

Giles Peeters examines the developments in satellite tracking of high valued cargo through hostile environments, and highlights emerging capabilities which ensure far greater security

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One of the most challenging elements of any first responder scenario is maintaining cargo security as it's transported to and from an operation. Whether it's keeping track of ISO containers in huge shipping yards in Kandahar or moving equipment through hostile environments where there are high levels of insurgent activity, the risks are ever present.

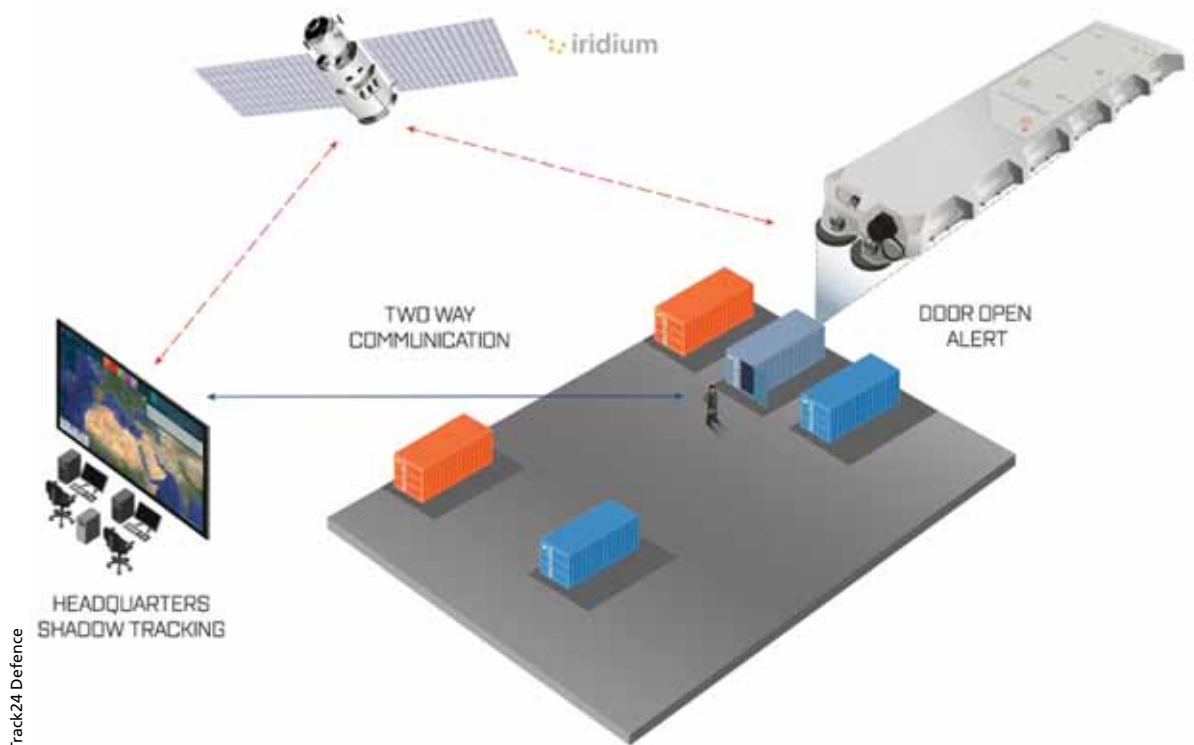
Traditionally, security forces have tracked cargo using radio-frequency identification (RFID) solutions. While this industry continues to grow, limited RFID range means once the cargo is on the move or outside the HQ radio bubble it becomes difficult to track, and is therefore vulnerable. And even if cargo is tracked using GSM/GPRS, where available, this writer knows of militaries who have welcomed the latest shipment of ISO containers from the frontline only to find they're full of sand instead of high-value contents – and therein lies the problem. Even if you know roughly where the cargo has been, you don't know whether it's been tampered with; at best in an interference scenario the cargo's been stolen, at worst it's been replaced with something malicious like an incendiary device. This is a real threat faced by security forces around the world. Militants know the best way to compromise a target is to get the security forces they're up against to transport an IED, for example, to the target themselves. If you have no intelligence on the status of cargo routed through hostile regions, this risk has to be factored into the equation.

