

Natural Gas Plant Increases Video Coverage Via Wireless

The proposed wireless system was challenged supporting a single video camera. But by installing a Longwatch system on the same wireless network, the company was able to support three cameras, with bandwidth to spare.

A leading marketer and distributor of natural gas produces natural gas liquids such as ethane, propane and butane at its fractionation plant in the Midwest USA. The company wanted to increase video surveillance coverage in critical areas of the plant. The plan was to add four Axis-233D cameras using GE-MDS radios to tie the cameras back to the central control room operators. The cameras would enable the operators to tour areas of this expansive site without leaving the control room. In addition, pan-tilt-zoom cameras enabled operators to see the instrumentation of traditional “steam gauge” panels without installing expensive sensors or wiring.

The gas company wanted two video streams from each camera (Figure 1): a Live feed and a Digital Video Recorder (DVR) feed. The DVR feed was to be recorded on a DVR in the control room for long-term review; the Live feed provides a way for the operator to be instantly “transported” to the field equipment without leaving the control room.

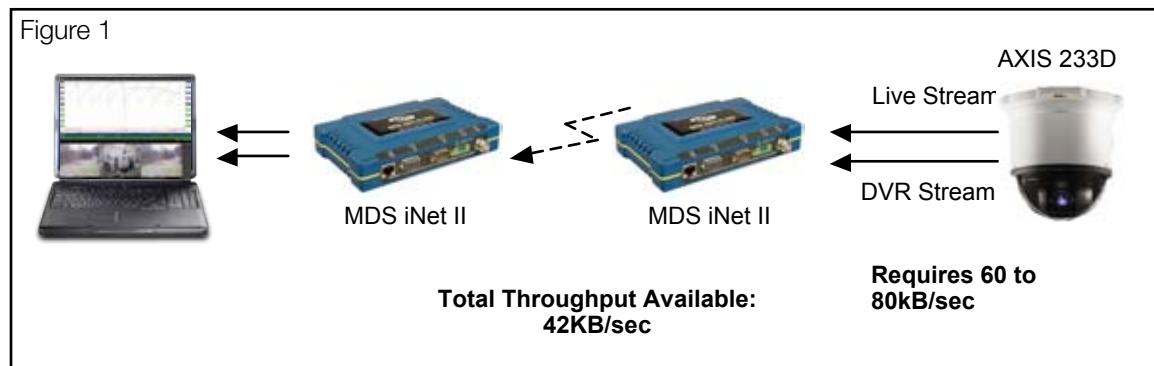


Figure 1: A single AXIS camera, transmitting live motion at 1 frame/sec and DVR data at 5 frames/sec over GE MDS radios, requires a 60-80 kB/sec wireless transmission rate. Four cameras would require more than 240kB. The GE wireless system could only handle 42kB/sec, so it could not handle even a single camera.

Live video (Figure 2) is sent by each camera using the MJPEG protocol: each picture frame is a complete representation of the image. DVR video is sent using the MPEG-4 protocol. Under MPEG-4, an initial frame

of complete information is sent. Subsequent frames are sent as much smaller “delta” frames which indicate only those portions of the picture that have changed. The advantage is that the overhead for MPEG 4 is one-tenth that of MJPEG. However, when an MPEG-4 delta frame gets dropped, the screen image scrambles. You can often see this effect when watching a sporting event over a satellite feed.

The original plan was to use the GE radios as a wireless point-to-point network. A hardware test showed that each Axis camera required between 60 and 80 kiloBytes per second (kB/sec) of network bandwidth to send Live and DVR video back to the computer and DVR. The result was choppy video pictures and occasional lost frames. The existing radio system can handle only 42 kB/sec, so installing four cameras on the wireless link was out of the question. Even one camera overwhelmed the system.

Because the original plan was unworkable, the gas company turned to Longwatch for a solution.



Figure 2: Live video is sent to the control room via the 42KB/sec wireless link. With Longwatch, the wireless system supports three cameras. Each camera requires 13KB/sec, so the network supports three live cameras while it archives video from all four cameras.

Longwatch Stretches the Ether

Longwatch installed a Longwatch Video Surveillance system and another wireless transmitter (Figure 3). The Longwatch system acquires video data from the four IP cameras from Axis, and transmits live data continuously. The live data requires 13kB/sec per camera, and the wireless system transmits at 42kB/sec, so only three of the four cameras can transmit at one time. The operators must select which three cameras they want to watch.

