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Executive summary

Active and mass casualty shootings have been on the rise. Since 2000, the FBI has recorded more than 220 active shooter incidents resulting in 1,486 individuals who were injured or killed. Of the recorded active shooter incidents, 21.8% occurred on an educational campus, with 75% of these incidents involving a K-12 institution. Four of the top 10 active shooter incidents took place on educational campuses and accounted for 94 deaths and several wounded. In each of these incidents, forensics video evidence was used to trace the assailant’s actions and movements during the event.1

After the Sandy Hook massacre, more than 400 bills related to school safety were proposed with 62 of them directly related to video surveillance. Over the years video management systems (VMS) technology has improved and costs have been reduced, allowing for a wide adoption of video surveillance.

However, with an average of 170 schools per district comprising 15 to 30 cameras per school, it becomes difficult for school officials and law enforcement to monitor every second of every camera in place. The other issue technology has not solved is the bandwidth issues and time it takes for live video streams to reach a central operations center. During the Marjory Stoneman Douglas shooting in Parkland, FL, it took nearly 30 minutes before the Broward County Sheriff’s office received what they thought to be live video of Nikolas Cruz dropping his rifle. In reality Cruz had left the scene 27 minutes prior.

How do we overcome these issues and provide greater insight and actionable results in real time? The key is using artificial intelligence (AI) to monitor and react when an incident is triggered and provide automated actions to alert, lockdown, and protect students in the event of an active shooter incident.

**Challenges with existing Video Management System (VMS)**

The key challenges most organizations face with their VMS are:

- With hundreds of video channels feeding into a typical operation center, it is difficult to manually watch all of them at once. Hundreds of unmonitored camera feeds require large teams of people to view them in real time to identify threats.
- The human concentration span is limited to 15 minutes when watching videos; therefore, in 15 minutes, 85% of video footage goes unmonitored, which means security events that are important to track may be missed.
- Most importantly, organizations must have the ability to cross reference images from a known database to live video streaming.

![Figure 1: Traditional versus enhanced AI analytics](image-url)
As a result of these challenges, VMS becomes useless and ineffective. Most closed circuit television (CCTV) footage is used for retrospective purpose. While it is good to know what happened; it is better to keep it from happening. As displayed on the left side of Figure 1, traditional VMS systems fall short of any analytical capabilities and waste precious time streaming video from the source to a central operations center; the right side of the diagram adds in AI analytics to detect a person, their identity, and if they are holding a weapon.

**Why video analytics at the edge**

Video data right at the edge can extract critical insights, help speed up reaction times, reduce the risk of data transfer, and drive better business decisions.

In today’s world of big data, there is an increasing demand for AI and hardware accelerated analysis (GPU-based analysis). For example, as the amount of data collected increases, the need for real-time, in-depth analysis increases to meet demand right at the data source, otherwise known as the edge. It is important to delegate AI-enabled video analytics at the edge to take action as close to real-time as possible. In the field of video surveillance, the speed, size, and complexity of data grows exponentially with every camera added to a system. AI-enabled Edge Video Analytics also provide other benefits, including less latency, lower costs, fewer threats, less drag on bandwidth, and less duplication, while providing bandwidth, reliability and compliance.

HPE’s Dr. Tom Bradicich clearly describes the bandwidth problem for video analytics in the HPE blog post entitled, “Seven Reasons Why We Need to Compute at the Edge.” Dr. Bradicich states, “Sending data from edge devices to the cloud or a data center can use a tremendous amount of bandwidth. Fearing that such devices will be a drag on the system, some have proposed creating a separate network for the IoT. You can greatly curtail that drag by eliminating the need to send data back and forth. Many companies simply cannot handle the bandwidth needs of IoT right now.”

Thirty billion images a second; 100 trillion images an hour! That’s how much content will be captured by 2020 by surveillance cameras across the globe. One billion cameras, which is twice today’s number, will be at traffic intersections, transit stations, and other public areas, helping to make our cities and schools safer and smarter. To make sense of this staggering number of pixels, traditional methods of video processing and human monitoring will not be able to meet speed and accuracy demands.

