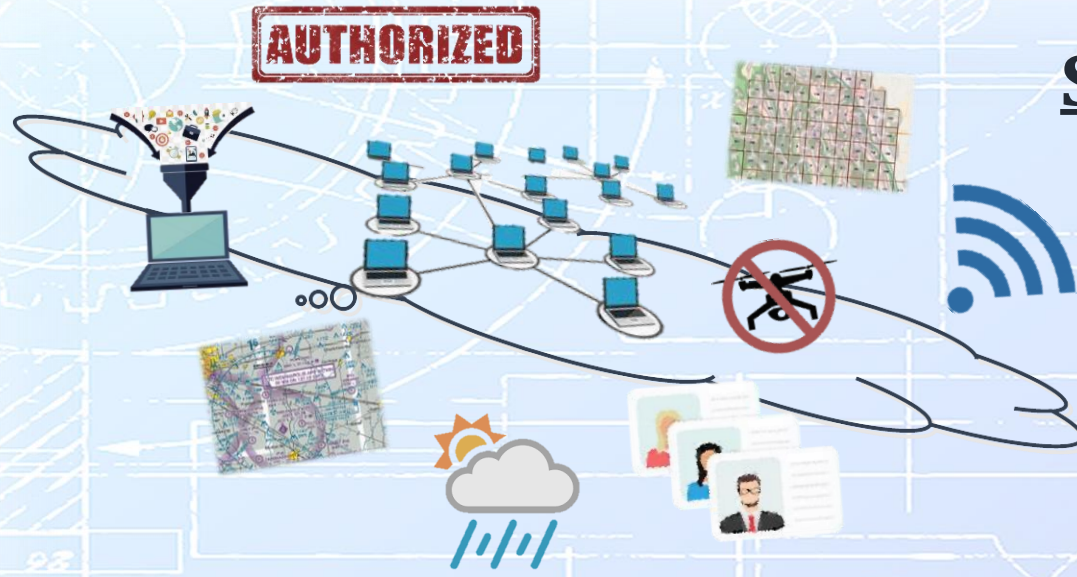5. Third party USSs build and operate the network infrastructure

Federal Aviation Administration

Remote ID Pillars

Operating and Production Requirements

(proposed Part 89 Rule)

Remote ID USS Network

(contracted third party service suppliers)

Industry Standards/Means of Compliance

(standards bodies such as ASTM, others)

Federal Aviation Administration

UAS Traffic Management (UTM)

Suite of Capabilities:

