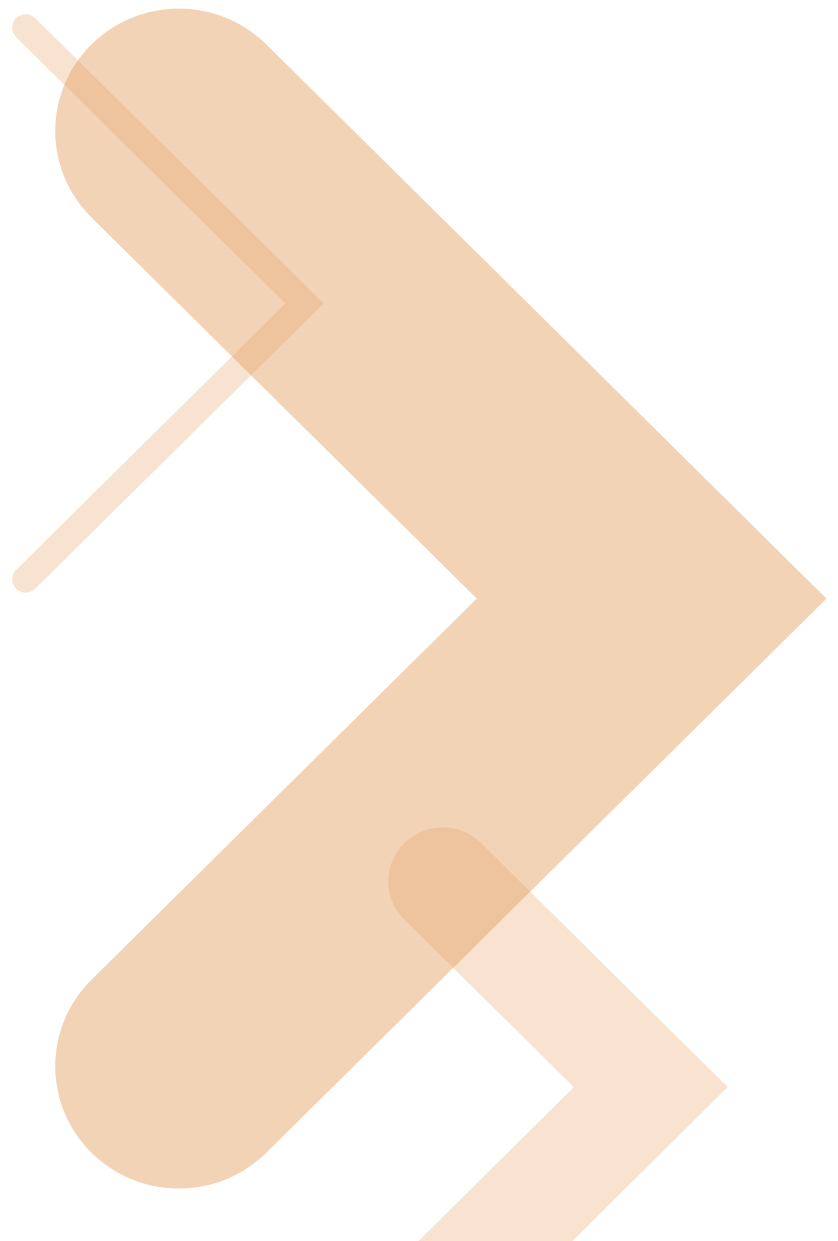




Video Surveillance Economics

Wireless Video Surveillance:

The New Picture of Quality and Economy



Security: the Eyes Have It

As the world becomes increasingly security conscious, municipalities, institutions and enterprises of all sizes are discovering that there's safety in sight. Real-time video surveillance systems are proving to be one of the most effective methods of addressing a wide range of security challenges in both the public and the private sectors.

A quick glance around the globe verifies the growing importance of video surveillance. Powerful video networks are playing a pivotal role in providing security at major sporting, political and community events. Analysts estimate that today there are almost 400,000 video surveillance cameras guarding public places in France and more than four million in England. Those numbers will most assuredly continue to grow rapidly. In the United States, it is estimated that currently there's one video camera for every 12 people; that number is projected to be almost one for every seven people by 2013.