Sending every bit of video data from the thousands of cameras at the edge back to a central operations center or to the cloud for processing is often:

- Slow, leading to a high latency, increased time to react.
- Expensive, due to the high bandwidth needed for all the video feeds.
- Plagued with a higher risk of data corruption or snooping when sent over a public network.

However, all these problems can be easily resolved by using compact and ruggedized systems such as HPE Edgeline Converged Edge Systems to process camera feeds directly at the edge, in real time, and with full benefits of advanced neural networks (ANNs).
Classic Machine Learning

Use known functions/features/algorithms to extract insights from new data. Experts choose recipe.

Deep Learning

Use massive datasets to generate deep (neural) graphs/models. Then use “trained” graphs to “infer” on new data. SME not required. Optimization is key.

Instead, as shown in Figure 1, a video analytics system integrated into the VMS uses AI to provide a powerful and scalable method for extracting detailed information out of video images captured by cameras and a VMS system. However, AI’s deep learning requires orders-of-magnitude more compute and memory than is typically available in a general-purpose server system. To gain actionable insights to the data being collected, we have to break from classic machine learning and lean on deep learning.

Deep learning is the fastest growing field in AI. It uses many layered, deep neural networks (DNNs) to learn levels of representation and abstraction that make sense of data such as images, sound, and text. As explained in Figure 2, the specific features of an image, video and sensor data, located in the solid green box, are extracted and understood at low level, mid level, and high level by ANNs. Compared to traditional handcrafted computer vision, ANN can pick the important and subtle features automatically by learning from large amounts of tagged data sets with sufficient validation, to providing higher level intelligence at actual raw image inferencing. An example of the standard VMS scenario is shown in Figure 3 with the analytics layer abstracted. The result of adding in a video analytics layer is a level of accuracy and performance that far supersedes human capabilities.
Classic machine learning is basic in its analysis of data. We can determine if something is present but cannot determine what is present. On the other hand deep learning—which uses DNNs—enables us to learn, understand, and identify levels of representation and abstraction that make sense of data. DNNs can now tell you if the object is a person, and if so, can help identify race, sex, and identification.

An ANN-powered HPE Edgeline Video Analytics Surveillance System (VASS) can watch, listen, and understand what is Advanced Neural Network on multiple cameras, at phenomenal speeds. It will be able to pull together massive video data sets from disjointed locations throughout a school campus and quickly transform the pixels into valuable insights. The resulting AI school campus can recognize and automatically respond when there’s a potential threat, active shooter, crowd gatherings, student fights, geofencing incidents, or when someone is experiencing trouble. An AI school campus becomes a thinking robot, programmed to help keep students and staff safe and happy, equipment smoothly functioning, and much more.

The HPE VASS, powered by HPE Edgeline servers, provides real-time, actionable results:

- Proactive threat detection
- AI-based video analytics with a dedicated decode engine
- Unprecedented efficiency at lower power and ability to scale-out
- Faster response time for first responders
- Better performance and capability
Accelerating video analytics and action at the edge

Designed to withstand space restrictions and harsh, hot, and dusty conditions, HPE Edgeline Converged Edge Systems are able to extract the value of video data generated at the edge (see Figure 4). Using compact and power-efficient HPE Edgeline systems, organizations in the private and public sectors benefit from:

**Faster time to action and control.** With a high concentration of GPUs, HPE Edgeline Converged Edge Systems enable analysis of events as they occur in real-time, so people can take immediate corrective action. Achieve analytics on up to 30 FPS in real-time, and gain the ability to analyze multiple search criteria at one time.

**Lower bandwidth utilization.** With up to a 10000x bandwidth savings avoid unnecessary video data transfers; use costly bandwidth more efficiently and transfer only the data or metadata that is relevant.

**Lower costs.** Drive down costs by analyzing the video near the camera and saving on the costly network infrastructure and storage required by a cloud or data center-only solution.

**Enhanced data security.** With fewer transfers to and from the central data center, data remains at the edge and not exposed to security breaches.

**Improved reliability.** By managing data locally, the risk of data corruption during transfer is lowered; data is computed at the edge rather than at a distant data center or cloud.

