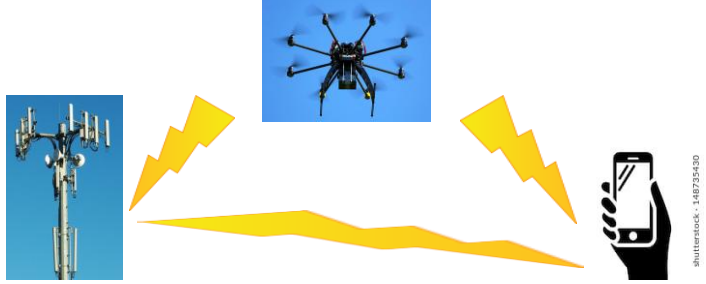


Drone Remote Identification Protocol (DRIP)

IETF124 updates (since interim) on externalities driving DRIP

2025 NOV 05 stu.card@axenterprize.com 315-725-7002

my topics

Beyond Visual Line Of Sight (BVLOS) operations

International Harmonization of UAS Related Standards

Trustworthy Air Domain Awareness (TADA!)

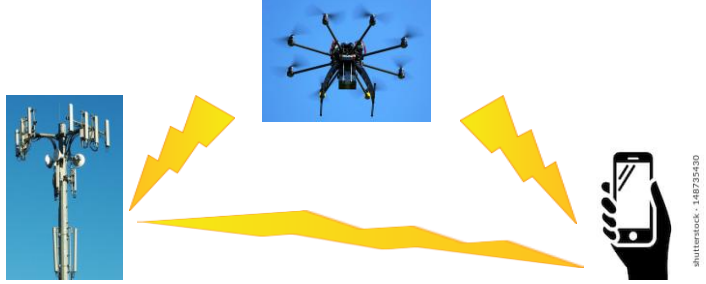
How do these drive DRIP work?

caveat lector

Please don't try to read the fine print during my talk:

it is there for the diligent student to read afterwards;

it is literally "fine print", mostly regulatory text.



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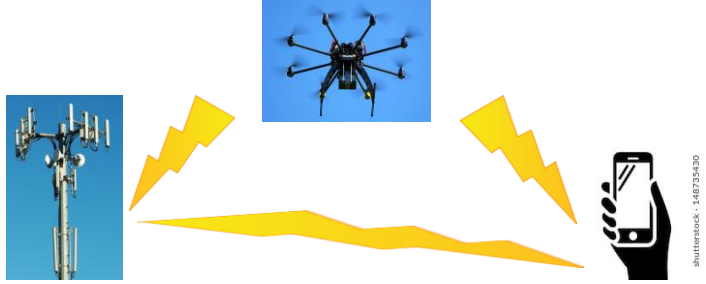
Beyond Visual Line Of Sight (BVLOS) operations

- The **global** UAS community is focused entirely on enabling economical/effective/safe/secure BVLOS.
- US Gov't (FAA & TSA) issued a Notice Of Proposed Rulemaking (NPRM) on "normalizing" BVLOS ops.
  - "performance-based regulations to enable the design and operation of… UAS… at low altitudes… BVLOS… and for third-party services, including UAS Traffic Management (UTM), that support these operations… provide a predictable and clear pathway for safe, routine, and scalable UAS operations… package delivery, agriculture, aerial surveying, civic interest, operations training, demonstration, recreation, and flight testing..."
  - § 108.190 Use of strategic deconfliction and conformance monitoring.
    (d) must… (1) Provide immediate alerts to operations personnel when the unmanned aircraft exits its operational intent…
    (e) through operational use of an authorized service provided by an appropriately certificated automated data service provider under part 146…
  - § 108.725 Flight data. Each manufacturer… must:
    (c) Implement adequate security measures to protect the confidentiality and integrity of collected flight data.
  - § 108.815 Signal monitoring and transmission.
    (a) unmanned aircraft must be designed to receive… and transmit… all information required for safe flight and operation.
  - § 146.400 Authorized service data exchange requirements. (newly recognized entities: ADSPs)
    (a) Interoperability. Services authorized under this part must be able to exchange data automatically and securely with both the user and other authorized service providers when necessary for provision of the service, irrespective of the user's or other provider's digital platform.
    (b) *Safeguards.* Services… must… ensure the integrity, accuracy and reliability of the data…
    (c) *Authentication*. Services… must use an access and authentication method that prevents unauthorized access to or interference with data...
    (d) *Non-repudiation*. Services… must use a validation and verification method that provides assurance of the integrity and origin of the data...
    (e) *Equitability.* A certificated service provider… must provide their service to users in a reasonable and non-discriminatory manner…



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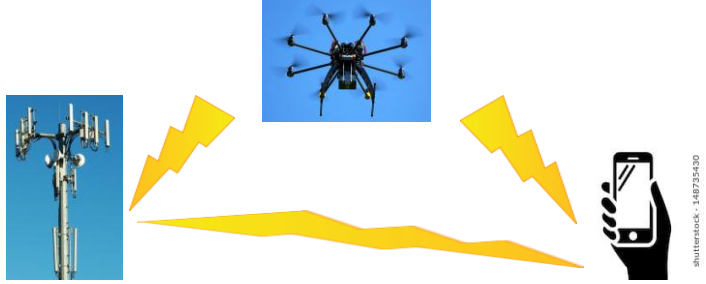
International Harmonization of UAS Related Standards

