Counter-Drone Concepts for Airport Airspace Control and Continuity

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CMO

D-Fend Solutions

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D-FEND SOLUTIONS

INTERNATIONAL AIRPORT SUMMIT 19 – 23 OCTOBER ONLINE

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AGENDA

- Intro: D-Fend Solutions – About Us
- Environment and Threat
  - Airport Factors
- Challenges & Considerations
  - Differentiating Drone Threats
- Traditional C-UAS Technologies
- Capabilities for Controlled & Safe C-UAS Solutions for Continuity
- Flexible/Adaptable Deployments
- Foreseeing the Drone Future
  - Staying a Drone Threat Ahead
- Counter-Drone Concepts for Continuity

D-FEND SOLUTIONS

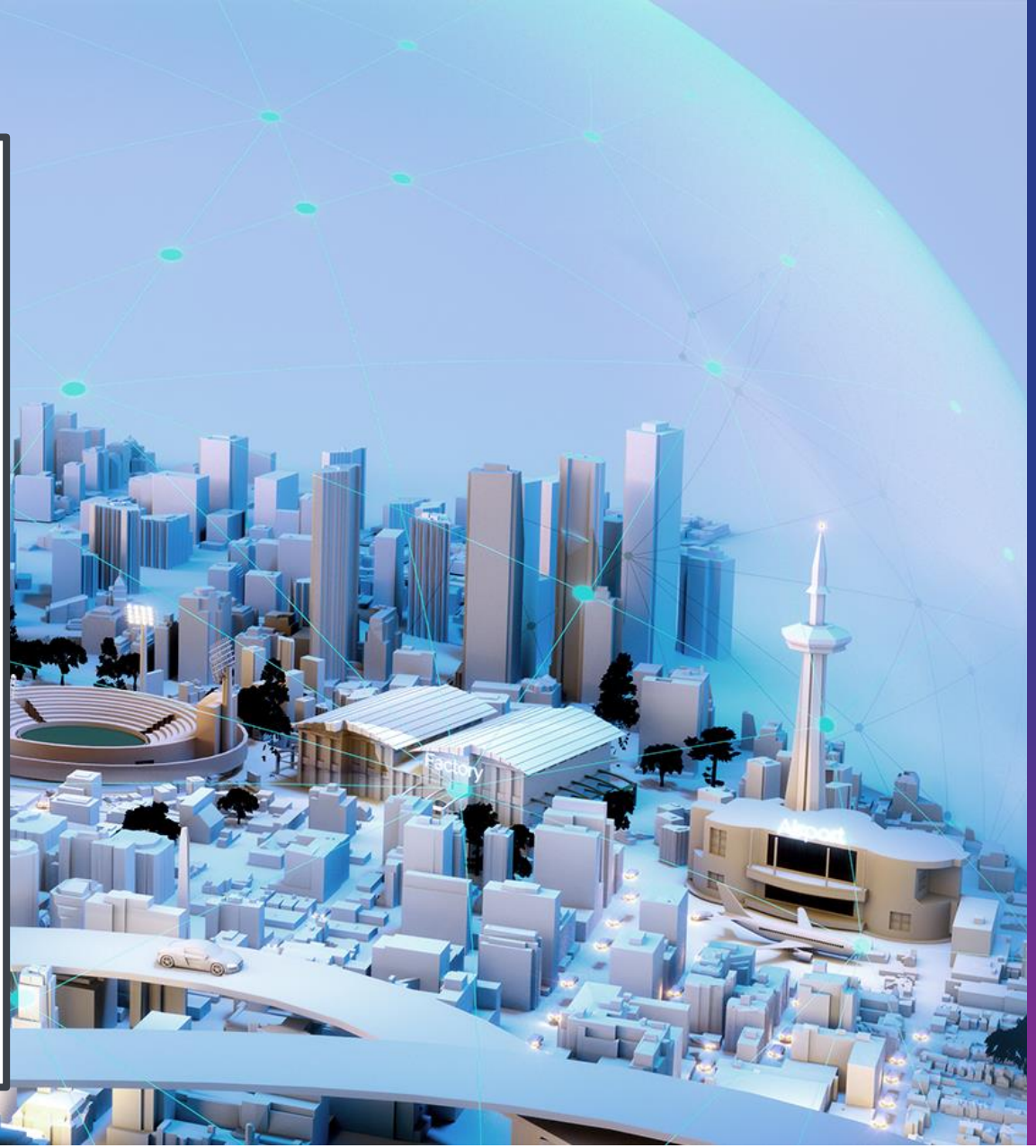
About us:

Leading global provider of counter-drone solutions for complex, sensitive and challenging environments.

