Drone-in-a-Box for Emergency Services

Resilient Connectivity Beyond Terrestrial Networks

Section 1: Business Case

Presented by James Bassam

- Why DIAB capability is critical for emergency services
- Operational drivers and gaps in current systems
- Regulatory and industry context

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Operational Problem Statement

- Frequent loss of terrestrial communications during disasters
- Limited situational awareness in remote/off-grid environments
- High dependency on fixed infrastructure
- Need for rapid deployment and sustained operations

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Why Drone-in-a-Box?

- Persistent aerial intelligence without on-site pilots
- Rapid deployment via trailerised solution
- Supports long-duration missions
- Enhances safety and operational decision-making

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What Was Required

- Fully off-grid capable system
- Resilient, redundant communications
- Integrated aviation awareness systems
- Remote control of assets and sensors
- Scalable and interoperable platform

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Regulatory Considerations (CASA)

- Requirement for redundant communications links
- Power system redundancy for sustained flight ops
- Airspace awareness and collision avoidance
- Compliance with BVLOS and automated operations frameworks

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L.8 RPA EQUIPMENT REQUIREMENTS FOR BVLOS OPERATIONS

In addition to any other equipment requirements detailed in the company operations manual suite (such as equipment for operations at night), any time while an RPA is operated BVLOS the aircraft must have:

- A lock on a minimum of 5 GNSS satellites or such other higher number as specified by the manufacturer as the minimum number for automated flight operations
- A command and control link with the Remote Pilot station that shows the position, direction of flight and height of the RPA at all staged during flight
- When operating over an area which is not a controlled ground area and outside of the Remote Pilot or Observer's VLOS of the ground area below the RPA, a live video feed of the ground area below the RPA sufficient for the Remote Pilot or Observer to determine and ground risks below the RPA prior to the RPA flying over or in the vicinity of the ground risk.
- Either Smart Controller, electronic tablet, laptop, or similar device to support GCS software

If at any stage during flight any of the above equipment requirements are not met the Remote Pilot shall immediately return the RPA to VLOS operations or land the RPA in a safe location.

Where available ADS-B in should be used as a situational awareness tool. It is important to note ADS-B does not see all aircraft and most aircraft which pose a risk to the operation will not be shown.

L.9 EXTERNAL EQUIPMENT REQUIREMENTS FOR BVLOS OPERATIONS

Where the RPA requires a third-party system for the safe operation of the aircraft (such as LTE), the third party service must be determined as available in the JSA validation stage by confirming with the third-party service if there are any outages based on:

- The published performance criteria
- The service level agreement performance criteria

If the required external system becomes unavailable during flight, BVLOS operations are to be aborted. Required external system requirements are located in Aircraft Flight Manual of each RPA type.

L.10 STERILE COCKPIT REQUIREMENTS

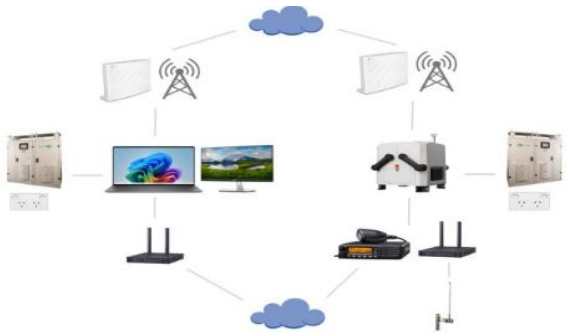
The Remote Pilot in Command must ensure a sterile cockpit is maintained for critical stages of flight. This includes when the RPA is being operated via a Remote Operations Centre.

L.11 BVLOS AVIATION RADIOTELEPHONY PROCEDURES AND REQUIREMENTS

The relevant CTAF or FIA frequency must be used during all operations. When operating in Class G airspace, the Remote Pilot shall broadcast at least 15 minutes prior to launch and again on take-off, then continuously monitor the frequency and make further broadcasts as required to maintain the safety of the operation.

For BVLOS operations all vertical references must be in altitude (height above mean sea level) to avoid confusion between the Remote Pilot and piloted traffic in the area.

The Remote Pilot may delegate an appropriately trained and certified Observer to make radio broadcasts. Where the Observer is not co-located with the Remote Pilot, any relevant aviation radio transmission received shall be immediately communicated to the Remote Pilot.



