AI-BASED
VIDEO CODEC

What's up with uplink? Addressing video challenges and opportunities in mobile networks

CONTENTS

VIDEO WILL ACCOUNT FOR 80% OF CELLULAR VOLUME BY 2028 .*
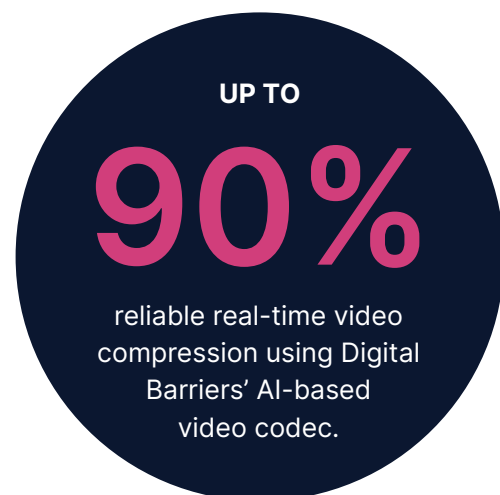
*June 2023 Ericsson Mobility Report.

EXECUTIVE SUMMARY

Video traffic over mobile networks has grown rapidly in the past decade, driven by factors such as increased internet access, faster networks, more smartphones and popular video streaming platforms.

The industry has focused innovation on developing new technologies and solutions for downlink video traffic. However, for mobile operators, uplink video traffic over mobile networks remains a challenge from an investment, operations and revenue perspective.

This whitepaper addresses these challenges and proposes new business and network optimisation using Digital Barriers' AI-based video codec. Designed for mobile environments, our solution provides reliable real-time video over mobile networks while compressing video by up to 90% and delivering new business outcomes.

UP TO

90%

reliable real-time video compression using Digital Barriers' AI-based video codec.

INDUSTRY OUTLOOK

The June 2023 Ericsson Mobility Report estimated that video traffic accounted for 71% of all mobile data traffic and predicted this share would grow to 80% by 2028 — with 40% of the traffic for uplink and 40% for downlink. The uplink traffic growth over mobile is predominantly attributed to growth in IoT video as a sensor, social media proliferation, advancements in AR/ VR and XR, gaming and other areas.

With the adoption of 5G and edge computing technologies, new and innovative 'video as a sensor'-based use cases are enabling new outcomes such as remote monitoring, training, surveillance, security and real-time data analysis to deliver insights and actions.

According to MarketsandMarkets research, the global video as a sensor market is expected to grow from $2.1 billion in 2022 to $10.9 billion by 2027, at a CAGR of 40.9%. In addition, the global market for private networks is expected to grow from $33.4 billion in 2022 to $68.1 billion by 2027, with edge computing market growth at a CAGR of 27.6% from 2022 to 2027.
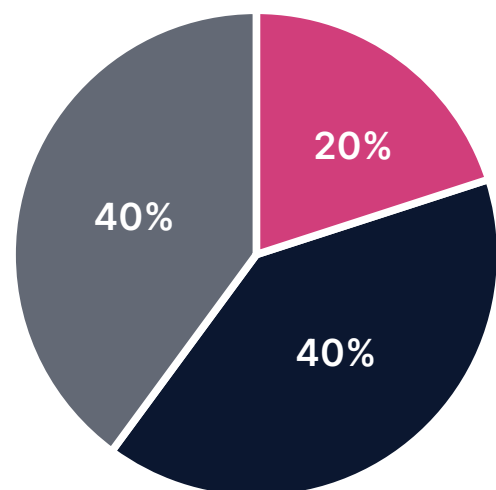
In summary, uplink video traffic over 5G macro, mobile private networks, edge computing and network slicing will drive most of mobile video growth. This will challenge mobile network operators to address uplink video traffic across the network.

2023 video: 70% by volume
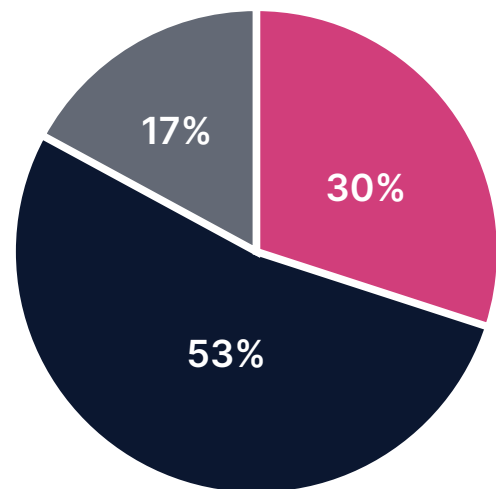
- Non video by volume
- Downlink video by volume
- Uplink video by volume

2028 video: 80% by volume

- Non video by volume
- Downlink video by volume
- Uplink video by volume

HOW DOES THIS IMPACT MOBILE NETWORKS?

The rapid growth of video traffic, particularly uplink video traffic, is creating new challenges for mobile network operators. Below are a few areas of consideration for these operators.

