

# Total Cost of Ownership

*How the cloud helps enterprises in bringing down video security costs*

It can be surprising to see the extent to which technology operational costs, many of which are not in plain sight, raise the cost of technology ownership to double (typical for many technologies) and sometimes even quadruple (typical for IT servers) the original purchase price. However, cloud computing has significantly changed the TCO landscape for security video surveillance deployments. Moving the computing and video storage infrastructure into the cloud results in significant economies of scale. Additionally, cloud system reliability, wide-area remote access and strong system cybersecurity surpass what is cost-feasible for typical data center server deployments.

## Purchase and Deployment Objectives

The purchase, deployment and operation of security technology has both risks and financial goals, which are reflected in these common purchasing objectives:

- Acquire the best technology value to achieve the desired security risk reduction.
- Avoid being blind-sided by unplanned technology operations and service costs.

Achieving both objectives is the sole purpose of a [Total Cost of Ownership](#) (TCO) analysis.

By evaluating all the costs to own and operate video management system servers (as opposed to using purchase price alone), a cloud system can be selected that has a total cost of ownership considerably below a typical on-site system. The savings generally range between 20% and 50% when compared to the costs for hosting the VMS applications in a corporate data center (whether in-house or third-party operated).

## A Simple TCO Example

TCO is an analysis meant to uncover all the lifetime costs that follow from owning certain kinds of assets. As a result, TCO is sometimes called “life cycle cost analysis.” TCO attempts to uncover both the obvious costs and the “hidden” costs of ownership over time. Most of the costs involved in automobile ownership are easy to see. For example, a \$31,000 automobile can cost over \$62,000 to own over 5 years, even taking the trade-in value into account.

Table 1. Edmund's *True Cost to Own*® for a \$31,252 Automobile

Cost Factor	Year 1	Year 2	Year 3	Year 4	Year 5	5-Year Total
<b>Depreciation</b>	\$6,837	\$2,990	\$2,633	\$2,332	\$2,094	\$16,886
<b>Taxes &amp; Fees</b>	\$2,620	\$211	\$191	\$174	\$159	\$3,355
<b>Financing</b>	\$1,694	\$1,362	\$1,009	\$631	\$229	\$4,925
<b>Fuel</b>	\$3,096	\$3,189	\$3,284	\$3,383	\$3,484	\$16,436
<b>Insurance</b>	\$1,812	\$1,866	\$1,922	\$1,980	\$2,039	\$9,619
<b>Maintenance</b>	\$2,411	\$665	\$1,207	\$493	\$3,120	\$7,896
<b>Repairs</b>	\$414	\$484	\$564	\$658	\$767	\$2,887
<b>True Cost to Own</b>	<b>\$18,884</b>	<b>\$10,767</b>	<b>\$10,810</b>	<b>\$9,651</b>	<b>\$11,892</b>	<b>\$62,004</b>

Depreciation, taxes and fees, and financing costs are likely to be comparable for similarly-priced vehicles. However, fuel, insurance and maintenance costs will vary depending on the class, make and model of automobile. These cost variations make a vehicle TCO analysis worth doing. Performing this type of analysis on various vehicles will

reveal which is truly the best buy.

Table 1 above shows the Edmund's 5-year *True Cost to Own* TCO analysis for a \$31,252 [2014 Dodge Charger SRT8](#) driven 15,000 miles per year. In this case, the cost to operate and maintain the vehicle doubles the price of the car. It is typical for many types of technologies that operational and maintenance costs are significant, including for electronic security system technologies, which is why TCO analysis is required to see the whole picture.

## Security System TCO

Calculating security system TCO is more complex and has more data-gathering challenges than most types of product comparisons. The chart in Figure 1 shows eight security system cost categories, whose relative sizes vary depending upon type and configuration of deployment. This paper addresses six of them, all but Field & Network Devices and Field Device Maintenance. These costs remain the same regardless of where the security system servers are located.

For small single-site deployments, calculating TCO is simple. For multi-site, large enterprise deployments it is more complex.

However, considering security system TCO more closely, even if a security manager wanted to calculate the TCO for a commercial video surveillance system, what benefit would there be? The competitive part of a commercial video system is not the server and network infrastructure, which is often provided or specified by the organization's IT department. The differences lie with the video management system (VMS) software.

