

Milestone Leverages Intel® Processors with Intel® Quick Sync Video to Create Breakthrough Capabilities for Video Surveillance and Monitoring



Executive Summary

Milestone Systems, the world's leading provider of open platform Internet Protocol (IP) Video Management Software (VMS) and solutions, recently released the latest version of its XProtect* VMS. XProtect provides simultaneous recording and viewing of streams from a single camera to tens of thousands of cameras. This new software version leverages Intel® Quick Sync Video integrated into select Intel® processors to fluidly display video at full HD (1920x1080 pixels 25/30 frames per second) from as many as 25 cameras at the same time on a cost-effective, single-socket, four-core client PC powered by a high-end Intel® Core™ i7 processor. That's equivalent to showing 25 Blu-ray* movies at the same time on one or more monitors without dropping a single frame. The solution can also support multiple 4K Ultra High Definition (UHD) cameras with fluid video at 25/30 frames per second. This paper describes the technology behind the solution and the accomplishments of Milestone together with Intel to deliver this innovative platform.

Challenges of Large Video Monitoring Installations

Video Monitoring Demand on the Rise

Video surveillance and monitoring deployments are growing across industries, including public safety, healthcare, land and wildlife management, retail, manufacturing, and others. Milestone Systems, the world's leading provider of open platform Internet Protocol (IP) Video Management Software (VMS) and solutions, is no stranger to the diverse needs of these customers. Milestone provides video surveillance and monitoring solutions for companies around the world with users managing from a few to thousands and tens of thousands of cameras per installation.

For operators to simultaneously view multiple video streams using a Milestone software-based solution, the data from various cameras is relayed through Milestone video recording servers to its XProtect Smart Clients running an Intel processor with Intel Quick Sync Video. Intel Quick Sync Video uses the dedicated media processing capabilities of Intel® Graphics Technology to make media processing, and video creation and conversion fast and easy. It is integrated in all Intel® processors with Intel Graphics Technology. The Intel technology accelerates video decoding for the monitors. Customers expect the resulting visual content to be fluid, clear, and

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without dropped frames at the camera resolution—Standard HD (1280x720), Full HD (1920x1080), and even 4K UHD (3840x2160).

The Challenges of Software Decoding

Each H.264 video stream to be displayed in the viewing monitor must be decoded by the processor (CPU), which consumes considerable processing cycles. CPU utilization can be overloaded with each additional camera video stream or increase in camera resolution (from HD to Full HD or UHD) to be displayed. Demand across video surveillance and monitoring customers for 4K UHD cameras is growing, putting incredible loads on monitoring systems.

An overloaded processor causes the display of jerky video with less than optimal clarity. The result is customers must purchase larger and more expensive systems to monitor a given number of

cameras (i.e., increased cost). Capitalizing on Intel Quick Sync Video, Milestone was able to dramatically reduce processor utilization and display more video streams while improving fluidity and clarity.

Increasing Video Decoding Performance with Intel Quick Sync Video

XProtect VMS Expands System Capabilities

Select Intel processors that include Intel Quick Sync Video, use the dedicated media processing capabilities of Intel® Graphics Technology to efficiently decode H.264 video streams, freeing the processor to complete other tasks.

Leveraging Intel Quick Sync Video, Milestone enables operators to simultaneously view significantly more H.264 video streams than without enabling Intel Quick Sync Video.

