



**UAS REMOTE ID
USE THE RADIO YOU HAVE**

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PROBLEM SET

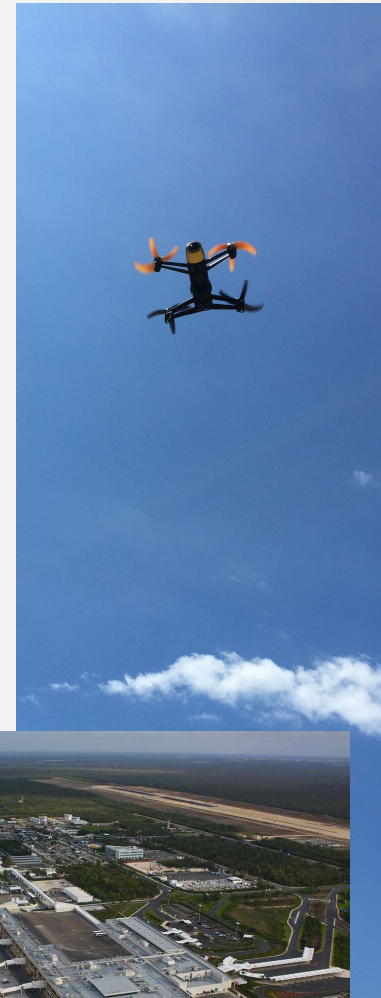
Identification at a distance

We want a license plate for drones.

- Whose drone is that?

But also:

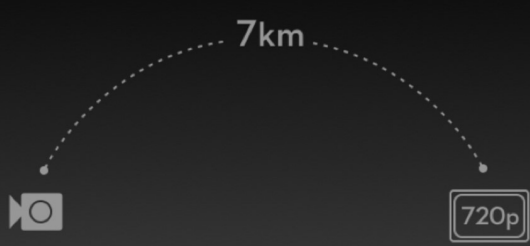
- Where is it located?
- What is its heading/vector?
- What type of drone is it (payload capacity)?
- What is it doing?



LEVERAGE EXISTING TECHNOLOGY

Use the Command-and-control link!

- Transmission distance scales with UAS capability -- which corresponds to level of threat/risk
- RF range is very good and improving because it is a sales feature.
Example: DJI Mavic Pro spec: 7 kilometers



7km

720p

FLY FOR MILES. FROM YOUR POCKET.

Inside the Mavic's pocket-sized remote controller is DJI's brand new OcuSync transmission technology, with a range of 4.3mi (7km)* and Full HD 1080p/720p video streaming.

