Kindly supported by:

Red Hat

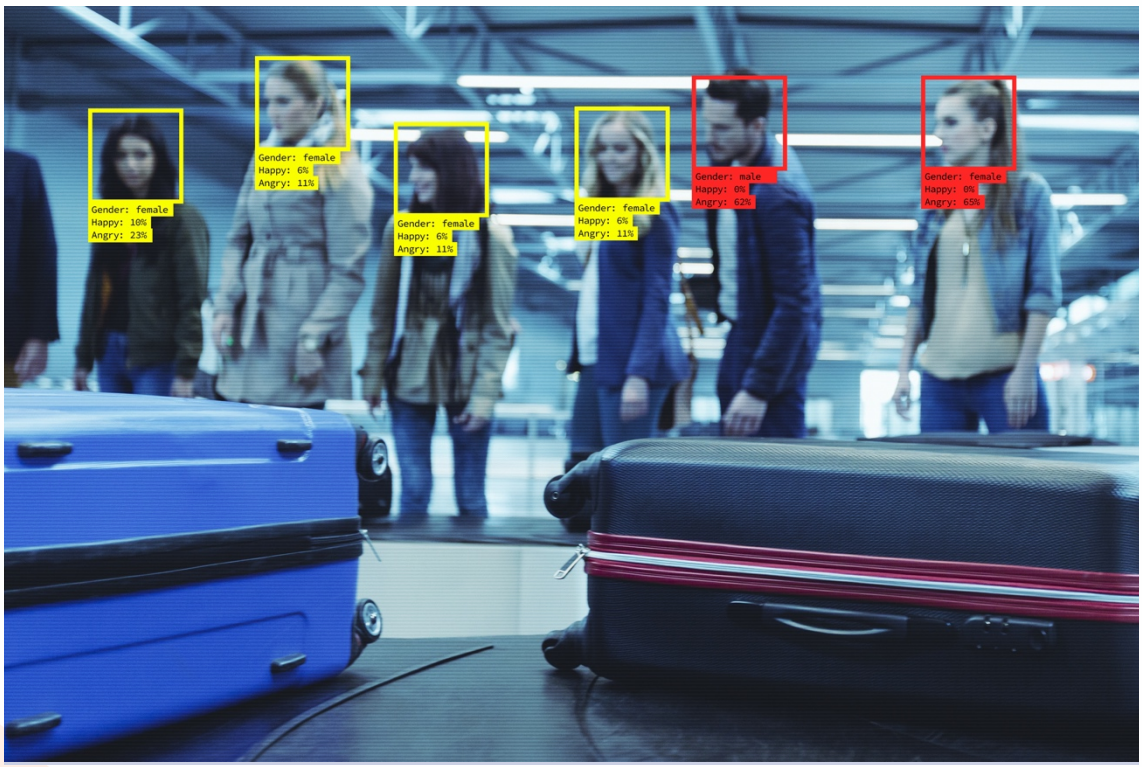
Atos

STL PARTNERS

Executive Briefing

HOW VIDEO ANALYTICS CAN KICKSTART THE EDGE OPPORTUNITY FOR TELCOS

Analysis of the edge computing market highlights video analytics as a short-term opportunity with a large edge-addressable market. We examine the video analytics market today, the role of edge in stimulating growth, and the actions telcos can take to achieve success in this space.



Miran Gilmore, Senior Consultant | miran.gilmore@stlpartners.com | April 2022
Yannick Mayaud, Consultant yannick.mayaud@stlpartners.com

This additional research was kindly sponsored by Red Hat and Atos, and supplements the findings of STL Partners' Edge computing market sizing model with additional insights from qualitative research and analysis.

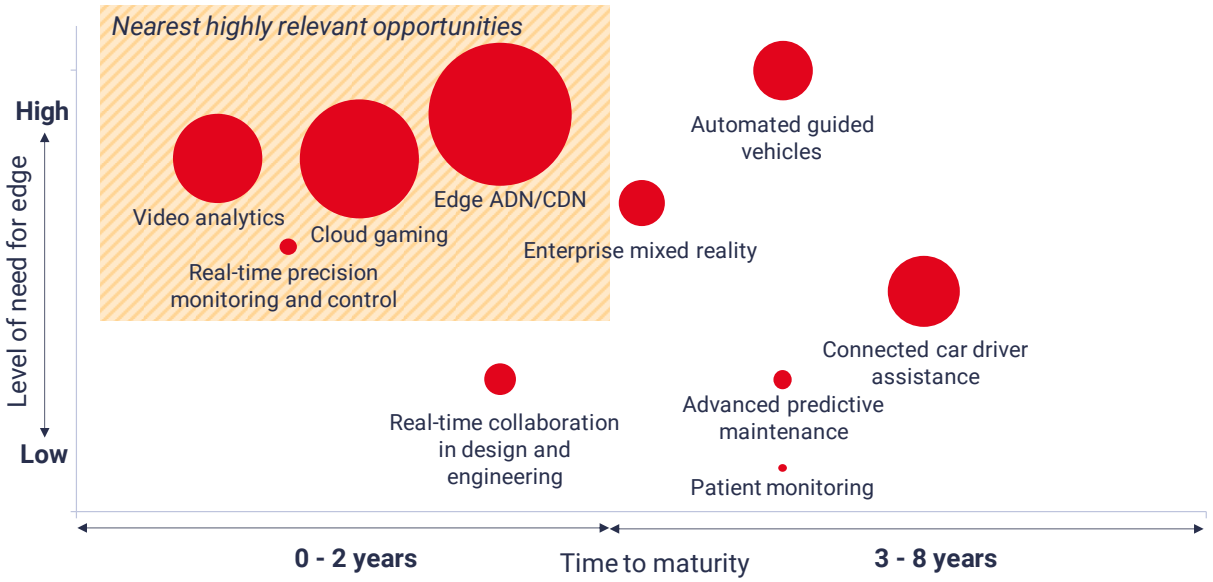
The research and analysis was independently conducted by STL Partners, and we believe it usefully illustrates an important near-term use case for edge computing.

Executive Summary

As the edge opportunity evolves and new use cases continue to emerge across different verticals, operators are looking to secure their position in the edge market. To do so they must identify where to focus their efforts, as catering to several use cases and verticals will not be feasible. This leads to the question: what is the key application that will kickstart the edge opportunity for operators?

In our analysis to size the edge market, STL Partners found that video analytics will be a strong use case. The analysis of video footage to derive insights or trigger actions is typically carried out today in the cloud or on proprietary cameras / compute, but there are significant drawbacks to these methods (including high bandwidth costs). Moving compute to the edge addresses these challenges, thereby cutting costs and stimulating greater market growth. With an estimated global market value of over $5 billion, edge-enabled video analytics accounted for a quarter of edge revenues in 2021, and this is predicted to grow at a CAGR of 34%.[1] It is therefore a key use case for edge computing.

