

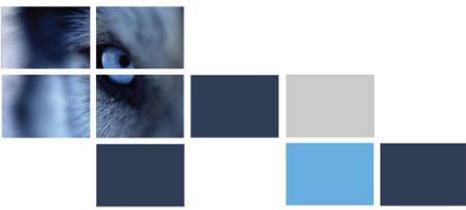
## Enhancing Campus Security

### A Milestone Blueprint Article



I went to college at a small New England University in an old industrial mill town that was going nowhere but down. It was an island of enlightenment surrounded by drab tenement housing and drug infested streets. We were so absorbed with getting an education that we rarely left the campus, and frankly didn't want to. This was before video surveillance became widespread, so the four man campus police force had their hands full just patrolling the property.

Video surveillance is becoming much more commonplace on campus around the world as concerns about the safety of students and faculty mount each time there is a campus shooting. It is a sad fact that cameras will probably not prevent the next incident from occurring but they still have an important role to play in the response. Real campus security can only be achieved through an integrated approach that includes advanced planning, teamwork, quick response, and mass notification of the student body when a threat is identified. The role of the video surveillance system in this blueprint discussion is:



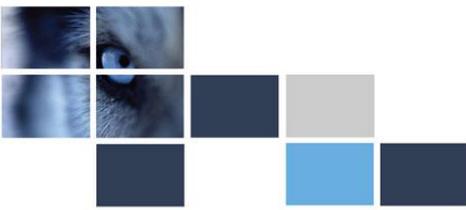
- To watch for intrusion of unauthorized vehicles and people by putting more eyes on over a wide area of campus.
- To identify inappropriate, dangerous, or threatening behavior before it becomes a larger problem.
- To discourage vandalism and graffiti.
- For public safety during natural disasters and inclement weather.
- To integrate with emergency communications and mass notification systems

### **IP Video is the clear choice**

For the video surveillance system integrator, a multi-building campus spread over a large geographical area represents a real design challenge. Camera counts are going to be high, and this will create a lot of data. With luck there will be a fiber network backbone connecting most of the buildings together on the school LAN. If not, you will need to create a back-haul to bring the video data back to the campus security office. There the issue will be how to display dozens of video images in a way that is meaningful and easy to navigate, but doesn't result in sensory overload.

IP Video is ideal for this application since no quality is lost when you transmit over long distances. CAT5e wiring cascades through each Network switch, which means that there is no enormous bundle of home-run coax cables at the head-end. The multi-server distributed architecture shown in figure 1 places Recording Servers at the 'edge' of the network where the data collection demands are the highest. The Milestone Xprotect Enterprise and Xprotect Corporate software both support the side-by-side display of video streams from multiple servers in a tiered system architecture.

In the remainder of this article we will explore some of the implementation details involved in constructing a campus wide network, especially with respect to the networking and human factors issues that are critically important to a successful deployment.



