A NEW ERA OF FRONTLINE SURVEILLANCE: tackling intelligence-gathering challenges head on

What are the limitations of existing video technology solutions, and how can reliable real-time video over cellular break down these barriers to revolutionise intelligence gathering on the frontline?

Digital Barriers Whitepaper | JULY 2024

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INTRODUCTION

Frontline police and law enforcement officers are constantly on the go. As such, real-time situational awareness and mobility are paramount to effective decision-making, rapid emergency response and criminal investigation.

So, it's no surprise that video technology is pivotal in ensuring public safety and operational efficiency across various applications. However, supporting frontline officers with video insights is becoming increasingly complicated...

With urbanisation, rising crime levels and growing network congestion, maintaining consistent visibility of people, buildings and assets is more challenging than ever. Plus, with the high cost of upgrading and preserving surveillance infrastructure, many existing CCTV cameras and other video technology solutions are left misconfigured or disconnected.

Modern cities need modern surveillance systems to enable rapid deployment and emergency response, as well as address issues associated with gathering reliable, accurate and usable footage. Fortunately, thanks to advancements in artificial intelligence (AI) and video software, there's a solution: reliable real-time video streaming that can deliver analytics and convert insights into actions.

Keep reading to discover how real-time video over cellular or mobile networks is overcoming obstacles to situational awareness within law enforcement and acting as a new frontier for effective policing...

CHAPTER ONE

LIMITATIONS OF EXISTING VIDEO SURVEILLANCE SOLUTIONS

Video surveillance is a staple of frontline law enforcement. You'll find cameras everywhere, from hotels and shopping centres to train stations and schools — helping police and security teams monitor events as they happen to ensure fast emergency response and improve officer safety.

However, despite the surging demand for advanced video streaming and analytics driving investment in video surveillance for law enforcement applications, several practical obstacles prevent police forces from adopting new urban video surveillance systems.

Wired vs wireless video systems

Most security teams will be familiar with conventional wired surveillance systems that connect to the internet and surveillance networks via cables. These solutions are often used in areas where network connectivity is poor, helping to support reliable visibility.

However, in recent years, advancements in technology and 5G networking have prompted the increasing adoption of wireless video security systems to address various issues associated with wired infrastructure.

Wired video systems	Wireless video systems
Frequent hardware upgrades and maintenance	Minimal cabling for low-maintenance operation
Expensive, disruptive and lengthy installation processes	Simple, cost-effective installation and maintenance
Limited scalability due to necessary wired infrastructure	Lightweight, flexible systems for straightforward expansion
Less susceptible to network problems, ensuring reliable video streaming	Depend on reliable network connections, meaning deployment locations are limited

Installing a wired CCTV system can be costly and intrusive. And though wired camera systems are generally less expensive than their more advanced wireless counterparts, they can quickly become outdated and require costly maintenance that councils and police forces can't afford.

These systems are also more prone to corruption and failure, relying solely on cabling and grid power. And because wired infrastructure is fixed, these systems can't easily scale or adapt to suit changing surveillance needs.

On the other hand, wireless video technology supports more flexible installations — operating over Wi-Fi or cellular to provide enhanced portability and cost efficiency.

The total cost of ownership for a mobile CCTV system is 20–30% lower than for a wired CCTV system.

ABI Research, Video Surveillance Systems: Market Shares, Strategies, and Forecasts, 2021 to 2028

This technology can also support on-the-go surveillance from vehicles, wearables and drones, improving situational awareness by delivering real-time video over mobile networks to boost collaboration between frontline officers and control rooms.