What's the catalyst behind this astonishing growth? There's little question that one of the prime drivers—perhaps the most important of all—is the meteoric rise of reliable, high quality, cost-efficient wireless broadband video surveillance networks.

Video Surveillance Camera Use Worldwide



United States
current estimate: 25 million



France
current estimate: 400,000



England
current estimate: 4 million



Wired Vs. Wireless

A majority of video surveillance solutions now in place are wired networks, which, depending on circumstances, continue to be a relevant alternative. These networks are generally installed in or around office buildings, medical centers, university dorms and classroom structures, taking advantage of wired backbone infrastructures already in place. It is as organizations begin using video surveillance solutions in locations beyond the reach of existing wired networks that issues arise. Simply put, creating or extending wired video systems beyond 300 feet or so can quickly become both cost and time prohibitive.

More and more enterprises, institutions and public safety departments see high-speed wireless video surveillance networks as a much more efficient alternative that offers comparable quality and significantly enhanced flexibility... at much lower cost. For most organizations, even a cursory comparison between the two can be quite revealing. Especially interesting is a direct head-to-head cost comparison.

Community WISP is a well-known systems integration organization headquartered in the Boston, Massachusetts area, and working with enterprises and municipalities in New England, across the United States and in numerous countries around the world. In Boston, their video surveillance customers include American International University and the Boston Police Department. "Our rule of thumb," says Bob Zakarian, CEO, "is that wireless systems are exceptionally cost efficient, sometimes offering savings of 80 percent over wired networks."

Trenchant Observations On Wired Deployment

Substantially lower deployment costs are the main reason for the huge cost differential when comparing wired and wireless video networks. A typical scenario often concerns an organization or municipality that already has an existing wired video surveillance network in a main building or location. For a growing number of reasons, these organizations want to extend their monitoring capabilities to areas beyond the main complex: parking lots, perimeters, mobile units, additional buildings or facilities near and far. There's a word for why extending or deploying a new wired video surveillance system is unlikely to be cost effective. Or, for that matter, even possible. That word is "trenching." The necessity of trenching can create tremendous obstacles in a wide range of video surveillance scenarios, especially those involving long distances.

As Distance Increases, Cost Increases

For new or extended wired video surveillance networks, distance is often the deal-breaker, and the reasons are mainly economic. Let's say an organization wanted to connect two buildings separated by a busy roadway, or perhaps a multi-lane expressway. Trenching across a roadway would be both exceptionally disruptive and expensive; trenching across a freeway would not even be a consideration. What if a large dairy operation wants to guard its perimeter with a series of 20 video cameras, which in some locations will be two or three miles from a wired network? Merely in terms of cost, trenching out to each camera would be out of the question. Many enterprises—from airports to universities to corporations—want protective video surveillance systems installed in remote locations such as parking lots. The need for trenching, Zakarian notes, "makes it virtually impossible to do a wired parking lot."

It's not hard to think of other crucial applications that can be difficult to deploy using cable or fiber.

- Round-the-clock surveillance of high crime areas.
- Real-time video feeds into patrol cars or fire vehicles to provide mission-critical information to first responders.
- Extensive, 24-hour outdoor monitoring of locations ranging from port facilities to airports to supply depots to nuclear power plants.
- Electronic visual patrolling of farm and ranch perimeters, extended pipelines and remote or unmanned facilities.
- Traffic surveillance solutions ranging from identifying traffic violators to providing early warnings of tie-ups due to accidents or weather.
- Ad hoc network surveillance of public venues from sporting events to political conventions to rock concerts.
- Comprehensive monitoring of off-the-beaten-path locations on corporate, educational and medical campuses.