Figure 1: Value of edge use cases (by size of total addressable market by 2030)



Source: STL Partners

[1] STL Partners - Edge computing market sizing forecast

Our top recommendations for telcos looking to enter this space are:

- Focus higher up the value chain, on the provision of the applications and platform. This will require an investment in the specialist skills to front these solutions but, because there is much more value to be captured, the return on investment should be significant.
- Although video analytics solutions can be quite horizontal in nature, CSPs should define target customer segments and specific value propositions to avoid solutions or services that are too generic and so fail to gain traction. Evaluating the use cases, industries and business models, plus the CSP's own skills and ability to compete, will show where the sweet spots are.
- An off-the-shelf offering to small and medium sized businesses (SMBs) in less specialised verticals such as retail or transport will play to CSP's existing strengths in offering network security to these types of enterprises.
- The video analytics ISV partner ecosystem is fragmented due to the broad range of industries and applications within the video analytics domain. Partnering wisely is therefore key, both with start-ups who are creating innovative software, and more established companies and system integrators that can provide scale and have integration skills. CSPs that have already identified their priority use case and partnered with the relevant ISV in this space have achieved early success.
- Ensure that solutions are founded on open-source to benefit from faster innovation and a clear path to more flexibility and cloud platform independence, as well as working across the full ecosystem of hardware OEMs. Security SIs can be slow to adopt new technology so solutions must also be able to integrate with existing video management systems.

Table of Contents

Table of Figures

Introduction

Processing video is a key use for edge computing

In our analysis and sizing of the edge market, STL Partners found that processing video will be a strong driver of edge capacity and revenues. This is because a huge quantity of visual data is captured each day through many different processes. The majority of the information captured is straightforward (such as "how busy is this road?"), therefore it is highly inefficient for the whole data stream to be sent to the core of the network. It is much better to process it near to the point of origin and save the costs, energy and time of sending it back and forth. Hence "Video Analytics" is a key use for edge computing.

The edge market is evolving rapidly

Edge computing is an exciting opportunity. The market is evolving rapidly, and although still fairly nascent today, is expected to scale significantly over the next 2-3 years. STL partners has estimated that the total edge computing addressable market was worth $10bn in 2020, and that this will grow to $534bn in 2030.[2] This is driven by the increasing number of connected devices, and the rising adoption of IoT, Industry 4.0 and digital transformation solutions. While cloud adoption continues to grow in parallel, there are cases where the increasingly stringent connectivity demands of new and advanced use cases cannot be met by cloud or central data centres, or where sending data to the cloud is too costly. Edge answers this problem, and offers an alternative option with lower latency, reduced backhaul and greater reliability. For the many enterprises who are adopting a hybrid and multi-cloud strategy - strategically distributing their data across different clouds and locations - running workloads at the edge is a natural next step.

Developments in the technologies enabling edge computing are also contributing to market growth. For example, the increased agility of virtualised and 5G networks enables the migration of workloads from the cloud to the edge. Compute is also developing, becoming more lightweight, efficient, and powerful. These more capable devices can run workloads and perform operations that were not previously possible at the edge.

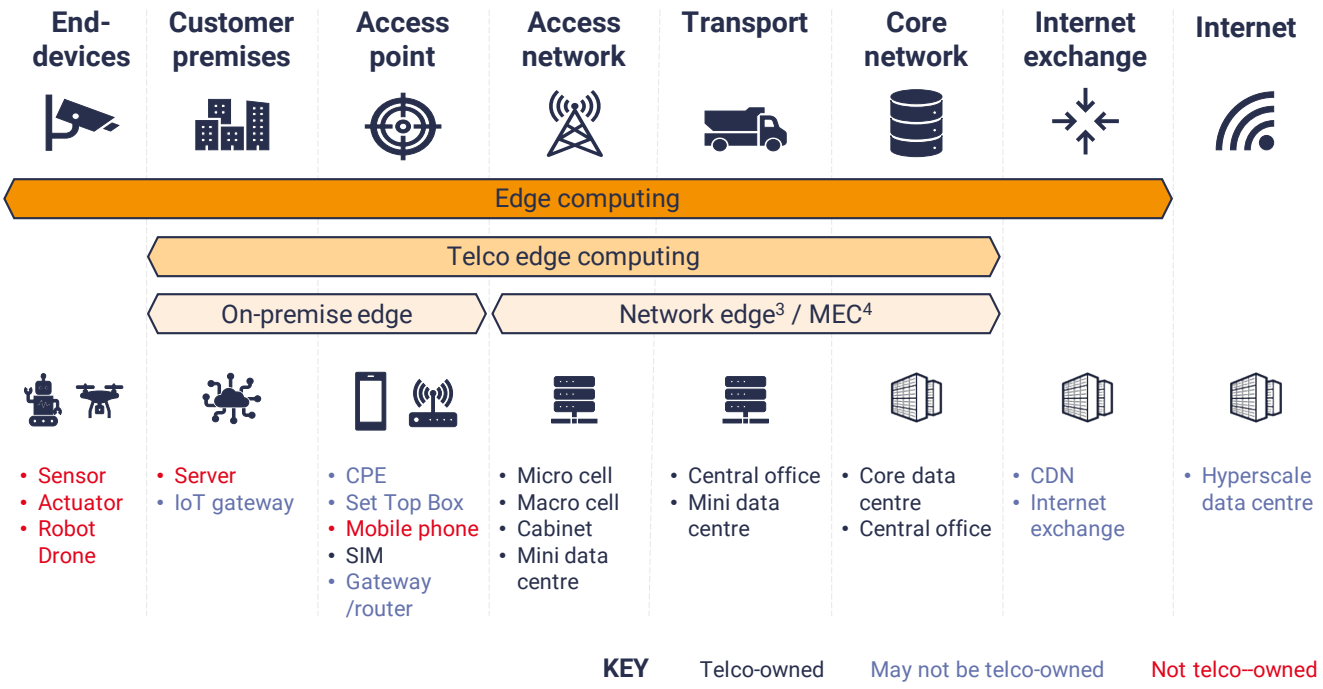
Defining different types of edge

Edge computing brings processing capabilities closer to the end user or end-device. The compute infrastructure is therefore more distributed, and typically at smaller sites. This differs from traditional on-premise compute (which is monolithic or based on proprietary hardware) because it utilises the flexibility and openness of cloud native infrastructure, i.e. highly scalable Kubernetes clusters.

The location of the edge may be defined as anywhere between an end device, and a point on the periphery of the core network. We have outlined the key types of edge computing and where they are located in Figure 2.

[2] STL Partners - Edge computing market sizing forecast

Figure 2: The types of edge computing



Source: STL Partners

It should be noted that although moving compute to the edge can be considered an alternative to cloud, edge computing also complements cloud computing[5] and drives adoption, since data that is processed or filtered at the edge can ultimately be sent to the cloud for longer term storage or collation and analysis.

