

# Latest Trends in Audio and Video Communications

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**Abstract:** *The field of audio and video communications is undergoing rapid transformation with advancements in compression techniques, AI-powered enhancements, 5G/6G technologies, and immersive media formats. This paper explores the latest trends that are redefining the way humans communicate and experience multimedia content. From ultra-low latency streaming to spatial audio and holographic calls, the evolution is driven by both technological progress and increasing user demand for quality, efficiency, and interactivity.*

**Keywords:** Audio Communication, Video Compression, Spatial Audio, 5G, AI, Immersive Media, Video Conferencing, Holography

## I. INTRODUCTION

Audio-video (AV) communication is foundational to modern digital interaction—used in video conferencing, streaming, virtual reality, and remote education. While past decades focused on bandwidth efficiency and codec development, the current trends emphasize **real-time performance**, **AI-based enhancement**, and **user immersion**. This paper discusses state-of-the-art developments shaping AV communications in 2024–2025.

## II. ADVANCEMENTS IN AUDIO COMMUNICATIONS

### 2.1 Spatial Audio and 3D Sound

Spatial audio creates a 360-degree auditory experience using binaural or object-based rendering. Apple, Dolby Atmos, and Fraunhofer Institute have developed advanced spatial audio codecs for VR, AR, and mobile applications.

### 2.2 AI-based Noise Suppression

Machine learning models, such as NVIDIA RTX Voice and Krisp, perform real-time background noise suppression using deep neural networks (DNNs), greatly enhancing call clarity.

### 2.3 Low-Latency Audio Streaming

Technologies like WebRTC, Opus codec, and edge computing enable sub-20ms latency audio communication essential for remote performance and gaming.

## III. DEVELOPMENTS IN VIDEO COMMUNICATION

### 3.1 Next-Gen Video Codecs (H.266/VVC & AV1)

H.266/VVC (Versatile Video Coding) offers 50% better compression than H.265, while AV1, developed by the Alliance for Open Media, is royalty-free and optimized for internet video distribution.

### 3.2 AI-Powered Video Upscaling & Compression

AI-based super-resolution enhances low-bitrate video streams. Platforms like YouTube and Zoom use neural networks for real-time quality enhancement under bandwidth constraints.



### 3.3 Immersive Video and Holography

Volumetric video and light field displays are bringing 3D holography into real-time communication. Meta and Microsoft Mesh are pioneering holographic telepresence.

## IV. NETWORK TECHNOLOGIES ENABLING MODERN AV COMMUNICATION

### 4.1 5G and Emerging 6G Networks

5G's low-latency (1–5 ms) and high throughput (~10 Gbps) allow seamless 4K/8K streaming and remote AV interaction. Research into 6G envisions holographic and tactile communications.

### 4.2 Edge Computing and CDN Integration

Combining Content Delivery Networks (CDNs) with edge computing minimizes latency and jitter. Services like AWS Wavelength and Azure Edge Zones are examples.

## V. APPLICATIONS AND USE CASES

- **Telemedicine:** Real-time diagnostics using high-definition AV feeds.
- **Remote Education:** Interactive learning with spatial audio and AR overlays.
- **Virtual Events:** Immersive concerts, webinars, and conferences in the metaverse.
- **Gaming & Esports:** Ultra-low latency AV for live game streaming and commentary.

## VI. CHALLENGES AND FUTURE OUTLOOK

- **Bandwidth and Energy Constraints:** AV communication demands high data rates and low power solutions.
- **Privacy and Deepfake Threats:** Synthetic media powered by AI may threaten authenticity.
- **Standardization Needs:** Fragmented codec support hinders cross-platform compatibility.

Future trends point toward **context-aware AV systems**, **neural codecs**, and **brain-computer interfaces** for direct audiovisual transmission.

## VII. CONCLUSION

The convergence of AI, advanced codecs, and high-speed networks is revolutionizing audio-video communication. With the rise of spatial audio, holography, and immersive media, the line between digital and physical presence is blurring, promising richer, more lifelike experiences in the near future.

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