Increasing Capital Investments to meet Video Growth

Mobile network operators will need to invest more money to build new networks to keep up with the growing video demand. There have been many technological advances to improve downlink video traffic, such as ABR (adaptive bitrate), CDN (content delivery network) and standards-based video codecs. However, there's been less focus on uplink video traffic. As uplink video traffic grows, it's important to look at new technology that can help handle and optimise networks.

Issues with asymmetric 5G environments

5G networks are asymmetric by nature. For example, they tend to prioritise downlink traffic such as streaming video and downloading files over uplink traffic such as uploading photos and videos. With the proliferation of new use cases with MPNs (mobile private networks), MEC (multi-access edge computing) and 5G macro networks (IoT 'video as a sensor', automotive, drones, broadcast, etc.), the uplink video demand is growing. The bandwidth allocation will impact the balance of RAN (radio access network) planning within 5G networks, leading to more congestion.

Need for bandwidth reliability and low latency

More enterprises and consumers are using real-time 'video as a sensor' to collect, process and analyse data, increasing the pressure on mobile networks. These must be able to provide optimised bandwidth and reliable, low-latency networks to deliver new business outcomes, such as real-time intrusion detection, predictive maintenance, theft prevention, citizen safety and more. So, mobile networks need to bring forward new technological advancements like uplink video compression and analytics solutions in conjunction with 5G, edge, cloud and AI/ML analytics.

Drive monetisation of video traffic

To date, telcos have faced challenges in montetising video traffic over mobile networks. This is mainly because mobile video is bandwidth and latency-sensitive and needs network investments to support the growing demand for mobile video traffic. Today's monetisation model is commercially driven by partnering with video content creators to provide sponsored content, pay-per-view, advertising, subscription plans and more.

With the proliferation of 5G, private networks and edge computing, there's a significant opportunity to monetise video traffic within enterprise markets.

REINVENTING UPLINK VIDEO TRAFFIC WITH DIGITAL BARRIERS' AI-BASED VIDEO CODEC

Traditional standards-based video codecs such as H.264 (AVC: advanced video coding) and H.265 (HEVC: high-efficiency video coding) aren't designed for mobile settings. As such, they have trouble delivering uplink real-time video over mobile networks with bandwidth, reliability and latency limitations, and they can't adapt to changing mobile network environments.

Compresses data to a low bandwidth to avoid latency issues
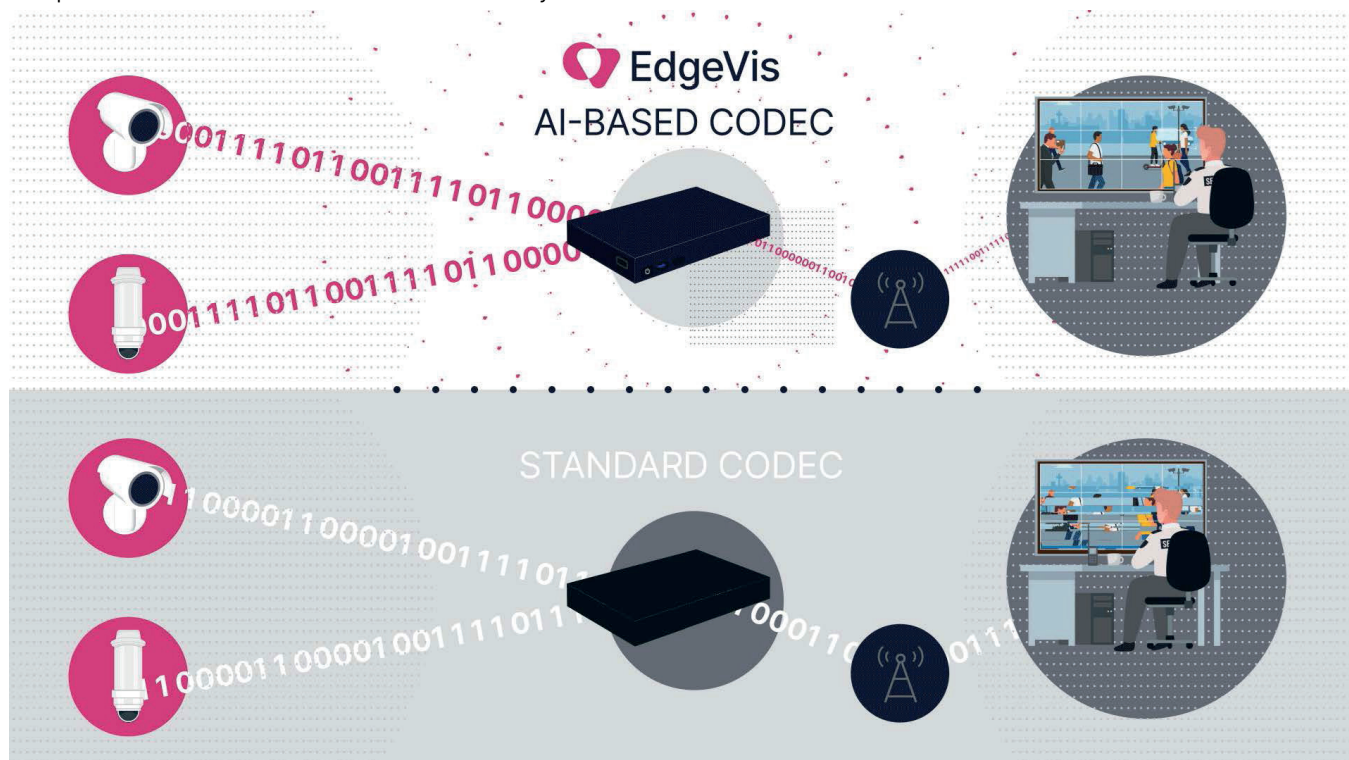
Not designed to operate within the constraints of current cellular networks