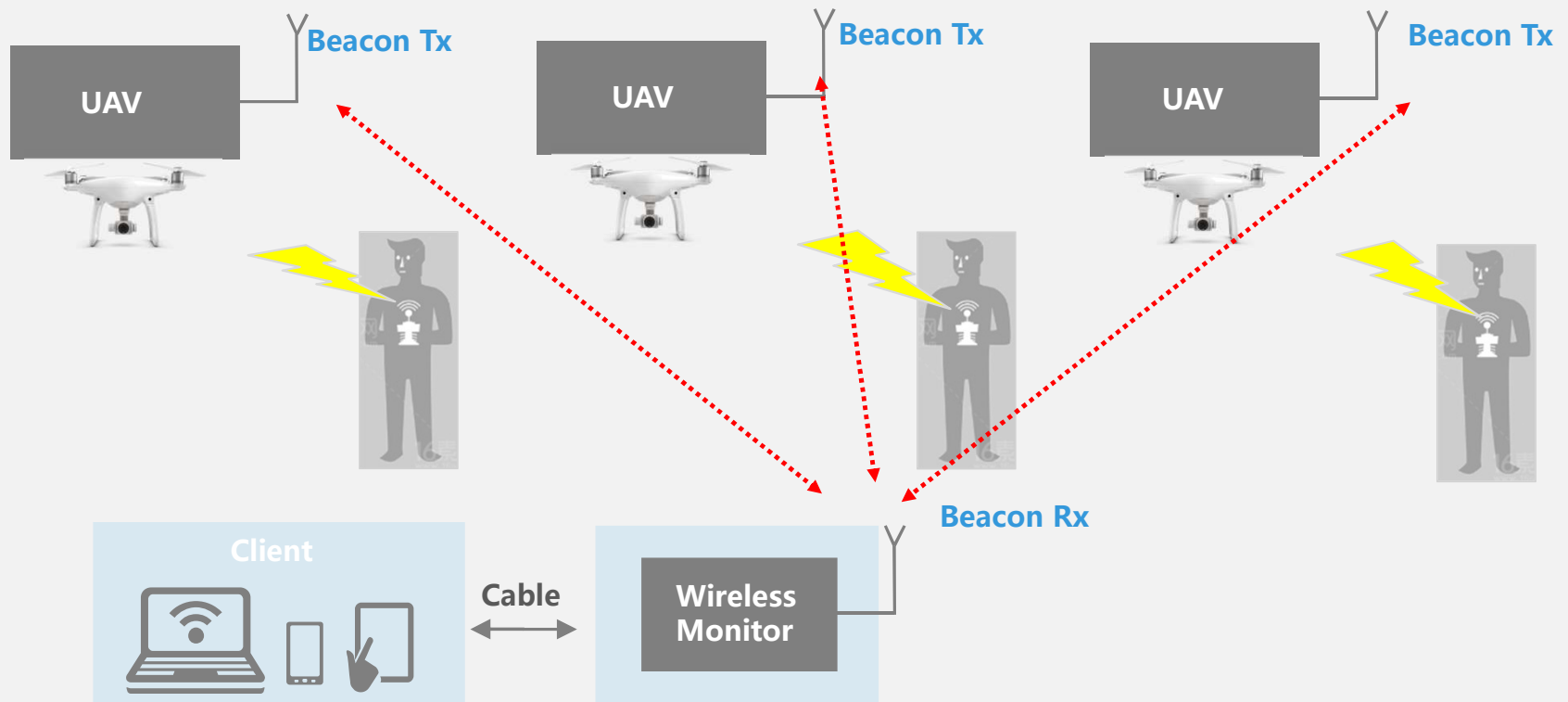
*FCC compliant, without obstacles or interference.



Solution: Use this existing RF broadcast to transmit ID & Tracking information directly to ground receivers which decode it.

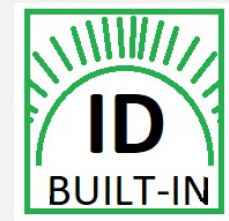
TECHNOLOGY

Detect ID and track via the UAS C2 link.



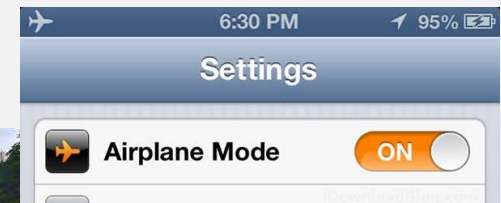
ADVANTAGES OF A DIRECT BROADCAST ID METHOD

- Automatic, built into the drone at purchase
- Zero fixed costs to user, and zero recurring costs
- Zero network/infrastructure sunk costs or maintenance costs
- Works everywhere, regardless of internet connectivity or user mobile device
- Retrofit solution: update drone with ID firmware at zero user cost
- International solution: uses C2 link that must be legal in locality



OTHER CONSIDERATIONS

- Minimizes risk of exposing confidential operator information (or PII) to broad audience incl. competitors or drone critics
- Effectively tamper-proof because you cannot disable the C2/video system without disabling drone
- If includes serial number, provides a verifiable unique identifier
- Addresses drone users who fly with no internet connection
 - Intentionally (cost, interference, privacy)
 - Out of internet coverage