## Implementation architecture

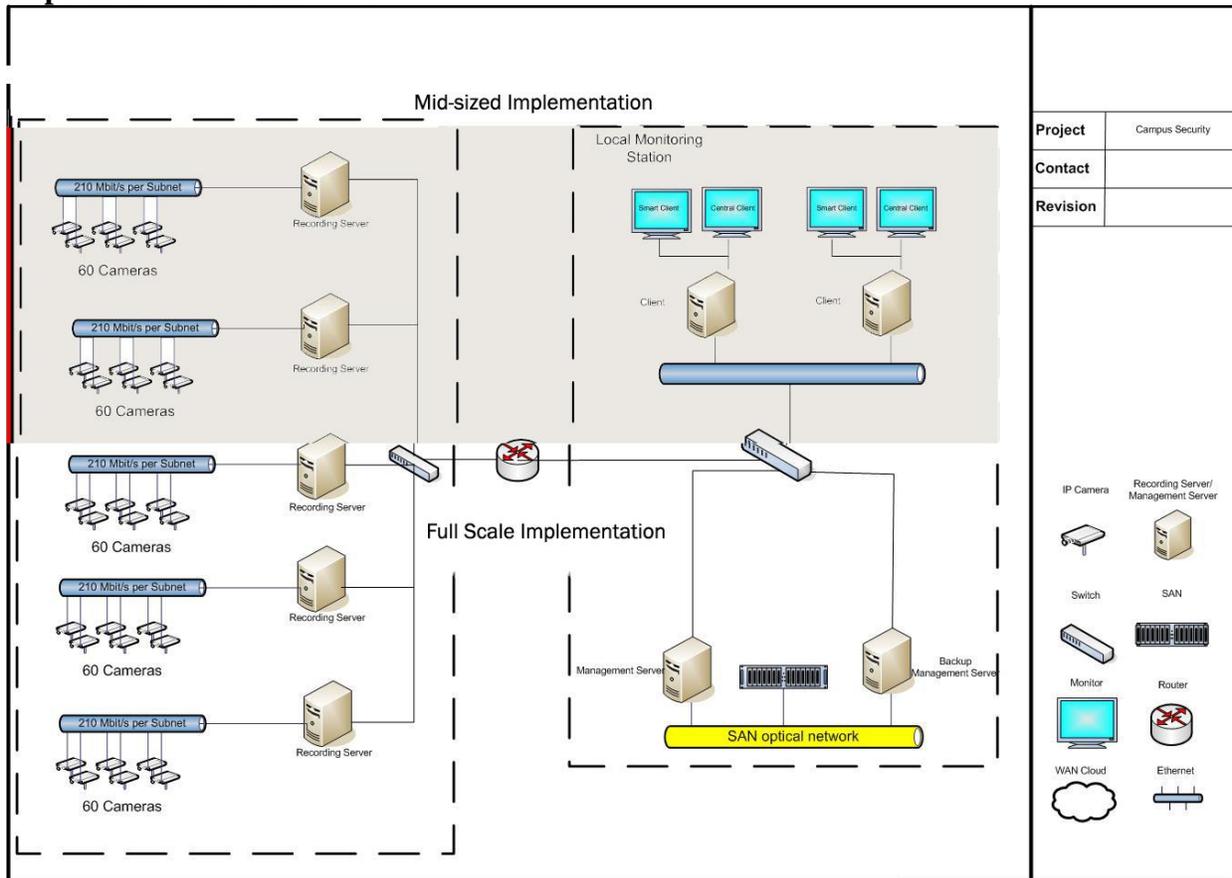


Figure 1: Campus wide multi-server architecture for IP Video surveillance

A mid-sized installation might consist of 30-100 cameras distributed throughout several acres and numerous buildings. With limited budget and a lot of area to cover, some priorities will have to be established. Some of the most common camera placements would include:

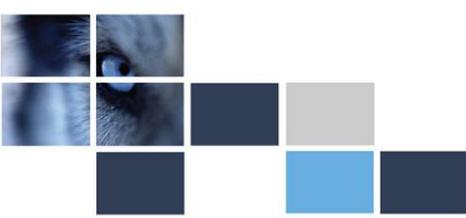
### Large outdoor overviews:

Sporting fields, Quads, the Student Center, parking lots. Use megapixel cameras to cover the most area. High resolution enables digital zoom after capture.

### Indoor hallways:

Monitor for disruptive elements or unauthorized access after hours. Use a Mini-dome with a varifocal lens to adapt to telephoto or wide-angle shots. The Milestone Scheduler function can define different alarm scenarios based on time of day.

**Trouble spots:** Graffiti locations, public restrooms, drop off and pick up areas, hang-outs. The camera will have a deterrent effect so make it quite visible, but vandal-proof!



### **Pan Tilt Zoom:**

A well placed Pan Tilt Zoom (PTZ) camera is the most flexible way to cover a very large area. PTZ's work best when there is a live human monitoring the site. Most come with very powerful optical zoom (25x or better).

### **Perimeter Control:**

Monitor the major entrances and exits of the campus. Consider a license plate capture camera if vehicular access can be restricted to entry through gates. Use a video tripwire for fenced and restricted access areas.