10000x bandwidth savings  Scales to 10s of objects  Real-time up to 30 frames/second

Figure 4: Benefits of computing at the edge.
Analyzing video at the edge greatly reduces network latency and demand, which can be shared via multiple protocols and SMS text messages, as well as integrated into car terminals and operations centers. No longer burdened by looking at hundreds of video feeds to spot a potential threat, operators can improve their ability to recognize and act effectively when seconds count. HPE Edgeline Video Analytics Surveillance System (VASS) offers an alternative to storage appliances by extracting only changed data for storage and then rehydrating live video streams when needed. Since most information of value has already been extracted from the camera feed, less video data needs to be archived in the back-end (typically, only pre- and post-event). This greatly reduces the need for large storage appliances in the data center, resulting in a potential cost savings.

**HPE Edgeline VASS use cases**

**Active shooter incident**

<table>
<thead>
<tr>
<th>Stage 0</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
</tr>
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<tbody>
<tr>
<td>Event occurs that requires action</td>
<td>Event information is transmitted over wireless network</td>
<td>Event information is observed and monitored</td>
<td>AI analytics sends alert to first responders</td>
<td>First responders respond to threat</td>
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As shown in Figure 5, there are different components of the HPE Edgeline VASS solution that are key during various stages of an active shooter incident. Stage 0 is an event that requires action. HPE Edgeline VASS can be preconfigured to detect a wide range of activity. The most common detections are facial/object recognition, geofencing intrusions, crowd gatherings, and integration with various cameras and sensors.
Once the event or action has occurred, Stage 1 is the detection stage that is transmitted over a wired or wireless network and observed in Stage 2. AI analytics occur in Stage 3, and a reporting engine sends the alert to Stage 4. This stage is critical as it does not impact network traffic or require high-availability bandwidth to be transmitted to a central dispatch terminal.

Here are two examples of scenarios to consider:

**Example 1:**
Door sensor Stage 0 determines an outside entrance door is not secured, and notifies the school resource officer via an app on his/her smartphone with the location and video image. The school resource officer can monitor the entrance until the door is secured.

**Example 2:**
Geofencing action in Stage 0 has occurred, and images and live video are routed to the school resource officer for action. The assailant with a weapon has been spotted from action in Stage 0. The school resource officer is notified via an app on his/her smartphone, where he/she can view video images and live stream. He/she can take defensive action by closing and locking all doors in the building through an API call to the fire alarm, signal an alert to notify first responders, and respond to the threat.

**Architectural diagram**

Training of video analytics algorithms is an extremely computationally intensive task and needs access to large amounts of sample or historical video data for learning. Figure 6 displays a typical HPE Edgeline VASS. At the remote office data center, a dense and powerful system such as an HPE Apollo 6500 or traditional X86 rack/blade server is typically used for this task.
However, the system is designed to utilize existing compute and storage resources as well. Having the ability to utilize existing infrastructure, the trained model is then uploaded to edge analytics systems such as HPE Edgeline EL4000 Converged Edge System at a remote location, which runs the trained model in real time against the video data streams. It can then choose to selectively upload only video segments of interest or just the extracted attributes (for example, face, weapon objects, vehicle type, or geofencing alerts) across the edge. It may also be permitted to use the results of this analysis to take immediate (and typically time-critical) control actions, such as locking outside perimeter doors, closing and locking hallway and classroom doors, or triggering an alarm.

This edge processing of video results in excellent reaction latency, and selective video or attribute uplink reduces bandwidth demands and data risk. In the compute era, processing is not defined in terms of discrete systems and silos. To move your IT infrastructure in lock-step with your school security needs, the focus is on relentlessly driving the lowest cost, fastest time, and highest value of service delivery.

While the architectural diagram depicts a full end-to-end intelligent video analytics and security system architecture, this white paper focuses on evaluating just the performance and use case of HPE Edgeline EL4000. The analytics software of the HPE Edgeline VASS has already been trained and optimized to run the selected video analysis algorithms, and will analyze pre-recorded video streams for stable and repeatable benchmarking.

