LiveU LIVEU AND 5G

BONDED VIDEO TRANSPORT IN A 5G WORLD

LiveU provides reliable, top-quality live video solutions for global broadcasters, sports organizations and other verticals. 5G has made LiveU's patented bonding technology even stronger with increased performance capabilities, lower latencies and innovative new features. Since launching the first native 5G production-level field unit in 2020, the company has shipped thousands of 5G units worldwide with deployment increasing every year. LiveU now offers a complete 5G portfolio, including a range of future-proof 5G field units and rackmount REMI encoders.

5G PROJECTS

LiveU's successful live 5G field broadcasts with leading US, APAC and European cellular providers, including AT&T, T-Mobile, NTT DOCOMO and KT (Korea Telecom), together with our ongoing participation in EU 5G collaborative research and validation projects, have put us at the forefront of 5G-based field production. It has strengthened our 5G understanding and expertise, resulting in enhanced 5G-native algorithms and implementation across our cellular bonding technology.

We are actively involved in EU collaborative projects, partnering in five 5G Infrastructure Public Private Partnership (5G-PPP) projects* funded by Horizon 2020, the biggest EU Research and Innovation program. The projects' goals are to provide the broadcast community and other verticals with insights into 5G performance in real-world scenarios, both in production and contribution/ distribution.

For example, in a "first", LiveU tested how 5G slices – the ability to segment a 5G network to provide guaranteed upload bandwidth and latency – can serve global media remote production. This was done together with Ericsson and RAI as part of the work the three companies are carrying on in the EU 5G-RECORDS* project, designed to develop, integrate, validate and demonstrate specific 5G components in endto-end 5G infrastructures for professional AV media content production. We have also been involved in another "first of its kind" dynamic 5G network slicing trial for live content contribution with L.M. Ericsson, Nokia, and the University of Patras (UoP), under the Horizon Europe 5G-Solutions project. We also participated in the IBC Accelerator 2022 project - 5G Remote Production / NPN (in the middle of nowhere), which utilized a proprietary private 5G network provided by Neutral Wireless and The University of Strathclyde.

In the US, LiveU has collaborated with carriers, AT&T and T-Mobile to evaluate the impact of 5G wireless on contribution of live broadcast video content using our HEVC portable transmitters. Current 5G carrier support for LiveU units deployed in the US include:

- T-Mobile's nationwide 600 MHz network and their rapidly growing mid-band network, both supported with options for 1 or 2 T-Mobile interfaces.
- AT&T's nationwide 800 MHz network, supported with options for 1 or 2 AT&T interfaces.

In other regions, LiveU distribution partner in Mexico, Magnum, successfully completed scheduled 5G transmission tests with Telcel, a telecommunications company that owns the 5G infrastructure in the country.

In Japan, the country's leading mobile operator, NTT DOCOMO, INC., selected LiveU for live video streaming as part of its value-added customer services offered over its 5G network.

5G CASE STUDIES

LiveU's bonding technology is an enabler in a variety of 5G use cases shaping the 5G-based smart bonding future. Examples include:



Qatar '22 World Football Tournament

Over 1,000 LiveU units were used by customers from 60 countries. Specifically supporting both 5G networks, we saw a 160% increase in live sessions to 78,000 with 40% of them over 5G, and a 73% increase in data usage to 62TB, out of which 40% was 5G-based (compared to 2018).



Live + Wild 5G project, UK

This innovative project led by Candour Productions, with its partners aql and MTN, demonstrated how LiveU technology with 5G can help filmmakers deliver live and fast turnaround content from remote, challenging locations.



S. Korean Election

SBS (Seoul Broadcasting System) used LiveU's integrated 5G technology for its live election day coverage, utilizing the advantages of KT's premium live broadcasting solution with its 5G network.



German Football & Handball Matches

Sky Deutschland used LiveU in two 5G tests for next-gen sports productions: network slicing at a 2. Bundesliga match using the LU800 over the Vodafone network; and production for a firstleague handball match using the LU-Smart over the Telefónica O2 network.