The cost of server and network installation, maintenance and repair will be about the same for any VMS. Only the software purchase price and ongoing license fees will make a competitive difference, right? In the past, that was generally true. However, in a cloud video system, it is no longer the case.

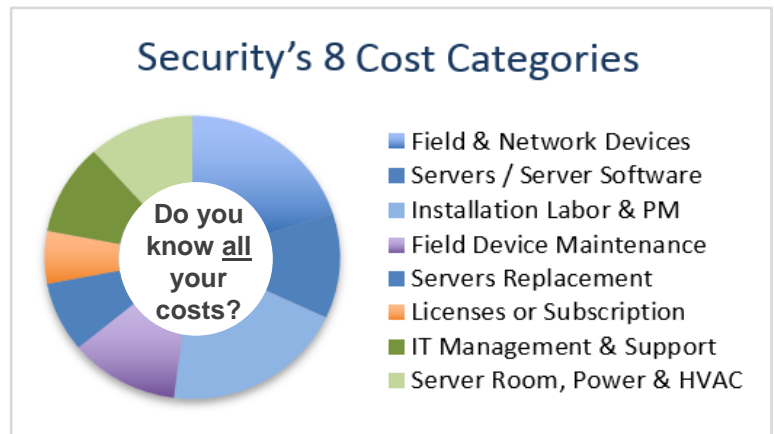
## Cloud Reduces Video Management System TCO

A well-engineered cloud-based VMS includes capabilities that are typically not affordable in systems hosted in a data center, such as server and video data redundancy across geographical zones, high bandwidth wide-area network infrastructure, and high cybersecurity controls that include routine penetration testing. A cloud-based VMS makes the redundancy and cybersecurity measures affordable due to the large economies of scale across all the computing and data storage resources – especially a data center designed specifically for a cloud-based VMS application. Hot redundancy for a server-based VMS – whether virtual or physical – is expensive because it requires standby servers and video storage arrays that are kept constantly running even though they will be infrequently used. It also requires VMS failover recording support found in only a few VMS products.

Typically, computing and storage hot redundancy – and high levels of cybersecurity – are not utilized for video management system deployments for cost reasons. *However, if such capabilities cost less in a cloud-based environment built specifically for VMS applications, wouldn't that be worth considering?* In a cloud VMS, backups are verified, and cyber security controls are tested, as part of normal everyday cloud operations.

Thus, this paper presents a *data-center vs. cloud* TCO comparison based on real costs, to make clear the cost differences between a cloud-based VMS and a client-server system hosted in a corporate data center. Other cloud benefits include geographically desirable video storage locations and continuous feature delivery not provided by a client-server VMS.

Figure 1. TCO Cost Categories for Electronic Security Systems



Notice that, in the TCO calculation example that follows below, the Eagle Eye Cloud VMS contains redundancy and cybersecurity measures that the data center VMS deployment does not:

- *Hot Redundant Computing*
- *Data Backups Stored in Preferred Geographical Locations*
- *Continuous Penetration Testing*

Eagle Eye's *Intelligent Bandwidth Management* feature with local on-premises buffering typically allows existing business Internet connections to be utilized for uploading video to the *Eagle Eye Security Camera Cloud VMS* (Eagle Eye Cloud VMS). There is no extra cost for getting the video up to the Cloud VMS.

## Data Center Video Recording

Some organizations with reliable high-bandwidth network connectivity between facilities are considering streaming video straight back to their corporate data centers and increasing their network bandwidth if necessary. These companies have experienced significant cost benefits from server virtualization. They now have the network and data center technology in place to host VMS management and recording servers in their data centers, where servers can be operated and maintained at lower costs than for on-premises local recording servers. However, that approach has TCO considerations of its own that are not in plain view. A corporate data center's virtualization technology is not designed for surveillance video recording use. Recording video in a corporate data center requires special attention apart from that given to business applications, and typically has higher-than-expected cost factors, like those listed in the Figure 2 example.

## Comparing Data Center and Cloud Video Management Systems

Figure 2 shows the TCO summary comparison for a corporate headquarters data center and 25 remote locations, with 624 cameras total and 30 days of video storage over a 5-year period, utilizing existing Internet service at all locations. The cybersecure cloud system's total cost of ownership is 36% less than the cost of the data-center-based system, a savings of \$497,441.

