

Video analytics:
the next horizon
for IoT connectivity



Discover Edge-to-Cloud Video Compression with up to 90% Bandwidth Optimization, Predictable Costs, and Proven Reliability

This report explores the emerging opportunity for IoT video analytics. Industry analyst firm Transforma Insights examines the changing technology landscape that enables more powerful AI-based video use cases, the key market opportunities that will be enabled, and the architecture necessary to support them. Based on those key developments, Semtech proposes a new solution for edge-to-cloud video compression delivering up to 90% bandwidth optimisation, predictable costs and proven reliability.

Changing technology landscape enables video analytics

The adoption of video analytics is being accelerated by a convergence of technology improvements across software, hardware, and network capabilities. Video analytics is increasingly being deployed not only as an enhancement to traditional sensor-based systems but also as a substitute in many applications. The following section outlines the key developments in the technology landscape, as identified by Transforma Insights, that are enabling this shift.

Advances in Computer Vision and AI Models

One of the most significant drivers of growth in video analytics is the rapid advancement of computer vision libraries and artificial intelligence models. These tools make it easier for organisations of all sizes to deploy video analytics solutions, as they reduce the technical barrier to entry and democratise access.

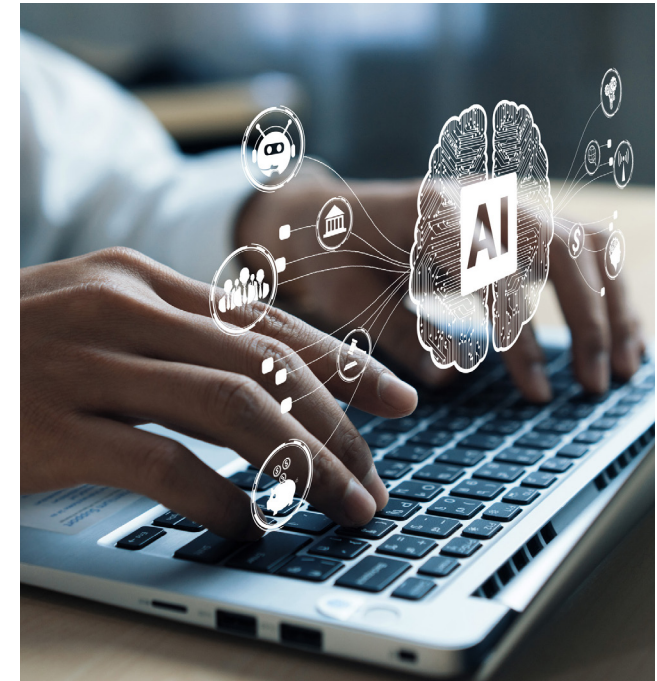
The emergence of advanced libraries such as OpenCV, ImageNet, Microsoft's Common Objects in Context dataset, and YOLO (You Only Look Once) has provided developers with pre-trained models capable of handling complex recognition tasks. These tools allow companies to implement functionality that previously required significant investment in custom development. Moreover, the availability of large-scale image datasets supports more accurate training, leading to higher precision

in tasks such as object recognition, anomaly detection, and behaviour analysis.

At the same time, large language models (LLMs) and vision-language models (VLMs) are expanding the range of applications for video analytics. These models enable faster decision-making, enhance operational efficiency, and provide a greater degree of autonomy in analytics-driven systems. The market is also seeing growth in industry-specific video analytics solutions, although the future of such verticalised tools is uncertain. Increasingly powerful general-purpose AI could reduce the need for bespoke industry functions, though specialised service layers such as onboarding, training, and maintenance are likely to remain valuable.

Natural Language Interfaces for Programming

Another enabler of video analytics adoption is the rise of AI-assisted programming interfaces. Natural language processing now allows developers and end-users to specify requirements in plain text, which can then be translated into video analytics tasks. For example, a system can be instructed with a simple command such as "notify me if anyone is not wearing protective equipment." This lowers the skill requirements for implementing and managing analytics solutions, broadening the addressable market and accelerating deployment.