Digital Barriers' AI-based video codec is designed specifically for mobile environments and delivers reliable real-time video over a mobile network without sacrificing quality. It offers:

- **AI-based compression efficiency** — achieves better compression efficiency than traditional codecs, leading to significant bandwidth savings.

- **Reduced latency** — improves the experience of real-time video streaming and delivering optimised outcomes.

- **Video analytics** — improves robustness to errors such as packet loss, jitters and network issues to maintain video quality in mobile networks.

- **Enhanced reliability** — enables new business outcomes and user experiences by delivering video over mobile networks without impacting quality to drive AI/ML video-based analytics.

Based on proven field testing, organisations can see up to 90% in bandwidth savings depending on the video environment while operating in a constrained and congested mobile environment.

Digital Barriers' AI-based video codec is network-aware and can self-optimise the compression level based on dynamic frame-by-frame network conditions. Since users can specify a minimum and maximum bandwidth, reliable and usable video is delivered wirelessly in real time with minimal latency — even at bandwidths as low as 9 kbps.

HOW DOES DIGITAL BARRIERS' AI-BASED VIDEO CODEC WORK?

The Digital Barriers AI-based video codec works by learning the statistical properties of video data and using this knowledge to compress and decompress video more efficiently. It uses proprietary technologies to adapt video content per frame based on network conditions and provides three main functions to optimise and compress uplink real-time video…

1. **Deep neural networks-based compression algorithm** — based on a patented and proven-at-scale compression algorithm, the codec is content aware, optimally compressing video/image frames without sacrificing quality.

2. **Dynamic and intelligent network awareness** — the solution is network-aware (bandwidth, latency, packet loss, etc.) to dynamically manage compression levels, enabling the reliable, robust and resilient delivery of real-time video over mobile networks.

3. **Intelligent scheduling** — our codec has the ability to multiplex multiple uplink video sources and prioritise the delivery of video traffic, along with metadata, analytics and local cache video replay.

> **Digital Barriers' AI-based codec can revolutionise the way we deliver uplink video over mobile networks by offering improved compression efficiency, reduced latency and improved analytics.**

Deep neural networks-based compression algorithm

Dynamic and intelligent network awareness

Intelligent scheduling

PARTNERING WITH TELCOS: OPPORTUNITIES AND GROWTH

Together with telco mobile networks and Digital Barriers' AI-based video codec and analytics framework, enterprises and consumers can transform the way they deliver reliable uplink real-time video over mobile networks without sacrificing quality — all at disruptive cost economics to enable new experiences.

Revenue growth

- Delivering video-optimised mobile data plans can enable enterprises and consumers to harness reliable video over constrained networks.

- Partnering with an ecosystem including AI analytics partners will deliver new business outcomes and solutions for joint customers.

- Leveraging 5G MPN and MEC solutions can deliver new capabilities with 'video as a sensor' across verticals such as security/surveillance, smart cities, law enforcement, retail, healthcare and more.

- Focusing on new customer acquisition and existing customer retention for users with real-time video requirements presents further growth opportunities.

Network efficiencies

- Reduction of video data traffic (per GB) using Digital Barriers technologies can translate into lower capital costs for spectrum, radios, core networks and infrastructure.

- Optimisation of infrastructure and network costs will result in operational savings based on the reduction of video data traffic.

- Introduction of Digital Barriers technologies can minimise capital investment avoidance, reduce price barriers to entry and accelerate time to value for MPN and MEC solutions.

New market creation

- Harnessing telco networks and Digital Barriers technology can provide reliable, resilient and robust video delivery — resulting in new product creation.

- Collaborating with telcos on new technologies such as ORAN, RIC, network slicing and REDCap will deliver new experiences to ensure quality of experience and quality of service.

CONCLUSION

In conclusion, real-time video over mobile networks is an essential technology for communication, collaboration, entertainment and new outcomes.

As the demand for real-time video over mobile networks continues to grow, it's crucial to develop and deploy new technologies and solutions that can improve the reliability and quality of experience for users while managing the impacts on the telco's network.

Digital Barriers' AI-based codec within telco networks can provide reliable real-time video delivery while compressing files more efficiently — without sacrificing quality. What's more, it can enable new network architectures and protocols that can support the optimised bandwidth and low-latency requirements of real-time video.

Digital Barriers