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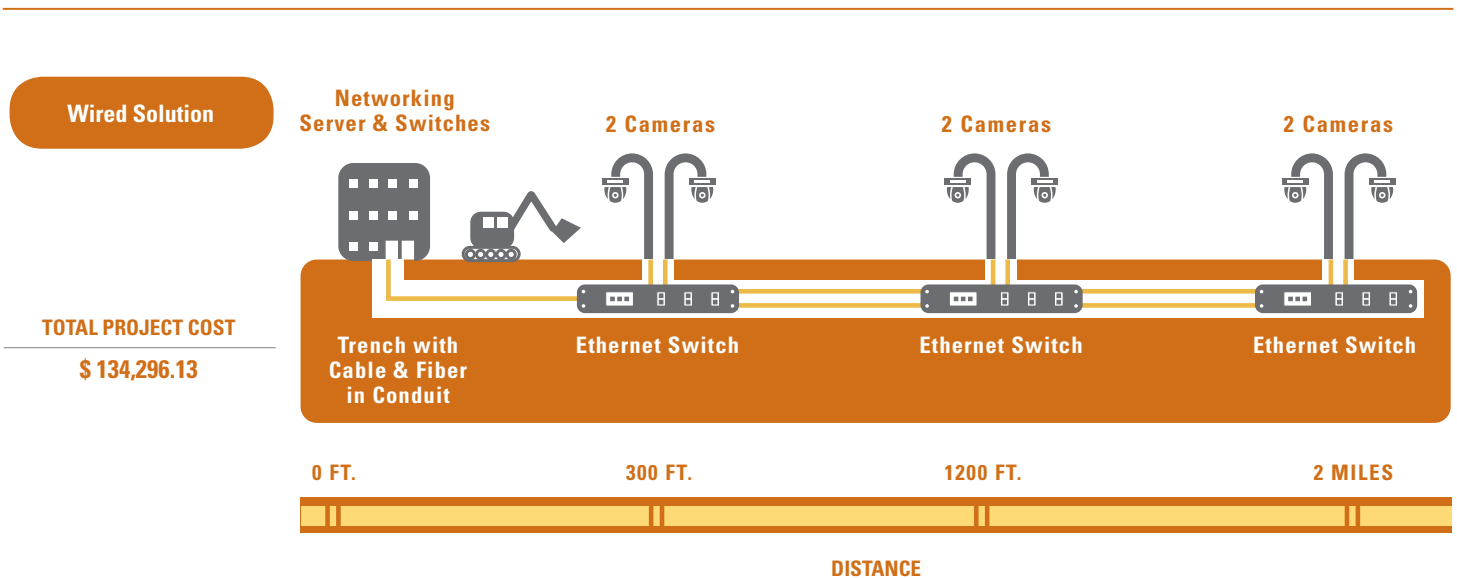
An Eye-Opening Comparison

Given the high cost of cabling and wired deployment, it's easy to see why, as the need for video surveillance grows, wireless broadband systems are dramatically changing the surveillance marketplace. Wireless networks provide comparable quality and reliability, but deployment costs are significantly less. Wireless makes trenching—the most costly and disruptive element of most wired networks and extensions—unnecessary. Let's look at a head-to-head cost comparison between wired and wireless video surveillance systems by examining a real solution provided by well-known global provider of video systems Industrial Video and Control (IVC) at a major construction site in the southeastern United States.

Background

A manufacturing company building a major new plant wishes to remotely monitor and control the construction site throughout the process. The plant is located about 45 minutes away from the company's main offices. A six-camera video surveillance network is designed to cover the area. The network calls for the installation of IP cameras at three different locations at varying distances from the site offices that house networking switches and servers:

- **300 Feet from Switch.** Two cameras were required at approximately 300 feet (91.4 meters) away from the main switch.
- **1,200 Feet from Switch.** Two cameras were needed approximately 1,200 feet (366 meters) from the main switch.



Wired Solution

TOTAL PROJECT COST

\$ 134,296.13

Cost Estimates

(All figures expressed in U.S. dollars)

