# BORDER SECURITY REPORT

## COVER STORY
### HIGH-LEVEL ARCHITECTURES OF MULTILATERAL INFORMATION-SHARING WITHIN THE MARITIME DOMAIN IN EUROPE

# NEXT GENERATION TECHNOLOGY IMPLEMENTATION ESSENTIAL FOR FUTURE BORDER SECURITY SUCCESS

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Law enforcement agencies and U.S. Border Patrol (BP) have utilized traditional aviation for patrolling broad areas of land for decades. Over the past few years, a variety of emerging technologies have matured to work in conjunction with these established methods. While the use of aviation was initially low tech and focused on searchlights and binoculars, BP has since advanced to include sophisticated sensor technologies such as Intelligence, Surveillance, Reconnaissance (ISR) EO/IR cameras, mapping systems, and Radio Frequency (RF) Microwave systems. However, not every helicopter or fixed wing aircraft in U.S. Border Patrol's Air and Marine Operations (AMO) fleet has yet made this migration, and the majority

of the aircraft patrolling along the border are still using binoculars and searchlights. While these next generation technologies have a high initial cost threshold, they have proven to be a valuable resource for law enforcement and Search & Rescue (SAR) operations who have found them to be a cost-effective investment with increasing success across a variety of border security missions.

Because Customs and Border Protection (CBP) policies can change depending on the current administration and laws enacted by Congress, the political dynamics of protecting the border are complex. However, most CBP personnel will tell you that their world consists of five categories that help them complete their mission each day: legal ports of entry and inland checkpoints, border walls and smart walls, ground teams, and AMO units. All five categories are critical to field operations. When one breaks down, national security, drug and human trafficking, and legal commerce are severely impacted. Until relatively recently, these five categories operated as disparate systems, posing unique challenges to CBP. Thankfully, industry partners and advancing technology is catching up to the problem at hand. With proper execution and adequate budget, CBP can streamline its border security processes by integrating these once disparate systems into a cohesive integrated mesh network that effectively connects all five key elements of border patrol.

The first major element of border security is where the decision makers are posted: CBP Field offices, legal ports of entry, and inland checkpoints. These field leaders need a bi-directional flow of real-time, accurate information to and from field agents to make the best decisions possible for the welfare of the country, officer/agent safety, and the population they interact with daily. This is where mobile ad-hoc networking (MANET) communications technology comes into play. Through MANET technology, field leaders or tactical teams can easily create a self-forming network of high-power radios capable of transmitting & receiving voice, video, and IP data. These radios can be deployed on fixed towers across the border or on vehicles, hand carried by ground personnel, and connected to other assets. In times of crisis, non-fixed MANET radios can be quickly stood up around a situation until the mission is complete, and then simply dismantled back into a man-packable Pelican case.

Walls, both physical and technological, are the second major component of CBP's border security efforts. Physical walls at the border serve a simple function: to slow foot traffic down. Smart walls, on the other hand, consist of technology



methods that agents have used for decades to determine if someone has been in each area, and alert CBP agents and command staff of the traffic's location. As technology has improved, ground sensors and Autonomous Surveillance Towers (AST) have been added to the smart wall's array of technology solutions - with portable AST towers strategically placed along the border, and fixed AST towers continue to be built as budgets allow.

After the smart wall has alerted authorities of activity and the physical wall has blocked entry, it's up to the CBP ground personnel (bush teams, patrol agents, and AMO teams) to do their job and intercept.

As budgets allow, CBP has taken small steps to integrate technology into the ground personnel teams, another critical aspect of secure borders. Using traditional Land Mobile Radios (LMR)

from fixed or portable AST towers, ground sensors, AMO video downlinks, unmanned aerial vehicle (UAV) video downlinks, pole cameras, attic and sweep cameras, body cameras, License Plate Readers (LPR), and other sensor-based technologies can deliver their imagery and data into the field, no matter where the agent or officer is located along the border. RF MANET mesh technology, make this possible by connecting these smart edge devices to agents in the field. Field personnel have ruggedized computers in their vehicles, and dismounted personnel or those on ATVs, boats, or horseback, have smartphone-based End User Devices (EUDs) that allow officers to access the Tactical Awareness Kit (TAK) software application. With this capability, the CBP ground personnel have immediate actionable visual information, empowering them to react to and make tactical decisions. Sensor based imagery streamed through TAK and connected through MANET radios create a powerful toolset of capabilities that will make CBP more effective operationally, increase officer and agent safety, tighten national security, and safeguard interactions with the population.

You may ask, how should CBP

from companies like Motorola, dispatchers can share data with the ground teams over voice. Today, Air units continue to "walk in" bush teams to subjects that are concealing themselves using traditional voice radios. However, with advancing technology comes many challenges, one being that LMR and cellular capabilities do not exist entirely across the borders and there are significant and often widespread gaps in coverage. This is not only an operational problem, but also an officer and agent safety problem. The field offices and dispatchers have access to the ground sensor and AST video feeds, as well as essential AMO video downlink feeds, but for the most part, the agents in the field do not. The field agents are being told what the image shows instead of seeing it for themselves. Historically, this was the best we could do, but not any longer.