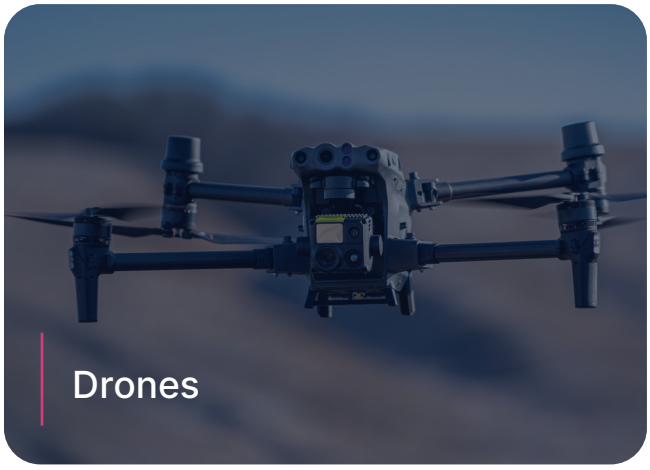
However, wireless video capabilities depend on the strength of network connections, which can prohibit their use in remote, rural or congested locations. Without the necessary bandwidth, footage will likely suffer from high latency, rendering video streams unreliable and unusable during incidents and post-event investigations.

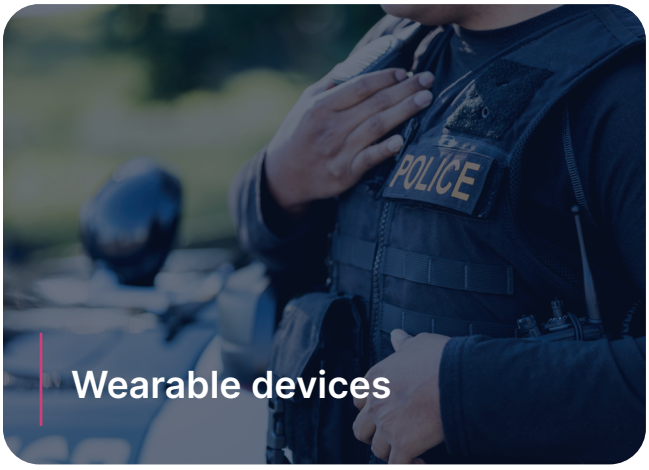
All these obstacles limit the full potential of using real-time video for law enforcement across city and rural environments.

Fortunately, there's a way for police forces to balance the reliability of wired camera infrastructures with the mobility and scalability of wireless video solutions...

CHAPTER TWO

APPLICATIONS FOR VIDEO TECHNOLOGY IN LAW ENFORCEMENT





There are two primary ways that video intelligence is used to support law enforcement: to deter crime and record incidents.

CCTV and other video technology systems have been proven to decrease drug, vehicle and property-related crime in specific contexts, such as car parks and residential areas.

The College of Policing's 'crime reduction toolkit' suggests several reasons why CCTV is a valuable deterrent:

- Increasing offenders' perception of the risk of getting caught.
- Encouraging public use of an area to impact criminals' perception of risk.
- Improving citizen awareness to take additional precautions.
- Supporting the effective deployment of security staff to incidents.
- Reducing the number of criminal opportunities.

However, no technology or tool could claim to mitigate 100% of crime. So, in cases where incidents occur, law enforcers then depend on accurate, high-quality video recordings to identify and track down suspects, with footage acting as invaluable evidence during investigations and prosecutions.

In-vehicle and wearables have a crucial role to play in these situations. Equipped with wearable devices, police officers, private security teams and emergency responders can record events as they happen and collect digital evidence from physical locations.

Combined with AI-powered innovations, such as automatic licence plate recognition, behavioural recognition and motion detection, these solutions can enable law enforcement personnel to unlock new technological capabilities with several valuable benefits.

For example...

- ✔ **Protecting officers from frivolous complaints.**
- ✔ **Lowering costs by supporting 'smart policing'.**
- ✔ **Validating and affirming positive officer behaviour.**
- ✔ **Orchestrating more efficient emergency responses.**
- ✔ **Reducing incidents of human error and false alarms.**

New technologies could contribute to saving an estimated 38 million hours of officer time.

Home Office, The Policing Productivity Review

LAW ENFORCEMENT USE CASES

Public safety

Maintaining consistent visibility across public spaces to respond to incidents efficiently.

Traffic management

Ensuring the free flow of people and goods by keeping track of vehicles and assets.

Police personnel & vehicles

Improving resource allocation and officer safety with reliable situational awareness.

Events & gatherings

Monitoring security weak spots and threats to support streamlined event security.

Thanks to modern technology developments, it's possible for law enforcement sectors to take the capabilities of video intelligence one step further by upgrading from 'live' to 'real-time' video.

