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White Paper

# Disaster Response & Drone Airspace Security

Dangers of Unauthorized Drones to First Responders  
and Critical Infrastructure



Dedrone & Verizon Share Insights on Drone Cyber and Physical Security Risks  
During Natural and Manmade Catastrophes



## Executive Summary

In the event of a catastrophe, high-risk infrastructures have significant resources in place to continue and protect their operations, relying on emergency power systems and backup connectivity measures. Updating these technologies and protocols relies on an understanding of the threats from every direction, including the airspace. Commercial and consumer drones in the hands of amateur and hobby pilots, as well as those with malicious intention, are forcing security managers to face the threat of rogue and unauthorized drones, which can interrupt activity or cause catastrophic injury.

Cities of the future are planning today how they want to integrate a cost-effective and scalable drone detection solution and pair it with a highly reliable network. Enterprises and critical infrastructures, including public utilities, prisons, government buildings, and stadiums are increasingly relying on proactive drone detection to help assess their airspace risks and maintain the safety of their buildings and the people that operate them. On an individual basis, drone security programs are quick to install and easily scales for large deployments.

The rise of commercial and hobby drones in U.S. airspace poses new questions and concerns with how emergency managers maintain safe skies for first responders. Reliable connectivity is essential for communications between disaster responders to understand airspace activity, as well as to individuals and enterprises who are maintaining the security of high risk and high value infrastructure against drone threats. Hobby pilots may not understand the risks they pose when they fly in dangerous conditions and may be flying without FAA

authorization, prompting law enforcement and federal agencies to rely on proactive drone detection during disasters.

- Significant resources are invested to protect communications infrastructure, but have limitations against powerful physical stress.
- Drones are being used for disaster response in unprecedented numbers.
- Hobby drone pilots are ignoring the calls from federal regulators to stay out of restricted airspace, causing delays in recovery efforts.
- Rogue drones are adding pressure to enterprises and organizations for protection of their physical and cyber infrastructure against drone threats while exposed to extreme security vulnerabilities.

Air traffic and connectivity systems for small drones at low altitudes is necessary for keeping skies clear for disaster recovery efforts, to identify rogue or nuisance pilots, and to continue to protect sensitive infrastructure from airspace threats. Verizon and Dedrone provide solutions for these issues and together, can help protect airspace from drone threats during a community's most dangerous experiences.

- With Dedrone, Verizon is providing strong network security to maintain safe drone operations and keep the Dedrone software platform fully operational during disasters.
- By using a cloud-based analytics server, and connecting through Verizon's LTE network, Dedrone provides reliable and remote access to airspace data.

Cities and local governments, whether managed locally, through private enterprises or by government municipalities, will require monitoring of their lower airspace for consumer and commercial drones. First responders nationwide know they can rely on Verizon's history of running to a crisis to support them, and with Dedrone's detection technology and Verizon's premier network and security platforms, a cost effective and scalable airspace security solution is being deployed today.

## INTRODUCTION

# Communication and Drone Detection Technology Protecting Airspace Vulnerabilities During Disasters

In the event of a catastrophe, high-risk infrastructures have significant resources in place to continue and protect their operations, relying on emergency power systems and backup connectivity measures. Updating these technologies and protocols relies on an understanding of the threats from every direction, including the airspace. Commercial and consumer drones in the hands of amateur and hobby pilots, as well as those with malicious intention, are forcing security managers to face the threat of rogue and unauthorized drones, which can interrupt activity or cause catastrophic injury.



Proactive detection of drones requires the airspace around critical infrastructure to be monitored and managed. Especially during times of catastrophe, as demonstrated recently during the disaster response efforts for the Northern California wildfires, Tropical Storm Harvey, Hurricane Irma, and Hurricane Jose, drones will continue to be used to survey damage and assist in search and rescue. As these natural disasters demonstrated, many hobby drone pilots do not heed warnings from federal regulators to cease flights, putting aerial rescue efforts at risk. When law enforcement is dedicated to saving lives in a disaster, it's up to the individual site manager to maintain their airspace security and prevent drone operators from entering their premises.

Verizon and Dedrone are working together to create secure information solutions for emergency response teams, and are dedicated to protecting critical infrastructure airspace during natural or manmade disasters. Proactive drone detection through the Dedrone platform is a critical element to all infrastructure security plans, and Verizon's LTE network provides emergency responders and security personnel with efficient and reliable wireless telecommunications. This whitepaper outlines the work between the two organizations, and sheds light on how catastrophes open a significant vulnerability to our airspace for first responders as well as security managers. Not only are drones capable of causing physical damage, but they are also capable of hacking into vulnerable networks.