- LAANC
- Remote ID
- Registration
- Dynamic Airspace

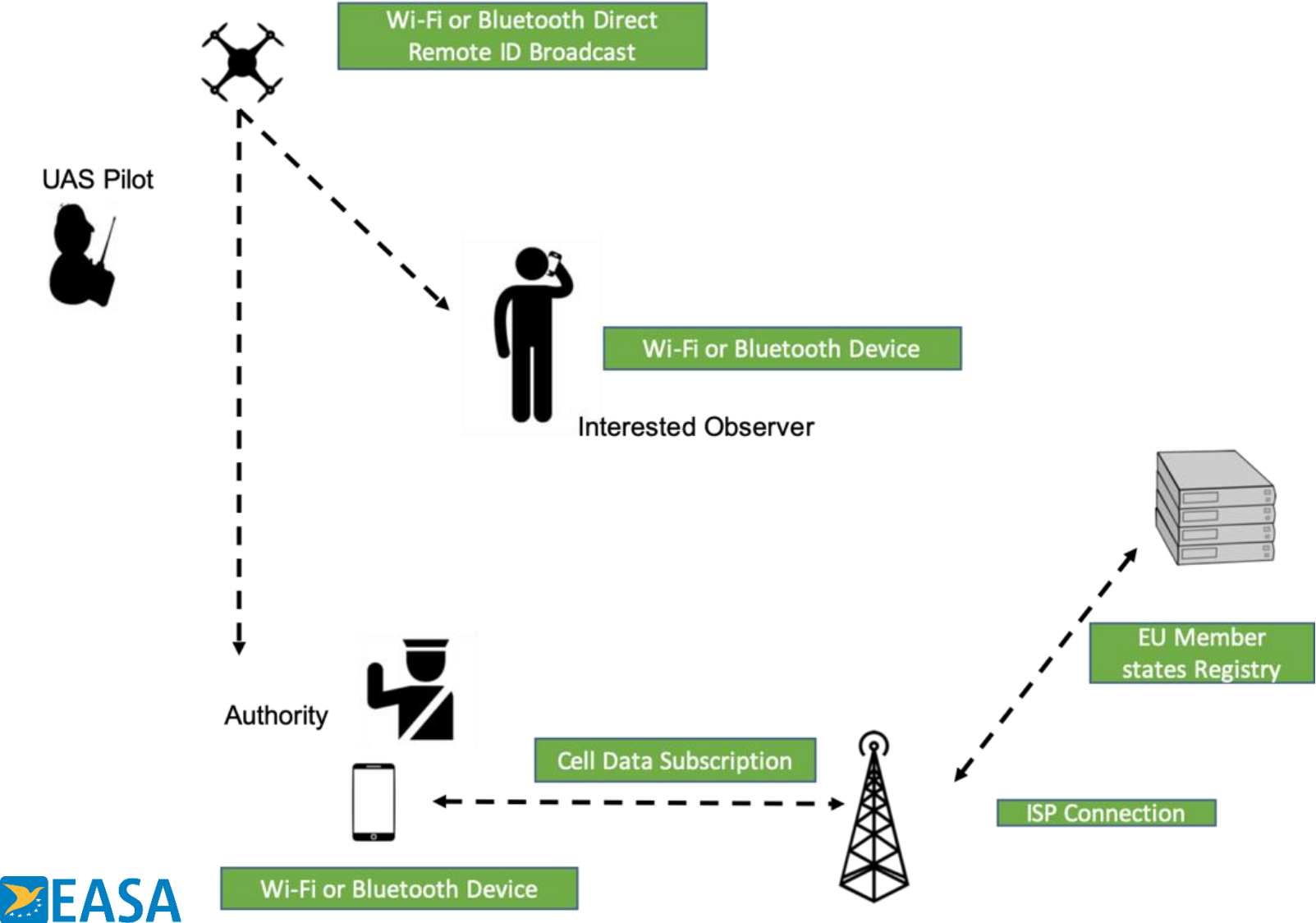## UTM Ecosystem

Federal Aviation Administration

Natale Di Rubbo

Drone
Project Manager

EASA
European Aviation Safety Agency
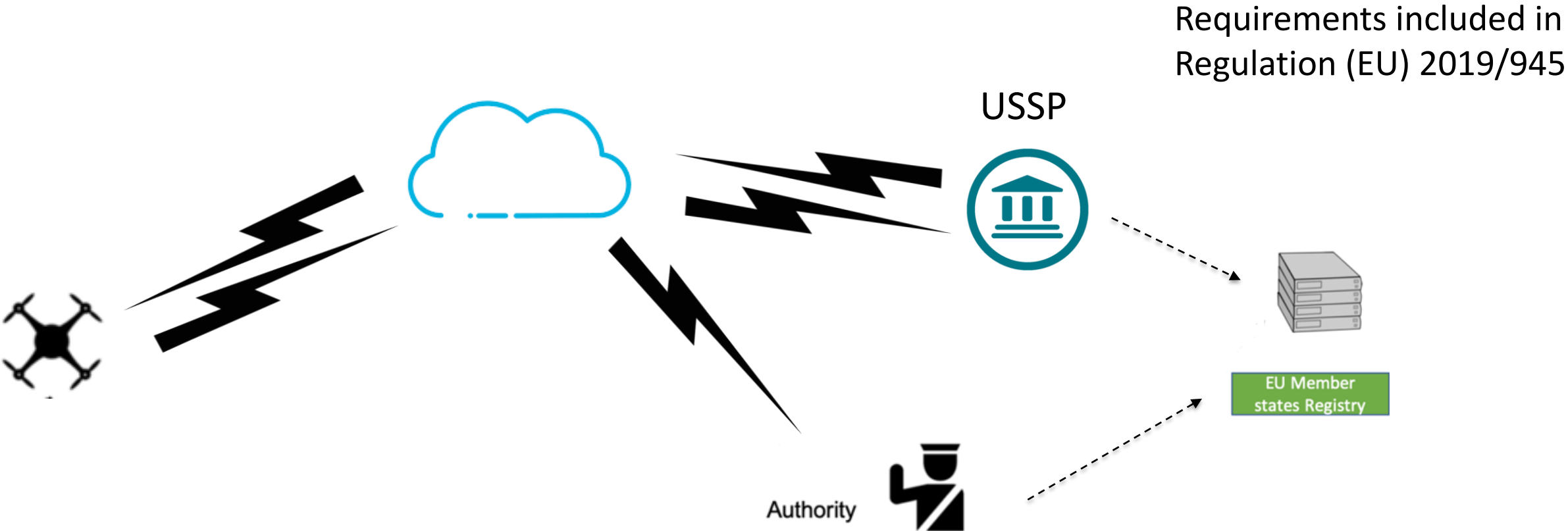
Direct remote identification