Tracking high-value cargo is also important from an operational viewpoint. It may be that the engine components required to get your convoy back on the road or the jamming technology you require to counter localised IED threats needs to reach your group at a certain time or date before you can progress. When this writer was in Joint Helicopter Command, operational efficiency could be compromised by something as seemingly simple as the late arrival of a rotor blade coupling for a helicopter. But by this time we'd had an established presence in Afghanistan for ten years – a well-oiled logistics chain had already been developed and was running fairly smoothly. This is in contrast to security forces that often work in hostile environments with no friendly presence. A good example of this is certain regions of Africa. First responder NGOs may have managed to take what they initially need out with them when responding to a humanitarian crisis, but what about second phase supplies? High-value cargo in this instance could be food deliveries. Not only would the NGO want to know where the consignment was and that it was progressing as



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Smart shadow: the latest generation of satellite tracking systems provides far more security features than its predecessors

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planned, but they'd also want intelligence on the contents to ensure they knew everything was fine with the food itself.

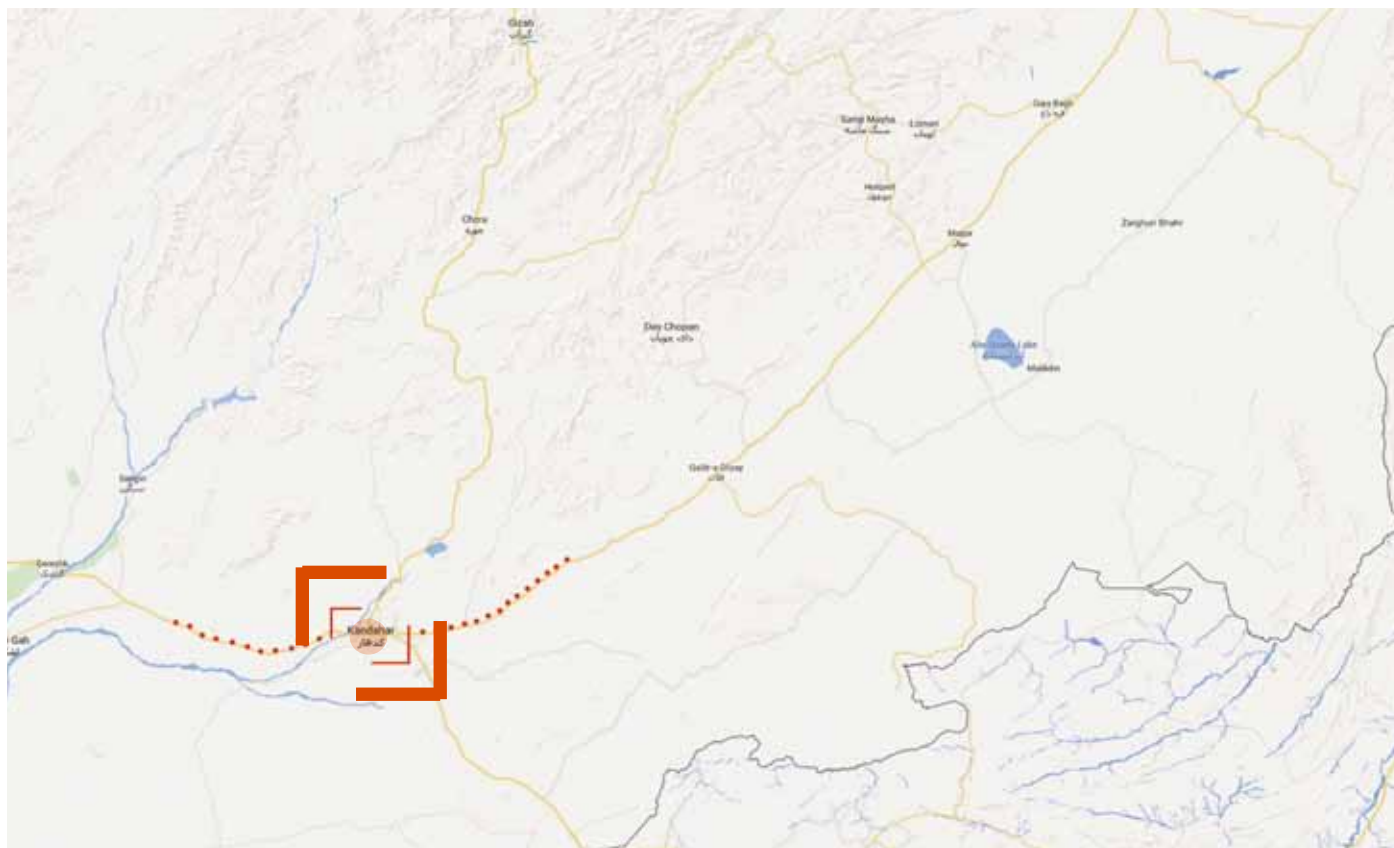
The other challenge faced by security forces is the threat from within. Quite often "friendlies" may have a different agenda. You might think operating in tandem with a local police force in a new area would be relatively risk free, but what if this particular police force has seen external security forces come and go in recent years, and individuals within that force feel the best way you can help them is for them to help themselves? They figure that, in six months' time when you're no longer around, they'll still be benefiting from your presence. The truth is, initially especially, the presence of secure satellite tracking for high-value cargo can be enough to ensure your "allies" work to the same agenda.

