LiveU
PUBLIC SAFETY

Photo credit: Skydio

Real-Time Visual Intelligence

Enhancing Situational Awareness with LiveU's Video-Over-Bonded-IP Solution

Executive Summary

With the use of uncrewed aerial vehicles (UAVs) increasing across visual line of sight (VLOS) and beyond visual line of sight (BVLOS) use cases - with the latter being vital for Drone as First Responder (DFR), the ability to share resilient, secure, low latency and high-quality sensor data, including video, is of paramount importance in modern policing.

Designed to increase mission performance and safety, the LiveU Situational Awareness Solution is drone and Video Management System (VMS) agnostic, enabling it to deliver secure, reliable, high-quality video and data streams in mission-critical environments.

LiveU's Video-over-Bonded-IP (VoBIP) solutions are designed to easily integrate into existing visual intelligence infrastructure, such as drones and VMSs, and are simple and swift to deploy. Utilizing the patented LiveU Reliable Transport (LRT™), a highly resilient IP-video protocol, LiveU solutions transmit high quality video and sensor data wirelessly, making them highly portable. By bonding, or combining a number of diverse IP connections, including 4G and 5G mobile connections, Low Earth Orbit satellite (LEO), Mesh Radio, WiFi and Ethernet into a single, secure and robust connection, the LiveU Situational Awareness Solution can be deployed in remote locations or areas experiencing network congestion.

The LiveU Situational Awareness Solution supports seamless sharing of real-time video on an 'invitation-only' basis, allowing operatives to view 'live' video directly from their connected smart device, without the need to download software. The solution also provides low latency video and data transport from the field to mobile and fixed control rooms, eliminating the need for dedicated video and data communication units.

With over 18 years of mission-critical IP-video experience backed by 24/7/365 support, LiveU and the Situational Awareness Solution increases operational performance, improves outcomes and enhances safety – simply, securely and reliably.

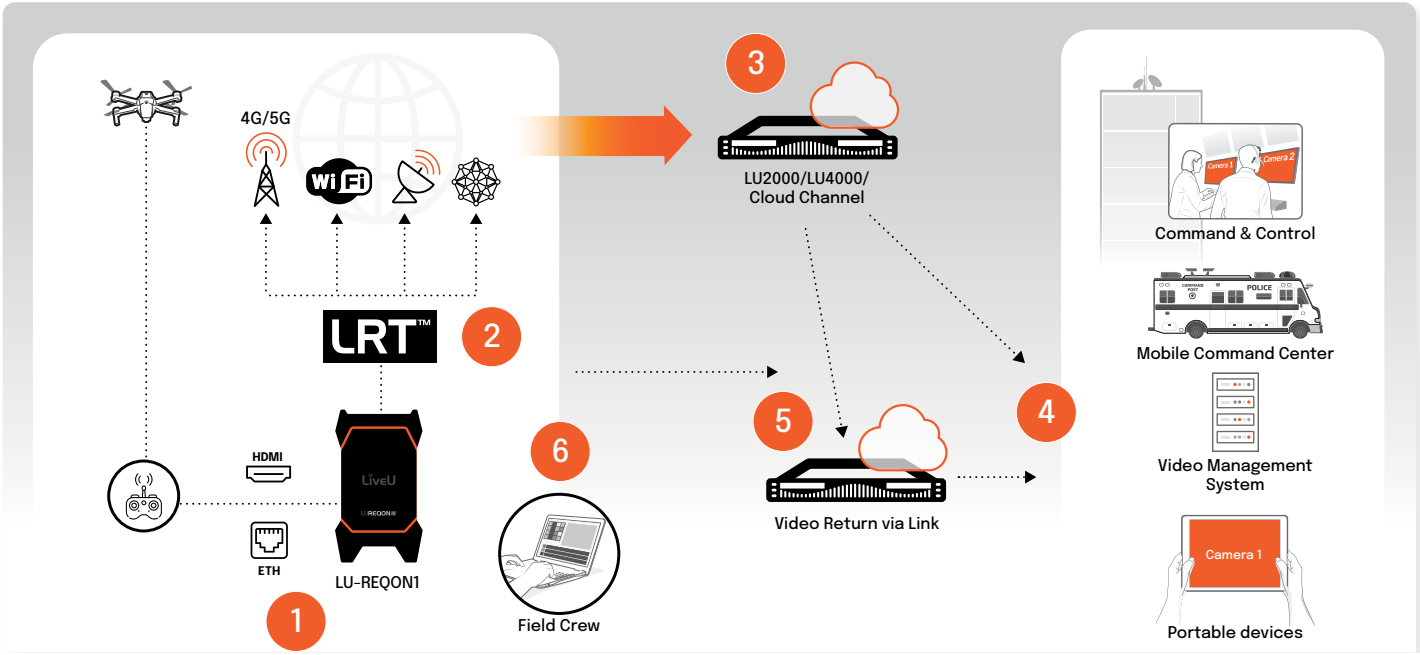
The LiveU EcoSystem of hardware and software that powers the company's Situational Awareness Solution.

