FROST & SULLIVAN

D-FEND SOLUTIONS

2018 North American Counter-drone Solutions Enabling Technology Leadership Award

FROST & SULLIVAN

2018 BEST PRACTICES AWARD

NORTH AMERICAN
COUNTER-DRONE SOLUTIONS
ENABLING TECHNOLOGY LEADERSHIP AWARD

2018
BEST PRACTICES
AWARDS

Contents

Background and Company Performance

Industry Challenges

The United States (US) Federal Aviation Administration (FAA) aerospace forecast predicts there will be between 2.75 and 4.47 million private drones operating in the US by 2021. The same estimates expect between 238,000 and 1.6 million commercial drones operating in the US by 2021. These predictions mean there could be over six million small unmanned aerial systems (sUAS) throughout the US by 2021 able to carry small payloads or cameras to any area or structure desired. Furthermore, the FAA estimates that the global number of small drones sold will be four times that of US numbers; therefore, over 20 million flying machines potentially used for nefarious purposes[1].

The dangers of drones entering restricted locations include carrying payloads such as weapons, contraband items or material, illegal surveillance, intelligence gathering, stealing intellectual property and harassment, or invasion of privacy.

In response to the increasing number of drones, commercial companies have developed new technologies, to detect drones and alert of their presence. Frost & Sullivan research shows that, while many companies are still pre-revenue, market entry barriers are relatively low; thus, over the next five years competition will be fierce as demand for commercial counter unmanned aerial systems (C-UAS) intensifies. The commercial C-UAS and their products will quickly transition from a nascent market to a growth market as the commercial C-UAS market is estimated to be worth over $1.23 billion by 2020 and over $1.58 billion by 2021[2].

C-UAS solutions rely on technologies such as radar, radiofrequency, optical, and acoustic detection methods; however, there are limitations associated with these methods, e.g., radar is costly and has limited capabilities to detect smaller objects, radar and solutions based on optics require a clear line of sight which is typically not the case in urban environments. Frost & Sullivan believes that a company that can offer an alternative detection method will have a significant first-mover advantage in the burgeoning counter-drone market.

Technology Leverage and Customer Impact of D-Fend Solutions

Founded in 2017, D-Fend Solutions (D-Fend) exemplifies just how nascent the counter-drone industry is. Nevertheless, despite the relative youth of D-Fend, the company set out forging its path by avoiding the use of industry standards detection methods, such as radar or optical identification; instead, D-Fend focuses on detecting the communication between the drone and the operator, and then the company's technology takes over the UAV and lands it safely.

[1] Global Commercial Counter-UAS Technologies Market, Forecast to 2022(Frost & Sullivan, Oct 2017)
[2] Global Commercial Counter-UAS Technologies Market, Forecast to 2022(Frost & Sullivan, Oct 2017)

An Anti-Drone Solution Tailored for the Urban Environment

D-Fend's flagship solution, EnforceAir, relies on autonomous software-defined radio (SDR) technology to detect the signals emitted by the drone and the operator. EnforceAir will most likely pick up the signal from the drone first, as it is moving towards the protected area and will locate the drone based on that without any need for reception of the remote control. However, the solution also has the unique capability of locating the drone-based solely on the remote control's transmission. By relying on SDR, EnforceAir can detect drones up to four kilometers from the center of the safe zone, which is up to four times the effective distance of radar-based solutions.

Once the drone pinpoints the location, an identification process initiates, thereby allowing drones that are permitted (e.g. drones that are part of a broadcast production) to continue operating while non-sanctioned drones are dealt with according to D-Fend's protocol.

After identifying the drone and establishing that it does not have a legitimate purpose for entering the protected area, EnforceAir conducts a forensic extraction on the digital signature of the drone to verify the operator's identity and the drone's flight path—information that D-Fend can share with law enforcement agencies, if necessary. Once D-Fend establishes the identity and credentials of the drone, it takes over the communication link between the drone and the operator and lands the UAV safely in a designated landing spot.

The ability to differentiate between *friend or foe* is a significant competitive advantage for D-Fend and allows its clients to deploy the UAV in areas where competitors cannot. One such area is airports, which have begun to use drones for external inspection of aircrafts and hence need those drones to operate while the area is protected. However, the FAA reports significant monthly foe drones incidents at U.S. airports; with zero incidents in 2014 to 250 incidents per month in mid-2017. This immense rise took place over the past two years, with spikes in the number of incidents during summer months when improved weather condition makes flying more comfortable.

D-Fend's mitigation solutions stand out as its competitors rely on GPS and radio control jamming to bring down the drone—methods not conducive for urban environments. Most nations have outlawed jamming, as well as kinetic solutions—i.e., shooting down drones with either a projectile or a net. These methods have a number of inherent drawbacks, including but not limited to, shot down drones may fall on bystanders, jamming will disrupt all forms of communication within its range without any discrimination, including Wi-Fi networks, cordless phones and TV broadcasts. D-Fend's ability to land the drone safely in a designated landing zone removes the risk of any potential collateral damage and increases its appeal for use within urban environments.

A Proven Solution for a Range of Industries

EnforceAir's autonomous capabilities and passive detection methods make it attractive for users in a variety of industries. Currently, D-Fend has or is in discussion with potential clients including law enforcement agencies, military and secret service agencies, airport operators, critical infrastructure management, enterprises, media providers, and sport event operators.

Furthermore, EnforceAir can operate either as mobile or stationary solution depending on the needs of the client. For example, law enforcement agencies might prefer the ability to cover different areas depending on the requirements per a particular day; while airports need the same space covered every day. To include a larger area than four kilometers D-Fend can integrate multiple units with automatic tracking and mitigation of drones synchronized between them.

D-Fend offers its solutions as a service platform with a three-year subscription (OPEX based) or a capital expenditure model (CAPEX). D-Fend is in constant communication with its customers regarding additional features and feedback on the solution. Furthermore, the clients have access to a library subscription, which contains the signature of signals of a majority of the drones commercially available today. The service can function analogically to an anti-virus software which automatically updated when new drones enter the market.

Conclusion

D-Fend Solutions' autonomous end-to-end EnforceAir solution tackles the ever-increasing threats of nefarious drones with a procedure tailored to handle the challenges of a modern urban environment. By relying on autonomous software defined radio, the company takes over communication links of rogue commercial drones and lands them safely in a designated zone. EnforceAir does not rely on jamming, kinetic counter-measurements, or a clear line of sight to detect and counter the drones; thus, making the solution uniquely suited for urban environments.

With its innovative and technological solution that enables countermeasures to the increase of nefarious drone threats, D-Fend Solutions earns Frost & Sullivan's 2018 North America Enabling Technology Leadership Award in the counter-drone solutions market.