Figure 2. Enterprise corporate data center comparison for VMS software, hardware and support

Twenty-Six-Site, Eagle Eye Cloud VMS							Twenty-Six-Site, Corporate Data Center exacqVision Enterprise VMS						
Capacity Assumption	Year 1	Year 2	Year 3	Year 4	Year 5		Capacity Assumption	Year 1	Year 2	Year 3	Year 4	Year 5	
Sites	26	26	26	26	26		Sites	26	26	26	26	26	
Cameras (1080p - Full HD) - 15 FPS	624	624	624	624	624		Cameras (1080p - Full HD) - 15 FPS	624	624	624	624	624	
Days of Video Storage	30	30	30	30	30		Days of Video Storage	30	30	30	30	30	
Cost Summary							Cost Summary						
	Year 1	Year 2	Year 3	Year 4	Year 5	Total		Year 1	Year 2	Year 3	Year 4	Year 5	Total
<b>1. Recurring System Fees</b>							<b>1. Recurring System Fees</b>						
a. Eagle Eye Camera Subscriptions	\$172,24	\$172,224	\$172,224	\$172,224	\$172,224	\$861,120	a. VMS Annual Software Support Plan	\$0	\$16,602	\$16,602	\$16,602	\$16,602	\$66,408
b. Internet Access			(use existing)				b. Internet Access (Sites + HQ)	\$0	\$0	\$0	\$0	\$0	\$0
c. Virtual VMS Servers with O/S & DB			(included in Cloud VMS subscription)				c. Virtual VMS Servers with O/S & DB	\$57,586	\$57,586	\$57,586	\$57,586	\$57,586	\$287,930
d. Video Data Storage			(included in Cloud VMS subscription)				d. Video Data Storage - 110 TB	\$105,600	\$105,600	\$105,600	\$105,600	\$105,600	\$528,000
e. Data Center Cost Allocation			(included in Cloud VMS subscription)				e. Data Center Cost Allocation	\$37,840	\$37,840	\$37,840	\$37,840	\$37,840	\$189,200
f. Server Technical Support			(included in Cloud VMS subscription)				f. Server Technical Support	\$10,905	\$10,905	\$10,905	\$10,905	\$10,905	\$54,525
g. Video Storage Technical Support			(included in Cloud VMS subscription)				g. Video Storage Technical Support	\$6,394	\$6,394	\$6,394	\$6,394	\$6,394	\$31,970
h. BC/DR Program Cost Allocation			(included in Cloud VMS subscription)				h. BC/DR Program Cost Allocation	\$15,189	\$15,189	\$15,189	\$15,189	\$15,189	\$75,945
							<b>Subtotal of Recurring Fees</b>	<b>\$233,514</b>	<b>\$248,028</b>	<b>\$248,028</b>	<b>\$248,028</b>	<b>\$248,028</b>	<b>\$1,225,624</b>
<b>2. Initial Purchase and Setup Labor</b>							<b>2. Initial Purchase and Setup Labor</b>						
a. VMS Camera Licenses			(included in Cloud VMS Subscription)				a. VMS Camera Licenses	\$101,731	\$0	\$0	\$0	\$0	\$101,731
b. VMS Server Licenses			(included in Cloud VMS Subscription)				b. VMS Server Licenses	\$4,232	\$0	\$0	\$0	\$0	\$4,232
c. VMS Software Installation			(not applicable)				c. VMS Software Installation	\$3,100	\$0	\$0	\$0	\$0	\$3,100
d. Eagle Eye Bridge Appliances Cost			(included in Cloud VMS subscription)				d. Site LAN Router Cost	\$1,690	\$0	\$0	\$0	\$0	\$1,690
e. Eagle Eye Bridge Appliances Setup	\$9,353	\$0	\$0	\$0	\$0	\$9,353	e. Site LAN Router Setup	\$5,200	\$0	\$0	\$0	\$0	\$5,200
<b>3. Upgrades and Updates</b>							<b>3. Upgrades and Updates</b>						
a. VMS Software Update Labor			(automatic - no labor)				a. VMS Software Update Labor	\$0	\$6,600	\$6,600	\$6,600	\$6,600	\$26,400
b. LAN Routers Update Labor			(automatic - no labor)				b. LAN Routers Update Labor	\$0	\$1,300	\$1,300	\$1,300	\$1,300	\$5,200
<b>4. On-Premise Electricity Cost</b>							<b>4. On-Premise Electricity Cost</b>						
a. Bridge Appliances (Routers built-in)	\$1,235	\$1,235	\$1,235	\$1,235	\$1,235	\$6,173	a. LAN Routers	\$182	\$182	\$182	\$182	\$182	\$910
<b>5. Hot Redundant Compute &amp; Storage</b>							<b>5. Hot Redundant NVR</b>						
a. Hot Redundancy Software Licenses			(included in Cloud VMS Subscription)				a. Standby Server Failover Software	\$3,702	\$0	\$0	\$0	\$0	\$3,702
b. Hot Redundant Computing & Storage			(included in Cloud VMS Subscription)				b. Hot Redundant Computing & Storage			(not available)			
c. Triple Redundant Data & Video Backup			(included in Cloud VMS Subscription)				c. Triple Redundant Data & Video			(not available)			
<b>6. Cybersecurity Controls</b>							<b>6. Cybersecurity Controls</b>						
a. Very High Cybersecurity Measures			(included in Cloud VMS Subscription)				a. Commonly Applied Cybersecurity Measures			(included in data center services)			
b. Information Security Audit			(included in Cloud VMS Subscription)				b. Information Security Audit			(included in data center services)			
c. Routine Penetration Testing			(included in Cloud VMS Subscription)				<del>c. Routine Penetration Testing</del>			(not cost-feasible)			
<b>Total Cost of Ownership</b>	<b>\$182,812</b>	<b>\$173,459</b>	<b>\$173,459</b>	<b>\$173,459</b>	<b>\$173,459</b>	<b>\$876,646</b>	<b>Total Cost of Ownership</b>	<b>\$349,649</b>	<b>\$256,110</b>	<b>\$256,110</b>	<b>\$256,110</b>	<b>\$256,110</b>	<b>\$1,374,087</b>