**Solution overview**

Video analytics is the perfect demonstration of the value of edge computing, as processing video near the camera eliminates the need to transfer large amounts of video data into the data center or cloud, reduces bandwidth costs, greatly accelerates reaction time, and lowers risk of corruption. HPE Edgeline Converged Edge Systems and NVIDIA Tesla P4 IVA enable rapid time-to-insight for video surveillance at the edge with AI capabilities. These hardware components can be coupled with well-designed ANN-enabled video analytics from a multitude of independent software vendors (ISVs) to make for a highly intelligent, performant, and cost-effective edge video analytics platform. Inclusion of HPE Aruba wireless connectivity will make it easy to scale this system from dozens of cameras to thousands, and industry-leading IoT security software, such as ClearPass and Niara, keep potential rogue edge devices and threats at bay.
Some items to keep in mind when designing an HPE Edge Video Analytics solution:

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<tr>
<th>Network type</th>
<th>Suspects database</th>
<th>Camera environment</th>
<th>Server and storage infrastructure</th>
<th>ISVs</th>
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<tr>
<td>- Internet connection speed and type (<a href="http://www.speedtest.com">http://www.speedtest.com</a>)&lt;br&gt;  - Download speed __________ Mbps.&lt;br&gt;  - Upload speed __________ Mbps.&lt;br&gt; - Local network speed&lt;br&gt;  - 10 Mbps/100Mbps/1000 Mbps</td>
<td>- Number of people in the database: XXX&lt;br&gt;  - Up to 10K or up to 50M&lt;br&gt;  - Average number of photos/videos per suspect:&lt;br&gt;  - Database structure (the name of the person, object or action; the name of the file; or the name of the folder?)&lt;br&gt;  - Known versus unknown&lt;br&gt;  - Watchlist&lt;br&gt;  - Different types of actions&lt;br&gt;  - Different types of objects&lt;br&gt;  - Format of the database:&lt;br&gt;  - Photos, videos, or both&lt;br&gt;  - Minimum face size:</td>
<td>- Number of cameras:&lt;br&gt;  - IP (digital) cameras:&lt;br&gt;  - Transport protocol:&lt;br&gt;  - Cameras resolution:&lt;br&gt;  - Camera brand:&lt;br&gt;  - Cameras location:&lt;br&gt;  - Cameras placement height:&lt;br&gt;  - Number of people expected in front of the cameras:&lt;br&gt;  - Lighting modes in the scene:</td>
<td>- Compute resources required:&lt;br&gt;  - Number of GPUs required per video stream&lt;br&gt;  - Storage resources needed:&lt;br&gt;  - Number of cameras:&lt;br&gt;  - Average image size:&lt;br&gt;  - Image rate (frames per second):&lt;br&gt;  - Days to store (archives and current day):&lt;br&gt;  - Hours recording per day:&lt;br&gt;  - Percentage of time with motion (100% if recording all images):</td>
<td>- You can find a sample online tool at: <a href="https://www.milestonesys.com/support/let-us-help-you/presales/support/Storage-Calculator/">https://www.milestonesys.com/support/let-us-help-you/presales/support/Storage-Calculator/</a>.</td>
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**System diagram and hardware requirements**

The objects caught in the camera’s field of view are translated in real-time into mathematical models, which are then compared to clients’ POI database. Recognition is done in no time, just as the human brain functions, with its results presented in the Better Tomorrow dashboard. There are four components required to support VASS: CCTV camera, edge video analytics processing servers, VMS recorder, data base storage, and client viewer stations.
HPE has created an edge solution for AI and hardware accelerated video analytics using a set of scalable building blocks and layers of various supported features. HPE is converging various features into a single platform and using scalable building blocks to provide the highest level of flexibility and convergence for a most efficient solution.

Each feature layer of the solution—for example the VMS, AI, or video analytics—operates independently on separate server cartridges within the same highly available and redundant chassis or set of chassis. Scalability of each server component is determined independently, based on the type of analytics or AI being performed, and the number of camera streams per server component. Each individual building block is optimized for each feature or analytics type within the solution to provide the highest level of hardware efficiency and performance possible.