Distance	Network Elements	Cost	Total Cost
300 feet	<ul style="list-style-type: none"> • Trenching • Cat 5 cable • Conduit • Labor (cabling) • 4-port Ethernet switch 	<ul style="list-style-type: none"> \$ 2,742.00 41.13 91.40 365.60 100.00 	\$ 3340.13
1,200 feet	<ul style="list-style-type: none"> • Trenching • Multimode fiber optic • Labor (cabling) • Outdoor fiber optic converter • Indoor fiber optic converter • 4-port Ethernet switch 	<ul style="list-style-type: none"> \$ 10,980.00 732.00 1,464.00 795.00 395.00 100.00 	\$ 14,466.00
2 miles	<ul style="list-style-type: none"> • Trenching • Single mode fiber optic • Labor (cabling) • Outdoor fiber optic converter • Indoor fiber optic converter • 4-port Ethernet switch 	<ul style="list-style-type: none"> \$ 96,000.00 6,400.00 12,800.00 795.00 395.00 100.00 	\$ 116,490.00
Total Project Cost			\$ 134,296.13

- **Two Miles from Switch.** Two cameras were considered necessary at the main entrance to the site, approximately two miles (3,200 meters) from the main switch.

When the costs of a wired network are compared with those of a wireless network, the numbers speak for themselves.

Wireless System Architecture

As designed, the hypothetical wireless system would use two main Access Points (AP) and six Subscriber Modules (SM) at 5.8 GHz. Each AP would serve three cameras at a throughput of 2 Mbps per camera, with distance capabilities of up to three miles. With a good Signal-to-Noise ratio and clear lines of sight at the site, this wireless configuration would provide both excellent performance and reliability. But the real eye-opener is cost.

92 Percent Savings

In this relatively common scenario, the cost differential is anything but common. Using a wired system, the company would have had to invest \$ 134,296.13. This doesn't even begin to include the monthly reoccurring costs for the service. A wireless system with the same capabilities, on the other hand, would cost only \$ 11,860.00.

"In this comparison, a crucial factor is that the project involves distances of over 300 feet, says IVC's CEO Norm Fast. "That means it's not possible to use Cat 5 cabling, in effect forcing the use of fiber. And in these types of situations, wireless is virtually always less costly."

How much less costly? These estimated figures don't exactly jibe with the previously mentioned "rule of thumb" of an 80 percent savings over a wired network. The actual savings would be over 92 percent! In fact, a new rule of thumb seems to be emerging: if you have to trench anywhere, go wireless.

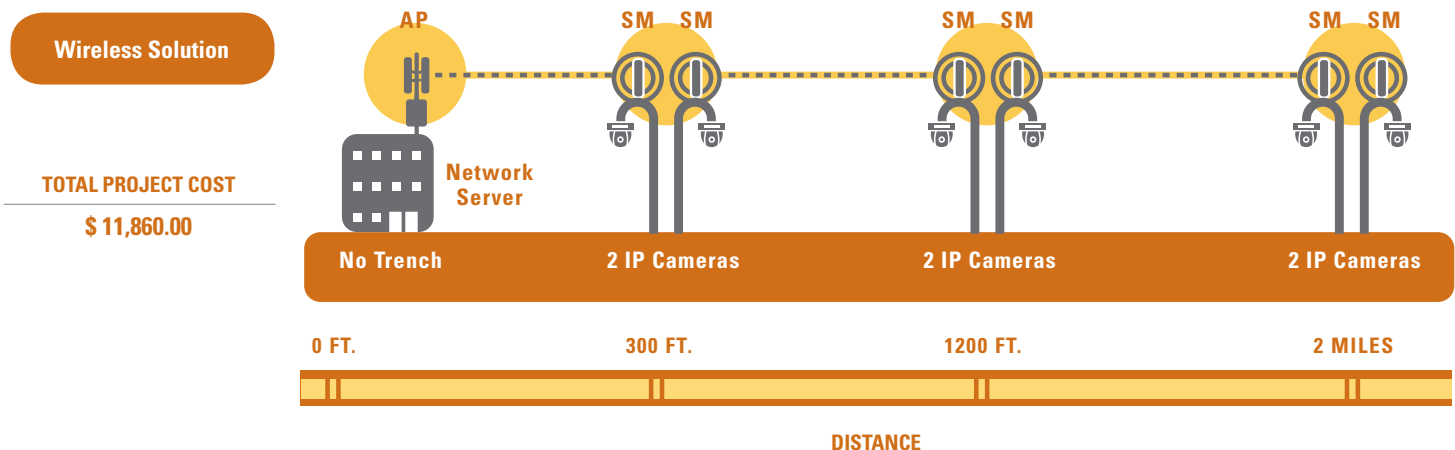
Saving Money Isn't Everything

In video surveillance network deployment, saving time is just as critical as saving dollars. Because time is money, speed of deployment is always a major factor that impacts the comparison of wired and wireless video surveillance network costs. For wired networks, trenching operations can take from weeks to long months depending on a number of variables, including weather, terrain and existing structures and facilities. Speed of deployment is not and never will be the strong suit of wired video surveillance networks.