The main difference between live and real-time video streaming is that 'live' doesn't necessarily mean 'instant'. With live video, transmission delays are likely, resulting in footage gaps and blind spots in vulnerable locations and preventing emergency services from maintaining advanced situational awareness.

What's more, live streaming can leave room for malicious actors to manipulate footage. Once hackers have access to a video network, they can view, delete or alter live and recorded footage — or even plant 'deep fakes' by replacing individuals' faces or modifying actions to create alibis or implicate innocent parties.

On the other hand, real-time video provides unparalleled visibility, delivering smooth streams with imperceptible delays to allow security teams and law enforcers to monitor and respond to activity as it unfolds.

For frontline officers, real-time situational awareness is paramount to effective decision-making and rapid emergency response — as well as criminal investigation. This technology can support more effective decision-making to help law enforcers streamline their operations, identify suspicious activity and ensure public safety — especially when used with the latest AI-powered analytics software.

BENEFITS OF REAL-TIME VIDEO STREAMING FOR POLICE

- **Cost efficiency.** Offering accurate and instant insights to control rooms to reduce false alarms and improve resource allocation.
- **Remote visibility.** Enabling law enforcement officers to oversee multiple sites at once, ensuring no incidents go unnoticed.
- **Criminal deterrence.** Helping address common issues with existing surveillance to discourage criminals from taking risks.
- **Evidence accuracy.** Providing prosecutors with the high-quality, low-latency footage they need to build airtight criminal cases.
- **Rapid response.** Supporting law enforcers in situations where immediate, informed decisions can mean the difference between de-escalation and escalation

The AI for public security and safety market is estimated to record a CAGR of 29.3% from 2023 to 2030.

ResearchAndMarkets.com, AI for Public Security and Safety Market Forecast to 2030

It's clear that video technology — particularly real-time video and analytics — has an important role to play in modern law enforcement.

So, what's preventing more police forces and agencies from embracing the latest surveillance solutions?

CHAPTER THREE

OPPORTUNITIES FOR VIDEO STREAMING OVER CELLULAR

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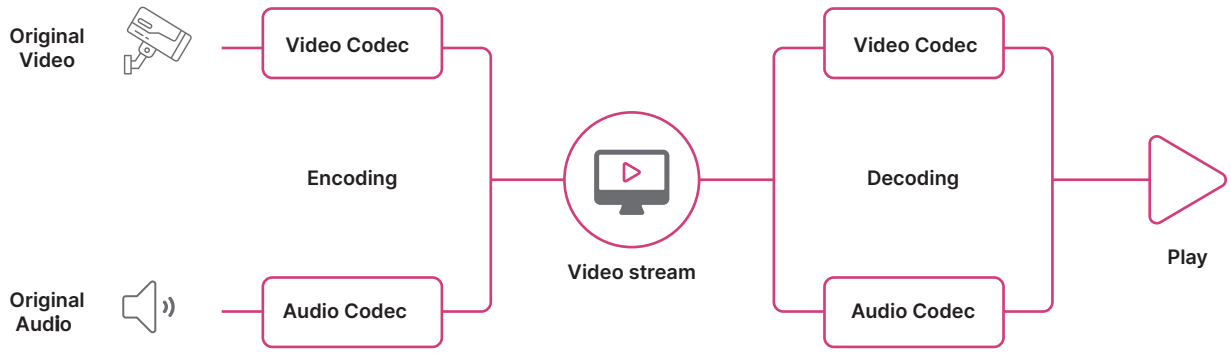


H.264 (AVC) and H.265 (HEVC) video codecs are the most standard for real-time video transmission — but they aren't designed for mobile environments. That means they often struggle to deliver high-quality video content in these contexts.

Cellular networks prioritise downloading data due to typical internet activities (such as browsing websites, streaming video and using social media), which involve downloading information.

CCTV cameras, however, require uploading data — involving sending data from the device to the network. Uploading requires more network resources and is subject to contention, as there's typically more demand for limited uplink capacity.

The result? Unpredictable costs, unreliable upload speeds and limited scalability.

