Gaining Ecommerce-like Simplicity within a Drone-As-A-Service Framework

Abstract

Taking note of the exponential growth of drone-as-as-a-service (DaaS), enterprises are deploying commercial drones for—inspection (infrastructure, survey, industrial, insurance), photogrammetry (3D mapping, digital twin), retail (delivery) and telecommunications (on-demand cell on wings, network connectivity). Usually, these drones leverage an ecosystem comprising specialized payloads, additional data storage, backup sensors, longer flight times powered by high capacity batteries, on-board or on-ground applications, and flight controllers. The pricing also varies depending on the requirements for customizing these drones to execute relevant services.

It's time unmanned aerial vehicle (UAV) service suppliers (USS) collaborate with multiple vendors to create an e-commerce platform capable of monitoring and monetizing drone-based services. Such a framework could on-board several service providers, extending capabilities to autonomous drone services, cloud-based applications and infrastructure, as well as on-demand applications. This would ensure inter-operability and effective pricing for an end-to-end DaaS offering.

Preparing for Flight

In 2017 alone, the global market revenue for personal and commercial drones has increased by 34%, and is well-positioned to reach more than USD 11.2 billion by 2022.1 As a strategic response, USS are preparing to provide pay-per-use, agile services that are supported by digital technologies and the cloud to ensure ubiquitous experience and usability.

A robust ecommerce-like platform can put USS in a position to offer differentiated, on-demand services and ensure effective monetization. This can either be developed in-house or through collaboration with different vendors. While both are viable options, the latter will accelerate time-to-market for such a solution.

However, there are certain roadblocks these service providers must overcome. These include the lack of digitized documentation of entitlements and usage, unified service tracking mechanism, and interoperable platforms that result in overall operational inefficiencies. As the demand for DaaS rises, USS must take note of these challenges that would affect overall profitability.

Building the DaaS Framework

For those leaning toward the in-house approach, developing such a platform will require enterprises to reorient their business processes such as supply chain management, order fulfillment. This will require internal teams to design, develop, as well as implement add-ons like an entitlement engine, a charging platform, and more – delaying time-to-market considerably.

In collaboration, however, USS can leverage cross-domain expertise and expedite the development lifecycle, and in turn, equip them to offer a diverse portfolio of constantly evolving services. The partnership will also be beneficial for the USS in providing diversified services with partners adding evolved features to the product suite. End users can accordingly choose the services they need, freeing up enterprises from worrying about developing and integrating entitlement, usage, subscriptions or renewals, and billing features.

Figure 1 illustrates the many components that must be considered for enabling such an ecommerce-like framework.

