

UNMANNED AIRCRAFT SYSTEMS



Image courtesy of ChandlerMay

Regulatory and Insurance Issues Rob Ireland

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Summary

Terminology

UAS – Unmanned Aircraft System

- *An aircraft and its associated elements which are operated with no pilot on board.*

RPA – Remotely Piloted Aircraft

- *An aircraft where the flying pilot is not on board the aircraft.*

RPAS – Remotely Piloted Aircraft System

- *A set of configurable elements consisting of a remotely-piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as may be required, at any point during flight operation.*

Autonomous Aircraft

- *An unmanned aircraft that does not allow pilot intervention in the management of the flight*

Context ...

“The potential for RPA for civil use has long been evident and is now being realized” (ICAO Circular 328, 2011)

“A study... published in 2007 estimated a huge potential for increase of civil RPAS applications as soon as appropriate legislation is in place” (EASA, NPA 2012-10, August 2012)

“RPAS can add, to the existing aviation activities, digital technologies and massive exploitation of information: in other words bringing aviation in the realm of the third industrial revolution ...” (European RPAS Steering Group “Road Map”, June 2013)

...and

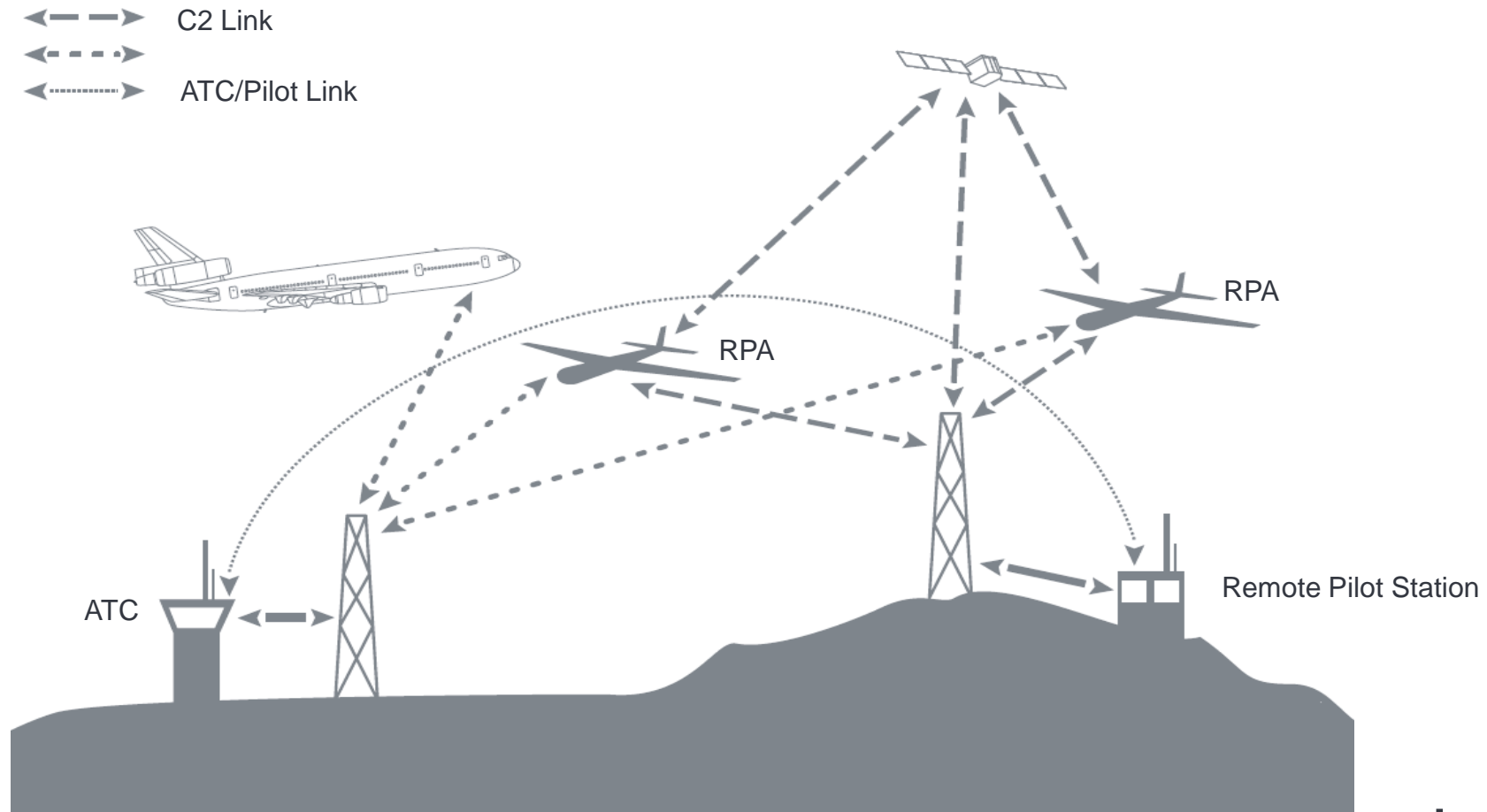
**“ ... would you accept an unmanned fully fuelled
tanker flying above your town?”**

(RAF Wing Commander)

“...they don't land so good...”

