



Technological Advancement: Waiting for the Next Big Innovation

From a technological perspective, the surveillance industry benefited from growing capabilities in computing

power, recording, and storage allowing manufacturers to roll out continuously improving models with better image quality, capturing more and more details such as facial features and license plate numbers.

The major innovation of the last few years was the introduction of the HD megapixel camera by Avigilon and IQinVision (which merged with Vicon Industries in 2014), followed by other manufacturers. Megapixel adoption is now wide scale with offerings even in the low-end market with cheap versions being sold in big-box retailers and online. The industry kept offering higher pixel counts and also higher resolutions over the years with 4K cameras being first introduced in ISC West in 2014 by Axis, Arecont Vision, Bosch, Sony and others.

“The past eight years have seen many technological breakthroughs for security, including the transition from SD to HD, HD to Full HD, and now to 4K. It is not only about the resolution, but also other innovations in imaging such as wider dynamic range, and greater sensitivity from sensors,” said Riki Nishimura, GM for Visual Security Solutions for Professional Solutions Company in APAC at Sony Electronics.

Another technology that became



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more prominent in recent years is mobile security management, which gained popularity together with the proliferation of smartphones and tablets. The ability to monitor video footage from a mobile phone or tablet is in demand and many manufacturers have added this capability to their offering. “The desire for constant connectivity and the demand to push video and data anywhere in the world at real-time speeds necessitated the build-out of the entire supporting infrastructure,” explained Charlie Erickson, VP of Product Management at 3xLOGIC.

HD-OVER-COAX TECHNOLOGIES

Several years ago, price was the main obstacle in switching from analog to IP systems. However since then the price of IP systems has gone down, their quality improved, and the adoption rates of IP video went up. Nonetheless, analog systems are still here and improving their quality.

HD-over-coax solutions are a serious contender for IP video and have made a big impact on the market in the past years, allowing users to get HD quality images and at the same time take advantage of lower pricing, easier installation (HD-over-coax does not require

any network configuration), and reusing of existing coaxial cabling.

The various HD-over-coax solutions which include HDCVI, TVI, and AHD, hail from Asia and are spearheaded by companies such as Dahua Technology, Hikvision Digital Technology, and other adopters of AHD. The competition among the various HD-over-coax products started from Dahua's HDCVI, which was introduced to the market in 2012. Then, in the next few years, other solutions joined in. HDCVI and TVI have become influential in the lower end of the market, where their price and easy installation make them very attractive. However, other solutions, such as HD-SDI and cHDtv, remain available in the niche markets and applications.

VIDEO ANALYTICS: WINNER TAKES IT ALL?

The early strides of video analytics in the security industry have not been successful. Video analytics were prone to false alarms and problematic detection rates. In addition, over the past eight years, legal disputes have also set back the pace of its development. In 2011 ObjectVideo (OV) filed a series of lawsuits against Bosch, Samsung, and Sony and also sued Pelco later on. In March of 2012, OV issued an "IP amnesty program" which many viewed as an attempt to try and intimidate manufacturers to pay a licensing fee or be sued by OV. The reason for the lawsuits, as put forth by OV's CEO, was to get return on the investment put into the company's intellectual property. Some companies such as Sony and Tyco agreed to pay OV, whereas Samsung went to court and won. These legal disputes held back the development of video analytics as companies



Larry Bowe, President and CEO, PureTech Systems



Jumbi Edulbehram, Regional President, Americas, Oncam Grandeye



Charlie Erickson, VP, Product Management, 3xLOGIC



Dr. Sadiye Guler, CEO, intuVision



Riki Nishimura, GM, Visual Security Solutions, Professional Solutions Company, APAC, Sony Electronics



Julian Rutland, European NVS Marketing Director, Canon Europe

didn't want to take the risk of getting sued.