NBA Summer League

NBA Entertainment leverages AT&T 5G and LiveU cellular bonding to broadcast the Summer League Game. The use of LU-Smart gave fans a unique look at the annual basketball tournament.

LIVEU LU800

Designed from the ground up to unlock 5G potential, the LU800 is LiveU's breakthrough production-level field unit, combining multi-camera production with mission-critical transmission in a native 5G unit. With superior video and audio capabilities, the LU800 offers up to 4Kp60 10-bit HDR transmission, 16 audio channels and up to 70 Mbps HEVC live video encoding.

Delivering unparalleled quality of service and resiliency, the LU800 offers superior 5G performance with up to eight 5G internal dual SIM modems, supported by high-efficiency internal antennas. The unit offers optimized 5G operation and full support for 5G network evolution with customized 5G video delivery



algorithms and unique modems, antennas, power and cooling configurations. The LiveU Reliable Transport (LRT[™]) protocol is also fully optimized to support 5G transmission.

LIVEU LU300S



The LU300S is a powerful, small-sized portable 5G video transmission solution for broadcast operations and live coverage on-the-go. The native 5G solution provides reliable 4K 10-bit HDR broadcast-grade live video at a fraction of the cost.

Weighing just over 900g (21b), the LU300S offers resilient bonding in a compact and lightweight portable unit. The unit supports up to 4x5G/4G cellular connections: two internal dual-SIM modems with high-efficiency antennas as well as two external modems. Powered by LRT[™], the LU300S offers rock-solid reliability in the most challenging scenarios.

LIVEU LU810 & LU610S

The multi-cam LU810 and single camera LU610S are LiveU's breakthrough rackmount 5G 4K REMI (remote production) encoders. Leveraging LiveU's LRT[™] protocol for IP bonding, the vehicle and fixed location solutions offer the highest levels of resiliency over the public internet together with ultra-low latency and cost savings. The one LiveU 5G product platform does it all, providing the business flexibility to run any live production workflow.



THE IMPACT OF 5G ON REMOTE PRODUCTION

Since the pandemic, the adoption of remote production (REMI) workflows has increased, reducing the number of people and equipment required on-site. Everything can be provided from a centralized studio with no need for a costly OB/SNG truck.

LiveU's cloud-based IP solutions are inherently suited for remote productions (REMI), reducing production costs and carbon footprints for a more sustainable future.



High-quality streams and super low latency, enabled by 5G networks, make remote production even more viable for productions. Reducing costs, 5G facilitates high-end productions with superior quality, synchronized 4K/multi-cam productions.

LiveU and 5G also provide the bandwidth and latency you need for all your remote I/O (input/output) when it comes to production: Video Return channels, IP Pipe camera control, Audio Connect and Tally Light.





THE IMPACT OF 5G ON DISTRIBUTION

With more users, watching more content, there's a growing need for high-quality content distribution. For live content, 5G broadcast and multicast have the important potential to reduce network load, enhance the viewer experience and reduce operators' costs. Supporting 5G networks, the LiveU Matrix IP cloud video management and distribution solution allows broadcasters and sports organizations to share the highest quality, low-latency live feeds over the public internet.

THE LIVEU 5G ADVANTAGE

- > Complete 5G portfolio: portable multi-cam/compact units + rackmount encoders
- A key partner with cellular carriers to enhance 5G video transmission technology with proven use cases worldwide
- > LiveU bonding provides a critical resiliency technique regardless of the available network
- With 5G, LiveU delivers lower latency video transport at higher resolutions: multi-camera, 4K and beyond
- Continues to add new classes of IP-centric high-speed features as bandwidths increase with 5G
- Supports the unique modems, antennas, power and cooling configurations required for optimal 5G operation
- Future-proof, providing seamless reliable operation in 5G Non-Stand-Alone (NSA) and Stand-Alone (SA) networks and all sub-6GhHz spectrum bands
- Enables super-fast file upload over multiple 5G networks



To learn more about LiveU's 5G bonded cellular video transport visit **<u>GET.LIVEU.TV/5G-SOLUTIONS/</u>** today!