(aero-systems engineer)

Anatomy of a “large” RPAS



Non-military uses of RPAS

Border and Customs Patrol

Homeland Security

Fisheries patrol

Law enforcement

Emergency response (e.g.: surveillance, medical supply to remote areas)

Weather monitoring

Communications platforms

Geo-magnetic survey

Conservation survey

Pollution control

Commercial aerial photography and cinematography

Power line / pipe line inspection

Industrial buildings and stacks inspections

ETC ...

Cargo ...

Some examples: Zephyr



Some examples: Euro Hawk (/ Global Hawk)



Some examples: Predator



Some examples: Vigilant



Some examples: Whirlybird



Some examples: Nano



Some examples: Autonomous UA



Currently

Significant use of <150Kg UA for commercial civil use

Use of >150Kg is principally limited to State operations

**Rule-makers recognise potential for commercial use expansion
<150 Kg and lower end of > 150 Kg.**

But regulatory barriers to realising that potential ... Road Maps

Current and Forecast (a flavour)

Estimates and forecasts vary widely – some sample figures:

Forecast global spend 2020 – US\$11.3bn

Forecast global production over next 10 years – 35,000 units

Europe currently:

- Over 60 large (>150kg) types; 11 production ready; 7 market ready
- Over 330 (<150kg) types; 115 market ready
- Over 10 types (>150kg) designed for non military State use
- 100s of types (<150kg) designed for commercial civil use

UK CAA estimates over 180 (<150 Kg) in current use

Forecast EU demand:

- 1,000's (<150kg) by 2020?

Indicative Hull Values*

< 20Kg ~US\$1,000's - US\$10,000's
(UAVSI "Vigilant" (UK) ~ US\$20,000)

20Kg – 150Kg ~ US\$100,000's
(RQ-7 "Shadow" AAI (USA) ~ US\$100,000)

> 150 Kg ~ US\$ millions +
(Global Hawk NG (USA) >\$35 million?)

* Varies widely depending on payload and variants; >150Kg costs information is difficult to obtain

International regime

Chicago Convention 1944 – applies to UAS

Minimum standards:

- Airworthiness (Article 31)
- Operators (Annex 6)
- Rules of the Air (Article 12)
- Piloting qualification (Article 32)

Same safety and operational requirements as for manned aircraft

Airworthiness and operator approval

A foundation but more detail required, particularly re:

- Collision avoidance – “detect and avoid”
- ATS and ATM – pilot / ATS communications integrity
- “C2” integrity

European Law

“EASA UA” – civil aircraft mass greater than 150kg

Regulation EC 216/2008 covers “EASA UA”:

- Type certification and airworthiness requirements
- Operational requirements (per manned flight)
- Pilot certification

National Aviation Authority aircraft:

- State aircraft (non-Military); and
- Civil aircraft mass 150kg or less

BUT regulatory and operating barriers:

- No EASA Type Certificates (CoA's) as yet
- Detect and Avoid for civil UAS.
- Operator standards
- Piloting standards (...currently CPL and above?)
- Aerodrome approvals and procedures for UAs

Present access to airspace in Europe

Generally:

- Regulation generally on State level – granular
- Segregated airspace or highly restricted access to low traffic density / uncontrolled airspace
- No shared use of controlled airspace

Technology, procedures and regulation (standards) not yet in place for “detect and avoid”

Predominantly civil “light” UA (<150Kg; <25Kg):

- Below 400ft/500ft
- Away from aerodromes (infrequent segregated operation at low traffic density fields)
- Away from urban / congested areas
- VLOS, EVLOS

No civil large UA access to non-segregated airspace

State non-military large UA:

- some access to low traffic density, non-segregated airspace
- under heavy restrictions - case by case exceptions
- infrequent

European Road Map

3 inter-related areas of activity:

- Development of required safety regulations (airworthiness, flight crew, operators)
- Research and Development (ATM and airspace integration; Data links; Security; Surface operation – take-off and landing etc.)
- “Societal impact” (third party liability and insurance; privacy; security)

2018 – 2023: Partial integration across all mass categories:

- Alleviation of mass category restrictions and other limitations on entry to non-segregated a/space
- Initial mixed ops at aerodromes by 2023

2024 – 2028: Refinement of separation criteria (RPAS/RPAS and RPAS/manned)

- “File and fly”
- Commercial international freight operations
- Mixed operations at aerodromes.