LIMITATIONS OF STANDARDS-BASED VIDEO CODECS

1

Costs

Real-time video over cellular can result in bill-shock or a throttled service due to data threshold constraints and network restrictions.

2

Robustness

Bandwidth, congestion and packet drops can impact the reliability of video over cellular, resulting in difficult capture or missing images and videos.

3

Quality

Video-over-cellular networks can experience delays or latency, making it difficult to use the video feed for real-time applications, such as remote monitoring or live streaming from the field.

Video traffic is estimated to account for 71% of all mobile data traffic, and this share is forecast to increase to 80% in 2028.

Ericsson, June 2023 Mobility Report

Cracking the 'real-time video over cellular' problem with AI

The global market for cellular-based CCTV systems is expected to grow at a CAGR of 18.2% from 2021 to 2028.[2] And with the Home Office committing to provide over £65 million in policing innovation and technology budgets in 2024/25, law enforcers need a solution to reliably stream real-time video from fixed and mobile cameras.

AI-based video codecs are making deep inroads into modern surveillance systems.

Unlike conventional video codecs unsuitable for transmission over cellular, these network-aware codecs can deliver high-quality real-time video over mobile networks by self-optimising compression — delivering accurate, low-latency footage in congested or remote environments.

This hardware integration can support various camera technologies — from drones to traffic light cameras, body-worn devices to fixed or mobile CCTV — allowing secure surveillance redistribution to help officers command mobile teams.

With advanced AI-based video codecs, local authorities and police forces can harness transformational real-time video and analytics to improve resource allocation, reduce false alarms, coordinate emergency responses and more — all whilst lowering operating costs for a better return on infrastructure investments.

Source: Grand View Research, Cellular-Based CCTV Market Size, Share & Trends Analysis Report by Product, by Application, and Segment Forecasts, 2021–2028

Transforming policing with AI-enabled real-time video

Standards-based video codecs:

- ✖ May put public and officer safety at risk due to unreliable video streams.
- ✖ Involve complex and expensive installations for additional infrastructure.
- ✖ Necessitate costly cyber threat management due to unsecured connections.
- ✖ Can harm evidentiary accuracy and usability due to latency and missed frames.

AI-based video codecs:

- ✔ Adapt rapidly to minimise latency and data loss for reliable transmissions.
- ✔ Integrate seamlessly with current camera infrastructure and VMS.
- ✔ Leverage existing private and public network infrastructure.
- ✔ Use edge-based recording and/or analytics for lower storage costs.
- ✔ Significantly reduce video transmission and operating costs with predictability.
- ✔ Offer encryption and don't need public static IPs, mitigating security risks.

AI-powered law enforcement: unlocking the full potential of real-time video

- Revolutionise your tactical capabilities and consult remote experts.
- Make instant decisions and respond faster to emergencies.
- Empower your frontline workers to act on the latest information.
- Access real-time video, audio and GPS coordinates from every nearby officer.
- Prevent delays and disruptions to emergency services.
- ✖ Deter illegal dumping, trespassing, theft and more.
- View video and analytics from fixed, mobile and body-worn cameras in one place.
- Deploy a cost-effective, reliable wireless surveillance system.

New and innovative technology will improve productivity by allowing police officers to spend less time on admin and more time on frontline duties.

Home Office, Improving police productivity: a response to the recommendations of the Policing Productivity Review

Video evidence is useful.
Real-time video from the scene is transformational.