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Network Capabilities and Optimisation

The availability of advanced connectivity, particularly with the rollout of 5G, is a further catalyst for video analytics adoption. The ability to transmit video streams reliably and with low latency is critical in scenarios where real-time analysis is required, such as in emergency response or industrial automation.

5G networks provide improvements in uplink and downlink bandwidth, lower latency, and features such as Quality-on-Demand and network slicing. These capabilities allow organisations to prioritise critical applications and ensure consistent quality of service even in bandwidth-constrained environments. For public safety and emergency services, the ability to guarantee high-quality video transmission on demand represents a significant advantage.

Alongside the benefits of 5G, there are emerging approaches to optimise connectivity in situations where networks are constrained. This includes adaptive streaming techniques, such as reducing frame rates or resolution to match network capacity while maintaining functional effectiveness. These optimisations make video analytics viable even in less predictable or lower-bandwidth environments.

Hardware Evolution and Economics

Hardware advancements have played a central role in making video analytics more widely available. Cameras and gateways are becoming cheaper and more powerful, extending the range of use cases where video-based solutions can be deployed. While camera prices may not fall much further, the capabilities of off-the-shelf devices have improved substantially, lowering the total cost of ownership.

More AI-capable hardware is reaching the market, such as image signal processors with embedded machine learning capabilities. Cameras are evolving into intelligent devices that act not just as data capture tools but as active AI agents. Enhanced low-light functionality has also made cameras more effective in challenging conditions, expanding their utility across sectors such as logistics, security, and manufacturing.

In the long term, there is potential for more processing power to be embedded directly into cameras themselves. However, the economics of deploying dedicated edge computing gateways that handle analytics for multiple cameras may remain more efficient in many scenarios. Containerisation further supports flexibility, allowing analytics workloads to be deployed on the most appropriate hardware, whether on the device, at the edge, or in the cloud.



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AI Orchestration and Integration

Beyond individual components, a growing focus is on orchestration platforms that manage the integration of video analytics, AI models, and business logic. These platforms are emerging as a crucial layer in enabling effective deployment and scaling of solutions.

AI orchestration includes the management of models, the integration of analytics outputs with business processes, and the triggering of automated actions. The value lies in creating productised, composable features that can be easily deployed and integrated through APIs. For example, a platform

may allow an analytics function to be combined with automated triggers, such as opening a barrier when a face is recognised or sending alerts to enterprise systems like ERP or CRM.

The challenge lies in the complexity of video analytics tasks, which often exceed the capabilities of generic open-source models or large language models when used in isolation. A curated set of pre-trained functions, combined with flexible orchestration tools, offers a more practical approach. Ultimately, orchestration ensures that video analytics do not exist in isolation but are fully embedded in operational workflows.

Dynamic Developer Environments

Finally, the developer environment is becoming increasingly dynamic, shaped by the convergence of AI, cloud-native tools, and containerised deployments. Developers now have the flexibility to build, test, and scale video analytics applications more rapidly, supported by ecosystems of open-source libraries, pre-trained models, and low-code tools. This environment lowers the barriers for experimentation, accelerates innovation, and ensures that solutions can be adapted to evolving requirements.



Market Opportunities and Use Cases in Video Analytics

Video analytics is emerging as a powerful upgrade to traditional IoT sensors, enabling organisations to extract richer insights and automate a wider range of processes. While many current deployments are centred on surveillance, the integration of AI-based analytics is extending these use cases into new domains such as safety monitoring, workflow optimisation, and customer engagement. The following sections outline what Transforma Insights considers to be the most promising opportunities across industries, as well as the potential for new market segments such as using the video sensing and self-install devices.

Public Safety and Government Applications

Public safety represents one of the largest and most established markets for video analytics. Governments, commercial buildings and educational institutions have long relied on surveillance systems, but the integration of AI allows for significant expansion in capabilities.

