
Advancing Native Multimedia Emergency Services Lessons Learned from Live Demonstrations

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Section 1: Live demo lessons learned

- Three-way native conversational video
- Citizen, telecommunicator, and responder in one standards-based session
- What we proved in the NGEN Innovation Lab

Section 2: Interworking requirements

- Minimum requirements between GSMA IR.94 smartphones and NG911 CHS
- SIP, SDP, codecs, RTCP, location, emergency service routing
- What has to work for interoperability at scale

Section 3: Path forward

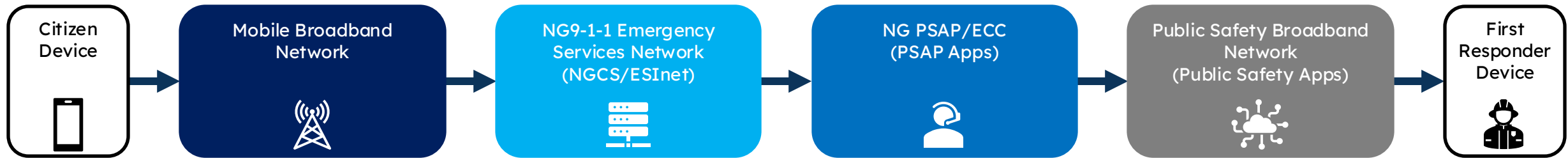
- Over-the-Top (OTT) and native are complementary, but not equivalent
- Why native multimedia matters for emergency communications
- Call to action for device vendors, carriers, NG911 providers, and PSAP leadership

- NG911 is evolving beyond voice toward video, real-time text, and data.
- NENA i3 and ATIS IMS emergency procedures already provide the framework for standards-based emergency multimedia.
- FCC CSRIC X now elevates multimedia and accessibility as a national policy topic, including **Expanding NG911 Multimedia Availability and Increasing 911 Accessibility**.
- Native multimedia emergency services are increasingly being treated as part of the regulated emergency session, where routing, QoS, policy control, security, and accessibility can be enforced end to end.
- NG.114 extends the interoperable path into 5G, adding voice, video, messaging, QoS flow considerations, and emergency service support over 5GS.
- IMS Data Channel points to the next layer of standards-based innovation, enabling richer in-session capabilities over IMS.

This is not just a technology evolution. It is now a standards, policy, and implementation priority.

NG911 end-state vision at a glance

- Standards-based multimedia emergency sessions should work across devices, mobile networks, NGCS/ESInet, ECC / NG PSAP, and responder workflows.
- The authoritative emergency path remains the regulated signaling, routing, and policy-controlled environment.
- The goal is a national, interoperable architecture for voice, video, real-time text, location, and future data capabilities.