In December 2014, Avigilon bought OV's patent portfolio as well as its licensing agreement, surprising the security industry. This move is of big significance since Avigilon now controls the major patents its competitors must use if they wish to use video analytics in their cameras. This is not the only IP related deal involving Avigilon. It was preceded by Avigilon acquiring VideoIQ in 2013. In addition, following the OV acquisition, Avigilon further acquired video analytic patents from BRS Labs, FaceDouble, ITS7, and Video Mining in January 2015.

Avigilon is not the first company to get control of analytic-related IP. In 2010 DVTel acquired video analytics company ioimage with the intention of integrating its IP and delivering a unified end-to-end solution.

VIDEO ANALYTICS DELIVERING BEYOND SECURITY

As video analytics continued to mature and stabilize, they have become more common over the course of the years. "The advances in supporting technologies such as proliferation of IP cameras and establishment of video streaming standards were key catalysts for the adoption of video analytics to enhance security," said Dr. Sadiye Guler, CEO of intuVision.

A noteworthy development in the field of video analytics is their use beyond security. "Video analytics have made it possible to review large amounts of video rapidly, get timely alerts on possible threats, and use video infrastructure for business intelligence," said Jumbi Edulbehram, Regional President of Americas for Oncam Grandeye. Video analytics are now used for business intelligence and improving operations in many sectors from retail to oil and gas, performing people counting, heat mapping, queue monitoring, etc.

"The rise of video analytics has been revolutionary to the video surveillance industry. This has facilitated the development of more sophisticated, versatile platforms which allows end users to gather data on and analyze a breadth of factors beyond security and within their business," said Julian Rutland, European NVS Marketing Director of Canon Europe.

The added value of having greater knowledge of customer trends and demographics is immensely important for marketing and there are now many offers that allow retailers to gain more insight regarding their floor operations.

"In the early days, cameras with video motion detection could simply detect if an intruder was there or not, however the latest systems can provide much more information about customer behavior from counting numbers, to analyzing what path they take and which goods they take an interest in. The latest analytics systems are much better at dealing with crowded conditions and users can find out reliably how long people are standing in a queue and, maybe more importantly, how many get fed up and walk off before being served," explained Geoff Thiel, CEO for VCA Technology.



NO "NEXT BIG THING"

Following the introduction of megapixel technology, the surveillance industry hasn't experienced any successful major innovations in the past few years. Instead, there has been a series of ongoing technological improvements.

Commoditization and the growing influence of Chinese manufacturers have driven prices down. Furthermore, differentiation between manufacturers is lacking. As a result, each year the surveillance industry looks as "more of the same" without new technologies or products.

Innovation in the security



Bodil Sonesson,
VP, Global Sales, Axis
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Geoff Thiel, CEO, VCA
Technology

industry is problematic; the market in general is conservative and doesn't quickly adopt new technologies. For systems integrators and installers, integration issues with existing legacy systems, and with other subsystems such as access control, alarms and others are still difficult. In addition, external bottlenecks from end users, such as tight budgets, also hinder adoption of new technologies.

The lack of innovation is also evident in the mergers and acquisitions (M&As) in the surveillance market. Many of the M&As that took place in the past few years were between well established companies, another indication that the industry is mature and lacking in innovation. In an innovative industry there would have been more acquisitions of start-up companies by larger companies.

One exception is the video analytics industry. Successful integration and implementation of video analytics, as well as the introduction of more business-intelligence driven analytics, can be the differentiator that will give manufacturers a competitive edge in a time where equipment prices are dropping and manufacturers deliver similar products. Which manufacturer will be successful in doing this is yet to be seen.

Commoditization and Technology Convergence Drive the Industry Shuffling

Several trends are evident in the industry's development over the past few years. The main ones are the rise of Asian manufacturers, a focus shift from providing products to providing solutions, and the recent wave of industry consolidation in the form of several M&A deals.

One of the outcomes of the global financial crisis of 2008 to 2009 was pushing buyers into looking for cheaper options for their security needs. This growing price sensitivity cleared the stage for Asian manufacturers, especially from China, to take lead in the global market. "I think to some



Eric Fullerton, CEO and
President, Vicon Industries



David Ly, Chairman and
CEO, Iveda

degree it helped accelerate the success of the Asian manufacturers since customers became more price sensitive due to reduced security budgets which forced them to look 'out of the box' at Asian manufacturers," mentioned Justin Schorn, VP of Product Management at Aimetis.