From this set of challenges is where the concept of the Tactical Bubble was born. Through the Tactical Bubble, surveillance cameras

implement this capability and what impact does traditional aviation have to do with it? To solve the communications problem along the border, one must use, as the old saying goes, "the right tool for the right job" and incorporate a hybrid of technologies into border solutions. For example, many of the fixed towers have a high speed backhaul/uplink capability with fiber, high speed microwave, or cellular capabilities. The new Starlink satellite capabilities, as an example, are an interesting part of the solution. Starlink breaks the cost barrier of traditional satellite technology and its "RV" solution's portability allows for an easy to deploy uplink for the Tactical Bubble. MANET mesh radios provide a

link from the fixed towers out to field deployed devices that can be several miles away. The end user devices can connect to the MANET radios via hardwire Ethernet, Wi-Fi, serial, or USB. Thus, the MANET radios create a meshed fabric that allows the RF signal to go around or over obstacles to get back to the tower and ultimately to a backhaul/ uplink connection.

What if there are not any towers in that area of operation that day? Aircraft from the AMO team or UAVs that have MANET radios installed on them, can now act as a "tower in the sky", or a communications relay, and transmit that RF signal back to a Fixed tower or any other MANET radio in the network within range. Then, the MANET system is smart enough to determine the fastest path with the least resistance to get the data packet to its destination.

By utilizing MANET mesh radio technology onboard CBP AMO aircraft, the video downlink is no longer limited to a single location. Normally, the video feed would have to be ingested into a system and transmitted across the network out to the field if a network connection was available, or an agent would have to verbally communicate what the image depicts. By allowing the AMO aircraft to become part of the Tactical Bubble, the video downlink can be viewed immediately by decision makers at a field office as well as the ground personnel using their vehicles' laptops or their EUDs with access to TAK. Additionally, the aircraft becomes a communications
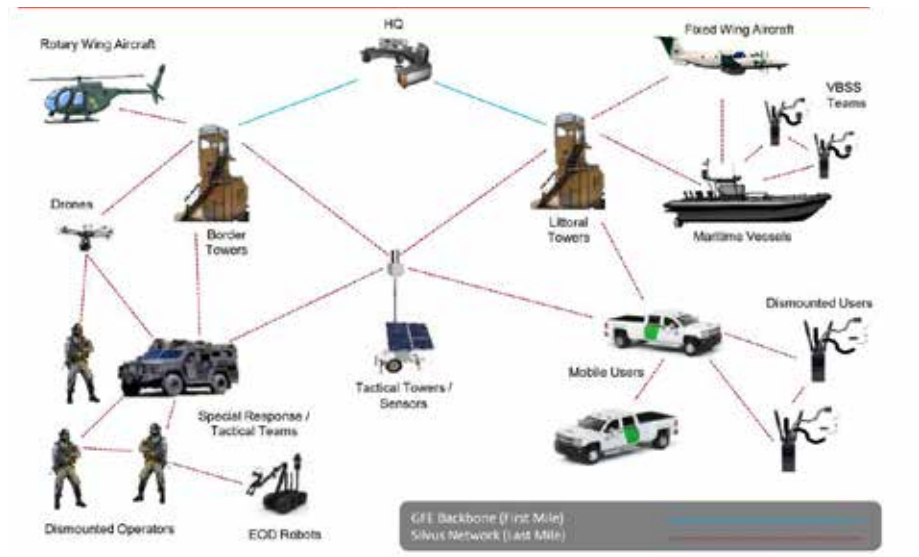


relay when overhead in a desolate area of operations. When you tie in tethered drones or Vertical Take-Off and Landing (VTOL) UAV's, CBP ground personnel gain more operational flexibility and real-time reconnaissance capabilities. Unmanned aerial systems (UAS) companies have routinely integrated MANET capabilities into their airframes for Command and Control (C2), Video Downlink, and Communications Relay applications, making them a natural addition to the Tactical Bubble.

While traditional aviation has historically been a valuable tool for Public Safety agencies, new technologies have an overwhelmingly positive impact on public safety and border security. Unmanned aircraft will continue to add much needed surveillance capability that allows AMO teams to focus on enforcement. Implementing TAK to all ground personnel and scaling the AMO

fleet's ISR capability in key sectors are critical projects. Additionally, the ISR capability is a tool for SAR operations which is increasingly becoming more common along the borders.

Overall, including MANET mesh technology as the connective thread on all ISR aircraft is the missing component to allow for immediate actionable data to base decisions on in the field. The key to CBP's success in tightening the security around the border is how these technologies are integrated with each other and tied back into traditional assets, like the AMO aircraft, and creating a sector wide Tactical Bubble. Advanced MANET mesh technology, combined with other recent technology advancements and traditional aviation solutions is the key to creating an efficient, secure, and safe U.S. border.