ELAN Technologies Inc.




Remote Video Security

Frequently Asked Questions

CASE STUDY

- How & What
- Camera Basics
- Radio Basics
- Design Considerations

General

System Concept: The goal is to be highly effective at low cost. The iNet will work great in a high-end system, passing data for the high-end security system. However those systems are overkill for utilities that up to now have gotten away with just door entry switches and whatnot. Rather, we give the client a good remote video solution with motion detection and multiple camera abilities, operating from a PC, which can be a stepping-stone to a future upgrade if needed.

Pricing: A point-to-point system including installation for $10K including a master radio, remote radio and remote camera. Pricing goes up based on the number and sophistication for cameras at the remote, and obstacles in establishing communication. There is no cheaper solution for the same capability.
System Setup: Set remote camera up to record 1 fpm (frame per minute) standard, 2 fps (frames per sec) with motion detection or sensor input. Suggest door switch be tied to camera, too. Use relay output on camera to go to SCADA system (i.e. local PLC or RTU) with any alarm condition.

Operation: To save radio bandwidth, likely the operator has the camera viewer on his PC, but it is minimized on the screen and not actually connected. Example: booster station has a door entry, SCADA picks it up, operator sees/hears alarm, connects to site via viewer on his standard PC over the dedicated iNET system to see what is going on, replay, download, etc. At the remote, the camera is recording itself and any connected cameras constantly. Upon alarm (motion or sensor) it kicks into higher frame rate recording.

Scope of Supply: Site Survey, System Design, Specification, Supply, Installation, System Commissioning, Support.

System Commissioning: Commissioning includes: radio programming to match communication design, site analysis for verifying installation is good and establishing baseline for future radio system support. Include a logged site analysis with printout as part of system commissioning and a log sheet for visual inspection of connectors, antenna, cabling, weatherproofing, grounding, Polyphasers, etc. Logged output should include RF Spectrum Analysis (outlines potential issues with other local radio system interference) and site analysis for: Return Loss; SWR; Fault location and Distance-to-fault (if fault located); Gain/ Insertion Loss; transmission line loss. All provided in report for future reference.

Ongoing Support: Service Contract or time/materials basis for ongoing system support as the system changes due to: weather deterioration, added/removed sites, damage, vandalism, lightning, new radio interference, new buildings built in radio path and any other issues impacting performance. Include measuring and comparing parameters against baseline recorded at system commissioning.

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Application Specifics

Fixed camera vs. Pan/Tilt - For water/wastewater remote site the key points of interest (doors, hallways, hatches, etc.) are generally known so a fixed camera trained on the point of interest, with a field of view showing surrounding area, is generally best. A pan/tilt might allow better resolution, but at the cost of a narrower field of view, required user interaction, the potential to train the camera in an one area and miss another, and greater cost. A pan/tilt camera can cost 3X as much as a fixed unit. If a site has multiple points of interest, which can't fit into a single frame, multiple cameras are generally best. The camera with DVR records them all and the iNET transmits them all.

Camera Frame Speed. 8 to 10fps is life like, but it not practical (too much data for transmission). For a wide-angle view (i.e. a parking lot), recording 1 fps is fine (captures a person walking through the field of view in multiple frames). For a smaller field of view (camera trained on a door), use 2 or 3fps to make sure you don't miss anything. For standard recording use 1 frame per minute. This is background video anyway so there is no sense in taking up drive space.

Field of View - The field of view for the camera is what it can see, i.e. a 3' wide door 15' away versus a courtyard 100' wide with the camera 300' away. The issue on large areas of concern is the % of the screen taken up by the subject corresponding to the desired level of monitoring. Per experts, the following applies:

Subject on Screen	Monitoring Level
5% - 10%	*Crowd control*
20%	*Detection (good for water & wastewater)*
50%	*Recognition (good for water & wastewater)*
100%	*Identification*

To achieve these, use different lenses. 5mm is wide angle. 8mm is standard. 50mm is telephoto (i.e. target a door only in a wall 50' away). Detection (motion at pump station) and Recognition (person, not a raccoon) are best for Water & Wastewater. Identification is not as critical, and the tradeoff is a narrow field of view for Identification, which inherently limits how much area can be monitored for Detection.