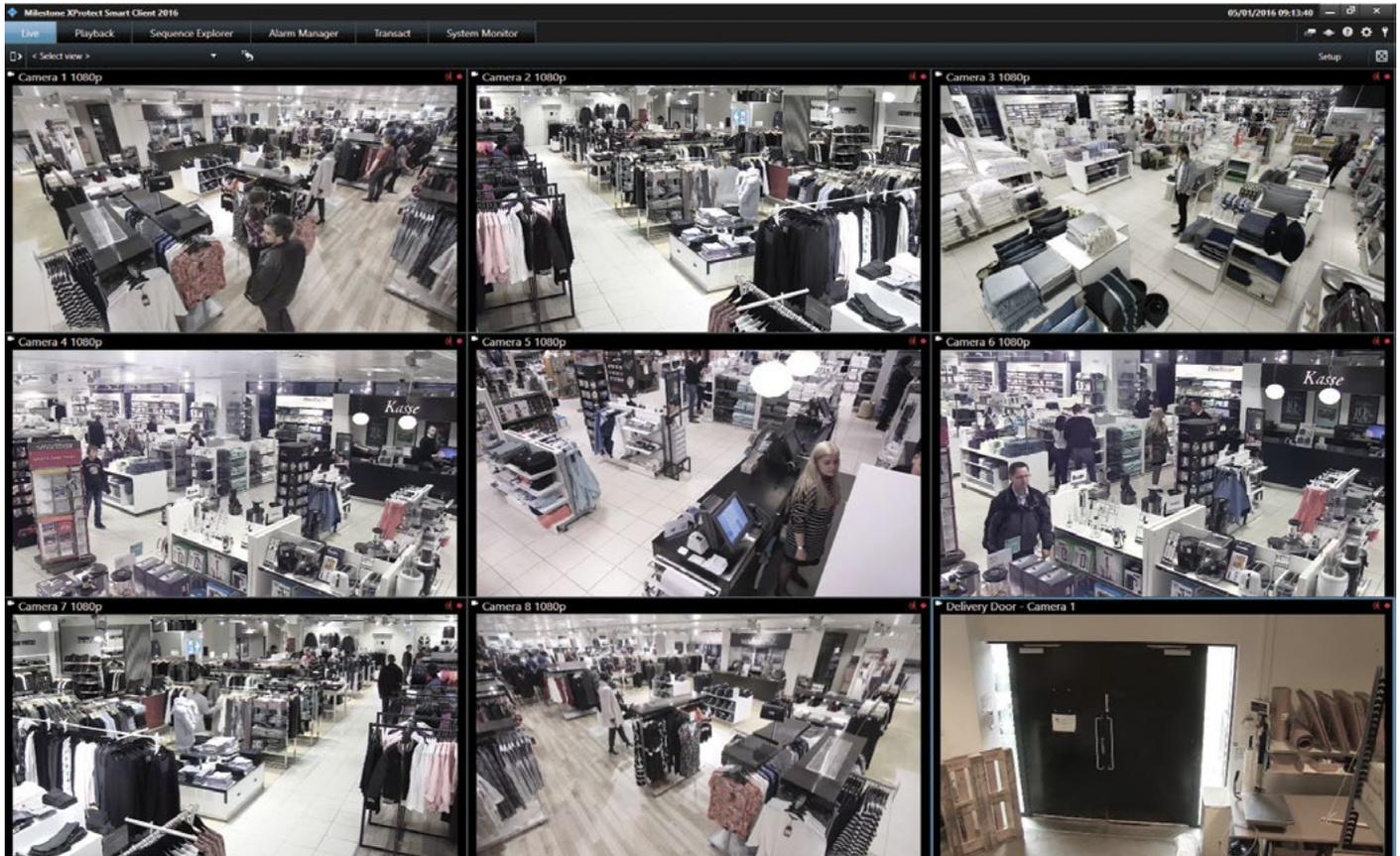


Figure 1. Monitoring multiple cameras in a retail application with XProtect* Smart Client.