## New Internet Service Costs

The example above assumes that existing network and Internet bandwidth will support the transmission of video from 25 sites to the corporate data center. However, the typical situation is that additional bandwidth is required. This is because client-server VMS systems are not designed to buffer and optimize data transfer to data centers, and thus have higher network and Internet bandwidth requirements than the Eagle Eye Cloud VMS. Network and Internet connectivity must be designed to accommodate the highest potential video data rates, even though those throughput capacities will not be required all the time.

If additional internet service is needed for camera video streaming at all locations, the data center VMS deployment example has an additional \$81,300 per year cost for new Internet service. The required service is 100 Mbits at the 25 remote sites (\$4,875 per month, \$58,500 per year) and 2 Gbits at the HQ data center site (\$1,900 per month, \$22,800). The additional \$81,300 increases the data center VMS total cost to \$1,780,587, resulting in a 51% cost savings of \$903,941 for the Eagle Eye Cloud VMS deployment.

## Cloud-Based Corporate Data Centers

Some organizations utilize cloud-based virtual servers for some of their business applications and consider doing so for their security video servers. In such a case the Recurring System Fees cost comparison items will be slightly more complex than the example above. This is because cloud providers typically have separate subscription fees for virtual server machines, virtual server data storage, application data storage, database servers and data storage, outbound Internet bandwidth, as well as setup and technical support services.

Also, the data throughput for VMS servers is significantly different from data throughput of the types of business applications on which cloud provider pricing is based. In the above comparison example, live video viewing requires that the 624 cameras send video streams into the cloud data center continuously, using server-based motion detection to trigger recording only when the video scene contains activity. There is often no charge for data going into a cloud data center. However, the continuous streaming of video back out to company facilities for live viewing will have its own outbound network data charges. That outbound data throughput is 2.1 Gbps for the video deployment example above.

Thus, Eagle Eye Cloud VMS cost savings can range between 25% and 50% compared to an organization's third-party cloud-hosted virtual servers – depending on the cloud service-provider's costs. The IT department's work to support the VMS servers will remain about the same as for an internal corporate data center. The security systems integrator will require direct access to the cloud-hosted VMS servers.