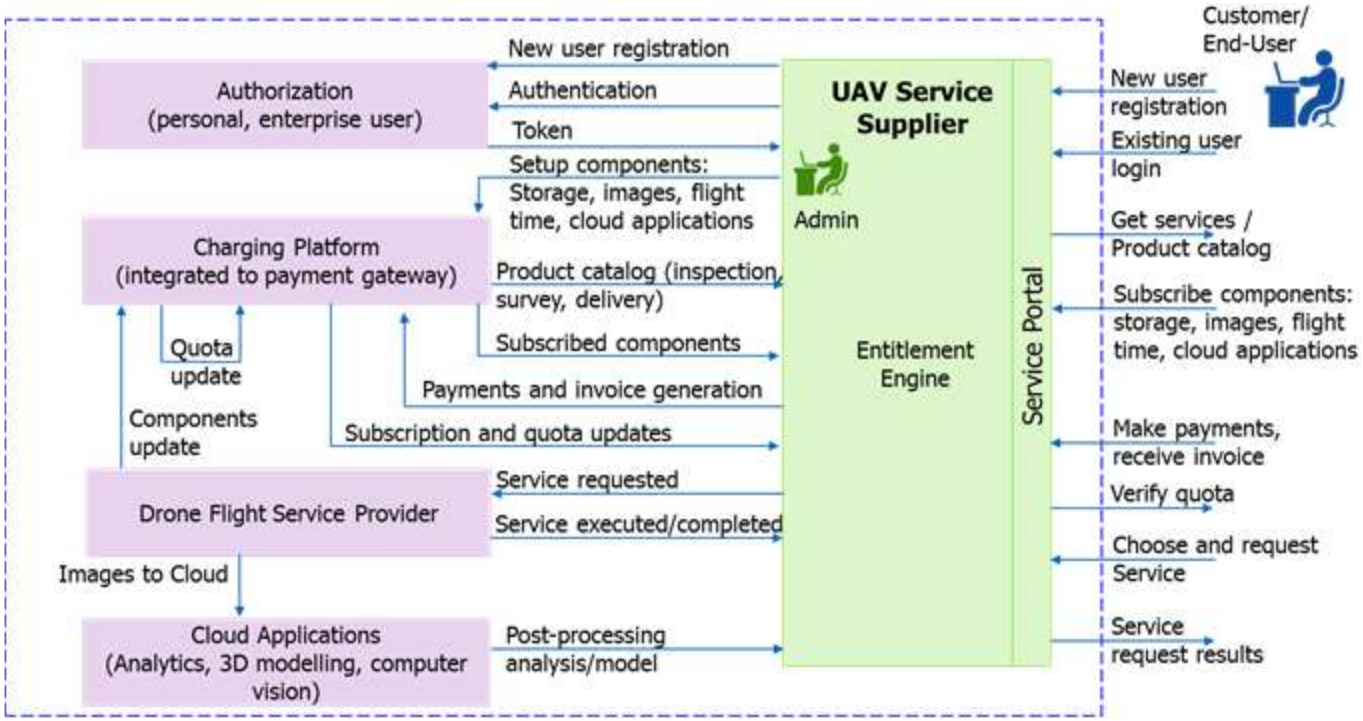

Figure 1: Drones-as-a-Service Ecommerce Framework

These include:

- **A service portal**—a single, unified pane for the end user to subscribe or request for relevant services, or renew existing ones. The service portal or user interface will allow end users to not only select the applicable services but also the duration and coverage, as well as have the option to include comments or additional requests accordingly. The user can also choose add-ons like post-processing services either on the cloud in real-time or offline. In turn, enterprises can effectively manage and streamline service request generation.
- **An authorization server**—that authenticates retail users through register or login, and enterprise users through an integrated Lightweight Directory Access Protocol (LDAP) for authentication, authorization, and accounting (AAA). This would enable users to retrieve existing entitlement or history of services, and modify current entitlement, if needed. USS can also extend services for a defined trial period for users to gauge their feasibility.

- **An entitlement engine**— responsible for key workflow management operations, linked to a co-resident or distributed data store with interoperability through APIs. This core engine must integrate with a multi-vendor product suite, and will be responsible for maintaining the life-cycle of service requests.
- **A charging platform**—accountable for maintaining subscription, quota, usage billing, renewal cycle, and so on, which is integrated with a payment gateway.
- **A drone flight service provider**—responsible for validating available quota or sharing usage for the requested service
- **Cloud applications**—for data storage (most applicable for surveys and inspection) and processing leveraging data analytics, 3D Modelling, and more
- **A cloud-based infrastructure**—that provides concurrent user support for processing and responding to requests and relevant queries in near real-time, ensuring optimized performance and scalability

Delivering Compelling User Experience

To illustrate the need for synchronizing the entitlement engine with a multi-vendor product suite, consider three hypothetical scenarios:

1. A pre-registered retail user with some existing entitlements requests for an on-demand aerial survey. This user selects the area to be inspected and relevant requirements for such a survey, and submits the request. Based on this, the drone-as-a-service application calculates survey area, flight plan, time, and so on. Depending on the payload (the camera type to be used, expected resolution), it notes the number of photos to be taken, cloud storage needs, and applications to be deployed for post-survey photo processing. This e-commerce framework then verifies the user quota—storage, number of maps and photographs, among others . In case for the requested on-demand services, the entitlements have exceeded, such a platform checks and validates whether the end-user has opted for the auto-renewal feature—renewing subscriptions and generating invoices accordingly. This ensures seamless operations in comparison to users being denied service requests and having to investigate the root cause across multiple applications.

2. An enterprise user requests for live streaming of an event. It selects the required services from the catalog, along with the event type, time period, and coverage needed. The drones-as-a-service application computes the required number of drones, payloads to ensure best coverage and post-processing or live relay of the event. The applicable entitlements for the user is validated by the e-commerce framework against the multi-vendor product solutions and service request processed. Post completion, a purchase order (or its equivalent) is sent to the enterprise.

3. A retail customer is looking for last mile delivery services, but wants to evaluate the costs for requesting these. The ecommerce platform calculates the applicable quote based on the service request and presents the same to the user. Based on this data, he or she can proceed to register and pay for the subscriptions. The applicable entitlements gets activated, and the user then proceeds with the service.

This framework will provide a single view of all relevant services to the user, while ensuring agility, increased on-demand services, and ease-of-use. Taking a step in that direction, Mercedes-Benz Van, siroop, and Matternet have initiated a first-of-its-kind project to test the efficiency of a fully-automated van and drone-based system for on-demand ecommerce goods delivery.[2]

Navigating the Skies Ahead

In the future, this platform will open up the scope to enhance user experience further by integrating additional features that promise:

- Agility through 'cloudified' services—enabling DaaS to leverage on-demand services from the cloud platform, including real-time video analytics, photogrammetry, digital twin creation
- Last mile connectivity—ensuring efficient operations pertaining to last mile retail delivery, inspection, and so on
- *On-demand first person view (FPV)—by integrating augmented reality (AR) and/or virtual reality (VR)
- Enhanced collaboration using drone swarms—for surveys, surveillance, inspection over vast areas within a short period of time

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