Telcos must identify which area of the edge market to focus on

For operators looking to move beyond connectivity and offer vertical solutions, edge is an opportunity to differentiate by incorporating their edge capabilities into solutions. If successful, this could result in significant revenue generation, since the applications and platforms layer is where most of the revenue from edge resides. In fact, by 2030, 70% of the addressable revenue for edge will come from the application, with only 9% in the pure connectivity. The remaining 21% represents the value of hardware, edge infrastructure and platforms, integration, and managed services.[6]

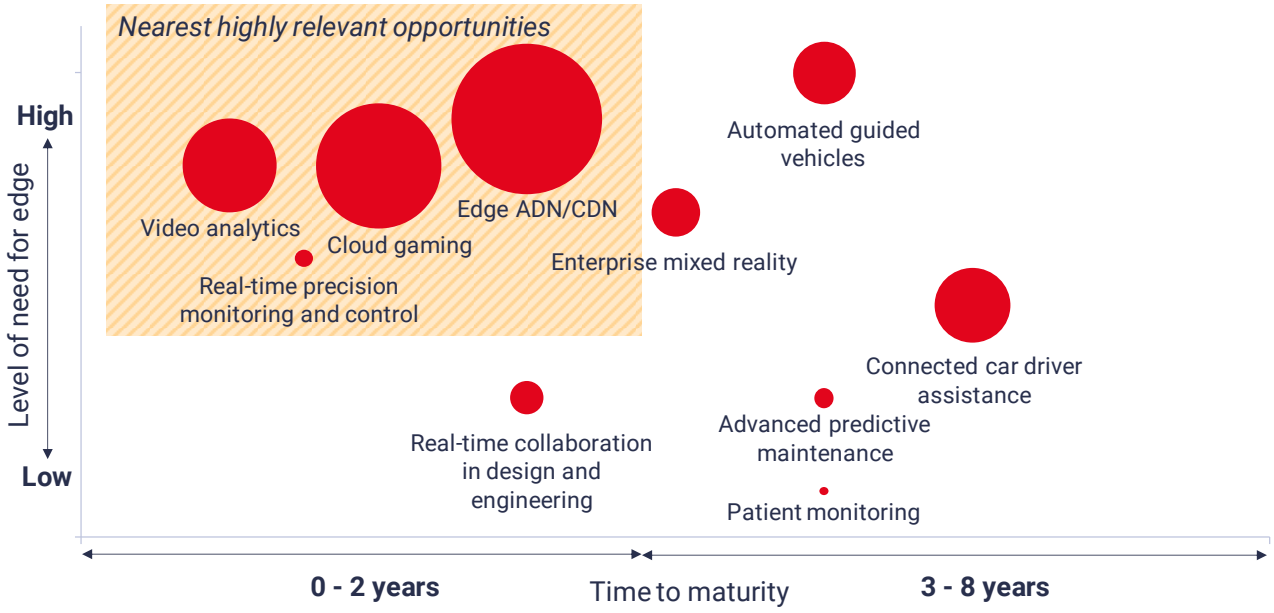
Realistically, operators will not have the resource and management bandwidth to develop solutions for several use cases and verticals. They must therefore focus on key customers in one or two segments, understand their particular business needs, and deliver that value in concert with specific

[3] Network edge refers to edge compute locations that are at sites or points of presence (PoPs) owned by a telecoms operator, for example at a central office in the mobile network or at an ISP's node.
[4] Multi-access Edge Computing, or MEC, is an ETSI-defined network architecture that enables cloud computing capabilities at the edge of the operator network.
[5] Gartner
[6] STL Partners - Edge computing market sizing forecast

partners in their ecosystem. As it relates to MEC, most operators are selecting the key partners for each of the services they offer - broadcast video, immersive AR/VR experiences, crowd analytics, gaming etc.

When selecting the best area to focus on, telcos should weigh up the attractiveness of the market (including the size of the opportunity, how mature the opportunity is, and the need for edge) against their ability to compete.

Figure 3: Value of edge use cases (by size of total addressable market by 2030)



Source: STL Partners – Edge computing market sizing forecast

We assessed the market attractiveness of the top use cases that are expected to drive adoption of edge over the coming years, some of which are shown in Figure 3. This revealed that the use cases that represent the largest opportunities in 2030 include edge CDN, cloud gaming, connected car driver assistance and video analytics. Of these, video analytics is the most mature opportunity, therefore represents a highly attractive proposition for CSPs.

> Video analytics is one of the most short term and easy to achieve use cases for edge and 5G.
>
> *-Tier 1 European CSP*

Video analytics is a large and growing market

Video analytics is the processing and analysis of visual data (images or videos). When artificial intelligence is used to extract information from the data, it is referred to as *intelligent* video analytics or computer vision, although video analytics is often still used as a shorthand.

Video analytics stands out as a huge opportunity. It has the potential to be a killer application for edge computing, due to:

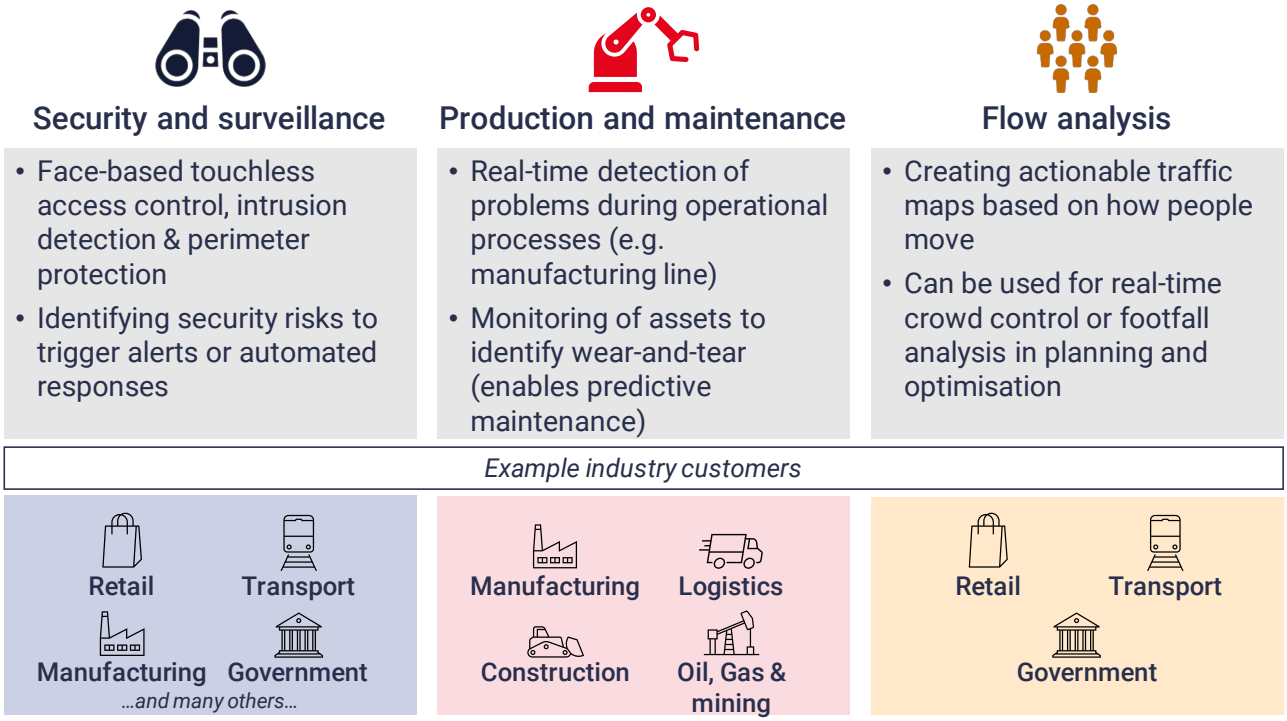
- **The large and growing market** – In 2021 there were an estimated one billion surveillance cameras operational around the world.[7] With the number of cameras predicted to grow by 20% in the period 2017-2024,[8] AI and analytics will become increasingly important to capture value from the wealth of video footage being collected each day.
- **The ability for edge computing to grow the market** – Without edge computing, video analytics is hindered by challenges with data sovereignty, and the cost of sending high-bandwidth data to the cloud (a problem that is heightened as video streams increase in quality). Edge computing therefore plays a key role in enabling video analytics, including more advanced AI/ML-enabled analytics, in a cost-effective way.
- **Its relevance to almost all industries** – Video analytics can address a wide variety of use cases, from understanding consumer habits in retail, to analysing how football players kick a ball. In the case of video analytics for security, it is relevant across virtually all industries - education, transport, manufacturing, the list goes on.