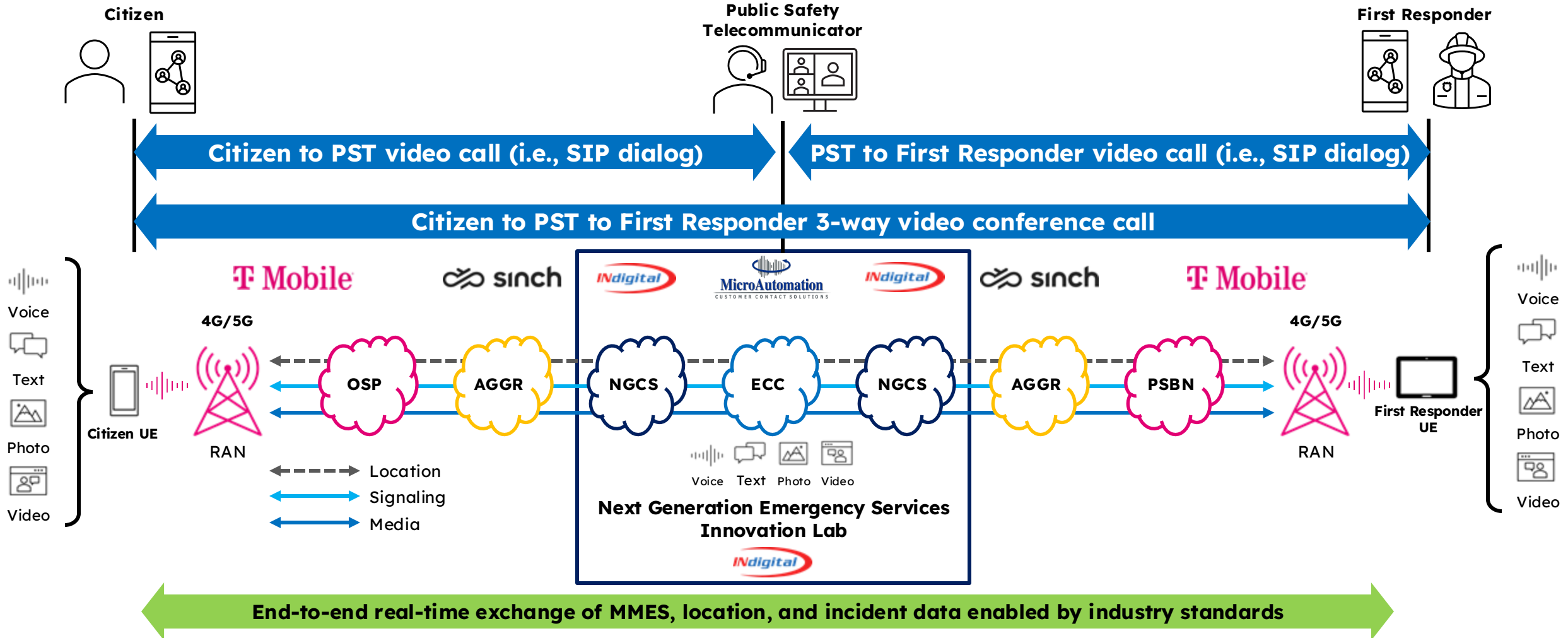
Trusted path: Caller → Carrier → NGCS/ESInet → NG PSAP/ECC → PSBN → Responder

The end-state is secure, interoperable multimedia from the caller, through NGCS/ESInet, to the ECC / NG PSAP and responder.

INdigital and T-Mobile NGES Innovation Lab, Live Demo Architecture



End-to-end three-way native video conference call



AGGR: Emergency Services Aggregator
 OSP: Originating Service Provider (Carrier)
 PSBN: Public Safety Broadband Network

Simplified diagram for illustrative purposes

What the NGES Innovation Lab live demo proved



- End-to-end native multimedia emergency sessions can work today across commercial mobile networks and NG911 systems.
- We demonstrated a three-way native conversational video session connecting:
 - a citizen smartphone
 - a 9-1-1 telecommunicator
 - a first responder endpoint
- The demonstration used standards-based signaling and media, not a proprietary application overlay.
- The demo highlighted practical value in:
 - situational awareness
 - responder coordination
 - Accessibility
 - a future path toward Total Conversation

This is not just video calling. It is emergency-grade session establishment, routing, policy, and media handling across the originating network, NGCS/ESInet, the call handling system (CHS), and the ECC / NG PSAP environment.

Signaling and session control

- CHS must correctly process **SIP emergency INVITE** requests and related session control procedures.
- Emergency service handling depends on **3GPP IMS emergency procedures** and their adaptation for North American NG911 by **ATIS 0700015**.
- **NENA i3** requires SIP-based calls into the ESInet, with routing and policy handled by NGCS elements.
- Support emergency service URNs, SIP headers, routing, and **location conveyance**.

Media and negotiation

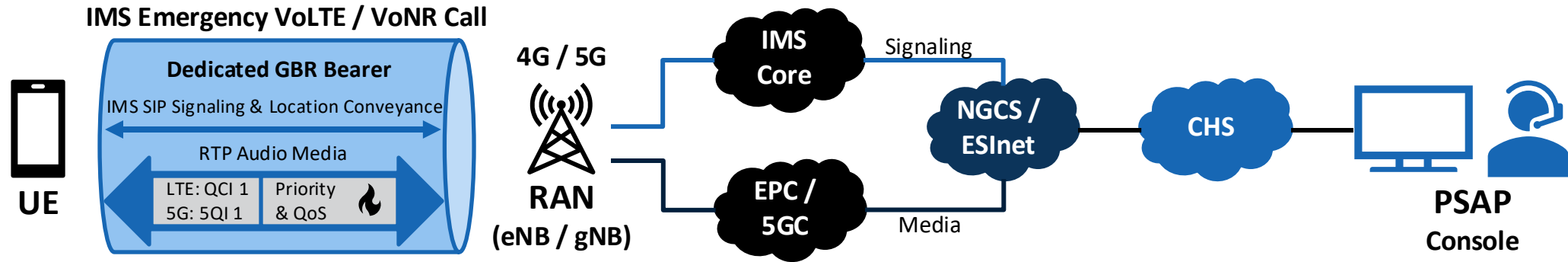
- **IR.94** defines interoperable IMS conversational video over LTE.
- Media handling must support **SDP negotiation**, audio, video, and **RTP/RTCP** interoperability.
- **H.264** video support, codec profile negotiation, RTCP feedback, and bandwidth negotiation are part of predictable interoperability.
- Support session modification, callback, and location conveyance in the emergency context.