AUSTRALIAN UAV SERVICE
SLSS OPERATIONS MANUAL
L - BEYOND VISUAL LINE OF SIGHT (BVLOS) PROCEDURES

L.26.5 Dock Location Requirements

Prior to BVLOS Operations the Remote Pilot in Command shall ensure that RPA Dock site selection and commissions conforms to OEM instructions and procedure. In addition to manufacturer instructions, the following procedures should be followed:

Equipment	Quantity	Requirements

DJI Dock	1	• The DJI Dock must be located in an area where:
		  ◦ Obstacles within a five-metre radius do not pose a hazard to take-off and landing.
		  ◦ Access is restricted to essential crew only.
		  ◦ The take-off and landing area can be cleared and monitored using a camera system capable of providing vision night.
		  ◦ The take-off and landing site is illuminated for night operations (this may be by onboard lighting).
		• Must be connected to primary and secondary power sources with automatic failover (Internal battery or UPS can be used in lieu of a secondary power source provided it contains reserve power in excess of 1.5x the flight time to return to home).
		• Must have access to primary and secondary network communication with a minimum failover time of 5 seconds.
		• Must have access to live weather information for wind, precipitation and temperature within 5 nautical miles of the dock location (this can be from an on board weather station)
		• Must be within electronic line of sight of the operations area (viewshed in accordance with these procedures)
		• Must have an alternate landing site with no obstacles within 1m radius. The site should be 5-50m from the dock, at the same height.

Airband radio such as ICOM A120E or equivlant connected to ROIP	1	
Access to primary and secondary power source		Internal battery or UPS may be used in lieu of a secondary power source, provided it contains reserve power in excess of 1.5x the flight time to return to home).

Industry First Capability

- First emergency service dual Drone-in-a-Box trailer solution
- Designed for statewide deployment across NSW
- Combines aviation, comms, and IoT in one platform
- Built in collaboration with industry partners (Hypha)

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Business Value & Outcomes

- Add Increased operational resilience
- Improved response times in disasters
- Enhanced situational awareness
- Reduced reliance on damaged infrastructure
- Future-ready scalable architecture
- body

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Section 2: Technical Integration

Presented by Riley Porteous
End-to-end architecture and system integration
Focus on communications resilience and control systems

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System Architecture Overview

Deployable Trailer-Based Platform
Fully self-contained, rapid deployment capability for incident and event environments

Integrated DIAB Ecosystem
Seamless integration of communications, power, and compute in a single platform

Edge Compute with Centralised Control
Local processing for resilience, with remote monitoring and command capability

Interoperable by Design
Built to integrate with Emergency Services Organisation (ESO) systems and partner agency platforms

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Connectivity Architecture

Resilient LEO Satellite Backbone
Dual bonded Starlink terminals providing redundant, high-availability connectivity
Hybrid Terrestrial Integration
5G links to enhance performance and maintain coverage where available, on LEO failure
Seamless Link Failover
Automatic switching between satellite and cellular to ensure uninterrupted operations
Future-Ready Expansion
Designed for integration with emerging LEO networks (e.g. Amazon LEO)

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Omnitronics Integration

Omnicore as Central Control Layer
Primary interface for system control and operational management
Integrated Radio Communications (Airband)
Seamless control and monitoring of aviation and radio channels
Platform-Based I/O Control
Hardware and system I/O managed through the Omnitronics ecosystem
Unified Operator Interface
Single pane of glass for communications, control, and asset visibility

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IO & Remote Asset Control

Centralised Control via Omnicore
Floodlighting and field systems managed through a single interface
Integrated IoT Device Ecosystem
Seamless connection of sensors and smart field devices
Remote Operation & Monitoring
Real-time control, status visibility, and alerting from anywhere
Scalable Field Integration
Easily expandable to support additional assets and devices