Security and military forces have typically used fit-for-purpose cargo management solutions from the commercial world, but these aren't designed for beyond-line-of-sight tracking and consignment management – especially considering the challenges faced by smaller security groups operating in hostile environments. Instead, the challenge of consignment tracking needs to be approached from a security perspective (multiple dispersed geographies and hostile engagement) and modern technology employed to solve the problem.

Satellite tracking is no longer the preserve of the rich and famous either. In fact, increasingly more established security groups with larger budgets – particularly Special Forces – are realising the benefit of cost-effective commercial solutions. This is not about all singing and dancing solutions; this is about quickly and affordably increasing capability. High-value cargo will often need to be transported over long distances at short notice, and it's a mix of commercial satellite and sensor technology that provides the necessary consignment tracking capability. By integrating sensors designed to detect light, temperature and humidity, for example, with accelerometers designed to measure direction and speed, and using AES256-encrypted short burst data from an established satellite provider, you suddenly have a lot of real time data on your cargo that you didn't previously have access to. (Incidentally, we're excited about Elon Musk's 4,000 low-earth-orbit satellite announcement – another affordable global network to join the likes of Iridium and Inmarsat which can be leveraged for increased tracking capability.)

Not only will operators be able to perform "health checks" on cargo to assess its state, but they'll also be able to build automated M2M intelligence into their operations. For example, if the cargo in a convoy slows to a stop for a certain period, updates can be automatically sent to the smart phones and tablets

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of the security team in charge and support can be routed to the stationary vehicles. A simpler example might find a small security team attempting to guard a huge ISO container yard. Traditionally they'd struggle to provide adequate cover, but we're now dealing with groups who use the aforementioned technology to automate the process – if an ISO container door is opened, a sensor detects the movement and routes the info back to the nearest responders. This could be

operational HQ thousands of miles away or the guard sitting at the entrance to the yard, tasked with calling for backup if necessary.

Satellite tracking high-value cargo has therefore evolved and is no longer just about providing a dot on a screen. The availability of high-capability, low-cost satellite services has enhanced tracking capability and opened the door for machine-to-machine intelligence to help counter insurgent threats.

Status update: cargo can be tracked through hostile environments, with detours or unscheduled stops creating automatic alarms

CASE STUDY: protecting democracy

Special Forces enter a new region to support the incumbent government throughout an election process. The voting period is over and ballot papers need to be collected and rerouted to a central location in the capital city to ensure counting accuracy. Local police forces are tasked with the job and assisted by Special Forces. Ballot boxes in regions are collected and stored in ISO containers at police stations before being moved the next day to their final location.

Darkness falls, and members of a local militia opposed to a political party bribe a local police force in charge of a key region to leave their station and go on patrol, giving them access to the yard in which the ISO container sits. The militia loads the container onto the back of a lorry and leaves the area to destroy the ballot papers at an unknown location.

Out of radio range and with no cellular coverage, the militia is confident they can complete their

disruption activities uninterrupted. But intelligent satellite tracking technology covertly installed on the ISO began transmitting data as soon as the container was moved. Special Forces units responsible for assisting police in the region are notified on their computers and smartphones that the container is on the move and receive position updates every 15 minutes. They know the container hasn't been opened yet thanks to the sensor technology at play, so they call for local military backup before moving to intercept.

The militia is unaware Special Forces are on the way; as a result they are taken by surprise when the camp is surrounded and captured by government forces. The container remained unopened throughout and the ballot boxes show no signs of tampering. As soon as the central vote centre receives news that the container has been successfully secured, it calculates current totals and prepares for the arrival of the slips. The final ballot boxes are then transported to their city destination, and the election is completed fairly and on time, ushering in the country's next democratically-elected government.

Giles Peeters is defence sector director at situational command and control and blue force tracking specialist Track24 Defence. He worked in the UK MoD's Defence Communications Security Agency (DCSA) as operations officer and procurement manager in the Satellite Service Delivery team before moving to GCHQ in 2001. From 2004 to 2007 he provided front line tactical communication and deployment capability for Joint Helicopter Command in Iraq and Afghanistan.