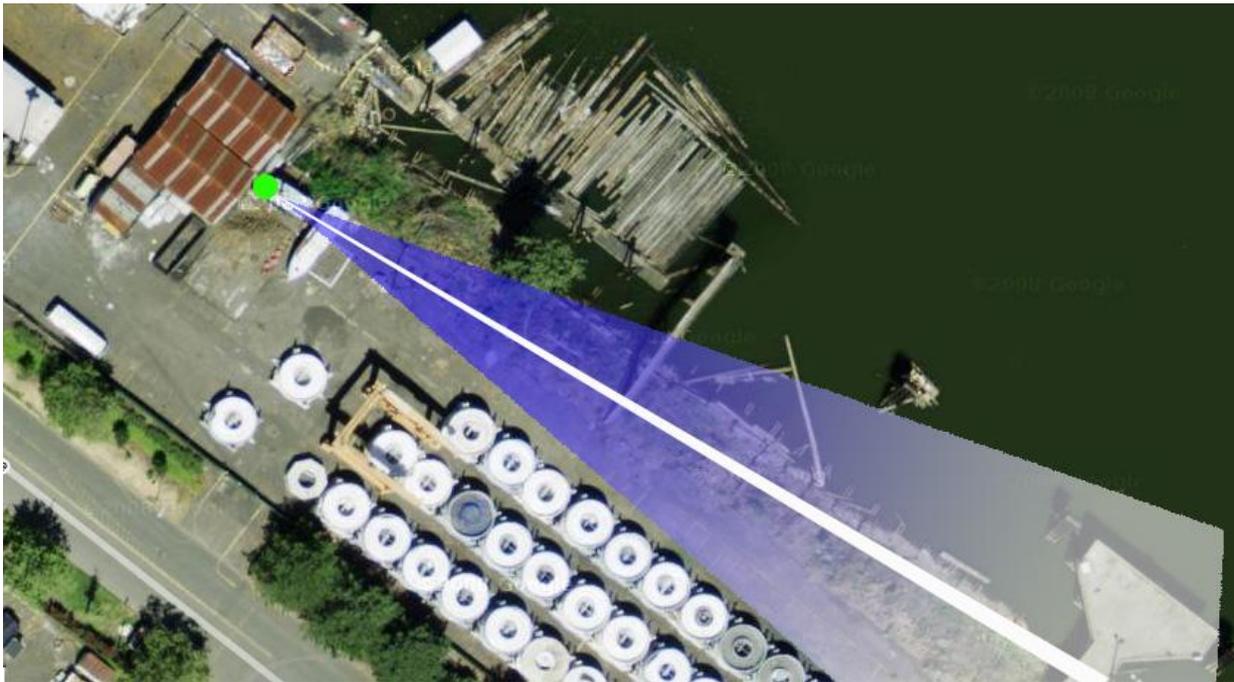
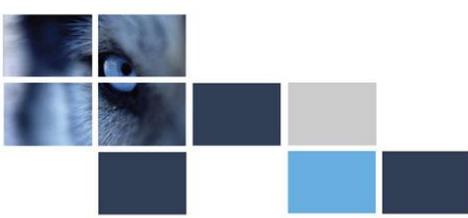


Figure 2: A video trip-wire can be used for restricted areas

As an example of a full scale implementation, consider a typical large State University with 15-20,000 students. This campus has dozens of major buildings and covers as much area as a small city. There will be an on-campus security office where all of the cameras are monitored, and there will be remote users in administration, student health, special events, and athletics who want access to the system for their own projects. For sure, a PTZ in the stadium will make the football coach very happy.