Interoperability is not just app integration. It requires standards-based signaling, media, routing, location, and policy end-to-end.

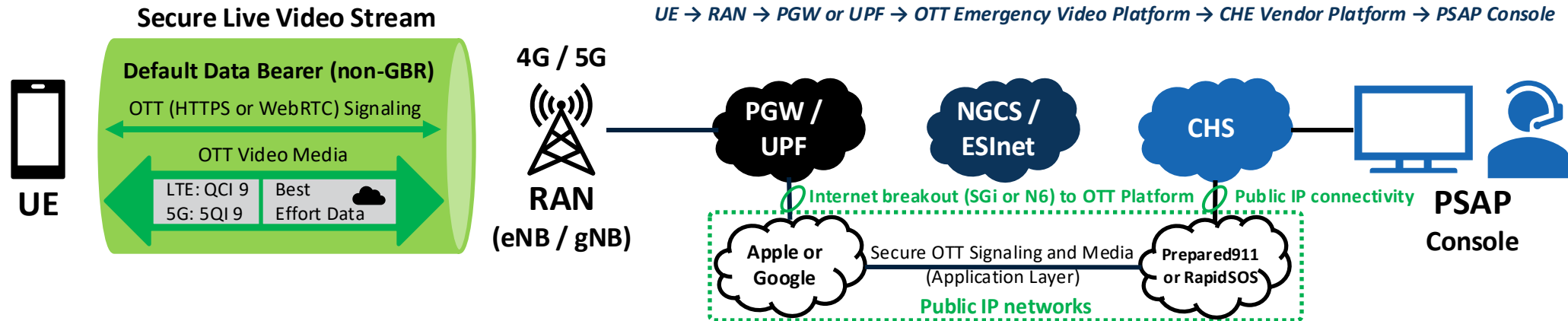
Native IMS Emergency Calling vs. OTT Emergency Live Video

Dedicated Emergency Bearers vs. Best-Effort OTT Data Paths

IMS Emergency Voice Call - Initial Session Establishment



OTT Emergency Live Video - Application-Layer Media Anchored to an IMS Emergency Voice Call

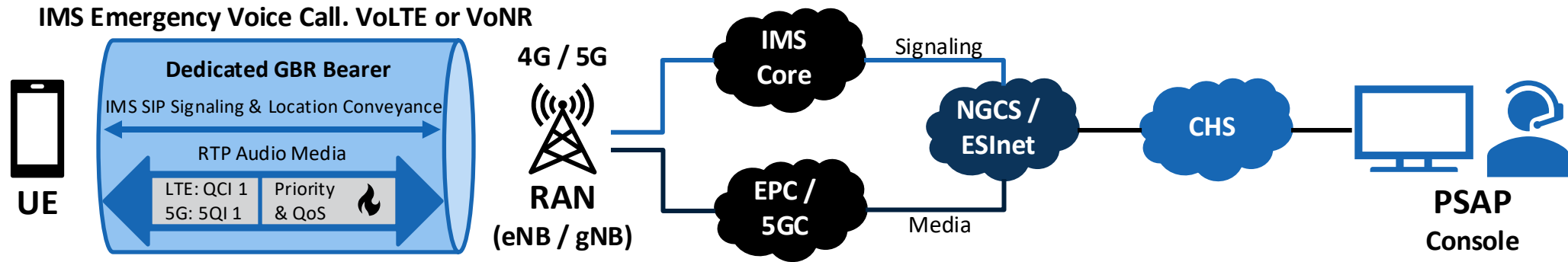


Emergency Live Video implementations vary by device OS, carrier, and PSAP vendor. Current OTT video flows use cloud-based application delivery. OTT video delivers near-term value but remains outside the regulated emergency media plane by design.

