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WHITE PAPER

The Hidden Costs of NVR, VMS and Direct-to-Cloud Video Surveillance Solutions

By Angelo Salvatore

Before investing in a CCTV video solution to centrally monitor multiple sites, consider the limitations and the hidden costs leading video surveillance system providers don't want people to know.

Video surveillance systems protect people in shopping centres, courthouses, office buildings, fast-food restaurants and many other facilities. They also help increase productivity, improve operations, enhance security and reduce risk and loss, among other benefits. But choosing one can be a complex process.

The technology has undergone immense change over the last decade. It is being used extensively in enterprise, commercial and residential applications. It has become so ubiquitous that one can order and install a system with components from a local office supply or hardware store. Commercial applications are not "plug and play," however. In a commercial setting it's not about monitoring a home or pets; the desire to measure operational efficiencies and business outcomes that lead a CCTV purchase.

Typically, when one thinks of CCTV, they think of cameras on the wall or in the ceiling, how they are placed or the aesthetics, but that's only part of a CCTV solution. Having a great keyboard and mouse does not make the computer an effective tool; similarly, having great cameras that are well placed does not necessarily address the business use case, the ongoing costs or measure return on investment.

Consider the following three main technologies available today.

Main Technologies

Network Video Recorder (NVR) System

The network video recorder (NVR) or digital video recorder (DVR) is a set-and-forget solution. Traditionally, these systems are an all-in-one appliance (recorder) that operate on a specialized operating system such as Linux that connects to the cameras and records them. This recorder connects to these cameras either directly via a specific cable, wirelessly or across a computer network. They are usually bundled with IP CCTV cameras, often from the same manufacturer.

- **Pro:** They have existed for many decades and are popular for their ease of deployment and, in most cases, lower upfront cost.
- **Con:** They have limited interoperability, are often proprietary, have limited features and are often not cyber secure. They also can be expensive to operate.

Video Management System (VMS)

A video management system (VMS) is a feature-rich software application that offers many benefits, including a vast range of features to address organizational requirements. The software application often will be installed on a Windows® platform and connect via a network to the cameras.

- **Pro:** A VMS solution is often favored over NVR/DVR CCTV systems when installations become larger because it is more flexible, often has greater functionality and can often allow more cameras and users to connect to the system.

Additionally, a VMS may allow other applications to integrate for increased features such as license plate recognition (LPR), smart video analytics (VA) or artificial intelligence (AI) to trigger an alert when a human or other objects are detected. It is more secure than NVR/DVR solutions and can deliver better ROI outcomes, if implemented and managed correctly.

- **Con:** These systems are costly to implement, maintain and support and are overkill for most commercial applications. They are better suited to critical infrastructure with operational control rooms and in-house IT departments.

Cloud System

Cloud has become an IT industry buzzword, and the term refers to a broad technological context. It refers to someone else's computers or servers that are accessible from the internet or a network.

- **Pro:** The cloud enables customers to lease out computing power, applications and/or storage from a data center where servers are housed, like Amazon Web Services®, for a set fee. This technology is becoming more popular as a new breed of video surveillance manufacturers offer software-based applications that enable users to store their video in the cloud without the need to have that computer on site. The end user pays for storage, applications (analytics) and/or computing power only as required.

- **Con:** Multiple cloud solutions make it difficult to understand the vast difference between offerings, including direct-to-cloud and cloud-managed solutions. Many direct-to-cloud vendors provide proprietary and expensive hardware to lock customers into their platform because it cannot be used unless a monthly or annual service fee is paid.

System Cost Comparisons

Now that the main technologies have been identified and explained, consider the limitations and hidden costs of implementing each.

NVR System

With an NVR solution, the initial cost is often the most attractive feature when compared to other forms of CCTV systems.

Consider the cost of exporting video footage. It takes an average of 20 to 30 minutes to export video footage from a recorder. In many cases, a person must be on site. As illustrated in Table 1, an employee traveling to a site to export footage spends 30 minutes each way for travel, takes 30 minutes to export footage, with two people to operate the system. This detracts from business productivity and costs about $250 per export. If this process is performed twice per week, 52 weeks per year, the total cost to a business is $26,000 annually.

Table 1: Video Extraction Cost Breakdown

Cost Item	Hourly Rate	Staff Required	Time in Hours	Subtotal
Travel Time	$40	1	1	$40
Onsite Labor	$40	2	0.5	$40
Loss of Productivity	$100	1	1.5	$150
Fuel & Vehicle Cost	$20			$20
Total Cost				**$250***

As noted above, buying a cheap system doesn't save money. It transfers the cost savings of initial purchase to an organization as an ongoing operational and maintenance cost.