**HPE Converged Edge Systems—a new product category**

HPE Converged Edge Systems—a new industry product category pioneered by HPE—is purpose-built for converging real-time data acquisition, control, enterprise-class analytics at the edge, and remote manageability. HPE Edgeline is the industry’s first product in this category. These compact, energy-efficient, ruggedized platforms have a broad range of network connectivity and data acquisition or control options to accommodate almost all edge video processing use cases. Chassis type, number of servers, number of NVIDIA® GPUs, number of CPU cores, memory, and storage can all be tailored to fit the precise number and quality of video feeds and intensity of analytics needed.

**HPE Edgeline Converged Edge Systems**

The HPE Edgeline EL1000 Converged Edge System accommodates two NVIDIA GPU cards and one server cartridge, such as the powerful HPE m510 incorporating up to 16 Intel® Xeon® cores, 128 GB RAM, up to 2 TB of blazing fast NVMe SSDs, and a dual-port 10GbE NIC. It can fit 2 PCIe full-height, half-length (FHHL) cards—such as the NVIDIA Tesla P4 used in this test—and 2 SFF SATA drives, and support a variety of wireless connection options, (e.g., Wi-Fi, LTE). It is ruggedized to operate in harsh environments across a temperature range of 0°C (32°F) to 55°C (131°F). See HPE EL1000 quick specs at www.hpe.com/info/edgeline.

The HPE Edgeline EL4000 Converged Edge System accommodates multiple NVIDIA GPU cards, up to four independent server cartridges, including the HPE m510 servers, giving an impressive 64 Intel Xeon cores, 512 GB memory, 8 TB of SSDs, and 8 10GbE ports in a slim 1U form factor. It can accommodate NVIDIA Tesla P4 cards, each connecting to one server cartridge, for an incredible amount of processing power to quickly run the most demanding video analytics algorithms at the edge. Dual-redundant power supplies, ruggedized (up to MIL-STD through HPE partners), and the backing of industry certifications such as NEBS Level 3, make this a highly reliable system. This is on par with server equipment used by telcos and other mission-critical operators. Both the HPE Edgeline EL1000 and EL4000 support several mounting options to fit any environment—be it a rack, wall, desk, or even within customer equipment.
HPE ProLiant m510 server cartridge: The HPE ProLiant m510 server cartridge is designed to enhance the performance of many general purpose workloads. The HPE ProLiant m510 server cartridge has one Intel® Xeon® D-1548 (8-core) or D-1587 (16-core) with up to 128GB of ECC protected memory, dual 10Gb ethernet along with up to 2 (1TB NVMe each) M.2 flash storage modules, and up to one 240GB SATA M.2 for local OS booting. This is used as the compute engine for the EL1000 and 4000 systems.

HPE ProLiant m710x server cartridge: The HPE ProLiant m710x server cartridge is designed to enhance the performance of video transcoding and HPC workloads. The HPE ProLiant m710x server cartridge has one Intel® Xeon® E3-1585L v5 (4-core) with up to 64 GB of ECC protected memory, dual 10Gb Ethernet along with up to four (1TB NVMe each) M.2 flash storage modules, and up to one 240GB SATA M.2 for local OS booting. This is used as the compute engine for the EL1000 and 4000 systems.
NVIDIA GPUs and Intelligent Video Analytics

NVIDIA Tesla GPUs and Intelligent Video Analytics (IVA) are powered by the revolutionary NVIDIA Pascal™ architecture. NVIDIA Tesla P46 is purpose-built to boost compute efficiency for scale-out servers running deep-learning workloads, enabling smart, responsive AI-based services. It slashes inference latency by 15X in any hyperscale infrastructure and provides an incredible 60X better energy efficiency than CPUs. This unlocks a new wave of AI services previously impossible due to latency limitations.

Traditional machine learning uses handcrafted feature extraction and modality-specific machine-learning algorithms to label images or recognize voices. However, this method has several drawbacks in both time-to-solution and accuracy. Today’s advanced deep neural networks use algorithms, large video or streaming data, and the computational power of the GPU to change this dynamic. Machines are now able to learn at a speed, accuracy, and scale that are driving true AI and AI computing.