Video analytics can enhance security in schools, universities, and public buildings by detecting unusual behaviour, identifying unauthorised

access, or monitoring compliance with safety regulations. Beyond passive monitoring, analytics can be used to trigger real-time alerts, helping security staff respond more effectively to incidents. Advanced features such as intrusion detection and anomaly recognition further increase the value of deployments in public safety.

Retail and Hospitality

The retail sector has been an early adopter of video analytics, initially focused on security and theft prevention. However, the integration of AI opens a range of new opportunities that extend well beyond traditional surveillance.

Retailers can use video analytics to better understand buyer behaviour, track in-store traffic patterns, and optimise product placement. Hotels and restaurants can enhance customer experience by analysing wait times, occupancy levels, and service delivery. In retail banking, video analytics supports both security and customer interaction, enabling banks to monitor branch traffic and optimise staffing levels.

As these applications deliver measurable

improvements in efficiency, sales conversion, and customer satisfaction, the commercial value of video analytics in retail and hospitality is expected to grow significantly.

Fleet and Emergency Services

Fleet management is another sector poised for rapid expansion in video analytics adoption. Dashcams equipped with AI can detect risky driving behaviours, monitor driver fatigue, and capture incidents for insurance and liability purposes.

Emergency services vehicles represent a particularly valuable application, as real-time analytics can assist first responders by analysing surroundings, traffic conditions, and incident sites. Integration with 5G connectivity ensures that video data can be transmitted and analysed in real time, enabling faster and more informed decision-making in critical situations.

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Manufacturing and Construction

Manufacturing facilities are increasingly adopting video analytics to improve safety, quality control, and process optimisation. AI can detect defects on production lines, monitor compliance with personal protective equipment (PPE) requirements, and track workflows to identify inefficiencies.

Construction sites share similar requirements, particularly around PPE detection and safety monitoring. In both industries, the ability to automate compliance and track activity reduces workplace risk while improving operational performance. The return on investment is further enhanced by the integration of video analytics with enterprise systems, enabling actionable insights to be directly embedded into operational workflows.

Transport Infrastructure

Airports, railway stations, highways, and urban transport systems represent another significant opportunity for video analytics. Use cases range from automated number plate recognition (ANPR) and road traffic monitoring to intrusion detection and crowd management.

Transport operators can use analytics to optimise passenger flows, reduce congestion, and improve safety. For example, real-time monitoring of platforms and boarding areas can help prevent overcrowding, while automated detection of road hazards can improve traffic management. As transport systems become more complex and interconnected, the demand for real-time insights is expected to grow, making video analytics a critical enabler of efficient and safe infrastructure operations.

Commercial Buildings

Commercial real estate continues to adopt video analytics primarily for security and access control. AI-powered solutions can identify unauthorised access, automate entry systems, and monitor occupancy levels. Beyond security, analytics can also support energy optimisation by linking occupancy data with building management systems.

These applications are particularly relevant for office complexes, shopping centres, and multi-tenant buildings where operational efficiency and tenant safety are top priorities.

Logistics and Supply Chain

Ports, warehouses, and distribution centres present strong opportunities for video analytics adoption. Security remains a primary use case, but analytics is also increasingly being deployed for workflow tracking, asset monitoring, and safety compliance.

For example, AI-powered video systems can monitor container handling in ports, track forklift operations in warehouses, and ensure that workers are wearing appropriate safety gear. These functions improve both efficiency and safety, supporting the broader trend toward more automated and data-driven supply chains.

Video sensing

A particularly interesting emerging opportunity is the use of video analytics as a direct replacement for sensors, effectively converting visual data into actionable triggers. This video sensing approach involves analysing video inputs to initiate actions such as sending MQTT messages, raising alarms, or activating automated systems, rather than to send streams of video.

Such functionality is especially valuable in constrained environments, including remote areas where connectivity is limited to satellite links. The ability to generate compact event-driven data from video streams minimises bandwidth requirements while still enabling intelligent automation. While few deployments exist today, this represents an open market with limited competition, offering significant potential for new entrants.

