

Terry White discusses how HD wireless video cameras and satellite communications can transform surveillance and security operations, giving immediate and actionable intelligence to commanders

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Satellite communications can play a key role in keeping surveillance personnel connected during a major incident, whether in the air or on the ground

While global defence spending is on the rise, many governments and organisations around the world are still facing increasingly constrained budgets. At the same time, surveillance is becoming increasingly complex as more threats emerge and security forces are stretched thinner than ever before. Furthermore, the nature of these threats is changing – they are more mobile and more dangerous than ever, placing an immediate focus on the ability to take decisive action based on live information. Defence officials require an all-encompassing solution spanning reconnaissance, surveillance and real-time monitoring to keep pace. The challenge is that, while more budget is now being spent in areas such as administration and litigation, the number of service personnel on the ground is shrinking and the

existing communications infrastructure is being put under considerable strain. But with advances in technology, today's surveillance teams no longer need huge numbers of personnel on the ground. Instead, forces need a combination of highly specialised surveillance teams, real-time high quality video, communications and analytics technology to enable those in command centres to make informed decisions to help resolve any situations as quickly as possible.

With fewer and smaller patrols on the ground, command teams are now reliant on high quality video to make decisions. Where grainy footage used to be acceptable – a small team back at command would manually review every frame to spot anything that might shed light on the situation – today's forces are inundated

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with video images from colleagues on the ground, but also from social networks and passers-by sharing and uploading information. Given this sheer volume of video data to be analysed, it is no longer feasible to deploy a team to study every single piece of information in detail. Instead, surveillance teams are turning to analytics technology that can spot and flag anything of interest and that can also recognise faces and patterns to provide detailed information to the team to review. Compared to manual review, this saves significant time, and can also ensure video information is acted upon immediately. This technology relies on high quality video, however – grainy images simply won't cut it as the software won't be able to understand it and make sense, potentially missing vital pieces of information.

To ensure a high enough quality of video footage, many police, counter-terrorism and defence forces, operating with tight budgets, are turning to a new generation of cost-effective wireless video camera systems and communications products that are now military grade and meets the highest standards. Using commercial off-the-shelf (COTS) equipment like this is a cost-effective route for surveillance forces which need the best technology to record and handle HD voice, video and high bandwidth data traffic simultaneously. Capturing this information is just the first stage in the process; the second is actually transmitting this back to the command centre for analysis. This second stage is crucial and any latency, delays or glitches can result in failed operations due to decisions being made either too late or without all the information available.

For this reason, security and surveillance teams rarely rely on cellular networks for communication. In a crisis, it's dangerous to rely on the security or performance of these lines of communication, as they will likely be overloaded by the public, rendering them useless. Furthermore, communication lines are also one of the first targets for terrorists, making them susceptible to sabotage –

terrorists may be reliant on maximum disturbance through the breakdown of existing networks. In these security situations, the existence of a reliable communications grid, free from the threat of terrorism, is essential to appropriately deal with the aftermath.

That's not to say there is no place for emerging 4G and LTE technologies which promise greater bandwidth and faster throughput. But, while these networks can be valuable in reconnaissance missions or non-security related surveillance operations where data can be either recorded for analysis at a later date, or transmitted without any worries about latency and delays, they are simply not reliable enough for security forces that require access to the latest information as it happens.

Instead, the requirement for HD video footage requires a high-capacity network with the emphasis now on front-end compression and transmission of data. Modern satellite equipment does not suffer from the same problems as cellular since capacity demands are met by a vast number of satellites in operation, and hardware is safe from ground-based attacks, creating the necessary infrastructure for HD video. For this reason, satcoms play a key role in keeping surveillance personnel connected. While satellite technology has historically been seen as an expensive and impractical communications network, with increasing capacity, modular functionality and high data transfer rates, satellite communications can actually exceed even the most stringent communication requirements.