Requirements included in Regulation (EU) 2019/945

Mandatory for UAS with CE class mark C1, C2, C3, C5 and C6

EU States may define geographical zones where only UAS with remote identification can operate

Network remote identification

Requirements included in Regulation (EU) 2019/945

USSP

Authority

EU Member states Registry

Optional for UAS with CE class mark C1, C2, C3, C5 and C6

Required when operating in zones where the U-Space is deployed
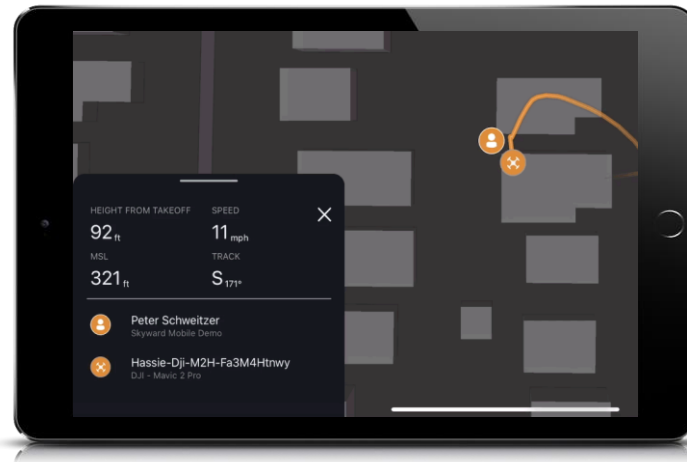
Remote Identification