2028: Full integration into non-segregated airspace (controlled and uncontrolled) including aerodromes

Liability

Rome Convention:

- does not specifically refer to RPAS, but consensus is that it applies to RPAS
- only applies where damage occurs in a Contracting State and aircraft causing damage is registered in another Contracting State
- strict liability for ground damage
- weight based limitations (125,000SDRs =/ < 1,000Kg; ~ £122,000)
- “Operator” (or owner) is liable party
- 49 signatories (10 EU Member States, but not UK, France, Netherlands)

Civil liability – strict or fault based:

- majority of EU member states – strict for ground damage
- unlimited liability
- damage to other aircraft....?

There are new participants in UA ops:

- C2 link provider
- Handover of controllers
- ATS link providers

Insurance (EU)

Regulation EC 785/2004 (and Civil Aviation (Insurance) Regulations 2005)

Third party damage (including war and terrorism risk (art 4 (1)) where UA used for commercial purposes)

Minimum cover – 750,000 SDRs (<500Kg) (~£733,000)

Road Map:

Anticipates that premiums for RPAS ops will be significantly higher than for conventional ops:

- Undefined airworthiness and safety standards
- Limited reliability / loss information

Identifies a need to reduce levels of uncertainty within aerospace insurance sector

Suggests Reg 785/2004 may not be fit for purpose for RPAS

Recommends:

- Assessment risks surrounding RPAS ops for use in insurance
- Review and (?) replacement of Reg. 785/2004

Minimum insurance requirements - Reg 785/2004

- Applies to “... air operators ... flying within, into, out of, or over Member State ...”.

MTOW (kg)	Minimum Insurance (million SDRs)
< 500	0,75
< 1,000	1,5
< 2,700	3
< 6,000	7
< 12,000	18
< 25,000	80
...	...

Challenges and trends

- Insurers have historically been largely in the dark as to risk profiles and claims adjustment options
- With the registration and e-identifications being required and implemented that will to some extent be changing
- There is provision as to accident and incident reporting in EU regulatory developments
- Standard insurance clauses e.g. AVN1C based on regulatory requirements for manned aircraft may need amendment
- Use of GPS tagged data is being collated on databases such as Flock and that is being used for particular flight conditions analysis offering a glimpse into the future for insurers

Challenges and trends

- **Start-ups such as one launched in UK provide pay-as-you-fly drone insurance**
- **Provides insurance for commercial drone pilots and those in training; plans to extend the scheme to recreational pilots**
- **Both hull and third party liability cover offered**
- **User inputs data on training, flight location and duration (1-8hrs) and required coverage (GBP 1M – 10M) into an app**
- **App then generates a risk factor based on factors such as weather, NOTAMS, hazards, proximity to buildings and airports**
- **Risk factor is then used to calculate the premium, which starts at minimal sums for a commercial flight (cf. larger sums for annual cover)**
- **Early days – no reliable statistics on claims made and paid etc.**

Challenges and trends – cont'd

- **Small premium / volume model present its own difficulties for insurers for small drones**
- **“Pay as you go” model has been popular with small drones operators in EU/US**
- **As the volume of small drones usage increases, that will give some insurers the revenue stream to make it worthwhile**
- **However, the potential will only really become realised with evolution to operational models such as:**
 - Swarms of small low costs vehicles
 - Beyond visual line of sight operations in urban environments
 - Centralised control
- **Room for deductible insurance market will depend on hull values and remains to be ascertained**

Other Issues

Problems at LGW

Other Issues

Gatwick airport disruption: military to be deployed as drone chaos continues - live

Gavin Williamson confirms military involvement as it is unclear when flights will resume as thousands of passengers face disruption caused by drones over the runway

ARE THESE THE MORONS WHO RUINED CHRISTMAS?

THE DRONE WOLF

JUST HOW CAN DRONE MANIAC SHUT GATWICK?

How COULD this speck in the sky ruin Christmas for 350,000?

Net closes on Gatwick drone pilot

110,000

760

10,000

2.9 million

ARE THESE THE MORONS WHO RUINED CHRISTMAS?

Net closes on Gatwick drone pilot

THE SUNDAY TIMES

CHRISTMAS & NEW YEAR TV GUIDE

The Observer

REVEALED: GATWICK DRONE SUSPECTS

Gatwick chaos sparks call for new controls on drones

19 Retweets **205 Likes**

Vincent

Other Issues



Other Issues

Aerodromes – particularly challenging

Radio frequency allocation through the International Telecommunications Union

Privacy (eg, Directive 85/46/EC)

Export Controls – military list technology and dual-use technology

Civil use of UAS is effectively restricted to <150Kg, VLOS, outside of congested areas

But industry is rapidly expanding – forecast for 2028: full integration in EU airspace incl. commercial freight ops?

Final word

ICAO (Circular 328) -

“...under no circumstances will the pilot responsibility be replaced by technologies in the foreseeable future”

!

BUT It is BIG BUSINESS – the European market is expected to be worth over 10 billion Euros in 2035 and over 15 billion Euros by 2050



THANK YOU

415

Partners

2200

Legal
professionals

3800

Total staff

50+

Offices* worldwide

* Includes associated offices

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