Easy-install programmable devices

In the longer term, video analytics solutions may evolve into easy-install, programmable devices. These would combine a camera with a gateway for upgradeability, access to computer vision libraries, and simple command interfaces for setting triggers and alarms.

The concept is comparable to the smart speaker market, but focused on visual data. Current consumer offerings, such as basic smart doorbells, provide limited functionality. However, the democratisation of video analytics could lead to more sophisticated solutions, such as consumer-grade cameras capable of triggering SMS alerts, integrating with smart home platforms, or linking to cloud-based services.



Architecture for Video Analytics Solutions

Video analytics solutions are built on a complex but increasingly standardised set of architectural elements that combine hardware, software, networks, and orchestration. Transforma Insights has identified a framework that brings together these components to enable scalable, reliable, and effective deployments. The architecture encompasses applications, analytics platforms, cameras, video management systems, edge compute, network connectivity, and essential layers of security and compliance. Each component plays a distinct role in enabling video analytics to function as an enterprise-grade capability.

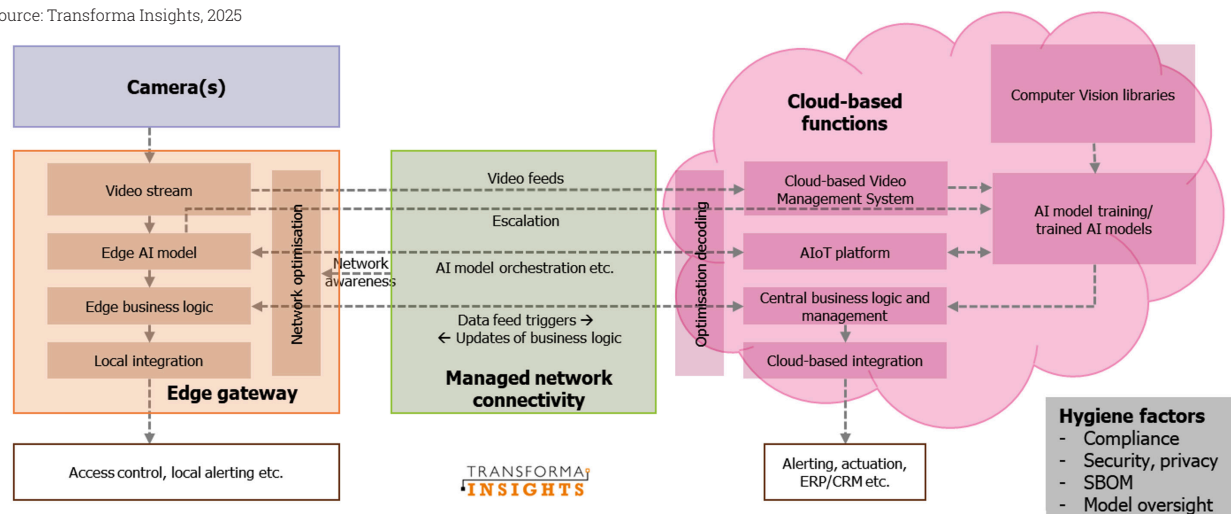
Applications

At the top of the architecture are the applications that deliver specific business outcomes, such as surveillance, buyer behaviour analysis, or industrial process monitoring. These applications typically combine artificial intelligence with analytics tools to transform raw video data into actionable insights.

While computer vision libraries provide the foundation for object identification and behaviour analysis, video analytics applications go further. They often incorporate pre-trained AI models with

IoT Video Analytics Functions & Architecture

Source: Transforma Insights, 2025



the capacity for further refinement based on the specific needs of the client. For example, a general-purpose model may be customised to recognise industry-specific equipment or workflows.