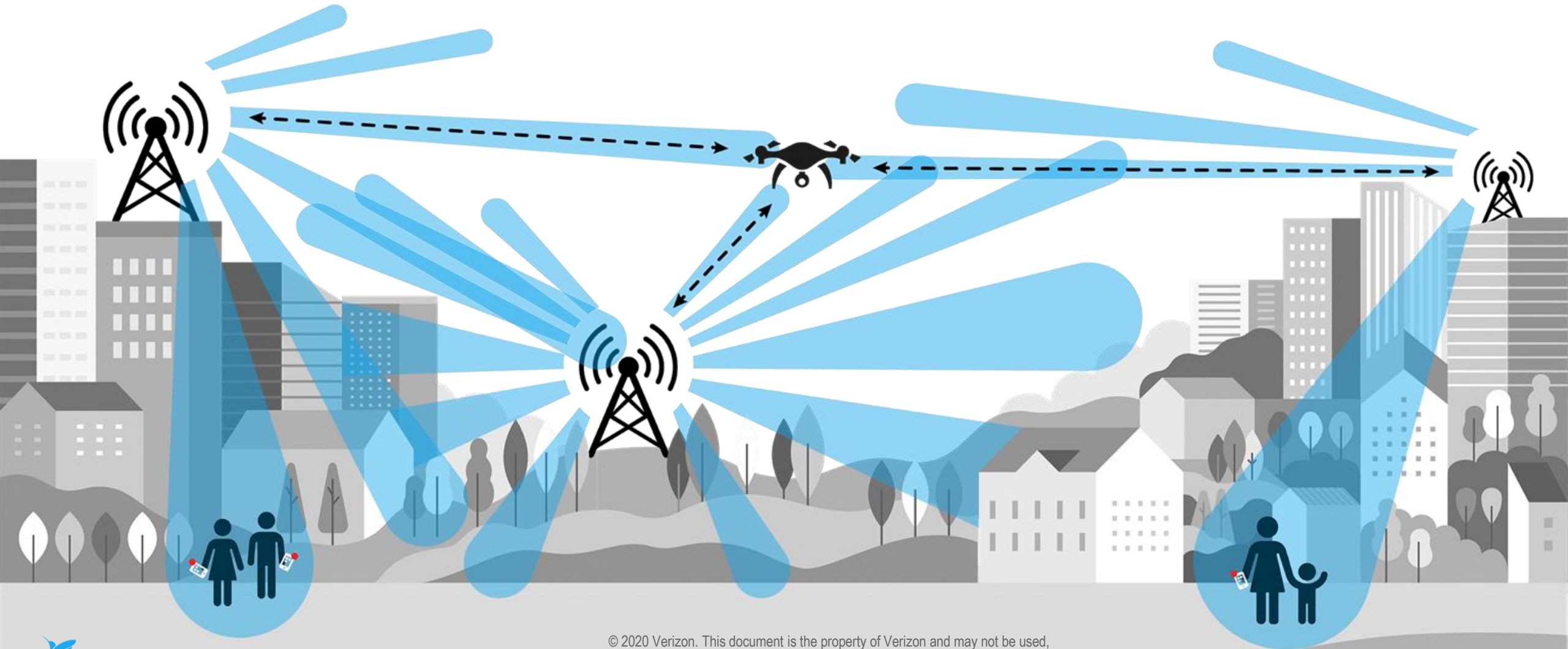## The Foundation of Universal Traffic Management