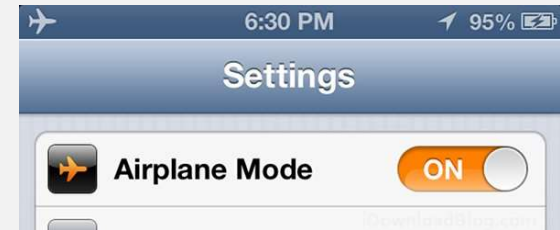


ADVANTAGES OF A DIRECT ID METHOD

(continued)

In contrast to any networked solution, Addresses the estimated 40% of small UAS operators not connected to internet during flight due to:

- No wireless signal in area
- Desire to reduce any RF issues during flight (user-selected “airplane mode”)
- Saving battery power of portable device
- No data plan with the portable device being used to fly
- Portable device is wifi-only (such as an iPad w/o a data plan)
- Close proximity line of sight flight (does not require any video screen)



LEVERAGE EXISTING TECHNOLOGY

Most sUAS use ISM band C2 links

DJI wireless protocols

- Identify all current DJI UAVs using existing C2/Video radio transmissions
- Note: Most DJI drones do not use Wifi, Bluetooth, LTE or other connectivity. Only C2/Video to the ground station.
- Many other COTS drones use Wifi-based C2 and video.

Open standard wireless protocol for WiFi C2

- Can be implemented in the DJI products that use WiFi (e.g. Phantom 3 Standard).
- This and other protocols can be developed via industry consensus (or sooner)
- A hardware module can implement this WiFi protocol on other drones

TECHNOLOGY READINESS: NOW

UAV Side

- Current DJI products can already be ID'd and tracked today (no update required)
- Other companies using WiFi C2 links could implement capability through a FW update

Ground Side

- Deployed and operating 24/7 at two major fixed sites overseas (airports)
- We have portable version of the equipment
- More portable solutions can be developed as interest grows

Solution will benefit from standardization process

INSTALLED AND OPERATIONAL (FIXED SITE)

Already deployed at two international airports

Information available in current system

Drone position/alt and vector

Pilot station position (if GPS available)

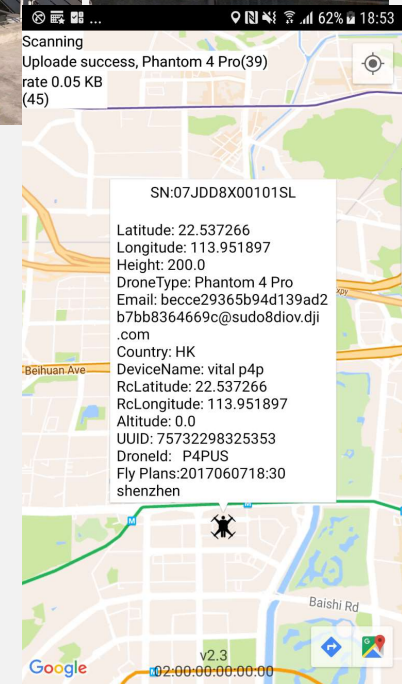
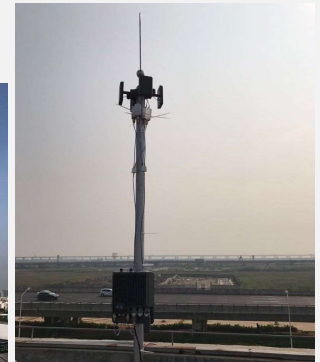
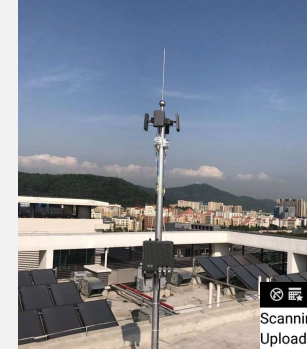
Drone make/model (proxy for payload cap.)

Serial number

User-defined field for **Registration** or Permit No.

User-defined field for **Intent** (and contact info)

Easily extendable to other info (battery life)



CONCLUSION

- Every drone has a radio – let's use them!
- Solution exists today, and can be quickly and cheaply deployed.