The market for edge-enabled video analytics will be worth $75bn by 2030

Video analytics is a huge application for private 5G and edge computing, accounting for a quarter of edge revenues in 2021 (topped only by cloud gaming). In 2021 the edge-enabled video analytics market was worth over $5 billion globally. This is predicted to grow to $75 billion by 2030 at a CAGR of 34%.[9]

[7] CNBC
[8] Security Sales research
[9] STL Partners - Edge computing market sizing forecast

Figure 4: There are three main application areas for video analytics



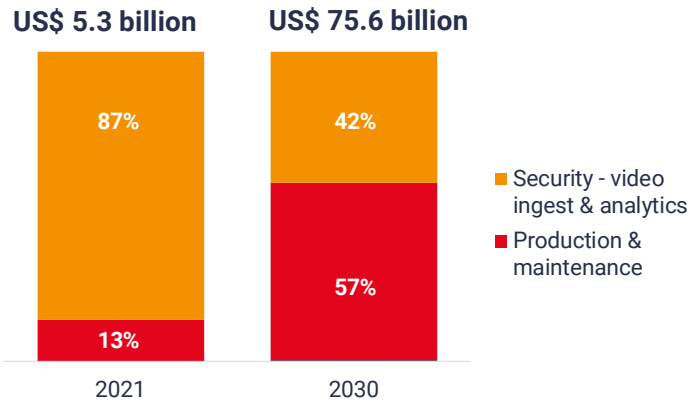
Source: STL Partners

There are many application areas for video analytics, of which three are shown in Figure 4. Of the three, video ingest and analysis for security and surveillance is the biggest short-term opportunity, representing an estimated 21% of the total edge computing market in 2021.[10] This is due to the large base of installed security cameras that already exists, to which video analytics solutions can easily be retrofitted.

However, by 2030, video analytics for production and maintenance will be a larger opportunity. This will grow throughout the decade along with the move to Industry 4.0 and increase in automation resulting in an increase in sensors and analytics. Verticals like manufacturing, oil and gas and logistics will therefore be key adopters of this use case.

[10] STL Partners - Edge computing market sizing forecast

Figure 5: Percent of edge-enabled video analytics revenue by use case: 2021 vs 2030



Source: STL Partners – Edge computing market sizing forecast

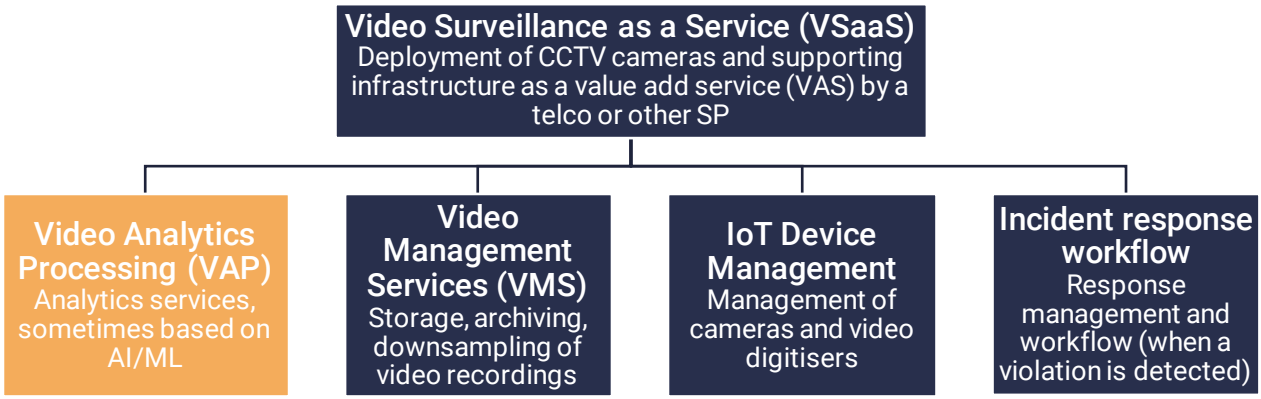
Using video analytics for flow analysis is a comparatively small opportunity, with the market for edge-addressable flow analysis solutions estimated to be $187 million in 2030 - less than 1% of the total edge addressable video analytics market. This is because the applications are less widespread, and much of the value from the use case is realised indirectly. It is still a relevant use case because it offers a large societal impact by providing more "modal" insights around how customers / employees / users act. This provides value to organisations e.g. into where they should stock high value goods, how to re-direct traffic, or how to manage large crowds. As a smaller video analytics opportunity, telcos may look to first enter the market by offering a security and surveillance solution, then flow analysis capabilities would make a valuable add-on, making efficient use of resources already installed on customer premises.

There are endless applications for video analytics – many of which sit outside of the three main application areas outlined in this report. Some common examples include the use of video analytics in agriculture to automatically detect plant pests by way of drones flying over the fields (this is popular in the Netherlands), or the detection of smoke on video streams to alert the emergency services to forest fires.

Edge computing changes the game and plays to operator strengths

Video analytics comprises just one aspect of the broader Video Surveillance as a Service offering.

Figure 6: Video analytics is one element of VSaaS



In cases where the emphasis is on analytics rules, not on recording and records management, VAP solutions can work as a standalone. They can also be combined with a VMS. For example, Ipsotek, an AI and video analytics SP, cooperates with Milestone, Genetec and other leading VMS vendors.

