

# A Route to Market with the Speed of Light

Sometimes, companies start out life with one business idea but end up doing something completely different. This is what happened to AMG Systems, one of the world's leading providers of fiber optic transmission equipment for CCTV surveillance operations in the security and transportation sectors.

BY CATALYST COMMUNICATIONS



Dr. Alan Hayes, founder and Managing Director of AMG Systems

**A**MG Systems was founded with the intention of developing gas detection devices based on innovative gas sensing solutions, including the development of an original IR-point gas detector capable of working directly with Wheatstone Bridge Pellistor drive control systems. According to Dr. Alan Hayes, founder and Managing Director of AMG Systems, "While we were working on the development of the gas detector we had to find a way to actually earn a living. We discovered a hole in the surveillance market which called for CCTV transmission on fiber optic cables. At that time—in the early 1990s—there was a big push from the U.K. government to implement town center surveillance systems. This required transmission products capable of transmitting uncompressed video signals over distances of more than a few hundred

meters. We, therefore, designed and developed a series of plug-and-play products which were brought to market under the brand name Vision 2000. During those days, most of the projects were single channel point-to-point using one or two fibers per camera, and we developed versions both for single-fiber and dual-fiber applications."

AMG quickly discovered that the U.K. market for security and surveillance products was one of the largest in the world, with a multitude of systems needed to cover everything from train stations, shopping malls and football stadiums to conference and hotel venues. Working with system integrators across the country, the company set about making a lasting impression and carving out a viable market share—and it succeeded. High-profile projects, such as the London West End, Chelsea Football Club, The Oracle, numerous town centers and



Regent Street in the heart of the capital is part of the London West End surveillance system. The signals from the cameras are transmitted in real time to the control center located in the Trocadero Centre near Picadilly Circus.

a large number of universities and prisons, all use the Vision series for their current CCTV transmission.

Having successfully established itself in the market for Vision products, AMG "took to the road" to talk to system integrators to find out where the CCTV transmission market was going and what the shortfalls were in functionality of the products that were available at the time. "We identified requirements in the transportation sector," explained Dr. Hayes, "and, in particular, areas looking to implement CCTV surveillance along roads, railways and large airport perimeters. The principles also applied to any large area CCTV system."

In this sector, transmission systems usually cover huge areas over many hundreds of kilometers, and the technology used for the collection of CCTV signals at the time was analog transmission. This means that a signal could only be repeated a few times before video quality reduced significantly, and, thus, CCTV signals could only be transmitted to a local control room. Communication between control rooms was not possible. This is where AMG saw a gap in the market. To work in a true wide area network, video signals must be transmitted in the digital format where they could

be effectively repeated indefinitely. The other benefit of the digital approach was that signals could be added to or dropped off from the fiber at each repeat location. This way, a network could be put together such that it would not only collect all the video on a minimum number of fibers, but could distribute these signals to any control room on the network. It was important though that any new add-on technology must not reduce video quality, and, to this end, video was to be transmitted in an uncompressed digital format without throwing away any video information.

"Based on our findings," said Dr. Hayes, "we developed the revolutionary Guardian 2800 series. This was the first product aimed at the CCTV transmission market to transmit video in a digital format and incorporate functions such as drop-and-insert and unlimited distance and manageability." The Guardian technology was first tested in 2000 on the M25 orbital motorway around London. AMG's technology introduced the ability to drop-and-insert camera signals anywhere along the system. It also eliminated the problem of video quality degradation with distance because as long as a repeater could detect if a bit was a 0 or a 1, it could recreate and forward a picture identical in every respect to the one taken out of the back of the previous camera. It was the first time that the U.K. Highways Agency had been able to transmit video signals all the way around the M25. This gave the police the ability to look at any cameras from any location--a very significant step forward for the police at the time. Today, the

system is installed and regularly updated on the Birmingham Box, the motorways encircling the second largest city in the U.K. It routes signals from many hundreds of cameras to many control centers from as far away as Exeter, hundreds of kilometers away from Birmingham. It also carries an Ethernet channel that allows the control centers to view any DVR-recorded images simultaneously with live images. It even operates with dual redundancy so that images can be switched to a second fiber in case of catastrophic fiber breakage.

The system is totally dynamic and flexible. Camera signals can be dynamically routed through the Guardian transmission system to any location on the network, interfacing with third-party control systems. As the first of its kind, one could argue that Guardian solution offered true "anywhere to anywhere" CCTV transmission. It was at this point that competitive suppliers started to introduce products based on digital transmission. However, all the competition did was replicate the functionality of analog transmission, and that

did not give end-users the real benefits of a digital-based transmission system. Therefore, AMG has been able to keep ahead in this competition by offering far more functionalities from the transmission system.