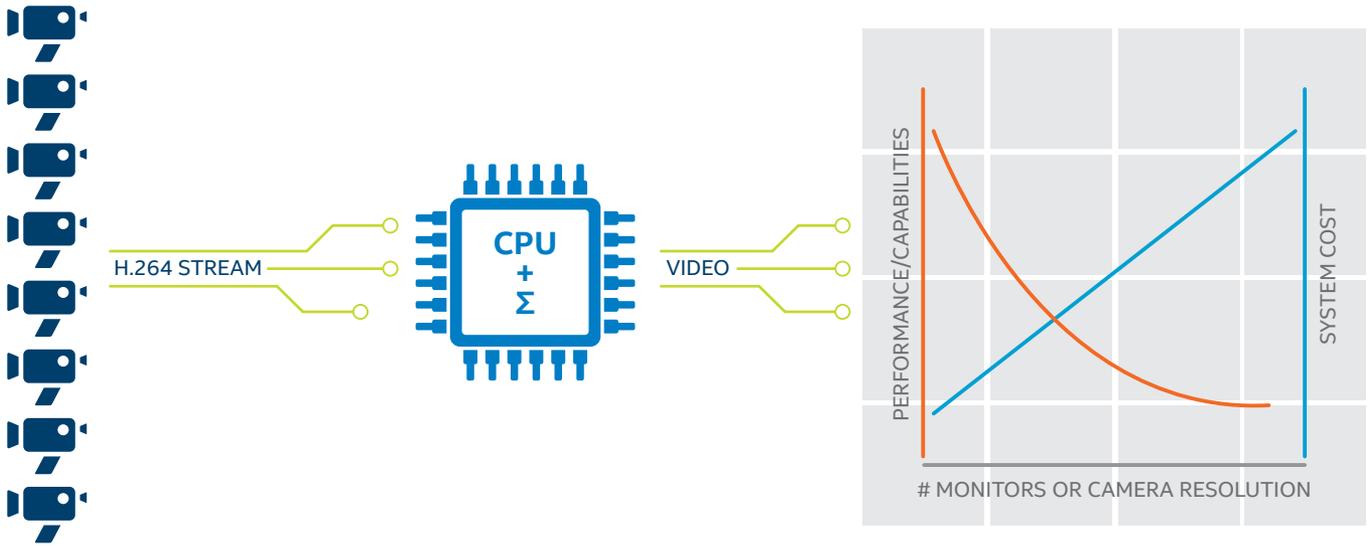


Figure 2. Software decoding impacts performance/capabilities and cost.

In recent testing, Milestone engineers displayed up to 25 Full HD (1920x1080) video streams at 25 frames per second (FPS) using one client PC powered by a single, four-core Intel Core i7 processor. That’s equivalent to watching 25 Blu-ray movies at the same time on a monitor without dropping frames. By leveraging Intel Quick Sync Video (and the Intel video libraries), Milestone customers benefit from either lowering the cost of hardware to meet their monitoring needs, or increasing the number of cameras or camera resolution and monitors they can use simultaneously.

TABLE 1. CPU LOAD HIGHLIGHTS^{1,2}

Cameras @ 25 fps	CPU LOAD (%)	
	Software Decode/XProtect Smart Client 2014 (9.0c)	Hardware Decode/XProtect Smart Client 2016 (10.0a)
25, 720p	99	26
10, 1080p	95	15
1 4K UHD	23 with 10 out of 30 frames dropped	15, no dropped frames

TABLE 2. TEST HARDWARE CONFIGURATION

Component	Specification
CPU	4th generation Intel® Core™ Processor i7-4790K
GPU	Intel® HD Graphics 4600 plus external rendering card
Memory	16 GB
Monitor Resolution	Full HD 1920x1080 pixels; 4K UHD 3840x2160
Network	1 Gbps Ethernet
OS	Windows* 8.1

Benchmarks Show Improved Performance

Milestone engineers compared the performance of XProtect Smart Client running with and without Intel Quick Sync Video enabled to evaluate how much using Intel technology benefited the new software. The results were dramatic (Table 1), indicating an 84 percent reduction in CPU utilization consumed by decoding the same number of H.264 video streams when Intel Quick Sync Video was enabled. Figure 3 shows CPU utilization and frames per second across multiple cameras and resolutions.

