



**Case Study: Live**

**Broadcasting using GXC**

**Onyx**

## **COPYRIGHT**

©2025 GXC All rights reserved.

This document is protected by copyright. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical photocopying, recording, or otherwise without the prior written permission of GXC.

## **TRADEMARKS**

GXC Onyx, Onyx Supercell are trademarks of GXC. Names of other products mentioned herein may be trademarks and/or registered trademarks of their respective companies.

## **DISCLAIMER**

This document was produced by GXC, and is intended for the use of its customers. The information in this document is subject to change without notice. The information contained herein may not include all details or variations in equipment, or provide for every possible issue that may occur related to the installation, operation, or maintenance of the equipment. Although every effort has been made to provide accurate and detailed information in this document, GXC disclaims liability for any difficulties due to the interpretation of the information contained herein.

## Executive Summary

Live broadcast production is rapidly evolving. As the demand for flexible, mobile, and high-quality video coverage increases, traditional infrastructure—wired cameras, RF transmission, and fixed fiber—can no longer keep pace. GXC's private 5G solution is purpose-built to meet these needs, providing high uplink capacity, low latency, and seamless mobility across large venues. With an edge-deployed Standalone 5G core and a supercell radio architecture, GXC enables broadcasters to wirelessly capture, transmit, and produce live content with professional-grade performance and operational efficiency.

GXC Onyx Private 5G solution enables seamless live broadcasting using three differentiated features

- Ease of Use - quick deployment, transportable and versatile.
- Optimized stack for low latency - Uplink heavy use cases, no frame loss.
- Supercell architecture - eliminate needs for handovers, enhancing ease of use.
- 5G Mesh - extend network beyond wired infrastructure.

## Ease of Use

GXC delivers powerful, flexible private 5G solutions purpose-built for modern broadcast environments, whether you're deploying in a stadium, studio, or on-location field production. Our product line includes compact, all-in-one starter kits as well as high-capacity mobile "network-in-a-box" solutions like our private 5G Cell on Wheels. These kits are engineered for instant deployment and come in rugged travel cases—ideal for temporary or pop-up installations at live events, news coverage, or remote shoots.



At the heart of our solution is the Onyx Portal, a zero-training-needed management system designed for simplicity and speed. With Onyx, even non-technical staff—such as camera operators or field producers—can bring up an entire private network in under five minutes. There's no need

for on-site engineers or complex configuration; the system auto-discovers hardware, syncs radios, and provisions SIMs in just a few clicks.

GXC's private networks support both voice and data, providing reliable, low-latency uplinks for high-bandwidth 4K or HD camera feeds while also enabling crew communications over OTT apps. This makes it especially suited for broadcast workflows where glass-to-glass latency and mobility are mission-critical.

Our multi-band capabilities support up to eight simultaneous frequencies—including CBRS(n48), n78, n77, n28 and n41 bands—ensuring flexibility across diverse regulatory environments and coverage scenarios. With Open RAN-compliant radios and GXC's supercell architecture, our system delivers seamless coverage without the need for handovers—perfect for fast-moving camera crews and live sports venues.

GXC solutions can be deployed in both fixed and portable configurations. Whether permanently installed in a control room or mounted on a truck to support a traveling crew, our platforms scale with your production needs. This versatility, combined with ultra-low latency, cable-free camera operation, and fast network bring-up, enables broadcasters to reduce costs, improve agility, and deliver richer, real-time content experiences.



## Optimized stack for low latency

At the heart of GXC's platform is the Onyx Edge, a compact, integrated appliance hosting the 5G Core, Central Unit (CU), and Distributed Unit (DU) on-site. This edge-native design supports local breakout of video streams, bypassing the need for public network backhaul and ensuring

sub-150ms (includes camera, encoding, 5G transmission, decoding and screen latency)

end-to-end latency—essential for live production.