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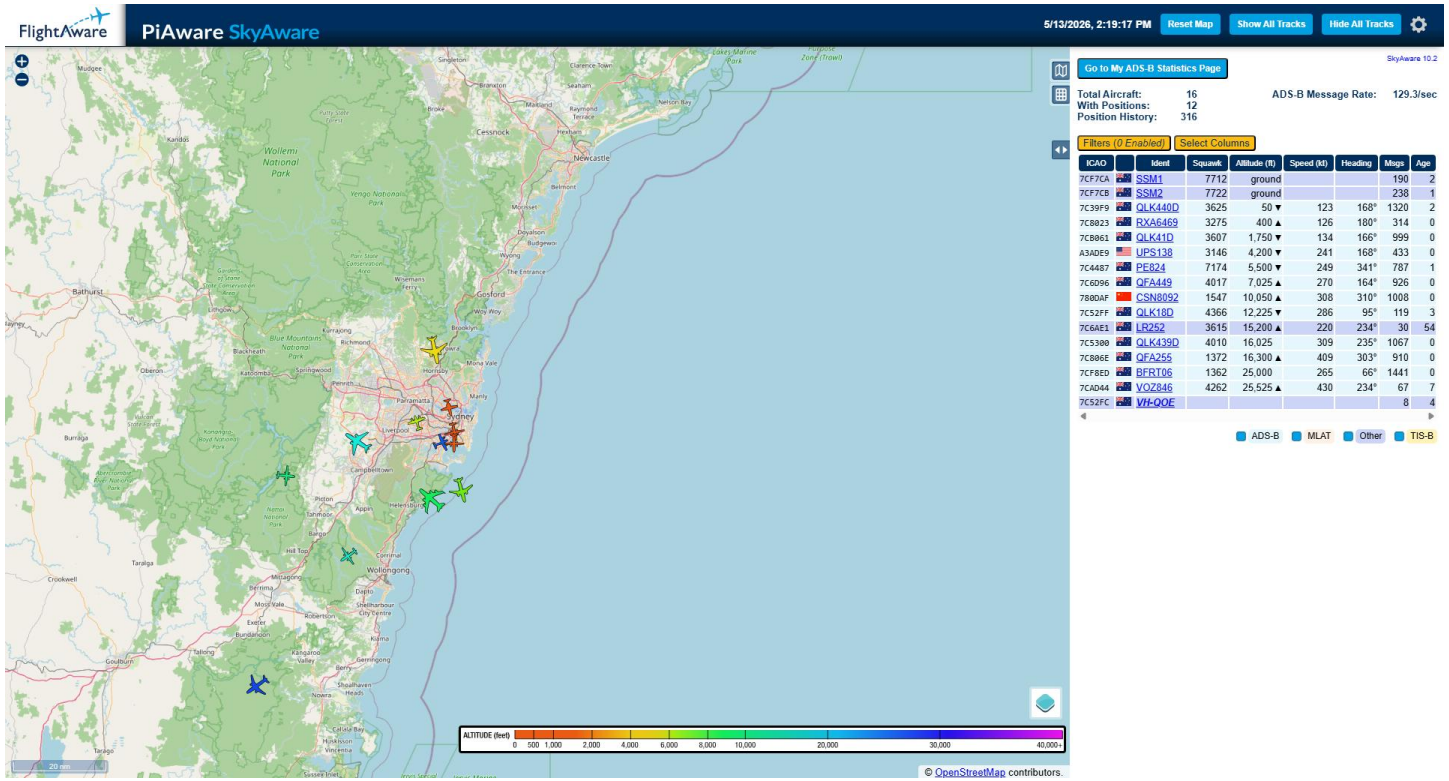
Aviation Awareness Systems

Integrated Airband Communications
Direct monitoring and control of aviation radio channels

Real-Time Aircraft Tracking (ADS-B)
Live visibility of aircraft movements within the operational area

Enhanced Situational Awareness
Improved decision-making through integrated airspace intelligence

Supports Safe Drone Operations
Enables deconfliction and safe UAV operations in shared airspace



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Power & Autonomy

Off-Grid Power Capability
Fully self-sufficient system requiring no external power source
Sustained Deployment Endurance
Designed to support extended operations in the field
Remote Switch Ability
All 12v & 24v devices have ability to remotely restarted
Optimised for Remote Environments
Reliable performance in isolated and low-infrastructure locations

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Real-World Deployment Considerations

Rapid Deployment & Mobility
Designed for efficient transport and fast setup in dynamic environments

Environmental Resilience
Built to operate in harsh conditions (heat, weather, coastal exposure)

Variable Network Conditions
Performance designed to adapt to fluctuating connectivity environments

Operational Readiness
Requires clear procedures, training, and integration into workflows

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Future Roadmap

Next-Gen LEO Integration
Incorporation of additional satellite networks (e.g. Amazon LEO) as they mature
Expanded IoT Ecosystem
Integration of a broader range of connected field devices and sensors
Automation & AI-Enabled Operations
Leveraging intelligent systems to enhance decision-making and efficiency
Cross-Agency Adoption
Scaling the platform across emergency services and partner organisations
New Dock Solutions
Docks from other companies, new designs and versions from DJI
Similar Systems
Other solutions using similar designs

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