Live Flight Tracking in Skyward

- FAA Remote ID cohort member

- Developing means of compliance

- Gateway to drone ops of the future

Cellular in the Air
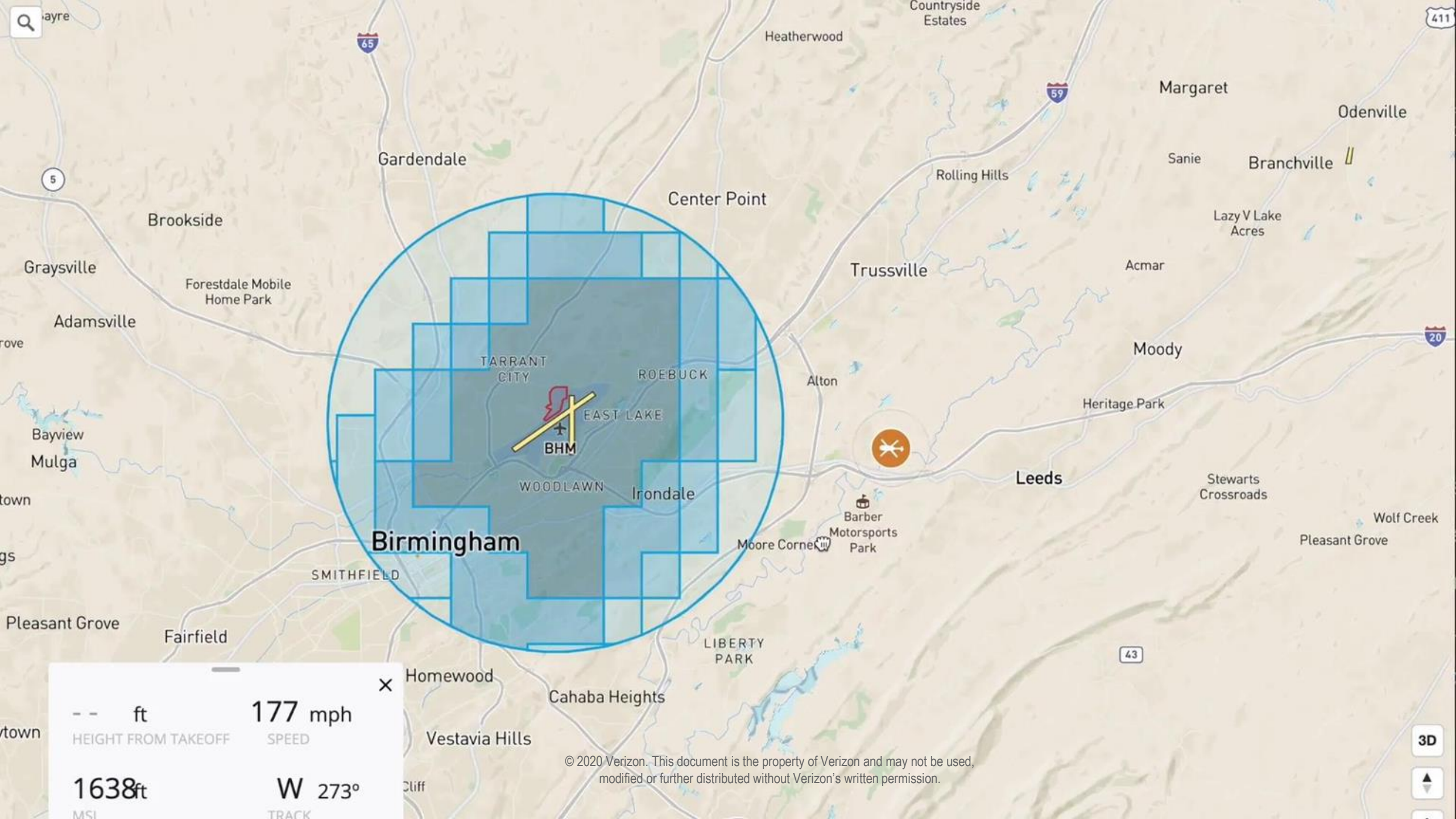
Skyward®
A Verizon company

--- ft   **177** mph
HEIGHT FROM TAKEOFF   SPEED

1638ft   **W** 273°
MSL   TRACK

AIR TAXI
Secure networked management

REMOTE ID
VERIZON RESPONSE
IRFDEUG0043

PILOT ID
DOVe 003
FAA37VZR2

ALTITUDE
154 ft
^ ASCENDING

SPEED
7 mph

5G UWB
↑ 100 Mbps
↓ 1.6 Gbps

AUTONOMOUS BVLOS
🔒 Secure, remote deployment

✅ **BVLOS**
7m 53s remain
0 conflicts

COMMAND & CONTROL
Over the network with low latency

DATA & ANALYTICS
Delivered in real time

Dr Eric Murray

Principal Engineer

**Vodafone Group**
Technology Networks Architecture

Network-based Drone Authentication Through APIs

Dr. Eric Murray
Vodafone Group Technology
15 July 2020

EU Regulations on Drone Identification

- What does EU 2019/945 say?
  - Direct remote identification is mandatory (for most classes)
  - Network remote identification is optional

- Vodafone and the GSMA worked to ensure the requirement was **technology neutral**

- For **direct remote identification**
  - Original proposed regulation mandated short-range technologies, such as **WiFi** or **Bluetooth**
  - Now **Cellular D2D** (Device to Device) can also satisfy the published regulation
  - This technology is **maturing quickly** through its use in V2V (Vehicle to Vehicle) use cases

- For **network remote identification**
  - **Cellular** is the obvious "network", but the application data would be transparent to the network
  - It is expected that the requirements will evolve to include **U-space**, but still under development