Satellite data terminals can be deployed on the ground with foot and car patrols, and also in the air in helicopters or in unmanned aerial vehicles (UAVs). Capable of transmitting high definition video footage from anywhere in the world, this equipment provides surveillance teams with a real-time overview of the situation as it happens, empowering decision makers with the information required to make crucial decisions. Satellite communications technology provides a vital link between disparate teams on the ground, in the air and in the control centre, enabling them to work together seamlessly and share information and data in real-time.

For example, where eyes on target are needed at all times, satcoms enables aerial surveillance teams to be in constant communication with ground patrol and command, sharing live video and data and providing continuous updates on the target's whereabouts. This enables the command centre to fully control and understand where all assets can be deployed to their best ability to resolve the situation, directing foot and car patrols to be in position ready for the arrival of the target. This provides a full 360-degree view of the incident as it unfolds.

Aerial surveillance is a key component in surveillance today. It can be highly effective in delivering situational analysis, and surveillance personnel can cover broad areas and long distances quickly. But helicopters are not



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always a viable resource due to limited budgets and safety considerations. There is also an increasing trend to use UAVs for part of this role. While helicopters can be covert by being overt, providing crucial updates to ground based teams, surveillance teams generally want UAVs to be completely covert providing surveillance teams with video data and information without anyone noticing.

For this reason, UAVs are often deployed at much higher altitudes than helicopters so that they cannot be seen by the naked eye. They also tend to be much smaller than a fully manned helicopter. In these cases, any recording and communications equipment needs to be compact, lightweight, and able to withstand adverse weather conditions. Again, modern satellite hardware is increasingly chosen for these situations. While high-capacity dishes and large reflectors used to be so big they had to be mounted on a vehicle, the equipment is now extremely mobile, versatile and easy to use, enabling covert operations to be up and running within minutes. Portable satellite data terminals have become a way of extending the range, allowing UAVs to cover greater distances and relay real-time footage back to the command centre.

UAVs can be absolutely invaluable, providing an overhead view of how the situation is developing on the ground below and providing command and control teams to make the informed decisions in real time. Commanders not only gain real-time situational analysis of all development, but are also able to maintain a safe distance and avoid aggravating the situation.

Despite this, challenges exist that are holding back the use of UAVs. Air traffic control restrictions are strict, and until assurances can be made that UAVs will automatically divert their course ("see and avoid") should they come across any obstructions in their path, it's unlikely we'll see them being deployed by surveillance teams operating in built up, urban environments.

It is not just in the air that these technologies can bring

real benefits, however. Body-worn equipment is already in use by military, law enforcement and intelligence agencies around the world, while we are seeing some very exciting developments in unmanned, ground-based equipment, vehicles and robotics. Again, the same principle applies: by equipping these agents with advanced HD wireless video camera and communications technology, commanders have a powerful tool to help them cut through the fog of a fast-developing, often far-away situation.

The nature of today's threats means that the consequences of failing to stop them can be catastrophic, and requires ever-more sophisticated technology and insight into what's actually happen. A picture paints a thousand words, but HD video paints so many more. Without eyes on what's happening, when it's happening, serious consequences can result during a fast-moving and febrile situation, such as endangering innocent lives.

While no technology can guarantee that all errors are avoided and no opportunities are missed, HD video immeasurably strengthens minute-by-minute, second-by-second intelligence gathering and command and control. These technologies also give an important degree of accountability. While their work is covert, the actions of security and surveillance agencies are under more public scrutiny than ever before. When operations fail because of missed or faulty intelligence, or because information was not processed and communicated in time, commanders can expect to have to account for their actions. Information and video gathered during operations can be a powerful way of demonstrating that procedure was followed to the letter, and can provide valuable lessons when subsequently reviewed.

The risks we face today, together with the pressures under which security agencies work, demand a new technological approach – one that can provide a panorama of a complex and fast-changing situation, and ensure that all parties have immediate access to the information they need in their crucial work.

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High-definition video can provide users with essential information, but requires a reliable means of data transmission to ensure images are timely and of good quality