## Network Design

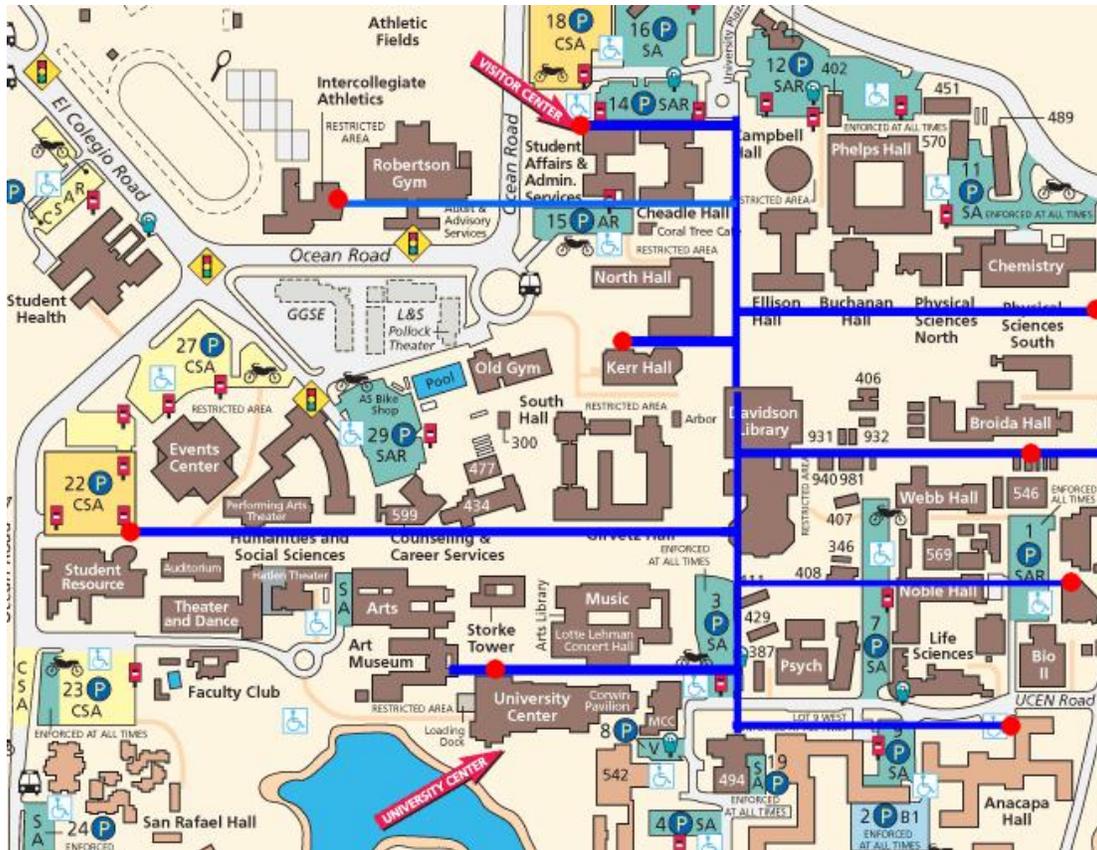


Figure 3: Using fiber optic cables to establish the network.

The first hurdle to overcome is network design. It is a safe assumption that most buildings on campus already have network connections for academic use, but these networks are typically heavily loaded and would not tolerate a massive new infusion of video traffic. Look for unused fiber optic pairs at the switches serving those buildings. If available, you can add your own video switch, or use the existing switch and create a VLAN with quality-of-service (QoS) guarantees for non-video traffic.

If the signal path does not already exist, there are two more options to consider. Check the architectural plans for the campus to see if any utility tunnels or conduits exist. Your choices will include copper (CAT5e or CAT6, up to 100 meters), Multi-mode fiber (up to 300 meters) or Single-mode fiber (for longer distances). Many popular network switches include a GBIC port to accommodate gigabit fiber optic connections. In figure 3 the red dots represent switch locations where groups of cameras enter the network.