In contrast, wireless video surveillance networks can be installed in hours or days at the most. Instead of spending days and weeks digging and cabling, two-man crews can install a wireless camera system in a matter of two-to-three hours or less. The ability to make productive use of the system so quickly should also be factored into the cost equation, as should the additional protection and productivity provided by a network that can be fully functional before a typical wired network even breaks ground.

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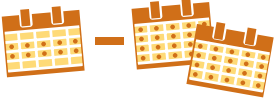


Cost Estimates

(All figures expressed in U.S. dollars)

Distance	Network Elements	Cost	Total Cost
Up to 3 miles	<ul style="list-style-type: none"> • 2 Wireless Access Points • 6 Wireless Subscriber Modules • Omni Antenna • Installation Services 	\$ 2,990.00 3,570.00 300.00 5,000.00	\$ 11,860.00
Total Project Cost			\$ 11,860.00

Speed of Deployment



**WIRED SOLUTION:
WEEKS – MONTHS**



**WIRELESS SOLUTION:
HOURS – DAYS**

Wait Not, Waste Not

Although wireless networks are fast and simple to deploy, actual deployment performance is also dependent on thorough upfront planning and coordination. There are, of course, a myriad of variables in any wireless video surveillance deployment. To avoid the costs of installation crews having to wait for hours to get access to a site, or having unexpected power problems, or even having to send back to the shop for tools to install cameras on light poles, organizations must take the time to plan the installation in detail before it begins. Access to buildings must be secured. Ownership of towers or poles must be established and access rights procured. Power supplies must be verified. Crews must be appropriately equipped. The fact is, downtime and waiting time can whittle away at cost savings, which can significantly influence both overall deployment costs and, ultimately, ROI. Because it delays installation, downtime also delays safety and security optimization.

Proven Reliability

What about the reliability of wireless networks? Especially wireless systems that use unlicensed spectrum? The reality is that thousands of wireless networks are now operating successfully in unlicensed frequencies in more than 120 countries. What's most important is designing reliability into

the network from the beginning. It takes a thorough understanding of the issues inherent in the unlicensed band. It takes meticulous planning. It also takes a hardware platform that has proven itself reliable under the real-world challenges of unlicensed spectrum. But the bottom line is, with careful planning and the appropriate equipment, wireless networks can easily provide the exceptionally high reliability needed in public safety applications. For a more thorough discussion of this issue, see Motorola's white paper "Reliability in the Unlicensed Spectrum" at <http://www.motorola.com/Business/US-EN/Document+Library>

A Paradigm Shift

As more and more organizations begin to see the exceptional security and productivity benefits of video surveillance, the industry is beginning to see new thinking in network design and deployment. Wireless video surveillance networks are demonstrating their high levels of reliability and performance in a wide variety of public and private safety and security applications. Add these to fast, simple deployment and exceptional cost savings, and the result is that wireless broadband networks are the basis for a paradigm shift in global video surveillance solutions.

A special thank you to Community WISP and Industrial Video & Control (IVC) in the development of this white paper.



About Community WISP

Community WISP delivers custom wireless connectivity solutions and wireless broadband Internet access from 256k to 100 Mbps. The company's solutions are found in New England's businesses, airports and within municipalities where their solutions are deployed for real-time security monitoring for ports, highways and city streets.

About Industrial Video & Control (IVC)

Based in Newton, MA, IVC delivers a broad range of quality IP based video systems to industrial, commercial and military applications. Their standards-based software, which delivers quality video to PCs and other client devices over a network, is designed to be scalable and easily integrate with third party software. A key strength of IVC is its ability to develop cameras, enclosures and software to meet demanding customer requirements.



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