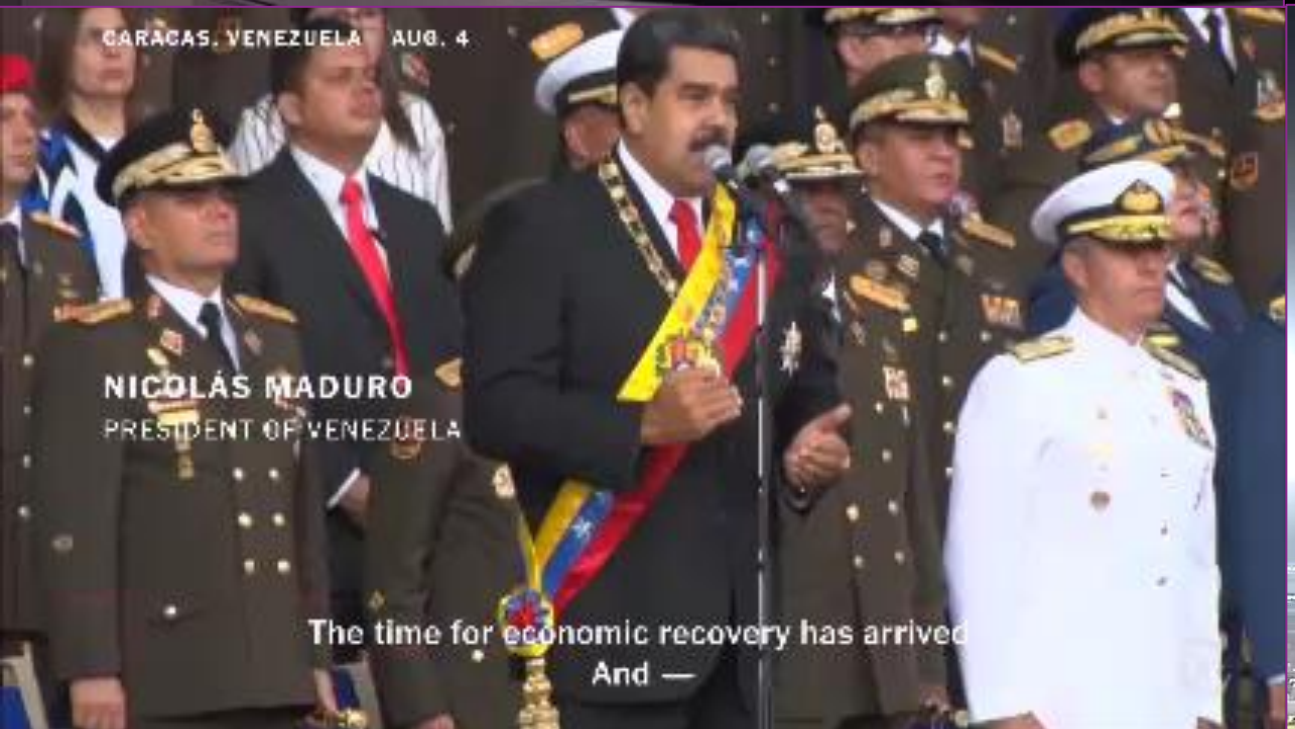
Our Mission:

Provide comprehensive, safe and scalable solutions for securing sensitive and important assets, airports, critical infrastructure, and security and defense forces/personnel from the ever-growing threat of rogue drones.