Direct

Network
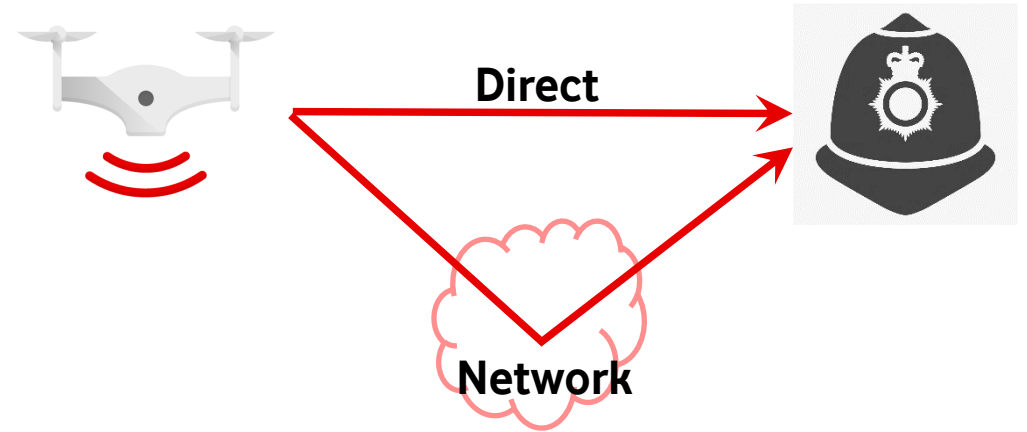
Anticipating the evolution of requirements, Vodafone have been working on connecting and authenticating drones to U-space using cellular connectivity

How are Cellular Devices currently Authenticated?

- IMSI (International Mobile Subscriber Identity)
  - The **primary identifier** used for authentication by the cellular network, and very secure
  - Stored in the SIM, and **identifies the subscriber** (account owner) and not the device
  - **Used internally** by the network for uses such as:
    - billing and quota enforcement
    - associating the subscriber with other identities, such as the MSISDN (the "phone" number)
  - The **device itself can be identified by IMEI**, but this is not securely authenticated

- For voice and SMS, the **MSISDN** is forwarded to the destination to identify the call originator

- But for data services, **no unique identifier for the originator is provided**
  - The source IP address is **NATed using a shared pool**, so not unique to a specific user
  - The IP address, port and time of use can be used to identify the user **retrospectively**, but not in real-time
  - Authentication between client and server is separate from and transparent to the cellular network
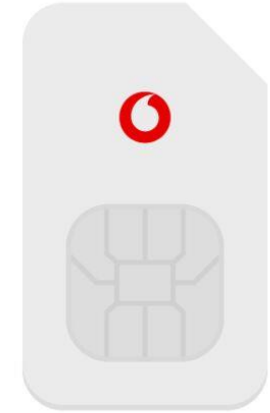
Whilst client/server authentication could be used to authenticate drones to U-space, network-based authentication offers important security benefits

How Might the Requirements for Authenticating Drones Differ?

- Not all drone users will be "honest", and may try to spoof the U-space

- Hence the U-space system would like to be sure that:
  - the connecting device really **is** a drone
  - it really is operated by **who** it says it is
  - it really is **where** it says it is
  - it is connected and **remains connected** via cellular for the duration of the flight