## BACKGROUND

# First Responders on the Ground Rely on Clear and Unobstructed Airspace

Cities are planning today how they want to integrate a cost-effective and scalable drone detection solution and pair it with a highly reliable network. Enterprises and critical infrastructures, including public utilities, prisons, government buildings, and stadiums are increasingly relying on proactive drone detection to help assess their airspace risks and maintain the safety of their

buildings and the people that operate them. On an individual basis, drone security programs are quick to install and easily scales for large deployments. As cities are looking to integrate IoT programs, they are looking to these installations to gain insights on what to monitor in their lower airspace.

In 2017, Verizon launched “Operation Convergent Response,” (OCR), an event where industry insiders saw how first responders in public and private sectors used advancements in Intelligent Networks (SDx), advanced security, the Internet of Things (IoT), smart and secure city solutions, and autonomous systems to enhance crises response operations. Disaster response organizations, such as those supported by OCR, use drones to support survivors and navigate disaster zones when time is short and the situation dire. This is vital work requiring that together we need to learn how to leverage every asset at our disposal to perfection as every minute after a disaster strikes counts. Drones can speed up response times and help locate victims by looking closely into buildings and piles of rubble with thermal imagery and other sensors, and relay time-sensitive data so first responders can identify trapped civilians and detect hazards like natural gas or other chemical leaks.

Disaster responders must incorporate a cloud-based drone detection and airspace security system that can be monitored remotely, to ensure clear skies and smooth airspace operations. In addition to responders, enterprises who are protecting high-risk sites, and actively monitoring drone threats, must also rely on highly reliable connectivity during disasters to protect vulnerable infrastructure and people.

#### PROBLEM / THE PERFECT STORM:

## Lack of Air Traffic Enforcement, Rise of Hobby Drones and Onlookers Exposes Critical Airspace to Drone Threats

The rise of commercial and hobby drones in U.S. airspace poses new questions and concerns with how emergency managers maintain safe skies for first responders. Reliable connectivity is essential for communications between disaster responders to understand airspace activity, as well as to individuals and enterprises who are maintaining the security of high risk and high value infrastructure against drone threats. Hobby pilots may not understand the risks they pose when they fly in dangerous conditions and may be flying without FAA authorization, prompting law enforcement and federal agencies to rely on proactive drone detection during disasters.

Significant resources are invested to protect communications infrastructure, but have limitations against powerful physical stress. In the wake of the Northern California wildfires, Hurricane Harvey, Hurricane Irma, and Hurricane Jose, telecommunications companies have increasingly turned to drones to support network connectivity and provide resources to first responders for search and rescue efforts. According to the FCC, Hurricane Harvey disrupted at least 17 emergency call centers and 320 cellular sites, and caused outages for more than 148,000 Internet, TV and phone customers. While cell towers have backup batteries and generators, they are still vulnerable to flooding and cannot avoid damage if equipment is blown off or damaged due to high winds.



Dedrone successfully installed drone detection technology for an event with over 3,000 global political and economic leaders

Drones are being used for disaster response in unprecedented numbers. Harvey and Irma showcased how drones could be flown to support search and rescue efforts, the FAA issued permits to commercial drone operators to assist in different functions to expedite the recovery process. They also set restricted flight areas in high-traffic areas, so that emergency responders can keep the skies clear and avoid collision or other interruptions. The American Red Cross has launched their first ever drone program, using drones tethered to the ground to assess damages through constant aerial observations. Allstate and Farmers Insurance are also using their company drones to make damage assessments and get ahead of the inundation of insurance claims that will follow in the coming months. News organizations like CNN Air are using drones, and national news outlets are relying on local drone pilots to provide aerial coverage to bring up-to-the-minute reporting on the personal stories and the community impact of these disasters.

Many hobby drone pilots are ignoring the calls from federal regulators to stay out of restricted airspace, causing delays in recovery efforts. Over the course of recent natural disasters, FEMA and the FAA watched with dismay as people posted photos and video on social media showcasing drone footage. Hobby pilots may also not be aware of the unique issues that extreme weather conditions pose to their hardware, as storms and hurricane force winds can make a drone a projectile that will possibly injure or damage property.

Rogue drones are adding pressure to enterprises and organizations for protection of their physical and cyber infrastructure against drone threats while exposed to extreme security vulnerabilities. On the enterprise side, drones are being used to survey damage to roads, bridges, underpasses and water treatment plants that required immediate repair. Oil and energy companies are using drones to spot damage to flooded infrastructure. However, their airspace security risks remain and increase with the lack of legal and emergency response to support their security efforts. An increase of drones in the sky heightens airspace activity, and increases the risk of drone threats to physical and cyber infrastructure, and puts the responsibility of protecting airspace almost wholly on the site operators and security managers.