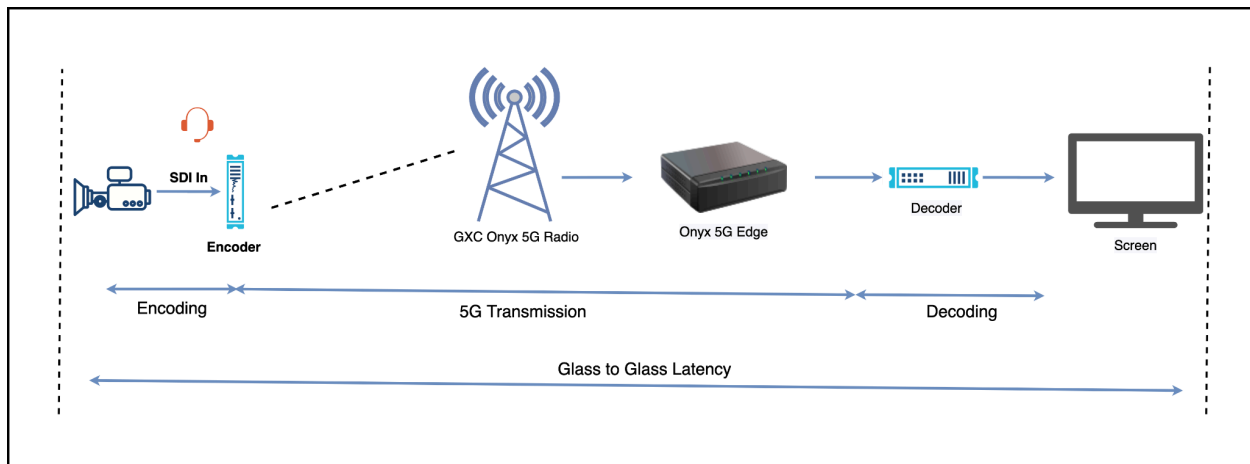
GXC's radio architecture is based on Open RAN (O-RAN) standards and features a three-tier RU-DU-CU design, enabling high-performance connectivity with commercial off-the-shelf radios.

The system uses IEEE 1588v2 and Synchronous Ethernet for precise timing and synchronization across the radio layer, ensuring jitter-free video transport even in TDD spectrum environments.

## Broadcasting Latency

Glass-to-glass latency refers to the time it takes for a video signal to travel from the camera lens ("glass") to the viewer's screen ("glass"). Minimizing this delay is critical in live broadcast production. 5G transmission is key to achieving ultra-low latency by enabling:

- **Real-time uplink from cameras** using high-throughput 5G links (e.g., n78 with 220 Mbps uplink)
- **End-to-end optimization**, allowing live streams to be encoded, transmitted, and decoded with latencies as low as 80ms
- **Flexible deployment** without the constraints of cabling, especially valuable in dynamic or outdoor environments



Together, these enable broadcasters to deliver seamless, near-instant live experiences.

This image captures a real-world *glass-to-glass latency* test. The stopwatch on the phone shows **53 :25 .114**, while the video monitor—fed by the camera—shows **53 :24 .966**, indicating a delay

of approximately **148 milliseconds**. This visual proves end-to-end transmission time from camera input to screen display, validating ultra-low latency performance.

**Important to note here that though the glass to glass latency is 148ms in this example, the 5G transmission latency is 5-25ms and the remaining is contribution from encoding and decoding latency.**



## Supercell architecture

One of the most critical innovations for broadcast is GXC’s shared cell or “supercell” architecture. Unlike traditional cellular deployments that require handovers between cells, GXC abstracts multiple Radio Units (RUs) into a single logical cell. This enables cameras to roam across large areas without interrupting the video feed—perfect for venues such as stadiums, race tracks, and golf courses.



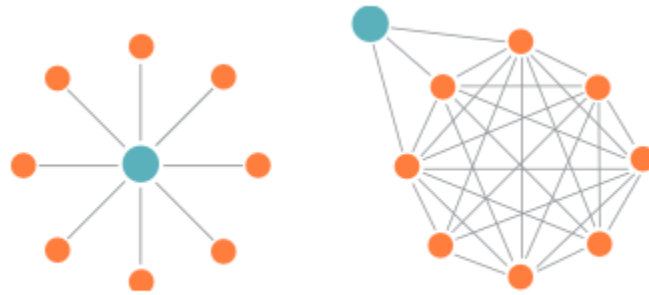
Supercell architecture allows multiple share same logical cell

## GXC Onyx 5G Mesh

GXC’s patented **Onyx Mesh** architecture is a powerful extension of our private cellular platform, designed to eliminate traditional infrastructure barriers that broadcasters often face in outdoor or large-scale deployments. With the ability to wirelessly backhaul between nodes using dynamic interference cancellation and microsecond-level scheduling, GXC Mesh enables rapid network extension without trenching or fiber runs. This makes it ideal for events like live sports, concerts, or news coverage in areas where physical infrastructure is limited or time-constrained. A single

mesh-enabled access point can connect over two miles from the core, enabling pop-up coverage zones on demand.

The **flexibility of mesh-based topologies** provides broadcast crews with a robust, self-healing network that can adapt to shifting coverage needs in real time. If a node loses connectivity or power, the mesh dynamically re-routes traffic, ensuring seamless video uplinks and crew communication.