Integration with other systems is a key aspect of application deployment. Outputs from video analytics often need to feed into external systems, such as access control platforms, manufacturing execution systems (MES), or enterprise resource planning (ERP) and customer relationship management (CRM) software. This enables analytics to trigger real-world actions, whether opening

barriers, sending alerts, or updating enterprise databases.

Increasingly, delivering vertical applications involves configuring generic tools—hardware, training pipelines, and optimisation frameworks—so they can be tailored to client datasets and requirements. While many software-as-a-service providers exist in this space, their focus is often limited to software, with limited expertise in integration or hardware deployment.

Analytics Platforms and AI Orchestration

Behind the application layer sit the analytics platforms, which provide the orchestration necessary to manage AI models and integration across deployments. This element does not deliver the applications directly but instead enables them by providing composable features, model management, and integration frameworks.

A key function of these platforms is to offer productised, easy-to-deploy features that can be combined into customer-specific solutions. For instance, an object detection module could be integrated with an alerting system through standardised APIs. To achieve this, common interfaces are essential, enabling seamless integration between components.

Analytics platforms face challenges due to the complexity of video analytics functions. Simple open-source image classification systems or general-purpose language models are insufficient in many cases. Instead, curated sets of pre-trained models are likely to become standard, allowing solutions to be assembled without the need for extensive customisation.

This layer is also where AIoT orchestration emerges. Platforms must increasingly combine capabilities from both AI and IoT domains. AI evolves rapidly with frequent iterations, while IoT systems often involve fragmented estates of resource-constrained devices that remain in operation for years. Designing orchestration platforms that balance these characteristics is one of the core architectural challenges.

Cameras

Cameras are the front-line hardware of video analytics solutions. These may be stand-alone products from vendors such as Axis, Bosch, or Genetec, or embedded devices such as aftermarket dashcams or vehicle-mounted systems. In addition to capturing video, many vendors also offer video management systems and limited analytics functionality directly on the device. However, standalone cameras are increasingly evolving to integrate more intelligence, with the potential for on-board analytics or enhanced AI-ready capabilities.

Video Management Systems

Video Management Systems (VMS) play a central role in handling the capture, storage, and management of video streams. These platforms support both on-premises and cloud deployments and are offered by a mix of independent vendors, as well as camera manufacturers.

The primary purpose of VMS solutions is recording and managing video content. While some include analytics capabilities, these are generally limited compared to dedicated analytics platforms. As a result, VMS is best understood as a foundational component that ensures video availability and integrity, upon which more advanced analytics can be layered.

Analytics platforms face challenges due to the complexity of video analytics functions

Edge Compute

Edge compute functions as the aggregation and processing layer situated close to video feed generation. While some analytics may be embedded directly into cameras, placing compute capability at the gateway level is often more practical. This approach allows multiple cameras, including legacy devices, to benefit from analytics without requiring costly upgrades to each device.

Edge compute supports distributed AI models, reducing latency and data transmission costs by processing information locally. It can also anonymise video feeds to address privacy requirements and provide localised triggers for real-time responses, such as opening gates or activating alarms. In many architectures, edge compute also hosts elements of business logic, enabling integration with local systems while minimising reliance on cloud processing.

Network Connectivity and Optimisation

Connectivity underpins the entire architecture by linking cameras, gateways, and analytics platforms. Options include fixed-line broadband, mobile networks, and satellite connections.

In most enterprise deployments, the choice of connectivity is less about availability and more about optimisation. With edge analytics handling much of the processing, network requirements primarily relate to efficiency, reliability, and cost-effectiveness. Adaptive techniques, such as adjusting frame rates or switching to static images when bandwidth is constrained, help maintain functionality under varying network conditions.

Certain scenarios, such as emergency services requiring real-time live streaming, do demand advanced mobile capabilities. Here, 5G and network slicing can provide the necessary quality of service. Satellite connectivity also presents opportunities in highly constrained environments, particularly when using the video sensing as discussed below.

Security, Privacy, Compliance, and Oversight

A cross-cutting layer of security and compliance is essential to any video analytics solution. This encompasses technical security, regulatory

compliance, interoperability, AI model oversight, and counter-party risk management.