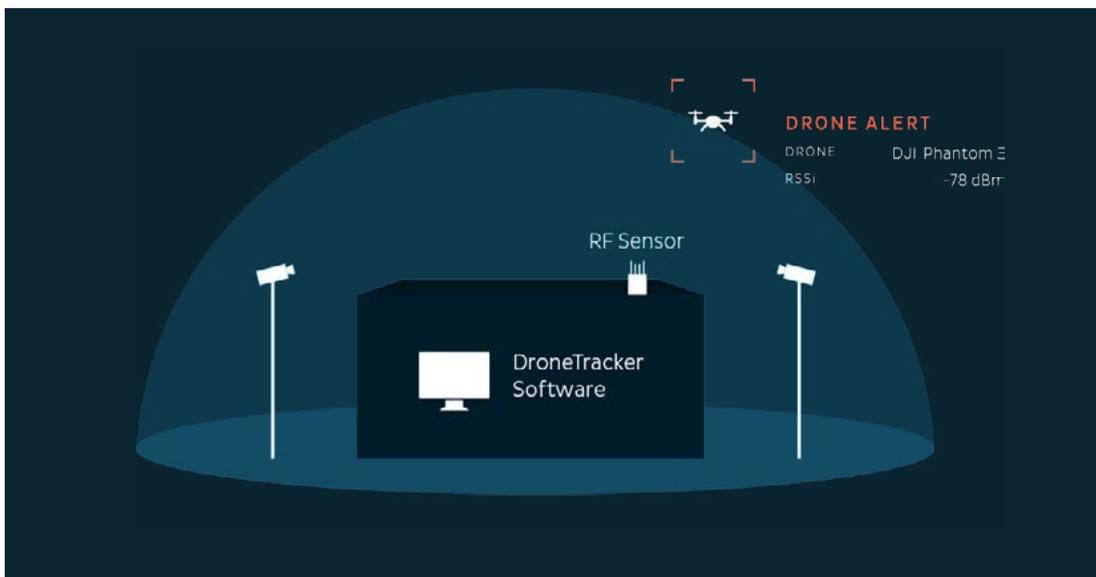
#### SOLUTION:

## How Telecommunications and Drone Detection Converge and Respond During Disasters

Air traffic and connectivity systems for small drones at low altitudes are necessary for keeping skies clear for disaster recovery efforts, to identify rogue or nuisance pilots, and to continue to protect sensitive infrastructure from airspace threats. Verizon and Dedrone provide solutions for these issues and together can help protect airspace from drone threats during a community's most dangerous experiences.

With Dedrone, Verizon is providing strong network security to help maintain safe drone operations and keep the Dedrone software platform fully operational during disasters. Verizon's new Software Defined Perimeter (SDP) service verifies the user and device identity before granting mission-based access. SDP is the first scalable, managed security-as-a-service solution based on the software defined security model. The combination of SDP, a strong security model, operated in conjunction with Verizon's 4G LTE Network coverage allows First Responders to securely access critical information from their mobile compute devices.

Certificate-based mutual TLS VPN protects connections from being intercepted when emergency responders connect to hosted application resources. To stop malware from spreading through network connections, Verizon's SDP provisions all connectivity at an application layer - such as from the "app inside" the user's device to a specific port of a server. Malware on the user's device is outside the application layer tunnel. Verizon is protecting their network users and first responders to secure access to their communications programs, leaving clear and reliable communication channels for drone detection programs to operate and inform of activity in restricted airspace.



By using a cloud-based analytics server, and connecting through Verizon's 4G LTE network, Dedrone provides reliable and remote access to airspace data. Dedrone sees a future vision of DroneTracker deployments is one of simplicity with ease of connectivity. The ability to easily "plug and play" Dedrone's detection sensors to a centralized cloud service has vast advantages for customers that require large areas of coverage. They will also need a robust, highly reliable network for which to utilize for data transfer and management. The Dedrone solution takes full advantage of Verizon's nationwide 4G LTE network coverage. Future 5G networks will provide Dedrone's customers, including first responders, with a highly efficient and reliable network to help detect drones for first responders to manage air traffic, and enterprises to maintain their airspace security programs.

**CONCLUSION:**

## Airspace Security Technology Keeps Operations Safe



Dedrone deployed drone detection technology at Joint Base Myer-Henderson Hall in Washington, DC. Photo courtesy of Francis Chung, JBM-HH Public Affairs

The outcome of programs like Verizon's OCR allows first responders, law enforcement, local and national government, and other critical infrastructure service providers, to understand and see firsthand how drone detection can support them in an emergency. OCR featured many real-world scenarios such as a subway accident, flood, and chemical spill, and active hostage situation. The takeaways from the event related to incorporating airspace security technology were applied weeks after the conclusion of the event in response to Hurricanes Harvey and Irma.

Cities and local governments of the future, whether managed locally, through private enterprises or by government municipalities, will require monitoring of their lower airspace for consumer and commercial drones. First responders nationwide know they can rely on Verizon's history of running to a crisis to support them, and with Dedrone's detection technology and Verizon's premier network and security platforms, a cost effective and scalable airspace security solution is being perfected today.