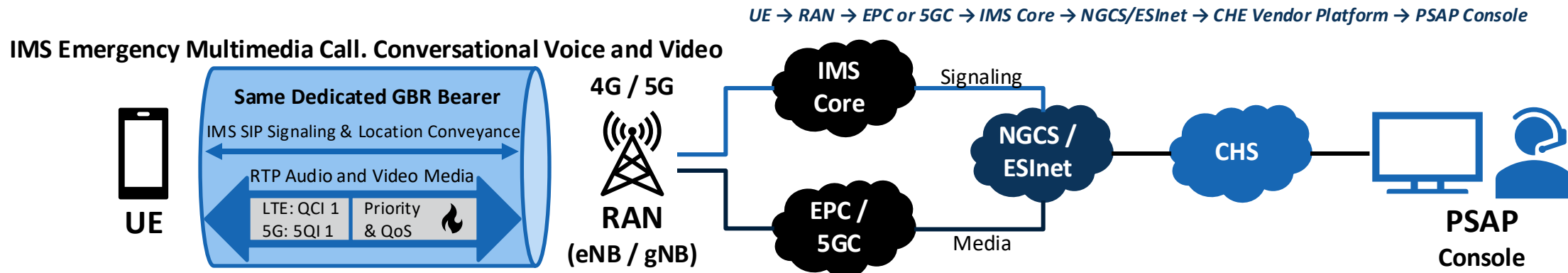
Native IMS Emergency Calling. Voice to Video Media Upgrade

Standards-Based Conversational Video Using a Single Emergency Session Built on Commonly Accepted Industry Standards

IMS Emergency Voice Only Call - Initial Session Establishment



IMS Emergency Conversational Video Added via Re-INVITE (Video is added as a media capability, not a separate application session)



Result. Voice and video remain a single emergency interaction, governed by the same routing, policy, and accountability framework

IMS conversational video extends an active emergency voice call using standardized SIP and SDP within a single emergency session, preserving priority, routing, and end-to-end control based on commonly accepted emergency communications standards.

- Native conversational video is added to the existing emergency session, not spun up as a separate application session.
- The same regulated emergency path is preserved across signaling, routing, policy, and accountability.
- Conversational video can be added through standards-based SIP and SDP session modification.
- This approach preserves the emergency context and supports a more seamless public safety telecommunicator workflow.

A native upgrade from voice to video is fundamentally different from sending a caller to an OTT link.

OTT applications

- Can add operational value quickly
- Useful for situational awareness and supplemental communications
- Can help public safety experiment with new workflows
- Often easier to deploy in the near term

Native multimedia emergency sessions

- Operate within the regulated emergency communications framework
- Support lawful routing, priority handling, QoS, policy control, and accountability
- Align with NENA i3, ATIS 0700015, GSMA IR.94, and GSMA NG.114 standards profiles
- Provide the long-term, interoperable emergency communications path into the NGCS/ESInet, the CHS, and the ECC / NG PSAP environment

The goal is not to reject OTT innovation. The goal is to ensure that emergency multimedia converges toward a secure, reliable, standards-based emergency communications infrastructure.

- Texas A&M CACN testing showed that congestion conditions can expose a major difference between best-effort OTT communications and prioritized native communications.
- Under stressed network conditions, OTT communications may degrade sharply or fail to establish, while prioritized native communications retain a more dependable path.
- The lesson for public safety is not that OTT has no role. The lesson is that emergency communications require a dependable path when networks are stressed.

Emergency communications must be designed for the worst day, not the best day.