Out of the Asian manufacturers, Dahua and Hikvision are the two companies that have taken center stage in terms of market share. According to IHS, these two companies have the largest market share in a highly fragmented industry. Hikvision has a market share of close to 16.3 percent as of this year and Dahua 5.6 percent as of 2014.

At the same time, the price of new technologies such as IP cameras was dropping, creating a commoditization wave in cameras and surveillance equipment. This influenced more sophisticated sensors (e.g., thermal cameras) which were previously too costly for most installations. "Significant cost reduction and technological improvement allowed thermal cameras to produce excellent images 24 hours/day without getting washed out during the daytime, have made thermal cameras with video analytics a commonsense choice for protecting commercial sites," said John Romanowich, President & CEO of SightLogix.

The commoditization of equipment and the growing computing

power were also influential in peripheral equipment. “For example storage prices have dramatically come down, thus enabling longer video retention times while simultaneously leveraging higher image quality,” added Schorn.

SOLUTION-ORIENTED APPROACH

The commoditization and dropping prices of security equipment mean that manufacturers can no longer differentiate themselves based solely on price or technical features and specifications. In the meantime, the advent of IP cameras and the ability to integrate them with other systems opened up the possibility to “tailor” specific solutions for different verticals. Small-to-medium-sized companies are striving to differentiate themselves through specialization in specific niches and market verticals.

More companies are now offering an end-to-end video surveillance solution offering both software and hardware. Surveillance companies are also branching out into other product sectors, offering both video surveillance and access control. VMS companies such as Genetec and Milestone Systems and manufacturers like Axis offer both video and access control solutions; other video surveillance companies acquire access control companies.

INDUSTRY CONSOLIDATION

With all these changes in the industry, it seems natural that video surveillance companies need to look for more resources in order to grow. Therefore, the industry consolidates with more M&A activities (See pages 28 to 29 for a timeline of major M&As from 2007 to now).

These new M&As also bring



John Romanowich,
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Zvika Ashani, CTO, Agent
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uncertainty to the industry. In some cases former suppliers have become competitors, in other cases, an open platform is now owned by a manufacturer. The existing ecosystem of partner alliances is no doubt going to change as the newly merged companies start rolling out their new offerings.

Our interviewees pointed to several possible outcomes of these M&As:

“I believe that a lot of companies that have consolidated will demonstrate traditional proprietary behavior and try to lock up their customers in their proprietary solutions while still claiming they are open. We may see that you have to buy a full solution from one vendor in order to get the maximum benefit of their solution, such as optimized recording servers. I strongly believe that there is a need for end users to have a market that drives towards fully open standards to deliver solutions that are state-of-the-art and give the end user freedom of choice to select what elements of a solution they need,” said Eric Fullerton, CEO and President of Vicon Industries.

David Ly, Chairman and CEO of Iveda, sees another possible result of the consolidation. “Future of consolidation may mean standardization of technology on a global scale. All will want the same, such as what happened with the smartphone. With that standard, delivery will come from those who have that market reach that can serve mass markets,” he said.

According to Bob Banerjee, Senior Director of Global Training and Knowledge at NICE Security, M&As are not necessarily the best path for businesses to pursue, especially in a commoditized industry.



Banerjee places an emphasis on vertical-specific cooperation. "I have seen technical alliances to solve vertical-specific challenges and this creates a micro-ecosystem where the manufacturers, integrators and consultants thrive. I think careful, deep alliances have a greater chance to impact our industry than

acquisitions," he said.

Some commentators view these acquisitions as a response to growing competition with Chinese manufacturers. The growing competition from Chinese manufacturers forces hardware-only manufacturers to look for new offerings that can compete in a highly commoditized product market. This could be one of the motivations for the M&As mentioned earlier, allowing manufacturers to broaden their offering by pooling together hardware and software.