AnyVision Better Tomorrow

Better Tomorrow by AnyVision is an advanced state-of-the-art tactical surveillance platform powered by cutting-edge artificial intelligence, deep learning and deep neural networks. Better Tomorrow enables real-time and post-analytic face and/or body recognition on-demand in videos and photographs, both on-premise or in the cloud. Better Tomorrow can work with any camera feed or prerecorded video on your existing hardware. It is a simple-to-use, plug-and-play, scalable system that is compatible with GDPR regulations.

Better Tomorrow Key Features

- **POI ENROLLMENT**: Enroll/delete Persons of interest (POIs) by image, directly from live or pre-recorded video or by rule.
- **FORENSIC**: Analyze video from files or from VMS (runs up to 20x faster), as well as still photos with multiple people.
- **SEARCH BACKWARDS**: Search for suspects backward through all connected cameras and display detections in a timeline.
- **WATCHLIST**: Create a POI database by uploading single or multiple images or adding existing detections to the watch list.
- **ALERT**: Define an alarm type (visual, sound or silent) and get an alert whenever a person in the watch list is recognized.
- **GROUPS**: Create suspect groups and define their label, color and alert type.
- **SEARCH, TRACE & DELETE**: Set automatic deletion rules and customize deletion options.
- **FACE-BLUR MODE**: Obscure all non-involved faces in the field of view automatically.
- **PRIVACY MODE**: Capture and present faces of pre-defined individuals only.
- **WHITE LIST**: Create a whitelist camera group or add a camera/suspect to an existing whitelist.
- **CAMERA MANAGEMENT**: Set camera for face or body detection.
- **TRACK SUSPECT**: Trace a suspect through all the appearances in different cameras.
How does Better Tomorrow work?

Better Tomorrow Stages
The Better Tomorrow facial recognition process has four stages – detection, feature extraction, tracking and recognition.

• Detection – During the detection process, the Better Tomorrow platform divides the frame into a grid and starts looking for a face or a body (according to your settings).

• Feature extraction – Once the face or body is detected, a mathematical model of its features is extracted.
• **Recognition** – The platform uses this model to search your database for persons of interest (POIs) and to indicate matches by creating an alert. This process happens simultaneously in a multi-camera environment on all faces and bodies in each camera’s field of view.

• **Tracking** – The detection process (described above) is repeated in each subsequent frame, thus creating a track. This enables the system to detect people even in extreme video conditions, such as high contrast, profile view, low resolution and even people in disguise.
Better Tomorrow Flow

1. **Video input** – Live camera feeds or Video Management Systems (VMSs) are connected to the Better Tomorrow platform. Offline video files and images can also be uploaded to the dashboard.

2. **Defining POIs** – The Better Tomorrow dashboard enables a user to easily define a watchlist of detected faces and/or bodies as suspects or POIs, which are stored in the Better Tomorrow database. Better Tomorrow enables you to upload a single image of a person, multiple images for the same person or large batches of multiple images for multiple people. Better Tomorrow also enables you to define a white list of authorized people, so that you can automatically trigger actions, such as opening doors. More information about this feature is provided in the Better Tomorrow Access Control User Guide.
3. **Real-time detection and recognition** – As video is streamed into Better Tomorrow:

- The Better Tomorrow Neural Network Engine analyzes it on-the-fly.
- Better Tomorrow automatically and immediately detects POIs and displays alerts in the Better Tomorrow dashboard.
- All detection data is stored in the Better Tomorrow database.

4. **Forensic analysis** – Better Tomorrow enables you to upload offline video files and VMS input for analysis in order to detect faces and to determine whether specific POIs appear in the video.
5. **Search** – Better Tomorrow enables you to perform retroactive searches of the detections stored in the Better Tomorrow database. A variety of options are provided for retroactively searching the database, such as to upload an image and search for that person, to find all the detections within a specific time range and more.

![Search interface](image)

6. **Report export** – Better Tomorrow enables you to export reports showing relevant POIs in a PDF.