Without Intel Quick Sync Video, CPU load rises with more cameras or increased resolution, which quickly results in lower frame rates and causes dropped frames. Decoding in the silicon with Intel Quick Sync Video is faster than software, allowing more simultaneous video streams with full image clarity. Figure 3 shows that this system configuration can support the simultaneous viewing of the following H.264 streams without any dropped frames:

- 49 simultaneous HD 720p streams
- 25 simultaneous Full HD 1080p streams
- 4 simultaneous 4K UHD streams

A client PC with newer Intel processors could increase the system's capability to simultaneously display an increased number of H.264 video streams. More cameras enable operators to expand the coverage of their monitored environment, such as the following (among others):

- More cameras in and around the police station
- More critical patients watched in the hospital
- Better protection against poachers in wildlife refuges

Alternatively, companies with installations needing a fixed number of cameras can potentially reduce the requirements—and thus the cost—of their monitoring solution.

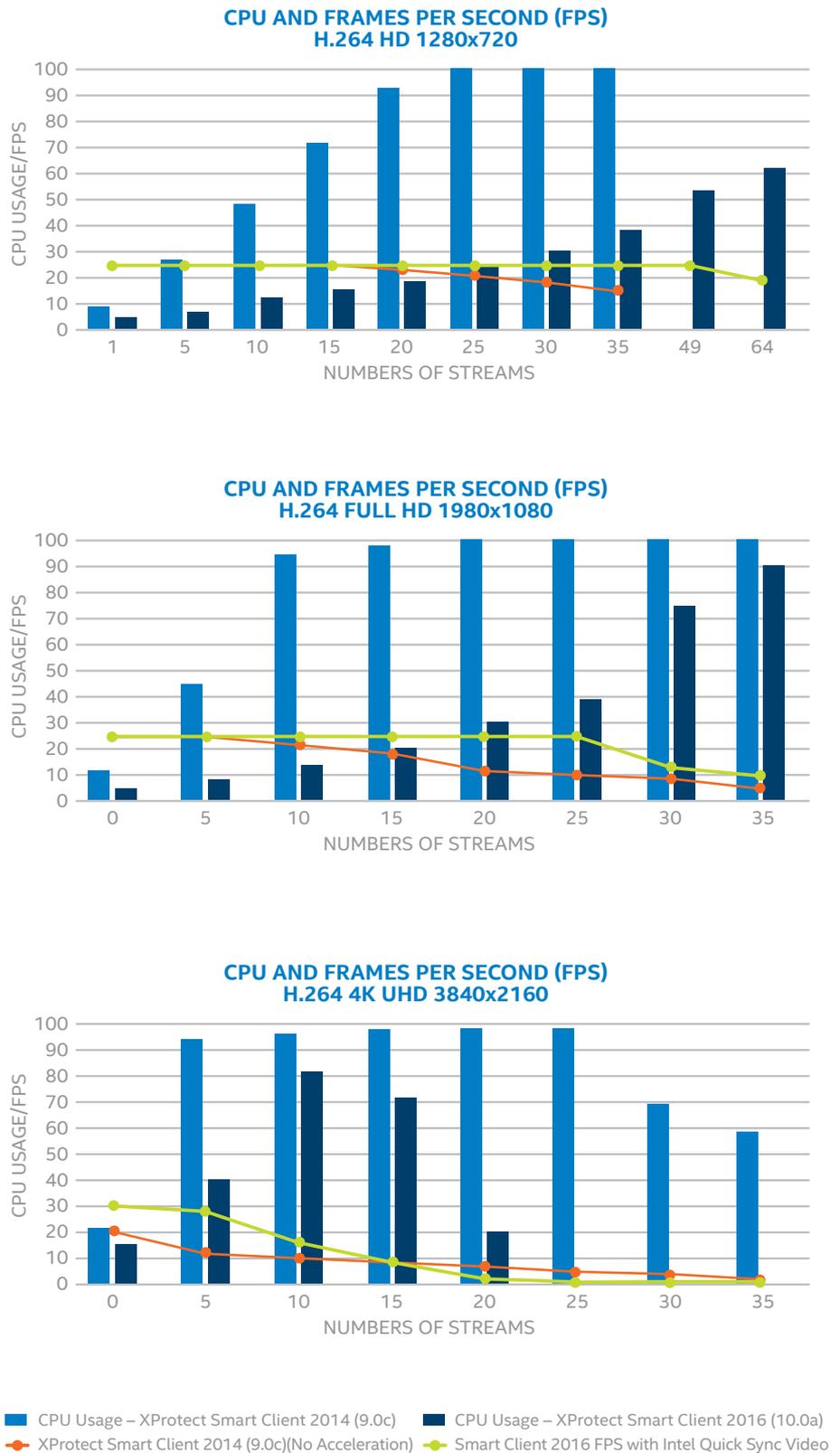


Figure 3. Benchmarks show the benefits of Intel® Quick Sync Video.

4K UHD in Demand

An increasing number of installations require 4K UHD camera support. For monitoring large environments, such as city surveillance, critical infrastructures, wildlife reserves, etc., the 4K UHD image covers a lot of area, while retaining fine details at higher zoom levels. Thus, while the image the operators watch might be on a relatively small screen, the 4K UHD stream affords an operator to zoom into a specific area of interest without losing image quality on the display. It's critical that the VMS and the VMS clients are able to decode and display multiple 4K UHD cameras at the standard frame rates of 25/30 frames per second as Milestone software does.

A Successful Collaboration with Intel

Milestone software and solutions are built around an extensible, flexible architecture, allowing customers many choices when specifying the components of the system they need. There are thousands of IP Camera vendors globally that support the H.264 video standard.

Milestone has developed dedicated drivers for over 4500 IP cameras, as well as supporting ONVIF and PSIA standards. However, H.264, while a standard, offers many options, and camera providers vary widely across the ecosystem of which options of H.264 their cameras use.