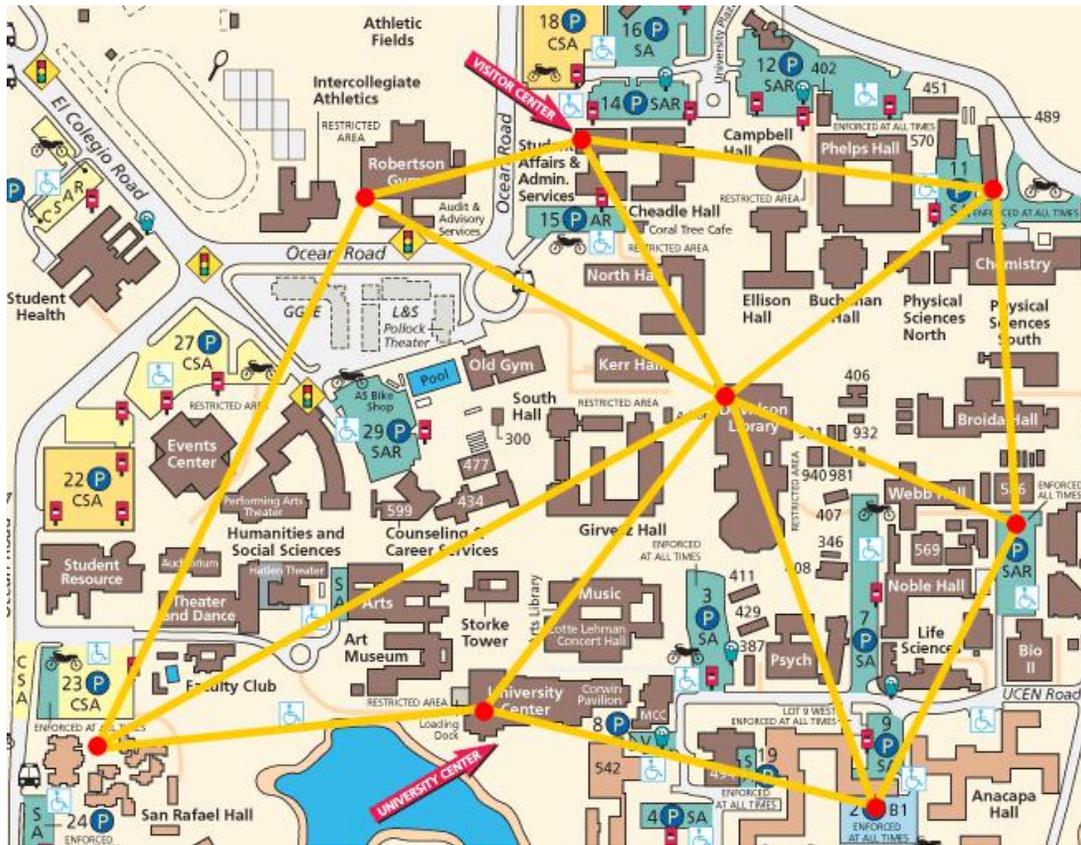
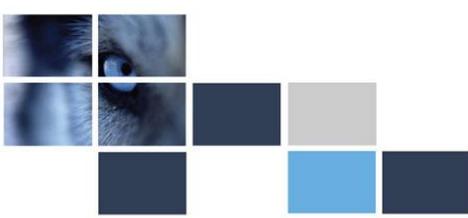
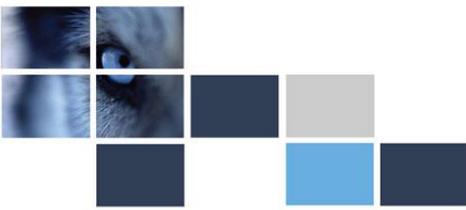


Figure 4: Using a Mesh Network to create interconnected access points

The second connectivity option is wireless, assuming there are good line-of-sight placements for the antennas. There are many different products to choose from and it may be beneficial to partner with a wireless specialist for this portion of the design. The red dots in figure 4 represent wireless radio locations that may be configured as bridges, repeaters, or access points depending on the requirements. In a mesh architecture, the radios can route to an alternate path where more bandwidth is available. But since the cameras are static, a point to point network will also work well. High gain panel, sector, or Yagi antennas should be used, and the 5 gigahertz band is much preferred over the crowded 2.4 gigahertz spectrum. To avoid interference problems, perform a wireless site survey before you begin.