- The **DronesQuad** consortium (Brazil, Canada, EU, US) issued criteria to facilitate development of UAS-related standards that can be cited in Means Of Compliance (MOCs) for rapid acceptance by the Civil Aviation Authorities (CAAs) in all 4 of those jurisdictions.
- At last week's ASTM F38 committee meeting, reps from the CAAs of Japan & the UK publicly stated their desire to join or at least intention to align with DronesQuad.
- This moves the community forward faster than agreement among 193 nations can be achieved in ICAO.
- DronesQuad endorsement is based on their evaluation of how well a standard meets applicable criteria from their list of 31.
- Criteria potentially relevant for DRIP as currently chartered include:
  - 010 Aerial Complementary Equipment and Services (ACES – stuff on the ground that interacts w/UA)
  - 040 Systems Safety & Reliability (explicitly includes communications resilience)
  - 050 Cybersecurity (DRIP is weak here in the area of post-quantum crypto)
  - 070 Position, Navigation & Timing (inc. GNSS SBAS)
  - 080 Signal Monitoring & Transmission (C2 Link)
  - 090 Collision Avoidance - Detect and Avoid (DAA)
  - 200 Flight Data Recording



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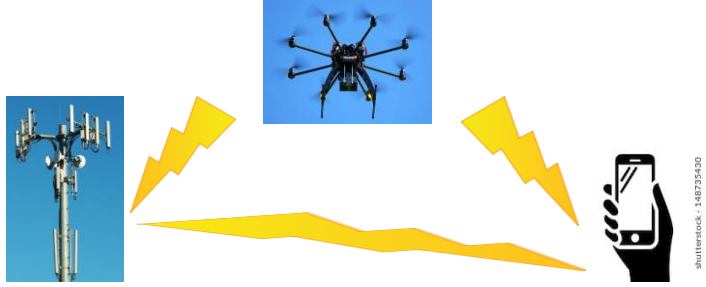
Trustworthy Air Domain Awareness (TADA!)

- Faster, higher flying, larger UAS for Advanced/Urban Air Mobility (AAM/UAM, inc. cargo delivery & air taxis) blur lines between “harmless” small UAS & conventional crewed aviation, increasing recognition of the urgent need for TADA:
  - supporting
    - pre-flight strategic deconfliction of operational intents via network-based UTM w/in-flight conformance monitoring
    - in-flight tactical deconfliction / self-separation / Detect And Avoid (DAA), then if that fails Collision Avoidance
  - integrating UAS Remote ID (RID) & other [non]cooperative systems w/UTM & Air Traffic Control (ATC)
  - ensuring trust in this safety-critical data as per applicable frameworks
    - International Civil Aviation Organization (ICAO) for **all aviation** using X.509
      - DRIP Key Infrastructure complies & compacts… but so far adopted only for DRIP WG internal use
    - Assoc. for Uncrewed Vehicle Systems International (AUVSI) for **all domains** (air, land, sea, space)
      - not yet scrutinized by DRIP WG for applicable provisions
    - In their intersection, DRIP standardizes most of the pieces needed for a complete solution, needing only:
      - process specification for populating & querying (w/AAA) registries of DETs w/required private data
      - a single point of entry into the DRIP document set, comprehensible to aviation community members not intimately familiar w/IETF, facilitating aviation regulator acceptance of MOCs, UAS manufacturer development of products & corresponding Declarations Of Compliance (DOCs), & UAS operator adoption, based on applicable framework compliant, DronesQuad endorsable, DRIP & related IETF standards



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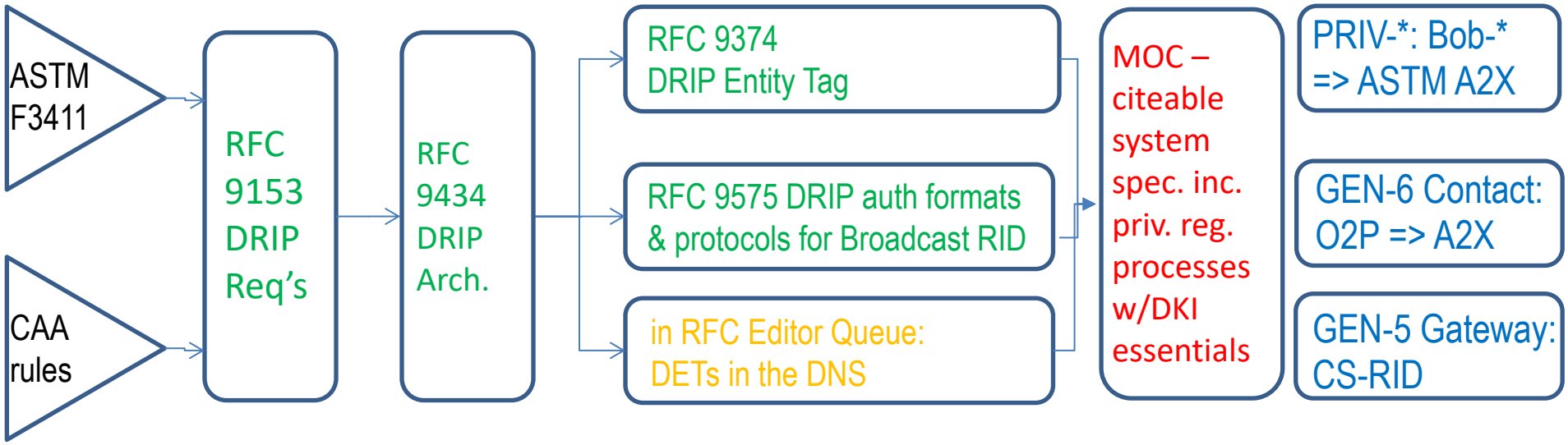
How do these drive DRIP work?



ICAO & AUVSI frameworks & DronesQuad criteria for standards facilitate other SDO MOCs (e.g. ASTM F3586) citing DRIP. We lead w/Session IDs, Authentication Key IDs & Encryption Key IDs.

Please adopt & review Adam's draft as the final currently-missing piece for DRIP to fulfill our current (initial) charter before closure or re-charter!