7. **Privacy regulations** – To ensure that the data is processed in the form of an irreversible mathematical expression, AnyVision has developed unique features designed to assist the data controllers to comply with GDPR requirements:
   - Privacy mode – captures and presents only faces of pre-defined individuals.
   - Face-blur mode – automatically obscures all not-involved faces in the field of view.
   - Complies with the GDPR
**Supported file formats**

The following are some of the image and video formats supported by Better Tomorrow. For a full list of image and video formats and codecs supported by Better Tomorrow, refer to www.anyvision.co.

- Image formats: jpg, jpeg, png, bmp, tiff
- Video formats: mp4, avi, mkv, mov, m4v, flv

**Why HPE?**

As a leader in the industry, HPE brings together hardware, software, and services to harness all your relevant data and deliver insights through massively parallel processing and data management. HPE delivers a converged platform to provision, deploy, automate, monitor, and proactively scan all video feeds to alert when a known or unknown threat is present.

**Improve overall surveillance operations**

HPE Edgeline VASS easily integrates into any existing security infrastructure, which elevates its effectiveness in helping the security team spot and react to suspicious activities and/or personnel:

- Minimizing the risk of disruptive false alarms
- Shortening response time
- Automating real-time analysis of video, audio, and text data and performing data fusion to deliver holistic intelligence
- Enabling activity profiles and alerts to achieve intelligent workflow

**Scene analysis**

While no real event should be missed, our technology can help prioritize attention and reduce the risk of missing high-probability incidents with an easy-to-use and extremely flexible configuration tool. This tool enables operators to define what they are looking for, and uses a self-learning algorithm to reduce false alerts over time.

**Facial and object recognition**

Detect suspicious activities associated with a person of dubious background and identify if a weapon or threat exists.

**Holistic situational awareness**

Automatic setup and alerting to events provide the ability to combine both structured and unstructured information for a more complete picture.

**Federated architecture**

Monitor and operate CCTV cameras and alarms at both local unit levels and at a centralized command center across multiple facilities.
Credentials

HPE is an IT solutions supplier for European and global security and intelligence agencies. We cover a wide range of sectors with our HPE Big Data platform.

Reference customers

Our clients include national ministries of defense, intelligence agencies, police departments, and international governmental agencies. Due to their sensitive nature, more details can only be provided on an individual basis.

Conclusion

Providing security in today’s K-12 education systems should include new forms of technology which allow first responders to gain critical insight on situations in real time. HPE Edgeline, together with AnyVision, provides an added layer of security protecting our children, students and teachers. K-12 institutions have been recording video for more than 15 years. It’s time we harness video analytics at the edge.

HPE has done just that by using a set of scalable building blocks and tightly integrated layers of various supported features within the HPE Edgeline Converged Edge System; a solution for video management, AI, and hardware-accelerated video analytics. Converging various types of features into a single platform and combining with scalable building blocks provides the highest level of flexibility and convergence for a most efficient solution. Furthermore, the ability to store high volumes of IP video surveillance data efficiently is critical for the overall performance and reliability of the surveillance solution.

For more information on HPE Edgeline or our work in public sector, please visit www.hpe.com/info/edgeline and www.hpe.com/info/public-sector.

Resources

Sources:

History of Active Shooter Mass Casualty
https://guardiandefenseplan.com/active-shooter-statistics/

Number of deaths and top 10 shooter incidents.

Parkland time line

Accelerated Edge Video Analytics - Overview

HPE Edgeline Converged Systems

Milestone Storage Calculator (JPEG)
https://www.milestonesys.com/support/let-us-help-you/presales-support/Storage-Calculator/
Seven Reasons Why We Need to Compute at the Edge
https://news.hpe.com/7-reasons-why-we-need-to-compute-at-the-edge/

NVIDIA Tesla P4 Datasheet

AnyVision Better Tomorrow
www.anyvision.co

HPE Converged Edge Systems Video Analytics and Management Solution (June 2018):
https://support.hpe.com/hpsc/doc/public/display?docid=emr_na-a00049981en_us

Delivering Accelerated Video Analytics at the Edge for AI Cities (early 2018):

Learn more at www.hpe.com/edge and
www.hpe.com/info/public-sector