In 2003 AMG introduced the Guardian-Lite system; this, again, was revolutionary in its design, offering much more to end-users than any other competitors could. The Guardian-Lite allowed the user to collect video signals on a single fiber, daisy chaining between each camera. The savings to the user were enormous for large area systems--no longer did eight individually located cameras require eight different fibers. Signals from all eight could be transmitted on just one fiber routed between each camera. Guardian-Lite also offered full dual redundancy, with built-in detection mechanisms for missing signals that would prompt an automatic switchover to transmit in the other direction if installed in a ring or daisy chain configuration. According to Dr. Hayes, "The technology we applied meant that we could offer virtual



The notorious Spaghetti junction on M6 is part of the motorway system encircling Birmingham.



For Phase II of the CTRL project, it was decided that a real-time, uncompressed video transmission system would be implemented.

guarantee of system integrity 24/7. We were gratified to see the market response, which included a traffic management system in connection with the Olympic Games in Athens in 2004."

The Athens project won AMG the "Industry Oscar" in 2005 when the company proudly picked up the Security Excellence Award for Best International Achievement. Another project worth mentioning is the Channel Tunnel Rail Link (CTRL)--the U.K. end of the high-speed rail system for the Euro Tunnel. For Phase I of the CTRL project, transmission of compressed video was applied. However, it was soon found that the reduction in quality and the latency caused by the compression were causing concern. The main reason for implementing CCTV surveillance on the CTRL was to deter terrorist attacks to, for example, certain points that could have catastrophic consequences for trains traveling at high speed. Latency in the transmitted picture means that you could not be absolutely sure of what

you saw; so, for Phase II, it was decided that a solution which could transmit uncompressed video would be implemented.

The last couple of years have seen the global market move towards increased use of IP for transmission of CCTV images, using different compression technologies. Dr. Hayes agrees that video-over-IP is a good solution for some applications, but has reservations about its universal appeal, especially for observation-critical applications like highways. "CCTV surveillance is an invaluable tool in managing highway systems. It does not matter if cameras are used for incident detection and management, for license plate monitoring or for many other applications--it is clear that the number of roadside cameras will continue to increase. This raises the challenge of getting increased numbers of camera signals from the roadside to a point where they can be used or processed. However, if you compress a video signal to raise capacity, information within the signal is discarded and cannot be recovered later. With increasing adoption of video

processing software that requires the maximum amount of video content information, the process of compressing a video signal--just to make it more convenient for the transmission system--starts to limit the future usefulness of the delivered video signal itself."

This point of view has led to the latest AMG product development, the AMG 3700 series, which was launched at IFSEC in 2006. It is the first technology in the world to integrate Ethernet, low-speed data and uncompressed real-time video on a fiber optic CCTV transmission system. "Our new products eliminate the need for separate IP, voice or data networks and bring about significant savings," Dr. Hayes clarified. "In a highway situation, for instance, surveillance can be carried out on high-quality, uncompressed, real-time video images while the Ethernet carries IP traffic for variable message signs, phones, automatic license plate recognition cameras and wireless systems. This approach is also beneficial in perimeter security situations,

again enabling high-quality video images to be relayed to the control room while allowing the access control system to be carried alongside." In every situation, it is a truly cost-effective alternative to the installation of separate Ethernet and low-speed data networks.

Dr. Hayes' standpoint was substantiated when Alcatel selected the 3700 series for National Roads Telecommunications Services, a single national approach to the future communications network on England's motorway and trunk system which is managed and maintained by the Highways Agency. "We were extremely proud to be selected as it proves that our product development philosophy is right. Our scope is to deliver the 3700 for collecting one video and distributing Ethernet at each location, with a single fiber daisy chaining between each camera," Dr. Hayes said. Initially, the contract covered 1,000 cameras, but included the option to expand the network to up to 7,000 camera locations over the next 10 years.

AMG is now marketing the 3700 Series worldwide and has already obtained orders in the Middle East and Europe. Later this year, AMG will exhibit in Asia for the first time at IFSEC India in New Delhi in October. By the way, the Vision series that started the whole process is still going strong as it has been updated with new features and functions over the years--but always with backward compatibility. And, what happened to the gas detectors? Well, this part of the business was split out into a separate entity named AMGas Ltd. And that, as they say, is a completely different story. **AS**