Tested, Selected & Deployed by the Top Tier




BBC NEWS
BBC NEWS 09:01
HEADLINES GATWICK AIR


CARACAS, VENEZUELA AUG. 4
NICOLÁS MADURO
PRESIDENT OF VENEZUELA
The time for economic recovery has arrived
And —


#WSJLIVE
WSJ Live


newsy


CNN
10:54 AM ET


euronews.
No Comment
02/07/2018
BUGEY, FRANCE


CNBC
This is what happens when
a drone collides into a plane

All drones used in these Incidents :

- **Commercial** drones (cost < US$ 1,500)

  and/or

- Do It Yourself (DIY) drones – **built from off-the-shelf commercial parts**

Counter-Drone Vertical Environments and Use Cases

Multi-Faceted Airport Drone Threats

Airport **Drone Threat Types:**

- Collision
- Attack
- Surveillance / Espionage

2018-2020 Drone Airport Incidents (Representative Sample)

2018

Tijuana International Airport
Dec 13
Collision between a Boeing 737-800 and a UAV, causing damage to the plane's nose

Gatwick Airport
Dec 19
More than 1000 flights affected

2019

Heathrow Airport
Jan 9
More than 40 flights affected

Newark Liberty Airport
Jan 23
More than 40 flights affected

Dubai International Airport
Feb 15
World's 3rd-busiest airport shutdown for 32 minutes

Dublin Airport
Feb 21
3 flights diverted

Milan Malpensa Airport
Apr 1
4 flights diverted

Frankfurt Airport
May 9
70 flights cancelled

2020

Cayman Islands Airport
Jan 9
Drone by runway

Madrid Airport
Feb 3
Delays

Frankfurt Airport
Mar 2
Drone sighting and disruption

Gatwick Airport
Mar 14
Incident

Riga Airport
May 2
Airport shutdown

Perth Airport
Jul 6
Near collision

Teterboro Airport
Jul 25
Drone sighting & disruption

Airport Drone Threats to VIPs
16 August 2020 Incident

CNN politics 2020 Election Facts First Election 101 Edition

US military investigating report of possible drone flying close to Air Force One

By Betsy Klein and Barbara Starr, CNN
Updated 0136 GMT (0936 HKT) August 19, 2020

POPULAR MECHANICS

CYBER THREATS

Sketchy Drone Buzzes Under Air Force One

What was that thing?

// BY KYLE

Photographer: Brendan Smialowski/AFP via Getty Images

Politics

Trump's Plane Was Nearly Hit by a Small Drone Sunday, Witnesses Say

By Alan Levin
August 17, 2020, 8:02 PM GMT+3 *Updated on August 18, 2020, 3:23 AM GMT+3*

INDEPENDENT

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Donald Trump calls Congresswoman Ilhan Omar 'a horrible person'

Air Force One with Trump on board nearly hit by drone, report says

President was not harmed as he returned from a weekend at his New Jersey golf resort

John T. Bennett Washington Bureau Chief | @BennettJohnT | Tuesday 18 August 2020 02:15

Oct. 2020 study: Drones Pose "High Risk" to Aircraft

"...The risk of impacting an aircraft at low altitude remains high from both malicious and careless operators."

Source: Canada National Research Council's (NRC) Aerospace Research Centre, October 2020

Experiment Parameters
Typical Drones, Typical Planes & Typical Speeds

http://www.website.com

Drones:

DJI Phantom 3 Standard Drones
Weight: 2.7 lbs. (1.3 kilos)
Original Price: $1,000

Planes:

Typical transport category

Components:

Windshields and wings

Tests

- Drones fired at 140-250 knots
- Typical speeds below 10,000 feet

http://www.website.com

DJI Phantom 3 Standard Quadcopter Video Camera

Visit the DJI Store

1,445 ratings | 1000+ answered questions

Amazon's Choice for "phantom drone"

Price: $699.00

Style: Quadcopter Only

Model Name	Phantom 3 Standard Quadcopter Dr
Brand	DJI
Video Capture Resolution	FHD 1080p

http://www.website.com

Canada NRC's Aerospace Research Centre Experiment Results Windshields

"Considerable damage"

"Significant amount of glass fragments released into cabin"

"Impaired vision "

"Penetration & inhalation hazard "