Combined with GXC’s shared cell architecture, mesh nodes can participate in a unified radio layer—eliminating handovers, minimizing latency, and maintaining high throughput for 4K/HD feeds even as cameras move across coverage zones. This level of operational agility is critical for meeting the zero-frame-drop requirements of modern broadcast workflows.

## Frequency band support

GXC’s platform supports a wide range of 5G frequency bands, including both mid-band (e.g., n41) and high-capacity TDD spectrum (e.g., n78), enabling flexible deployment in diverse regulatory environments. This multi-band capability allows broadcasters to take the same 5G production workflow across different venues and countries without re-architecting their infrastructure. Whether operating in CBRS in the U.S., n78 across Europe, or other licensed or shared bands globally, GXC’s solution adapts to local spectrum availability while maintaining consistent performance and reliability.

BAND	TECHNOLOGY	FREQUENCY RANGE (Mhz)	GEOGRAPHY
<b>b42</b>	<b>4G LTE</b>	<b>3400-3600</b>	Canada, Chile, Argentina, Colombia, Slovakia, Iran, Japan
<b>b43</b>	<b>4G LTE</b>	<b>3600-3800</b>	Canada, Argentina, Slovakia, Iran

<b>b48</b> <b>n48</b>	<b>4G LTE</b> <b>5G NR</b>	<b>3550-3700</b> <b>3550-3700</b>	USA
<b>n41</b>	<b>5G NR</b>	<b>2550-2700</b>	USA, UK, ROW
<b>n78</b> <b>n77</b>	<b>5G (NR)</b>	<b>3300-3800</b> <b>3300-4200</b>	several countries in Asia, Australia Europe, Oceania and Middle East

## Performance at Scale

GXC's private 5G architecture is built to deliver high-capacity, low-latency performance across a range of deployment sizes:

- **Small Venue:** One Onyx Edge, one Fronthaul Multiplexer (FHM), and up to 4 RUs support seamless mobility and camera roaming with up to 140 Mbps uplink per cell.
- **Large-Scale Venue:** A high-availability configuration with multiple Onyx Edges and 16+ RUs forms a dense supercell architecture, enabling over a dozen simultaneous uplink video streams with no degradation in quality or handover delays .

The system's support for network slicing, SIM-level QoS enforcement, and real-time visibility through the Onyx Portal provides broadcasters with fine-grained control over every stream and connected device.

Feature	Onyx 5G (40MHz)	Onyx 5G (100MHz)
UL MIMO Configuration (Downlink)	2x2 (4x4)	2x2 (4x4)
UL Modulation	256-QAM	256-QAM
Peak Uplink Speed (Mbps)	140	350
Assumed Uplink per Camera (Mbps)	15	15
Max Simultaneous 4K Cameras	~8	~22
Glass-to-Glass Latency (ms)	<80	<80
Ideal Applications	Portable Broadcast Kits, Small Stadiums, OB Van Offload	Multi-Camera Events, Arenas, Festival Grounds

Additional Device Support	IoT, Phones, Edge AI, Robotics	IoT, Robotics, AR/VR, UHD Cameras
---------------------------	--------------------------------	-----------------------------------

## Applications and Use Cases

GXC's platform has been optimized for a range of live production scenarios:

### Stadium and Arena Events

Deploy a supercell RAN that covers the entire venue, from playing field to concourses, enabling fully mobile cameras with consistent video quality across all angles.

### Outdoor and Long-Range Sports

Combine mesh nodes and edge compute to cover long distances without laying fiber. Ideal for sports like cross-country skiing, golf, and motorsport.

### Mobile ENG and News Gathering

Deploy portable private 5G networks for breaking news and live events. Vehicle-mounted radios and compact Onyx Edges create pop-up 5G bubbles for wireless production anywhere.

### Hybrid Broadcast Environments

Integrate GXC's 5G infrastructure with existing SDI or IP-based workflows. Our modular architecture supports phased adoption without requiring full system replacement.

---

## Conclusion

GXC's private 5G solution redefines what's possible in live broadcasting. By delivering high uplink bandwidth, ultra-low latency, and seamless camera mobility, our edge-native, Open RAN-based platform eliminates the limitations of legacy broadcast infrastructure. Whether it's covering a soccer match in a stadium, streaming a ski race across a mountain, or deploying a mobile ENG crew in a dense urban environment, GXC provides a future-proof foundation for real-time media production.

To learn how GXC can power your next event or production workflow, visit [www.gxc.io](http://www.gxc.io).