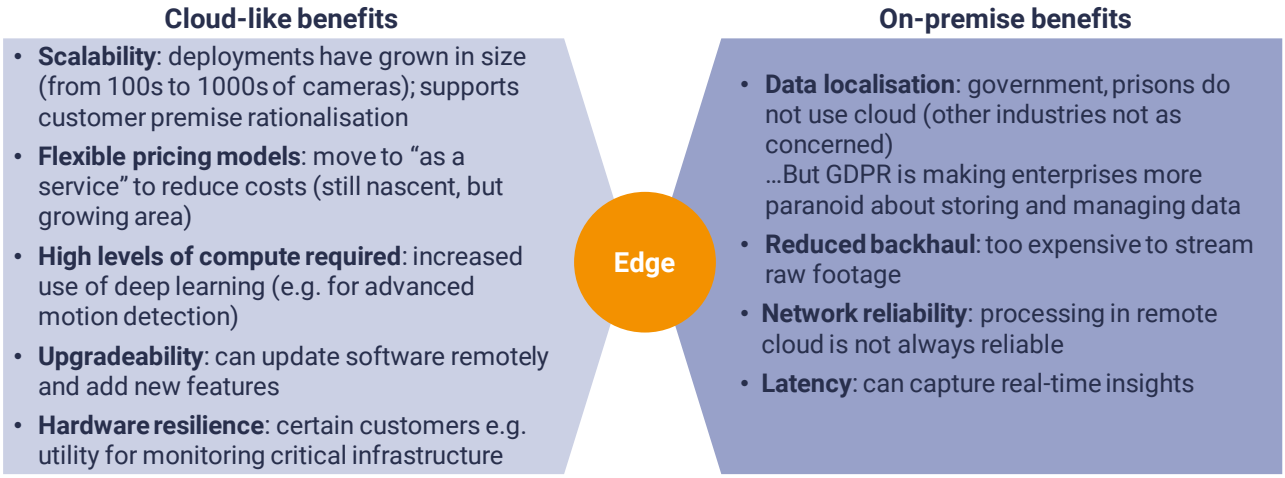
Source: STL Partners

Telcos have previously looked to capitalise on the VSaaS opportunity. In those early ventures, Video Analytics Processing – if offered at all - traditionally relied on compute that occurs in the cloud, at the camera level, or on proprietary on-premise infrastructure. These offerings have faced challenges, particularly in the case of intelligent video analytics which requires more powerful compute such as specialised high-performance GPUs.

With each HD camera streaming at 10Mbps or more, a multi-camera solution quickly requires too much bandwidth to rely on the cloud, not to mention questions of data sovereignty when processing sensitive security footage off-premise and potentially in a different country. On the other hand, doing this processing on proprietary infrastructure on-premise or on-device brings with it the inflexibilities of specialist equipment that is expensive to update, hard to scale and does not allow for extra applications to be added to the solution down the line. The high-performance GPUs required are too expensive to dedicate to a single camera, with the economics of the solution only working when these are a shared resource.

Edge computing changes the game. It offers the same flexibility and scalability as the cloud, but with the additional benefits of reduced backhaul and data localisation that come with on-premise compute. This changes the costs drastically, making it a much more economically feasible solution for telcos to offer.

Figure 7: Edge computing combines the benefits of both cloud and on-premise compute



Source: STL Partners

What is the role of 5G?

While edge is most valuable for its reduced backhaul and data localisation, 5G also plays a key role in enabling intelligent video analytics. That is true for public 5G networks as well as for private campus 5G implementations. Beyond the obvious advantages of 5G's low latency, high bandwidth and high reliability, it offers three key benefits:

> HD video analytics is the sweet spot between 5G and edge.
>
> *-N. American Hardware OEM*

- **It enables mobility**: Flexibility of movement is clearly essential for cameras that are attached to moving vehicles (such as autonomous cars or drones), but even in static environments mobility of cameras may be necessary (such as in factories and shops that update their layout regularly depending on what is being manufactured or sold). In these cases, working with a wired connection can be difficult or impossible, and even Wi-Fi can be undesirable since its reliability is much inferior to that of 5G.

> Right now there are only a small number of the most innovative cameras leveraging 5G – we are expecting this to change in the next 2-3 years.
>
> *-European Video Analytics SP*

- **It reduces time and cost of deployment**: A wireless video surveillance system can be implemented much more quickly, and is more agile to extensions, than having to lay cables in the ground. This also reduces cost.
- **It enables connectivity in remote locations**: In some locations wireless is simply the only option e.g. a solar-powered camera in a remote location that cannot be reached by a cable.

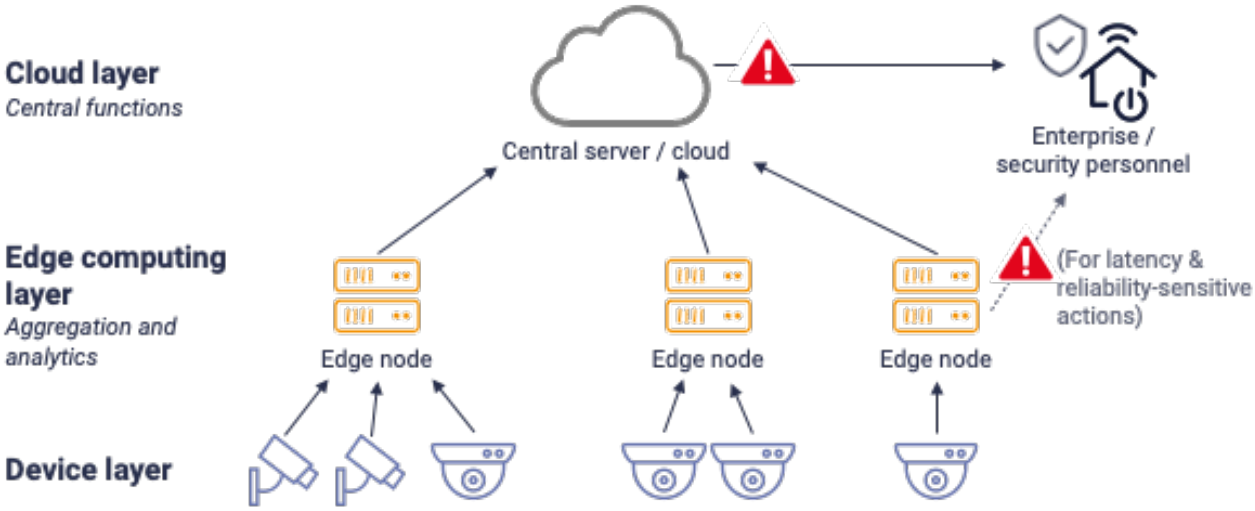
Security is the largest growth area and operators have skills and assets in this

Security and surveillance is the most mature video analytics opportunity today. Depending on the use case the architecture of a video surveillance solution augmented by analytics can vary, but broadly works as follows:

- Video footage is captured on a camera.
- The video stream is continuously sent from the camera to a video analytics agent executed on a local edge node. There, it is processed and aggregated in real time, along with footage from other cameras in the same vicinity.
- Processing typically uses AI/ML algorithms, triggering a rule when certain conditions are met: people stepping on tracks at a railway station, cars moving the wrong direction down one-way streets, vehicles parked illegally or luggage abandoned in public areas. Other conditions that trigger rules include crowds forming, smoke rising, or detection of license plates or human face profiles.
- Triggering an analytics rule in real time immediately leads to a configurable variety of actions. These actions can either be triggered directly from the edge node when reliability and latency are key (e.g. stopping machinery when a hand breaches a virtual perimeter), or several inputs from multiple edge analytics nodes can feed into a central instance that can sit in the cloud. Examples of triggerable actions:
  - Metadata is added to the video recording and stored alongside it (this is typically done by a video management system that integrates with the analytics system). Metadata may then be used to make decisions about retention: non-event video is deleted after a short time, while event video is kept for longer; it may even become part of legal evidence.
  - An alert is raised to trigger an immediate incident response. This may be a workflow application, an emergency response Command & Control software, or numerous other options. When a security force or police force interception team is used, incident video clips and/or live background video feeds can be sent directly to their smartphones or tablets.
  - Other actions such as switching on lights, locking or unlocking gates, emergency stop of an approaching train (when people are detected on tracks), etc.