Cellular Audio Testing During Network Congestion

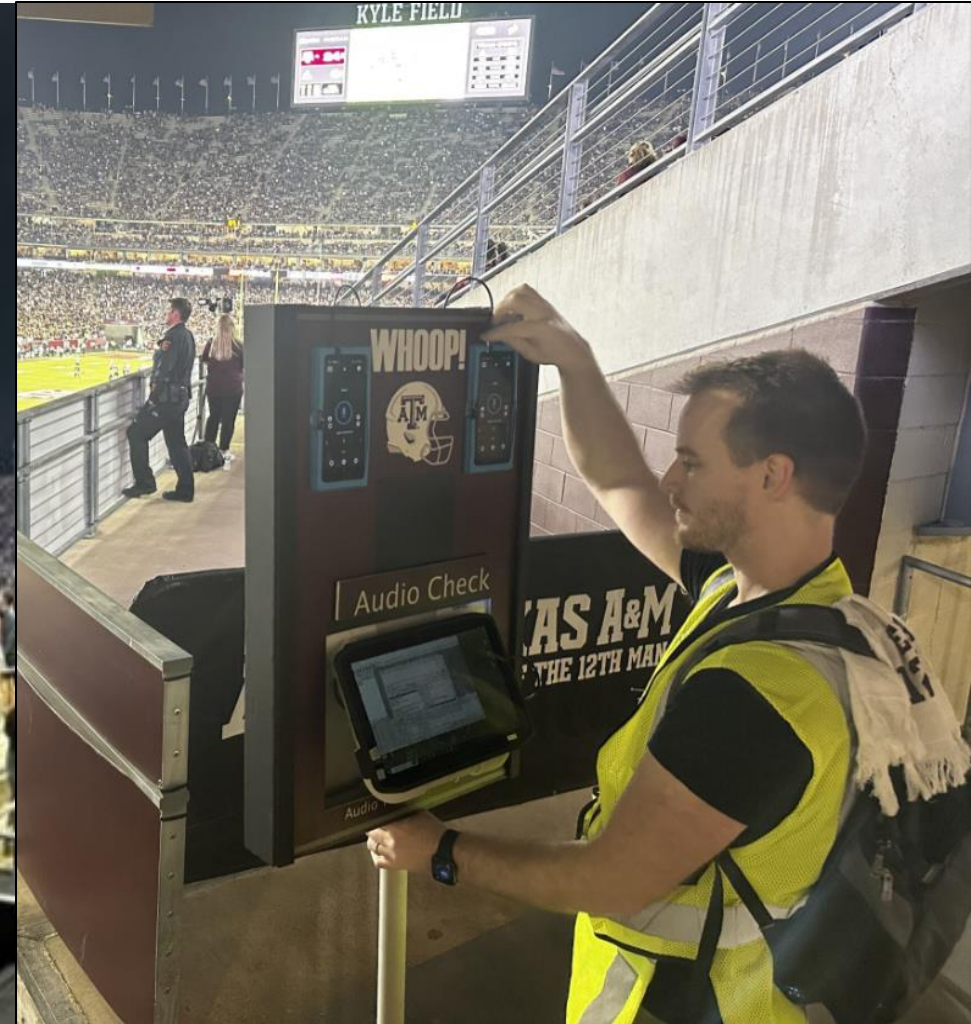
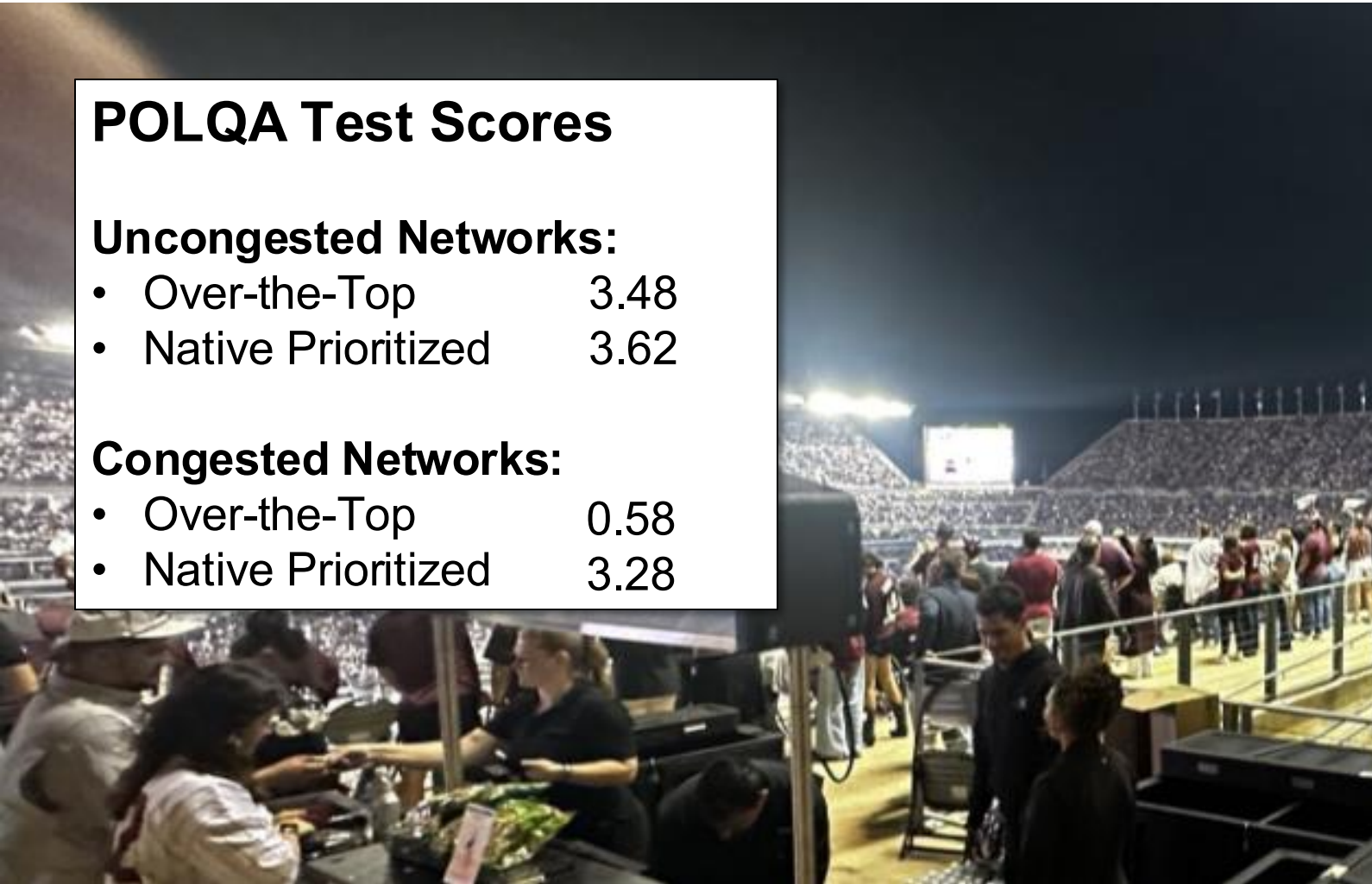
POLQA Test Scores