Technology has made extraordinary advances in efficiency, usability and functionality that NVR/DVR operational costs could be reduced by as much as 80% compared to other technologies.

VMS Solution

When compared to other forms of CCTV systems, the initial attraction of a VMS solution is the feature set and interoperability with other systems like access control and analytics.

Some leading software VMS platforms can cost up to four times the initial purchase price of the software over a 5-year period. (See Table 2.)

In this example, the total cost is 1.8 times the initial purchase price after five years.

Table 2: VMS Cost Over Five Years

Year	Base License	Per Camera License	Total
1: Initial Purchase	$500	$200	$700
2: Maintenance Fee	$100	$40	$140
3: Maintenance Fee	$100	$40	$140
4: Maintenance Fee	$100	$40	$140
5: Maintenance Fee	$100	$40	$140
Grand Total			$1,260*

For software systems to remain bug free, feature complete and cyber secure, they must be physically managed and maintained. The cost will continue to increase when labor is added. Therfore, the total cost for purchasing and maintaining a VMS over a 5-year period is estimated to be $2,780, nearly four times the initial cost.

In reality, there are many more factors at play than shown, but Table 3 illustrates how a VMS solution

can cost much more than its initial purchase price. With a single camera solution, the percentages are linear. The cost to maintain and upgrade the system would increase exponentially as the number of cameras and/or locations increase.

Table 3: VMS Cost With Mainteance Over Five Years

Year	Technician Cost/Hour	Time to Upgrade	Times/Year	Cost/Year
1	$80	1 hour	3	$240
2	$80	1 hour	4	$320
3	$80	1 hour	4	$320
4	$80	1 hour	4	$320
5	$80	1 hour	4	$320
Grand Total				$1,520*

Direct-to-Cloud Storage

The initial selling point and attraction of a direct-to-cloud CCTV solution is that it eliminates the need for onsite recorders (NVR) by storing video in the cloud. Their marketing makes them appear enticing, as they are easy to deploy and manage. Nevertheless, one should be aware of the potential commercial trap that is intended to limit freedom of choice and require ongoing fees. Consider what the ownership experience of a direct-to-cloud CCTV model looks like over one year. Note the following comparison in Table 4.

Table 4: Direct-to-Cloud Single-Camera Cost Comparison

	Cloud Provider	Popular Brand Name	Low-Cost Brand Name
Camera Initial Purchase Cost	$1,200	$600	$400
Works with Other CCTV Systems	No	Yes	Yes
Onboard Storage	Yes	Yes	Yes
Included Storage	Included for 12 months	None	None
Ongoing	$250*	N/A	N/A

As seen in Table 4, the direct-to-cloud provider appears to be a good value for a single camera solution, since no recording or storage hardware is required. The storage fee is included in the first year and increases to about $250 a year thereafter.

For a more accurate comparison, we will add recording hardware for the brand name cameras for 30 days of storage and increase the number of cameras to eight.

Table 5: Direct-to-Cloud 8-Camera Cost Comparison

	Cloud Provider	Popular Brand Name	Low-Cost Brand Name
Camera Initial Purchase Cost	$9,600	$4,800	$3,200
Recording Hardware + Software	$0	$1,900	$1,900
Total Hardware Cost (Year 1) Storage	$9,600*	$6,700*	$5,100*

The cost of a direct-to-cloud system can be between 25% and 45% higher than a traditional or cloud-managed system, even though an on-site recorder is needed.

The total cost of a direct-to-cloud solution is estimated to be $17,600 over a period of five years.

Some direct-to-cloud providers will lock you in by expecting you to purchase their expensive hardware and services.

Conclusion

An organization should purchase a video surveillance system that fits its needs. Be wary of systems that are too technical and complex to deliver, costly to maintain and a possible liability for the company.

Table 6: Overall Technology Comparison

	Complexity	Purchase Cost	Ongoing Cost	Suitability	Users
NVR/DVR	Low	Low	High	Single site	Limited
VMS	High	High	High	Few sites	Unlimited
Direct-to-cloud	Low	High	High	Few sites	Limited
Cloud managed	Low	Medium	Low	Multiple sites	Unlimited

The best of both worlds would be using a cloud-managed solution, which combines the reliability of local recording and the flexibility of the cloud.

*Estimated total, varies depending on manufacturer.

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About the Author

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