Motion Detection - Motion detection is used to signal a higher recording rate, it should probably not be used to be the primary means of sounding an audio alarm other than to tell the operator to look at the screen. There is no audible alarm on the iNET camera viewer, so any audible alarm would have to be through the separate SCADA system. The cameras have motion detection sensitivity mostly based on size, i.e. a person in a view might take up 10% of the view, whereas a squirrel takes up 0.5%. There is no "sure thing" to eliminate raccoons, blowing trees, etc. from setting off recording. Separate high-end (expensive!) software packages can filter out most of this but add tremendous cost. Our goal is to be highly effective at a low cost. Better to err on the side of being too sensitive on motion and record everything and set up DVR accordingly.

Black & White (B/W) vs. Color - Use black and white. It has better resolution and is better in low light & nighttime. Many color cameras switch to b/w at night.

Low light / nighttime operation - : Use black & white. All cameras have low light ability to pick up naturally occurring infrared (IR) light. If not sufficient:

1. Use an ultra high sensitivity B&W outdoor camera. Increases camera from $750 to $1383.
2. Buy a separate IR illuminator. Invisible to naked eye. Narrow or wide angle available. $657. Works with all cameras.
3. Tell client to put a light at the site.

Mobile access - The iNET can accommodate mobile access, allowing user to tie to Master which then links to mobile. But since the same connection link is used to backhaul the data, speed is cut to ½. Option is to put a 2nd iNET at the Master Location, which speeds it all up.

Home Access - Either do the same as Mobile Access noted above, or tie in via landline to the company's network (if their IT people have made this available). With 2nd option, speed is dictated by the landline, so better hope the person has DSL or other fast dial up connection. Regarding software, best solution is to probably load the camera software onto the remote PC. Or you could probably use PC Anywhere or similar program to simply emulate the PC at the master. Likely a slower solution.

Police Department Access - Similar to Mobile or Home Access. If speed is an issue put a 2nd iNET at the Master Location. If the Police Department network is linked to the water/wastewater plant no radio is needed at the Police Department, it is just an issue of IP routing to the remote camera, through the radio link at the plant.

Network Access - Once the camera is on the network it allows up to 100 people at a time to connect up to it viewing the same camera. The camera has IP Address, and their Administrator can set the ID and Password for each person, meaning no ID or Password, no access to the camera.

DVR Storage capability - The camera stores data in JPEG wavelet compression format only readable through the supplied software. There is no restriction as to how many people can load the software. The storage capability is completely dependent on the resolution, frame rate and quality (compression rate) selected by the client. The specs outline a 6GB DVR digital camera for use with the iNET radio.

Specs:

Hard Drive Space: 5,807,932K (6GB); 324,975 frames (reference only, varies based on resolution)

Frame Size: QCIF, quality 5 = 5K per frame typical (ok for typical recording); Full, quality 9 = 26K per frame typical (ok for alarm recording, i.e. higher res)

Typical Usage:

Assuming 90% of time std recording, 10% of time during day is sensor activated alarm recording at: Standard = 1 frame/min; Alarm = 2 fps

Calc: Std: 24hr/day x 0.9 x 60min/hr x 1 frame/min x 5K/frame = 6480K/day

Alarm: 24hr/d x 0.1 x 60min/hr x 2 fps x 60s/min x 26K/frame = 449,280K/day

Total = 455,760K/day;

Storage in days = 5807932K / 455760K/day = 12.7 days.

Realistically there will be less than 10% of time in alarm condition (10% = 2.4 hours, or 144 minutes of motion or alarm time in a day). And if any event does occur, the likely access to the data will occur within 24 hours. The camera is normally programmed to delete the oldest data, or in the case above 12.7 days before data overwrite. Data overwrite is selectable to 1000 frames, 2000 frames, etc. or by %, i.e. 20% . A sensitivity adjustment on the camera will also reduce false alarm recording as will a completely secondary motion detection sensor.

Radio Speed - The camera is rated at 512 Kbps. Realistic throughput is in range of 350 Kbps figuring for radio overhead.

Repeater Radio - A repeater will cut the overall speed by ½. Putting 2 radios at the repeater (one for transmission, one for data backhaul) eliminates the speed loss, so the throughput is back to 350Kbps range.

For information on Remote Video Surveillance and other remote monitoring solutions from ELAN Technologies visit our website at www.ELANTechnologies.net