These same actions can be triggered by access control systems integrated with video analytics, where combined rule logic is also possible, e.g. for tailgating alerts (where one person opens a door by way of a card reader or biometric sensor, but more than one person walks through).

Figure 8: Video analytics use case diagram



Source: STL Partners

Video analytics for security will increasingly rely on the network edge

Today, most video analytics occurs on premium, AI-enabled video cameras.[11] Enterprises that have started moving this compute to the edge are reliant on on-premise edge servers that aggregate the camera feeds (because network edge deployments are still nascent). Over the next ten years, we expect much more of this compute to move to the CSP's own network edge. For use cases where there isn't a fixed premise or where those premises are likely to be space constrained (e.g. for monitoring open air sites like parks) the network edge is most likely to be leveraged.

Figure 9: Transition of video analytics to edge

	Device/ on-prem	On-prem edge	Network edge	Cloud
Today	70%	20%	0%	10%
2030	10%	10%	60%	20%

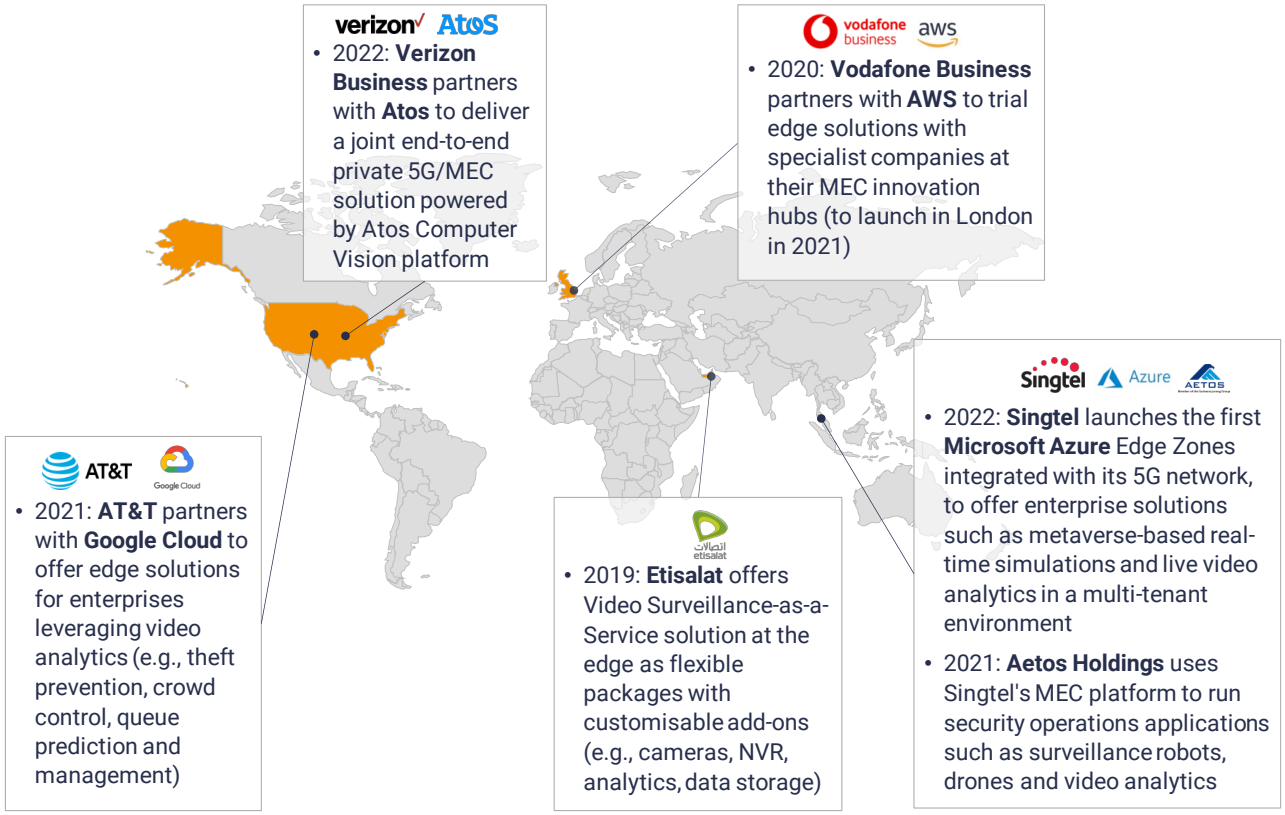
Percentages denote an estimate for the amount of overall application processing that occurs at each location

[11] In this case we are referring to analytics with modest functionality, such as motion detection. More advanced video analytics functions are more likely to run in a central data centre or cloud location.

Source: STL Partners

There is empirical evidence from early movers that telcos can be successful in this space

Figure 10: Telco solutions with video analytics today



Source: STL Partners

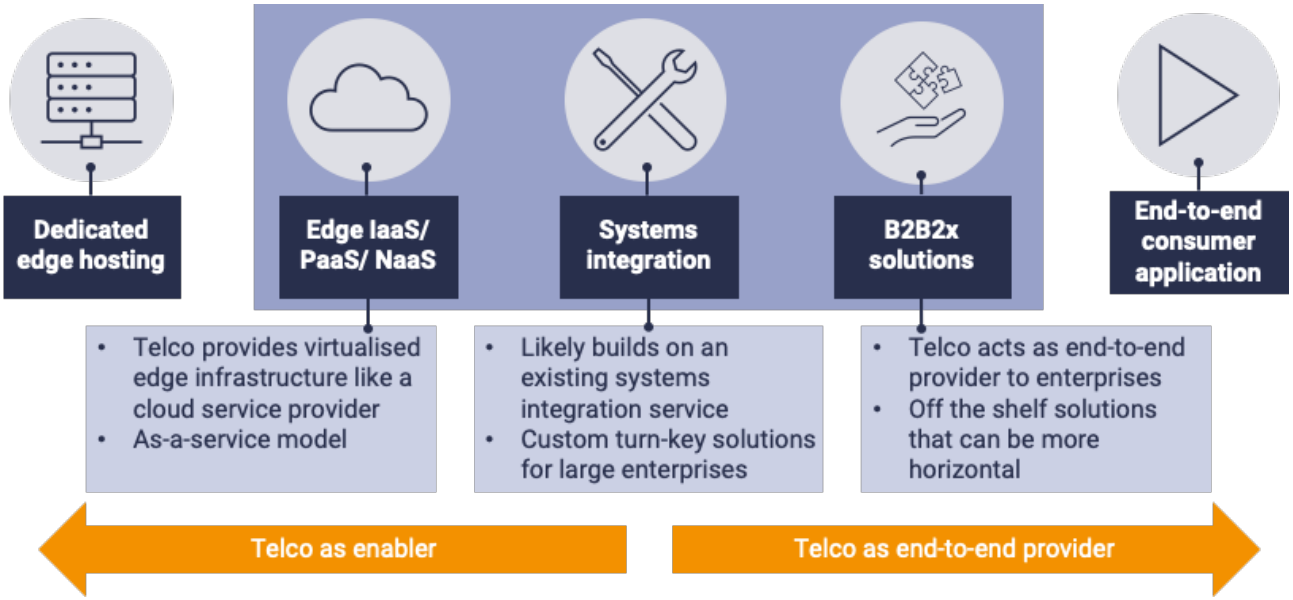
What are telcos doing today?