Cloud Technologies, Big Data Analytics, and Cyber Security

Increasing cloud storage options and big data analytics are two of the most mentioned future developments that will affect the video surveillance industry, and will change technology as well as business models.

Today, most security related software is installed locally on dedicated servers. This is a major barrier in terms of cost and complexity and also the ability to provide end users with the latest feature sets. "We see a significant shift into cloud-based models which will remove these barriers. The cloud model will be both public and private depending on the user preference and regulatory requirements. In the future, the only hardware that will need to be installed on site will be the cameras, and possibly some storage, whereas everything else will be located in a cloud data center. This will also converge with the IoT trend where the camera is perceived as a sensor that will connect to various types of services," said Zvika Ashani, CTO of



Agent Video Intelligence.

"The cloud also brings us a 'pay-as-you-go' model, allowing users to avoid what is typically a major up-front capital expenditure for their business," explained 3xLOGIC's Erickson. This is already evident in several companies offering VSaaS or ACaaS.

Dean Drako, President and CEO of Eagle Eye Networks pointed to several aspects that make cloud applications significant. "First, the cloud offers economies of scale — infrastructure can be shared and efficiency goes way up, compared with each customer buying their own hardware and software, then supporting it themselves." In addition, Drako pointed to the ability to access video from anywhere in the world and the ability to gather more insight from big data analytics.



BIG DATA ANALYTICS

If in the past the challenge was to gather information, today the challenge is how to make sense of the mass amounts of information at hand. In the video surveillance domain, mass amounts of footage already exist due to growing numbers of cameras and more storage capabilities.

Many of our interviewees point to cloud technology as the future direction of the surveillance industry. A combination of cloud technology, video analytics, and big data analytics will allow end users to collect information on the cloud, structure it using video analytics, and then use big data analytics to make sense of the sea of information: validate hypotheses and predict trends. This process will be for both revenue generating activities such as understanding consumer behavior in retail, learning driving and parking patterns in smart cities, and also in the security domain, trying to predict and manage security events.

The cloud might be gaining pace, however video files are big and the cost of uploading them to the cloud is still prohibitive for many end users. One should also remember that growing resolutions like 4K will only increase the demand for bandwidth. A successful introduction of cloud applications for video surveillance will require a reliable and efficient compression technology that can upload the data to the cloud without compromising its quality.

UPCOMING THREATS: CYBER SECURITY

Cameras traditionally were designed to be tamper-proof or vandal-proof. However, as we move fast towards ever-growing connectivity, a new threat emerges, cyberattacks.

Regardless if we upload our content



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to a cloud or access a local server through the internet, we are exposed to possible security breaches. IP cameras are essentially part of the network and as such pose two risks: one is being compromised by an intruder and the other, an unprotected IP camera can serve as an access point to gain access to the network. These are not theoretical risks, in March 2015 Hikvision confirmed that vulnerabilities in its networks exposed clients to cyberattacks.

An attacker exploiting vulnerabilities in IP cameras can potentially breach installations from anywhere in the world. In view of this threat, manufacturers need to make sure their products are secure and end-users must also make sure they take the necessary precautions, even simple ones like changing a default password could greatly help. In this sense, there is an advantage for systems using coaxial cables which are not part of the IP network, or cloud solutions. Cloud solutions offer professional network management and therefore potentially more protection from cyberattacks.

LOOKING INTO THE FUTURE

The video surveillance industry is a mature industry and the past few years have been characterized with growing commoditization of its products. Price competition with Chinese manufacturers has driven prices down and also pushed the market to consolidate.

The questions that are still open are: What will be the fate of the other players in the market? Will they force to consolidate themselves? Will they specialize in niche markets or will we see smaller, agile companies respond to new market needs and come up with disruptive innovations? Will the industry adopt the cloud in a large scale, changing the business model from selling and installation to recurring monthly fees? The answers are not yet clear but we promise to continue and monitor the industry. **AKS**