## **Which Software solution?**

Both the Milestone Xprotect Enterprise and Corporate versions will work well for this application, with the advantage leaning toward Corporate as the camera and server count gets larger. Enterprise defines one Master and many Slaves to create an integrated console at the Command Center. Each server can support up to 64 cameras. End users connect using the Smart Client application, and can arrange views that come from any part of the campus.

Corporate creates a network of recording servers connected to a management server which serves as a single point of configuration for the entire collection of cameras and servers. Corporate uses a scripting language to easily create very complex responses to triggers.

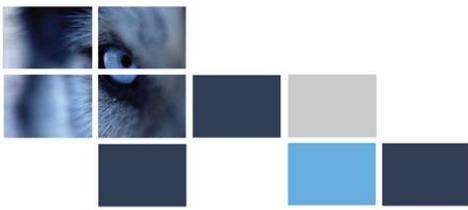
If the campus has good wireless connectivity, consider outfitting some security officers with a PocketPC compatible device, then running Milestone PDA on it. They will be able to view cameras in real-time on a portable device while making their rounds. Milestone Xprotect PDA is included free with the Enterprise and Corporate products.

## **The Central Station**

As shown in figure 1, multiple LCD displays are recommended to support the high camera count. Go for the largest and highest resolution LCD panels that you can afford, and either wall-mount or desk-mount them in an ergonomic array.

Keeping track of over 100 cameras for any length of time is asking a lot from a human being. Milestone Xprotect Central is an alarm management tool that works with either Enterprise or Corporate. With so many cameras to monitor, Central focuses the attention on alarm conditions such as motion detected or door opened (contact switch) for quick visual confirmation.

Analytics is another tool that can help security operators focus in on activities of interest. Several vendors are now offering advanced detection algorithms such as loitering, fence scaling, left object, and tail-gating through controlled access doorways.



## **Integration with Access Control, Security Alarms, Mass Notification**

In the reports following the Columbine and Virginia Tech shootings, much emphasis was placed on mass notification as an important tool for containing the violence and keeping other students safely inside. Cell phone text messages are a logical way to do this, but intercoms, emails, and voice messages are suitable. There are some very sophisticated emergency response systems that have become commercially available since campus safety became such a prominent issue.

Milestone Xprotect Enterprise and Corporate integrate easily with such equipment, either through TCP/IP messaging or dry contact switches. Several access control manufacturers have integrated their door control systems with video as displayed in the Smart Client. Security alarms can interface to Milestone through any available camera I/O port, so a coordinated response is generated from an alert.

Many cameras now have audio inputs and outputs, and the two way audio support in the latest releases of Enterprise and Corporate opens the door to intercom applications such as controlled access entry. Likewise, a PTZ camera mounted high on a pole becomes a PA system when supplemented with an amplifier and outdoor speaker horn.

### **Summary**

When it comes to protecting the students and faculty at our colleges and universities, security professionals should seek solutions that integrate well as part of their total coordinated response to any imaginable situation. Scenarios should be thought out and rehearsed prior to the actual emergency.

Video surveillance plays a central role in this discussion. As a force multiplier, video allows a small team to cover a much larger area and pinpoint problems before they get out of hand. Graffiti and vandalism cost schools millions of dollars in repairs each year. A few highly visible prosecutions will go a long way toward reducing this problem.

Finally there is the students' view of cameras on campus. No one knows where the next campus shooting will be, but it seems certain there will be one. Generally the cameras are well accepted and students feel more secure knowing they are there. Educational institutions around the world are investing in video surveillance to ensure that their campus is as safe as possible for the students and faculty that work there.

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### **About WatchPoint Video:**

WatchPoint Video LLC is a Milestone Certified Partner and System Integrator serving the Pacific Northwest. Based in Portland Oregon, the founder and author of this article is Roger Finger, a former Applications Manager at Intel Corporation for 21 years. WatchPoint Video specializes in IP based video surveillance solutions for government, industrial and commercial customers. Contact [sales@WatchPointVideo.com](mailto:sales@WatchPointVideo.com) to find innovative solutions for your challenging video surveillance requirements.