- All of this information is available to the cellular network **independently of the drone**
  - The SIM can be **registered as a drone SIM**
  - The drone IMSI can be used to **cross-reference the drone operator identity**
  - **Network-based geo-location techniques** (e.g. Vodafone's Radio Positioning System) can be used to independently estimate the location of the drone
  - **Propagation prediction tools** can be used to confirm the proposed flight path has adequate cellular coverage
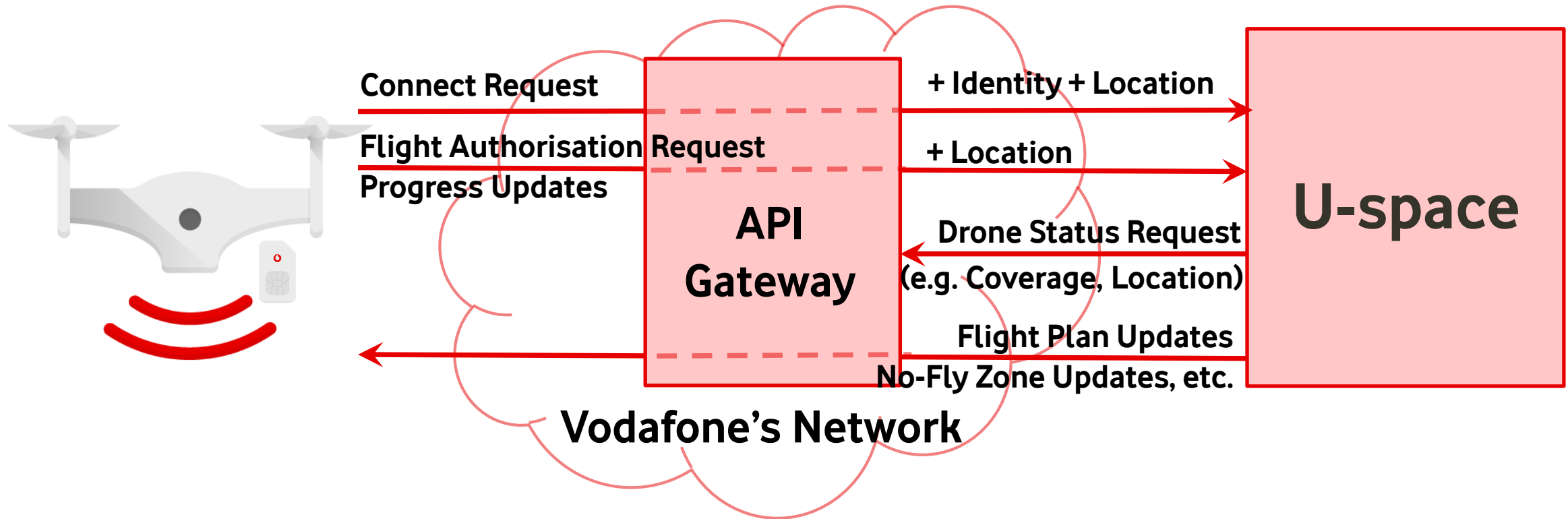
How can the cellular network provide these additional parameters to the U-space?

Communicating with U-Space via APIs

- The drone communicates with the U-space via an **API Gateway** within Vodafone's network
  - The API gateway **adds additional identifying information** to the connect request, independently of the drone

Connect Request
Flight Authorisation Request
Progress Updates

API Gateway

+ Identity + Location
+ Location
Drone Status Request (e.g. Coverage, Location)
Flight Plan Updates No-Fly Zone Updates, etc.

U-space

Vodafone's Network

- The U-space can get additional information using **additional APIs** (e.g. location updates or coverage predictions)
- Drone and U-space can **exchange information during flight via API Gateway** (e.g. status updates, flight plan updates)
- The API Gateway authenticates the U-space, and can support multiple U-spaces or changing U-space APIs transparently to the drone.

Summary

- **Cellular D2D** technology is one solution for EU "direct remote identification" requirements
  - This technology is rapidly maturing through its use for **Vehicle-to-Vehicle** uses cases

- But if the drone is also connected to the cellular network, Vodafone can provide **secure verification of the drone's identity** to U-space or other systems
  - The network can also verify parameters such as the **drone's location** or **predicted coverage quality**

- By interfacing through a **secure API Gateway**, this verification is independent of the drone application, and thus not easily spoofed
  - Equivalent to 2FA, with the second factor provided by Vodafone

- An API Gateway also allows **U-space systems to evolve** without the need to necessarily update the drone client

Vodafone have a large programme exposing network capabilities through APIs to support novel use cases

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Dr ERIC MURRAY
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Vodafone Group Network Technology

BARBARA PAREGLIO
Executive Director for Aviation and Drones,
GSMA Internet of Things

GSMA's Connectivity for Aviation Project

- This IoT WebTalk was recorded and a link to the **On-Demand video** recording will be sent to you within the next few days as well as other relevant materials. These assets will also be posted on https://www.gsma.com/iot/iot-resources/

- To find out more about our Connectivity for Aviation project, visit https://www.gsma.com/iot/connectedskies/

- Contact us on Drones@gsma.com

Thank You!

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