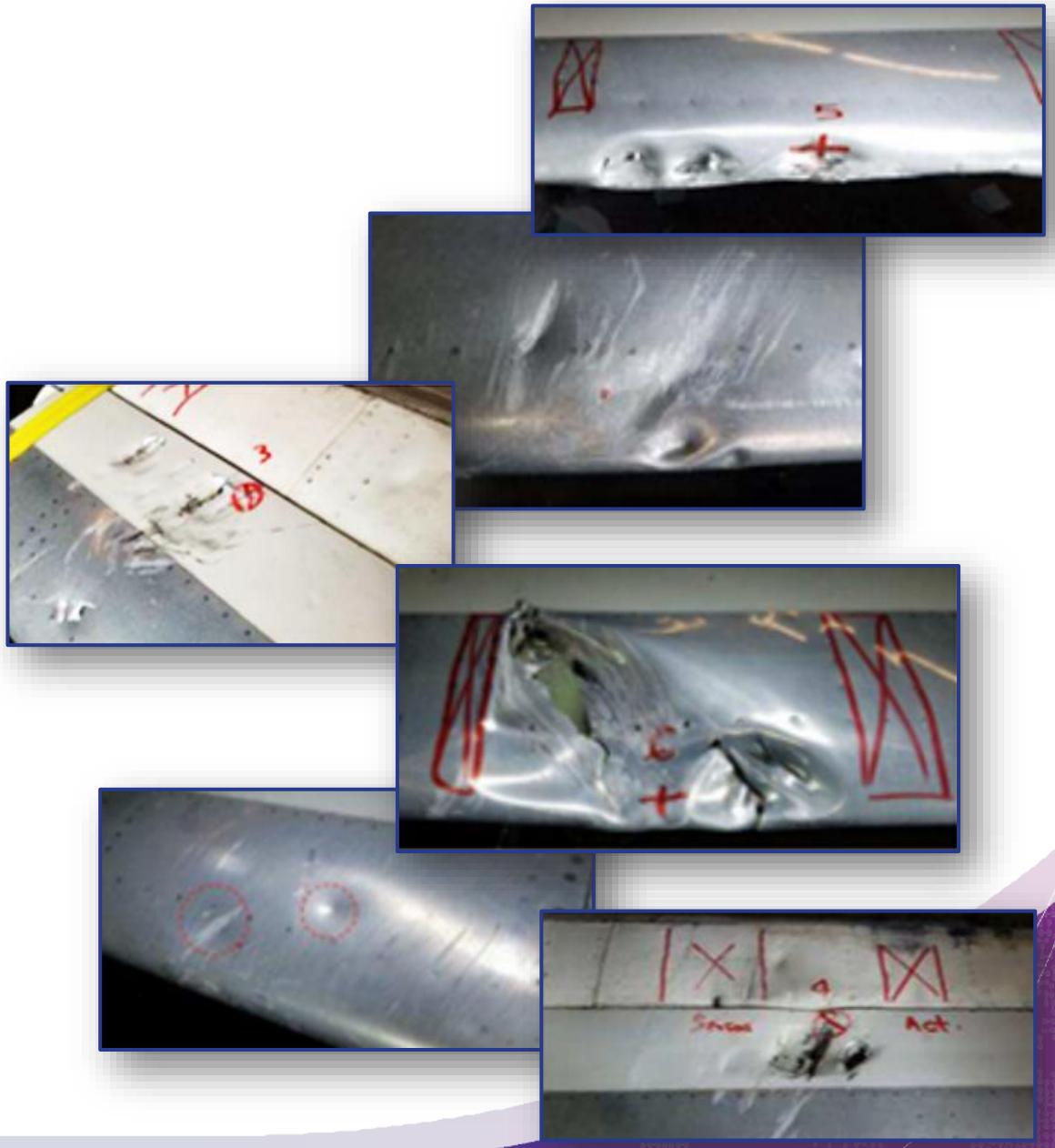
"Optics expected to be lost"

"Emergency landing expected"

Canada NRC Aerospace Research Centre
Wings – "Level 3 Damage"

"Such damage is categorized as 'level 3' according to FAA-ASSURE damage level reference."