Features of LiveU Situational Awareness Suite of Solutions

Video Return for sharing the feed with operatives on the ground, command center, and invited agencies via a unique, secure, temporary link.

DataBridge creates a robust, high-capacity mobile internet hotspot that enables forces to use additional applications for critical communications in the field.

File Transfer enables teams to transmit large files and **metadata** from anywhere. These files can be collected **evidence**, or high-quality images used for 3D scanning. Seamless integration with existing equipment, **VMS**, and other infrastructure minimizes complexity and investment and preserves the chain of evidence.



Typical Use Case

1 In a typical workflow sharing a video feed from a drone with relevant decision makers, the drone controller is connected to one of **LiveU's field units**, such as the tactical **LU-REQON1™** in the diagram above. Weighing less than 2lb (955g), the molle mountable LU-REQON1 is fully self-contained and accepts video input using either an HDMI or an Ethernet connection.

2 The field unit **encodes the video and bonds multiple IP connections**, such as cellular, satellite, Mesh, and WiFi networks, which are used to transmit the video. Furthermore, it uses the patented LiveU Reliable Transport Protocol (LRT™) to provide reliable, resilient and stable connectivity and video transmission.

3 The video is securely transmitted using the LRT protocol from the field unit to one of **LiveU's decoders**. These can either be physical servers **(LU2000 or LU4000)** or a cloud implementation. The physical on-premises servers can be installed in a fixed location, such as a Command & Control Headquarters or in a Mobile Command Center. The cloud instance can be deployed in a public or private cloud implementation.

4 The LiveU server can be integrated into a **VMS** to continue using existing infrastructure and seamlessly support existing work methodologies.

5 A **Video Return server** can be optionally added to **share the video** with additional destinations, such as forces on the ground and commanding officers' portable devices, and to **create ad-hoc** mission-specific **links** that can be shared with additional operating forces joining the mission. Video Return can also be on-premises, public or private implementation.

6 **LiveU DataBridge** converts the field unit into an internet hotspot, providing WiFi (or wired) connectivity at the push of a button, to support other communication needs in the field.

The LiveU Solution can be configured, managed, and operated using **LiveU Central,** a centralized management system.

About LiveU Reliable Transport and Video over Bonded IP (VoBIP) Technology

IP bonding aggregates diverse and multiple network connections (Cellular, Satellite, WiFi, Mesh, etc), to provide a resilient, stable high-capacity bandwidth link, resulting in reliable, high video quality transmission.

LRT continuously monitors network fluctuations and automatically compensates, maintaining a resilient live stream regardless of any instability in various network connections. This is done using multiple techniques, including:

- **Adaptive Bitrate Encoding** matches the stream rate with the available connection speed to minimize buffering and deliver the best quality video for the prevailing conditions.
- **Packet Ordering** guarantees packets are placed back into their proper order after arrival to the receiver.
- **Acknowledgement and Resend Requests** sent back to the encoder to increase transmission integrity.
- **Dynamic Forward Error Correction (FEC)** monitors network conditions in real time and reduces the number of parity packets sent to a minimum. These packets help the receiver recover lost or corrupted data without retransmission.

LRT's dynamic nature, plus the use of disparate and diverse IP connection links, ensure that the transmitted stream quality is optimized, even in the most austere or contested network environments.

Secure by Design and Enhanced by Encryption

The LiveU Solution is a point-to-point solution, utilizing LRT to securely pair field units and receiving servers. The proprietary LRT protocol and algorithms used provide additional degrees of protection from interception attempts and, due to the use of multiple connection paths, the bonded nature of the solution provides an inherent layer of additional security. For customers requiring additional security measures, AES 256 encryption is offered as an option.

LiveU Solutions have been used for nearly two decades to transport high value video and data in scenarios that demand high levels of data sovereignty, including on-premises deployments requiring complete ‘air-gapped’ isolation from the internet.

Reliability Built-In

LiveU is a leading developer of real-time video transmission and streaming solutions for mission-critical, real time and tactical uses. With over 5,000 customers in 150 countries, our technology is trusted by a wide variety of private and governmental organizations, public safety agencies and other institutions worldwide. These include **law enforcement agencies, search & rescue, emergency services, fire fighters** and **military organizations.**

Photo credit: Skydio

UK's Derbyshire Constabulary uses LiveU solution to transmit real-time video from its drone teams for **information, evidence gathering,** and **surveillance**. We have extensive deployments with federal, state, and local agencies around the globe, supported by in-the-field engineers, a 24/7 customer support team, and on-demand training.

Our solutions are designed with ease-of-use in mind, allowing operators to focus on the mission rather than networks and technology. Sharing mission-critical video and data, in real time, in a secure, reliable and high-quality manner is our focus. This allows us to dedicate significant R&D resources to ensuring that we remain at the vanguard of offering Public Safety professionals accessible, dependable and resilient visual intelligence solutions.

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To learn more about LiveU's Public Safety solutions and case studies, please visit:

https://www.liveu.tv/solutions/public-safety

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