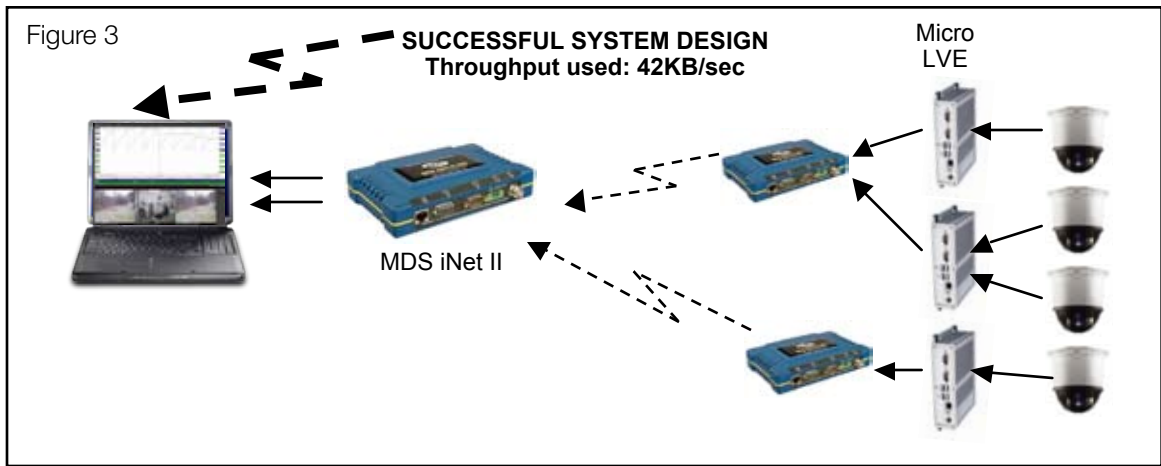


Figure 3: The Longwatch system transmits live data from any three of the four cameras simultaneously, archives DVR video locally, and sends DVR data whenever requested.

Instead of sending the DVR feed to the control room in real time, the Longwatch Micro computers, installed near the cameras at the remote sites, archive the DVR stream locally at five frames per second, and send the DVR data only when requested (Figure 4). For example, if operators need to look at events that occurred just prior to an incident or event, they can request an immediate DVR download. If the data is not needed to solve problems, the archived DVR data can be sent when live images are not needed, such as late at night.



Figure 4: The operator can request that archived DVR data be transmitted to the control room at any time, or it can be downloaded to a thumbdrive or portable hard drive and brought to the control room.

Each Micro comes equipped with 8GB of solid state onboard storage which can store 3-5 days worth of archived video. All Longwatch Video Engines are capable of expanding their built-in storage with the addition of any variety of USB storage device or, for that matter, a network storage device. Archived DVR video can be requested by the operators in the control room with simple commands on a Wonderware HMI screen.

The value to the gas company is that the DVR data is kept in the field, instead of being transmitted continuously, where it could be scrambled in transmission. The DVR footage can be retrieved at any time by “sneakernet;” that is, operators can manually download archived data by visiting the remote site and plugging in a thumbdrive or a portable hard drive. In practice, the company keeps a thumb drive plugged into each micro at all times. If operators want to see DVR video, they can instruct the Longwatch Micro to download specific archived data to the thumb drive, and a field technician can bring it back to the central control room at the end of a shift.

Longwatch also has the capability of further adjusting the video stream so that the bandwidth requirement is as low as 2.5KB/sec/camera for live video. For example, the bandwidth can be set to 10KB/sec for each camera, so four or more cameras can be viewed at the same time.

It is important to note that the original system was not capable of streaming and archiving video from a single camera over the wireless network; however, with the Longwatch system, it is streaming live data from any three of the four cameras, and archiving data from all four cameras.

The gas plant system used multiple Longwatch Micros and radios at each camera site, due to physical site demands. However, in many cases, multiple Micros (each of which is capable of handling two cameras) can be connected to a radio. Most radios can handle multiple devices. Because Longwatch sends DVR video only on demand and uses optimized messaging for transmitting live video, several Longwatch Micros can share a single radio and still deliver good performance. This provides a very cost-effective system solution that delivers more flexibility, performance and reliability than just radios and cameras alone.

About Longwatch

Longwatch, Inc. was founded by industrial automation and software veterans with the goal of simplifying video delivery over existing SCADA, HMI and distributed control networks. The result is the Longwatch Surveillance System™, a portfolio of products that enables SCADA system users to view events and easily verify alarms at local and remote sites using both legacy and new networking infrastructures. The system integrates video and system alarms on the same display for fast, reliable operation and decision-making.

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