Early versions of the Intel Quick Sync Video library supported fewer H.264 options than it does today. To fully take advantage of the Intel technology while supporting the wide range of available cameras supported by Milestone XProtect VMS, more H.264 options needed to be supported in Intel Quick Sync Video libraries. Thus, Milestone and Intel engineers engaged in a multi-year, joint engineering project to enable the new capabilities in their products. Milestone had considered other graphic technology providers, but Intel's flexibility and interest in expanding the capabilities of their technology ultimately led to the collaboration and a successful achievement of creating high-performance, highly capable video monitoring solutions based on Intel processors with Intel Quick Sync Video and Milestone Video Management Software.

Conclusion

The demand for video surveillance for security and video enablement for business applications is increasing globally, and Milestone Systems provides solutions for many of the largest deployments. Costs and capabilities of these installations depend on the performance of the underlying IT infrastructure system hardware to ensure reliable decoding to view an ever increasing number of video streams with increasing resolution from 720p to 4K UHD. Milestone Systems' XProtect Smart Client 2016, running on Intel processors with Intel Quick Sync Video, have shown they can easily support a large number of simultaneous camera streams (from 720 to 4K resolution) with a single client PC based on a single, four-core Intel Core processor. This breakthrough achievement was possible through a close collaboration between Intel and Milestone Systems. The significant advancement in performance enables Milestone customers to increase their monitoring capabilities or reduce system costs, while meeting their needs with a sophisticated, high-performance monitoring solution.

For more information about Intel Quick Sync Video, visit [the Intel Quick Sync Video web page](#).

For more information about Milestone Systems VMS, visit [XProtect Software Suite web page](#).

¹ Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

² Configurations: See Table 2. For more information, go to <http://www.intel.com/performance>

Intel does not control or audit the design or implementation of third party benchmark data or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Web sites or others where similar performance benchmark data are reported and confirm whether the referenced benchmark data are accurate and reflect performance of systems available for purchase.

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