Video surveillance solutions have historically seen success in the Middle East, due to the region's growing government initiatives and security concerns. Etisalat have been fronting an end-to-end VSaaS solution targeted at SMBs since 2019, which includes the installation of hardware, the analytics and business intelligence applications, along with cloud data storage and connectivity in as-a-service subscription plans. The recent announcement[12] of a partnership with Microsoft to deliver a Multi-access Edge Compute (MEC) platform suggests that Etisalat's strategy of building market presence as a provider of video analytics services is a crucial anchor application to seed their MEC platform offering.

[12] Etisilat and Microsoft MEC partnership

Singtel, by contrast, is pursuing a strategy of enabling others to build on top of a more generic MEC platform. Also coming off the back of a partnership announcement with Microsoft, Singtel is targeting "Government agencies and enterprises of all sizes that have built their business applications and operations on Microsoft Azure's plug-and-play cloud computing service".[13] By integrating Microsoft's Azure Edge Zones into its 5G network (along with previous integrations with AWS Outpost), Singtel is pursuing more of an enablement role as a provider of edge IaaS and PaaS to application providers, such as Aetos Holdings, that have built solutions that use video analytics[14] on the hyperscaler platforms. Here, it is the application provider that maintains the relationship with the enterprise customer.

Figure 11: Three relevant edge business models for video analytics



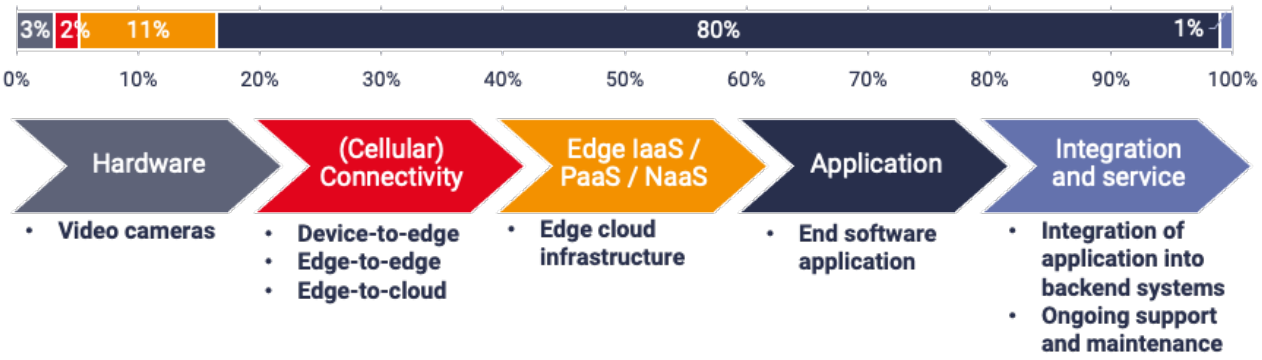
Source: STL Partners

Both Etisalat and Singtel see video analytics as a key use case in their MEC offering but have chosen different business models to address this. In previous research, STL Partners has suggested five viable business models that telcos can adopt to commercialise MEC; the three most relevant models to the video analytics opportunity are highlighted in Figure 11.

The choice of whether to play further to the right in this diagram, as Etisalat have done, will depend on the market dynamics and the willingness of an operator to invest in acquiring the specialist skills to front these solutions and play higher up the value chain. However, the pay-off for doing so could be significant as the majority of the $75bn addressable revenue of the edge video analytics opportunity will be in the provision of the application; up to 80% as shown in Figure 12 below.

[13] Singtel and Microsoft Azure Edge Zones
[14] Aetos Holdings enhancing security operations

Figure 12: Split of revenue across the edge video analytics value chain



Source: STL Partners – Edge computing market sizing forecast

Telcos can front end-to-end video analytics solutions

There is certainly scope for more telcos to front an end-to-end solution, as Etisalat have done in the UAE, though they should play to their strengths in crowded brownfield markets. Existing presence on a customer's premises helps to support these telco-led solution ambitions, so a careful consideration of which segments this existing relationship is strongest in should dictate considerations here. For example, a particularly difficult segment for the hyperscalers to target are the SMBs, as these customers do not have the scale and expertise to customise and integrate their own applications onto generic cloud platforms. An off-the-shelf offering to SMBs in less specialised verticals such as retail or transport is likely to be a good target customer segment for telcos, playing to their strengths of offering network security in these types of enterprises already.

Retail and Transport offer a significant opportunity for quick returns on investment: a newly-installed intelligent video analytics security solution in one Japanese retail chain saw a 50% reduction in shoplifting in six months, for example. The security video analytics applications themselves are also relatively transferable between these verticals, essentially boiling down to AI and ML-based object or situation detection and perimeter breach, and so lend themselves to a more horizontal, off-the-shelf product strategy. Targeting this segment crucially avoids direct competition with the hyperscale cloud providers, who are more focused on offering scale to the largest customers building their own applications with specialised requirements. This is especially key in situations where CSPs have existing partnerships with the hyperscalers that only facilitate access to their economies of scale for the CSP's own large customers.

The hyperscale cloud providers are not the only ecosystem players that it will be key to negotiate partnerships or to compete with. The ecosystem of application providers and independent software vendors in the video analytics space is fragmented due to the large number of different applications that sit under the video analytics umbrella, with many vendors building off the same open-source tools. It can therefore be challenging to identify the right ISV partners, but this will be necessary to build an end-to-end solution play that doesn't require the development of proprietary applications. Since it is unlikely that one ISV will cater to every industry and type of application, telcos should identify their

priority use case domains and conduct an in-depth assessment of the potential partners for each application type. Telcos should then engage with ISVs to promote their role and proposition in this space and begin to form partnerships.

It is important to maintain openness

> The key to success for telcos [with video analytics] is that any store can buy a solution from a telco and it's as easy as buying a phone.
>
> *-Global Software Company*

To maximise the applicability of video analytics solutions, telcos should ensure that their solutions are provider-agnostic, working with developers to make applications that are able to run on any cloud – public, private or edge. This enables greater application portability and flexibility, which is especially important for enterprises that are looking to scale solutions across geographies that rely on different cloud providers. Ultimately, this also provides the support for more viable economics for any video analytics solution, as the choice to configure the solution in the most cost-effective way by avoiding lock-in has been a key barrier to adoption in the past. Telcos must also work with application developers to ensure it is easy to connect to existing video recording and management systems (which is particularly important since security SIs can be slow to adopt new technologies).