Security involves protecting all layers of the stack, from devices to applications, as well as implementing end-to-end anomaly detection and escalation processes. Compliance spans a wide range of regulations governing AI, IoT, and video data, including requirements for anonymisation and privacy protection.

Interoperability ensures that deployments are future-proofed by adhering to standards and enabling integration across diverse components. Oversight of AI models is becoming increasingly important, with emerging regulations requiring transparency, auditability, and traceability of decision-making processes.

Finally, counter-party risk must be addressed, particularly where enterprises depend on small AI start-ups for mission-critical services. The presence of guarantors of service continuity adds resilience to the ecosystem and provides confidence to adopters.

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Solution Spotlight: Semtech's Answer to the Video Analytics Challenge

How edge-to-cloud video compression with up to 90% bandwidth optimization delivers on the promise of scalable video analytics.

The convergence of AI, edge computing, 5G and satellite networks has created unprecedented opportunities for video analytics. Yet as revealed in this report, organizations still face fundamental challenges: bandwidth constraints, unpredictable costs and the complexity of integrating multiple technologies. These barriers are particularly acute in the very scenarios where video analytics offers the most value—remote sites, temporary deployments and bandwidth-constrained environments.

Introducing Semtech Fully Embedded Video Compression Solution

Semtech, a leading IoT systems, connectivity and cloud service provider, has partnered with Digital Barriers, a leader in edge-intelligent video compression software, to deliver an innovative fully embedded video compression solution to enable use cases that rely on modern video analytics. This offering combines AI-powered edge Video Compression software embedded in the AirLink® XR60 5G router, global multi-IMSI Smart Connectivity and the AirVantage® management platform in one integrated package.

Revolutionary AI-enabled Edge Compression Technology

Digital Barriers' patented AI-based compression technology, EdgeVis, enables cost-effective, reliable video transmission at a predictable cost without compromising video quality, as it:

Reduces bandwidth by up to 90%: Optimizes streams from 4-6 Mbps to 300-500 Kbps while maintaining video quality essential for analytics.

Improves transmission resilience: Enables reliable video transmission even on constrained networks like satellite links.

Enables predictable cost: Compression limits transmission bandwidth for any kind of monitoring environment.

Enhanced Security: 256-bit encryption, device authentication, edge firewall, and tamper-proof recording deliver comprehensive protection

The Power of Integration

Semtech delivers a unified Video Compression solution with compelling advantages:

- **Rapid Deployment, Seamless Expansion:** Pre-integrated components and unified management accelerate time-to-value. Smart Connectivity provides access to 600+ networks across 190+ countries and territories, allowing seamless expansion into new markets whenever needed.
- **Superior Reliability:** The ultra-rugged AirLink XR60 router delivers reliable 5G connectivity with LTE and satellite fallback, for dependable operation even in remote and harsh environments. With the compression software embedded, the XR60 transmits optimized video streams directly without requiring additional compute hardware.
- **Predictable Cost Saving:** Zero license fees—deploy as many cameras as you need, just pay for the data consumed. Save up to 90% on data costs and achieve up to 5x long-term savings with no bill shock or throttling.
- **One Vendor, One Support:** Eliminate the complexity of managing multiple vendors for hardware, connectivity and compression. No finger-pointing - just 24/7/365 support with SLAs tuned to your needs.

Flexible Deployment Options

For deployment with third-party routers, Semtech offers the Smart Connectivity data plan bundled with Digital Barriers' video compression software as a standalone package, or pre-installed on a Next Unit of Computing (NUC) to enable compatibility with your existing deployment.

Ready to unlock cost-effective video analytics?

Learn how Semtech's Video Compression solution can transform your deployment economics. Contact our team at sales@semtech.com. For more information about Smart Connectivity and AirLink routers from Semtech (formerly Sierra Wireless), please visit www.sierrawireless.com.