Uncongested Networks:

- Over-the-Top 3.48
- Native Prioritized 3.62

Congested Networks:

- Over-the-Top 0.58
- Native Prioritized 3.28



What must happen next



Device ecosystem

- Encourage device vendors to support standards-based native multimedia emergency sessions consistently.
- Reduce fragmentation in video and emergency service support.

Networks, NG911 providers, and CHS vendors

- Continue implementing and validating IMS emergency session procedures, routing, location, QoS, and media interworking.
- Prepare for NG.114-based 5G voice, video, and messaging interoperability, and track IMS Data Channel for richer in-session capabilities.

Policy and standards

- Align industry efforts with the CSRIC X focus on expanding NG911 multimedia availability and increasing 911 accessibility.
- Federal policy and industry leadership should actively encourage device manufacturers to support standards-based emergency multimedia frameworks, whether through NG.114, IMS Data Channel, or another standards-based implementation appropriate for North America.

ECC / NG PSAP leadership

- Begin planning now for multimedia workflows, accessibility, procurement, training, and operational policy.
- Treat multimedia as an operational capability, not just a future feature.

The next phase is not more theory. It is coordinated implementation across devices, networks, NG911 systems, and operations.

- Native multimedia emergency services are technically achievable today.
- Live demonstrations have shown that end-to-end conversational video can work across the ecosystem.
- Interworking depends on standards-based signaling, media, location, routing, and policy, not just application integration.
- OTT applications can complement operations, but they do not replace the secure and authoritative emergency communications layer.
- The industry should accelerate alignment across devices, carriers, NGCS/ESInet platforms, call handling systems (CHS), and ECC / NG PSAP operations.

Next, we will show a live demonstration of a three-way native multimedia emergency session and then discuss what it will take to scale these capabilities across the industry.

The logo features the word "INdigital" in a bold, italicized sans-serif font. The "IN" is red, and "digital" is blue. The text is centered within a red, horizontal, teardrop-shaped swoosh that tapers at both ends. The background is a dark blue gradient with a faint, repeating pattern of binary code (0s and 1s) in a lighter blue color.

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