## The Eagle Eye Networks Advantage

The typical corporate Window-based server runs at less than 10% utilization, drawing around 500 W power. Using virtualization, the same server can be run at 60% utilization, drawing 550 W, without decreasing the server's useful life. This means five or six times fewer servers are needed. These are real and easily achievable savings, hence the attractiveness of data center virtualization for many organizations.

Such savings are greatly multiplied in a cloud data center, where a well-engineered cloud VMS can automatically scale up and down cloud resources according to real-time video system demands, enabling a cloud-based VMS solution to provide the greatest savings. However, there is a significant additional reason to use the Eagle Eye Cloud VMS, rather than hosting a client-server system in a corporate data center or third-party data center.

Eagle Eye's data centers are specifically dedicated to the Eagle Eye Cloud VMS. Thus, the entire data center infrastructure is built specifically to provide the kind of high-performance computing, data throughput and flexible large-scale storage required for security video management systems. Corporate and third-party business data centers are designed primarily for business applications, and their infrastructures are not

performance-tuned for security video requirements. This gives Eagle Eye and its customers significant cost and performance advantages.

## Cost and Performance Advantages

For example, when higher-than-usual site activity increases the motion-based video recording, video can be lost unless the computing and storage capacities have been oversized to account for such peaks. When an increase in camera counts increases the data center VMS's requirements for computing, storage or data throughput, IT manual intervention is required to expand the server count, video storage or network capacity.

That means the data center's initial VMS server count, storage capacity, and network bandwidth must be oversized, to prevent dropping video frames or falling short of intended video retention. This is why, for example, server-based VMS manufacturers recommend sizing a virtual server's data throughput capacity to 150% of the expected throughput. There is a cost for such server, storage and network over-provisioning.

In contrast, the cloud data center resources assigned to an Eagle Eye Cloud VMS subscriber expand and contract automatically – even for peaks in motion-based video recording. Thus, a subscriber never experiences a loss of video due to computing, storage or network limitations. Adding cameras to the Eagle Eye subscription automatically allocates the additional cloud data center resources. There is no over-provisioning required, which is one reason why the Eagle Eye Cloud VMS is typically more affordable than data center cloud VMS server deployments.

## Cloud System TCO Is Simply Better

The above TCO comparison underscores the typical advantages of cloud-based over data-center-based video management systems. The hard and soft benefits are clear:

- **Lower TCO.** Lower total cost of ownership.
- **Lower Up-Front Costs.** Lower up-front expenditure costs.
- **Full Hot Redundancy.** Data storage and video recording and processing are fully redundant.
- **Cybersecurity.** [Strong cybersecurity](#) including data encryption in transit and at rest.
- **Mobile Performance.** Better wide-area mobile device performance.
- **Automatic Updates.** [Automatic security and feature updates](#) with no action needed by the service provider.
- **Only Pay for What you Use.** Cloud customers can add and subtract video analytics and other system capabilities on demand, paying only for the period in which they use them.
- **Instantly Adjustable Video Retention.** Cloud customers can expand video retention and recording resolution and frame rate on a per-camera basis, without having to make any on-premises infrastructure changes.
- **Minimal Downtime.** True cloud systems remain fully operational during upgrades to server operating system software, application software, and computing and storage hardware. Downtime from security/bug-fix updates, software version updates and server hardware refreshes are eliminated.
- **Accelerated New Features.** True cloud system development utilizes *continuous delivery* software engineering, which provides incremental software improvements in intervals of weeks, rather than months or years. Incremental improvements eliminate the staff learning curves that often occur with typical client-server software update cycles. Additionally, all subscribers are always using the very latest set of features and capabilities.

## About Eagle Eye Networks

Eagle Eye Networks ([www.een.com](http://www.een.com)) delivers the world's first on-demand cloud-based security video management system providing both cloud and on-premise recording. Its flagship product is the *Eagle Eye Cloud Security Camera VMS*, which is the basis for the TCO comparisons in this paper. The Cloud Security Camera VMS works with a broad range of analogue and IP video cameras, providing secure encrypted access to cloud storage via an onsite bridge appliance, with on-premise video storage also available. Eagle Eye also provides an open cloud video API for integrations and application development, enabling customers and partners to easily realize further value while retaining the benefits listed above.