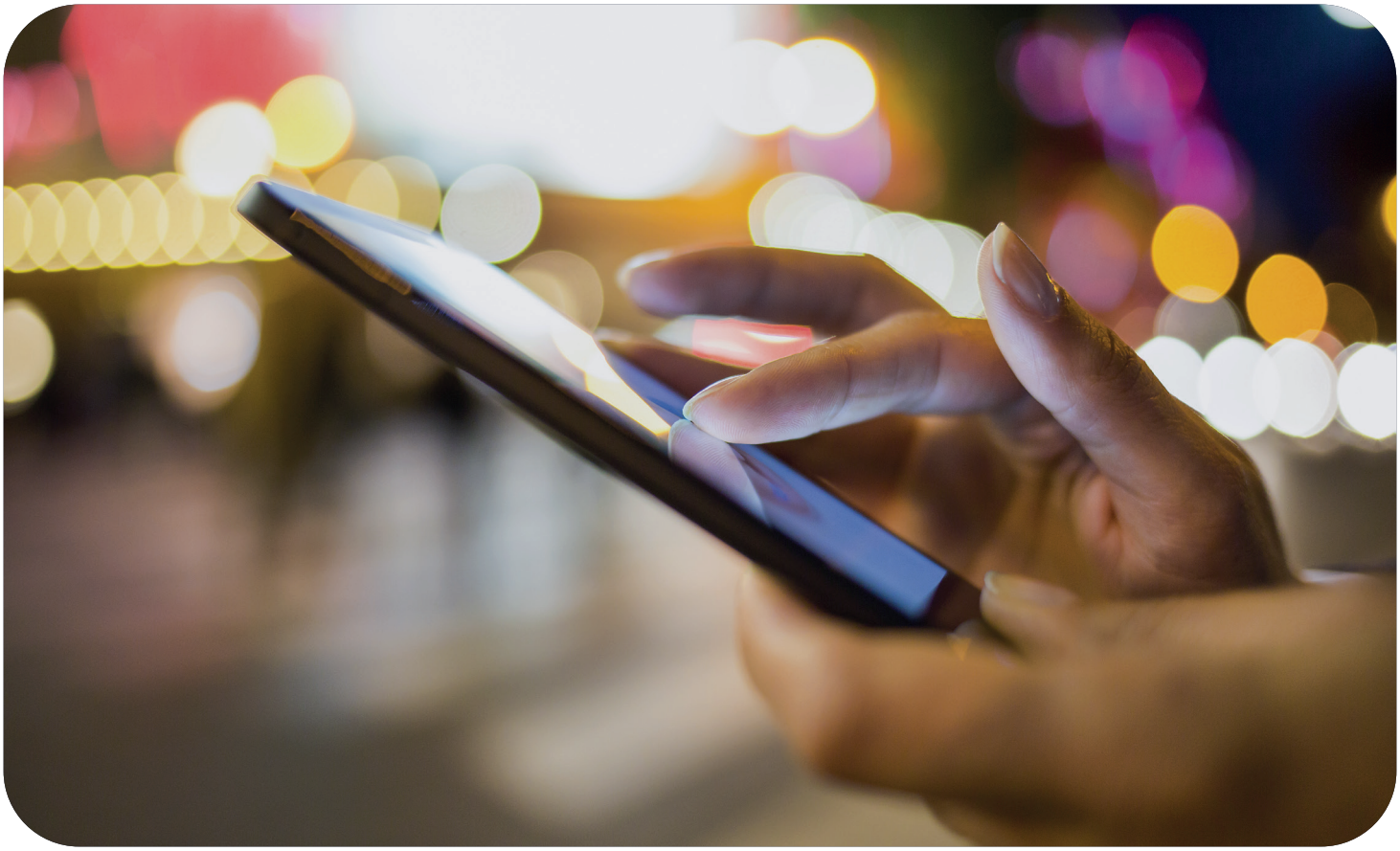
Digital Barriers is a revolutionary video technology provider that empowers individuals, organisations and society with instant insights to make mission-critical decisions. Through our patented AI-based video codec and secure edge analytics platform, we help customers in various markets — including city law enforcement and public safety, industry, transportation, defence, events, retail, healthcare and hospitality — **unlock the full potential of real-time video**.

For 10 years, we've worked with governments, military and specialist law enforcement in the defence sector alongside numerous public and private-sector clients. **Our patented AI-based codec has been proven at scale** — keeping troops safe in Afghanistan and Iraq, deploying across NATO and securing presidential inaugurations, Olympic Games and royal events.

Today, we partner with major global network operators, including Vodafone and AT&T, to deliver reliable real-time video over cellular and other transmission technologies that offer **up to 90% bandwidth cost reduction** without sacrificing quality in low-latency environments — ensuring our customers have a 360-degree view of their operations at all times.

For more information about our AI-based video codec, please contact hello@digitalbarriers.com

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.