It is also necessary to provide multiple device and connectivity options. If, for example, cameras support wired Ethernet only, 5G micro-routers in the portfolio can fix the problem. If the customer wants to continue using their analogue cameras and cables to reduce cost, video digitisers can allow edge-level video analytics to be applied to the footage. Should telcos choose to target customer segments in which they own the access network, they can be in a strong position to solve the challenge of connecting legacy technology to the edge compute resources. This can earn them the right to play higher up the value chain and front the complete video analytics solution.

Conquering the video analytics opportunity will open doors for telcos

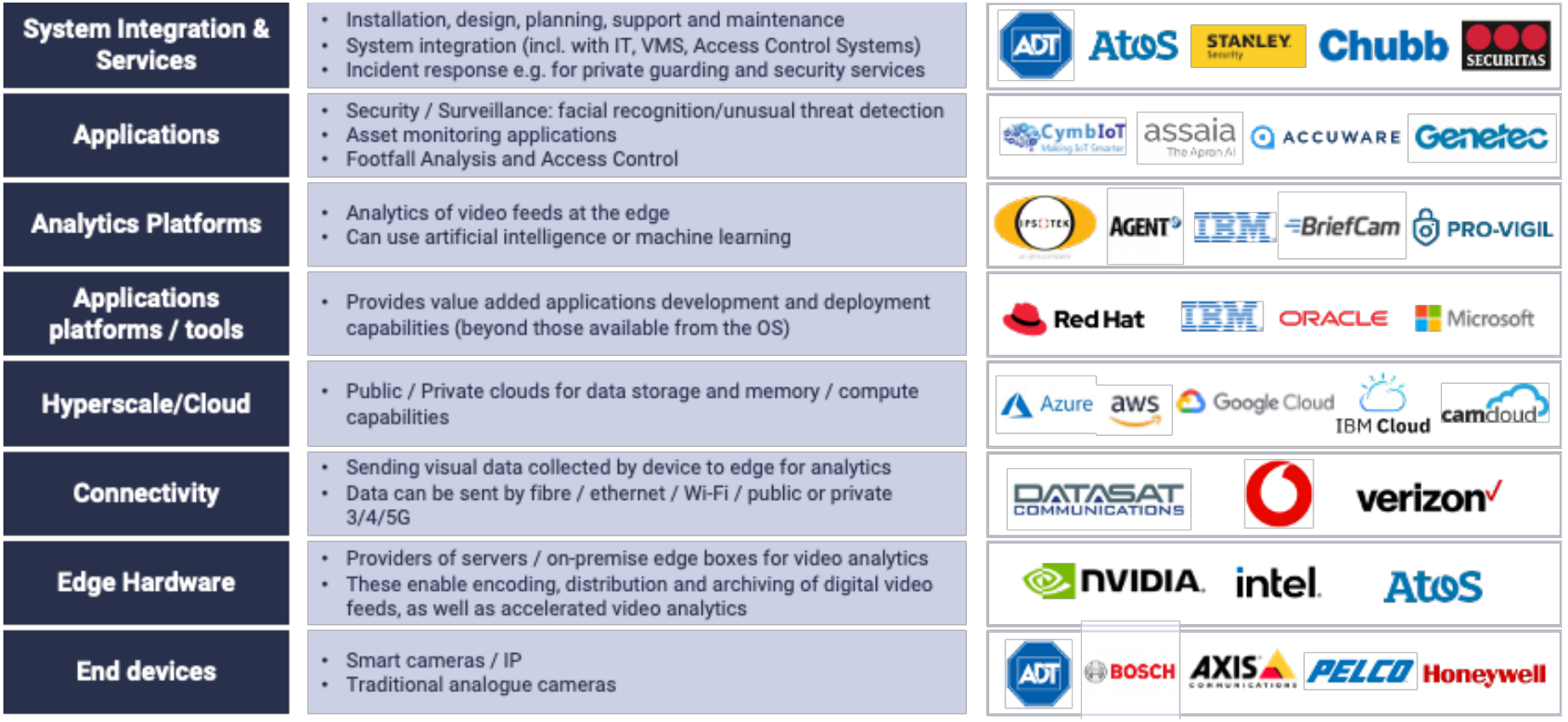
Video analytics is a relatively scalable anchor application for enterprises across industries to adopt edge infrastructure. If telcos are able to succeed in this space, they will be able to use this as an upsell opportunity to other edge applications.

Looking at the security ecosystem, video analytics is just one piece of the pie. There are many other elements to branch out to or incorporate into VSaaS solutions including Video Management Systems (VMS), IoT device management, or other security offerings such as Automated Access Control Systems (AACS) or Command and Control (C&C).

Looking beyond security, AI and analytics capabilities are applicable to many use cases. Operators can leverage the strengths gained in offering solutions beyond connectivity, as well as the relationships developed with application developers, ISVs, and other ecosystem players, and apply these to other edge applications.

> Cameras are just one type of sensor – there are many others out there and we can enable them with AI.
>
> *-Global IT Service Company*

Figure 13: The video analytics ecosystem and value chain



Source: STL Partners

Conclusion

- Having analysed the current edge landscape and range of opportunities, STL Partners has identified video analytics as an attractive proposition for telcos.
- It is a short-term opportunity with a large addressable market size, for which edge computing will become a key enabler resulting in significant growth over the coming years.
- If telcos are able to succeed in the video analytics space, they will be well positioned to use this as an upsell opportunity for other edge solutions.
- Our top recommendations for telcos looking to enter this space are:
  - Focus higher up the value chain, on the provision of the applications and platform. This will require an investment in the specialist skills to front these solutions but, because there is much more value to be captured, the return on investment should be significant.
  - Although video analytics solutions can be quite horizontal in nature, CSPs should define target customer segments and specific value propositions to avoid solutions or services that are too generic and so fail to gain traction. Evaluating the use cases, industries and business models, plus the CSP's own skills and ability to compete, will show where the sweet spots are.
  - An off-the-shelf offering to small and medium sized businesses (SMBs) in less specialised verticals such as retail or transport will play to CSP's existing strengths in offering network security to these types of enterprises.
  - The video analytics ISV partner ecosystem is fragmented due to the broad range of industries and applications within the video analytics domain. Partnering wisely is therefore key, both with start-ups who are creating innovative software, and more established companies and system integrators that can provide scale and have integration skills. CSPs that have already identified their priority use case and partnered with the relevant ISV in this space have achieved early success.
  - Ensure that solutions are founded on open-source to benefit from faster innovation and a clear path to more flexibility and cloud platform independence, as well as working across the full ecosystem of hardware OEMs. Security SIs can be slow to adopt new technology so solutions must also be able to integrate with existing video management systems.

STL PARTNERS

Research

Consulting

Events