- Low speed (140 knots)
  - Plastic deformation and extensive damage to skin
  - Damage to underlying honeycomb structure
- High speed (250 knots)
  - Skin fracture
  - Severe deformation of slat curvature
  - Secondary damage to leading edge
  - Penetration of drone debris into fractured area



Different Drones, Different Threats

High Endurance Drones

Do It Yourself (DIY)

Wi-Fi Drones

Different Drones, Different Threats

Threat Categories

Attack

Size

Range

Trafficking

Size

Range

Collision

Size

Range

Espionage

Size

Range

Threat Focus

Major Threats

Payload :	3-12 Kg
Distance:	4-20 Km
Protocols:	Lightbridge, Ocusync, DIY433/915 MHz, eWi-Fi
Threat Type:	Terror& crime, intelligence gathering

MAIN FOCUS

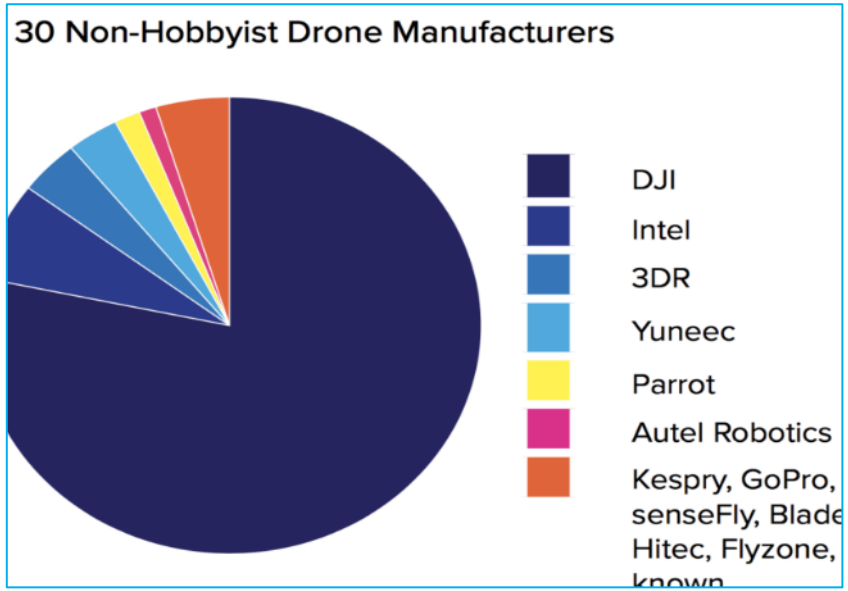
Minor Threats

2ND PRIORITY

Payload:	<0.5 kg
Distance:	<0.3 Km
Protocols:	Wi-Fi
Threat Type:	Reckless users

High Security Level for Most Pervasive & Popular Drones

- HEDs > 80% market
- WIFI & DIY drones
- Must protect against new drones & radio modules



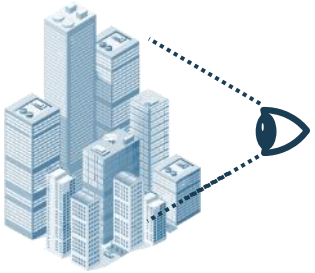
TRADITIONAL COUNTER-DRONE TECHNOLOGIES

Detection

- Radar
- Optical
- DF
- Acoustic

Flying Objects
False Positives

No Clear Line-of-Sight



Mitigation

- Radio Control & GPS Jamming
- Kinetic

Signal Disruption

Collateral Damage

Less Populated Environments → Sensitive Environments

Counter-drone solutions for Sensitive environments

Detection

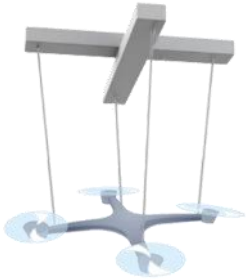
- Radar
- Optical
- DF
- Acoustic

Remote Control <-> Drone Communications

Mitigation

- Radio Control & GPS Jamming
- Kinetic

Disconnect, Take Over and Control, Safe Route, Safe Landing



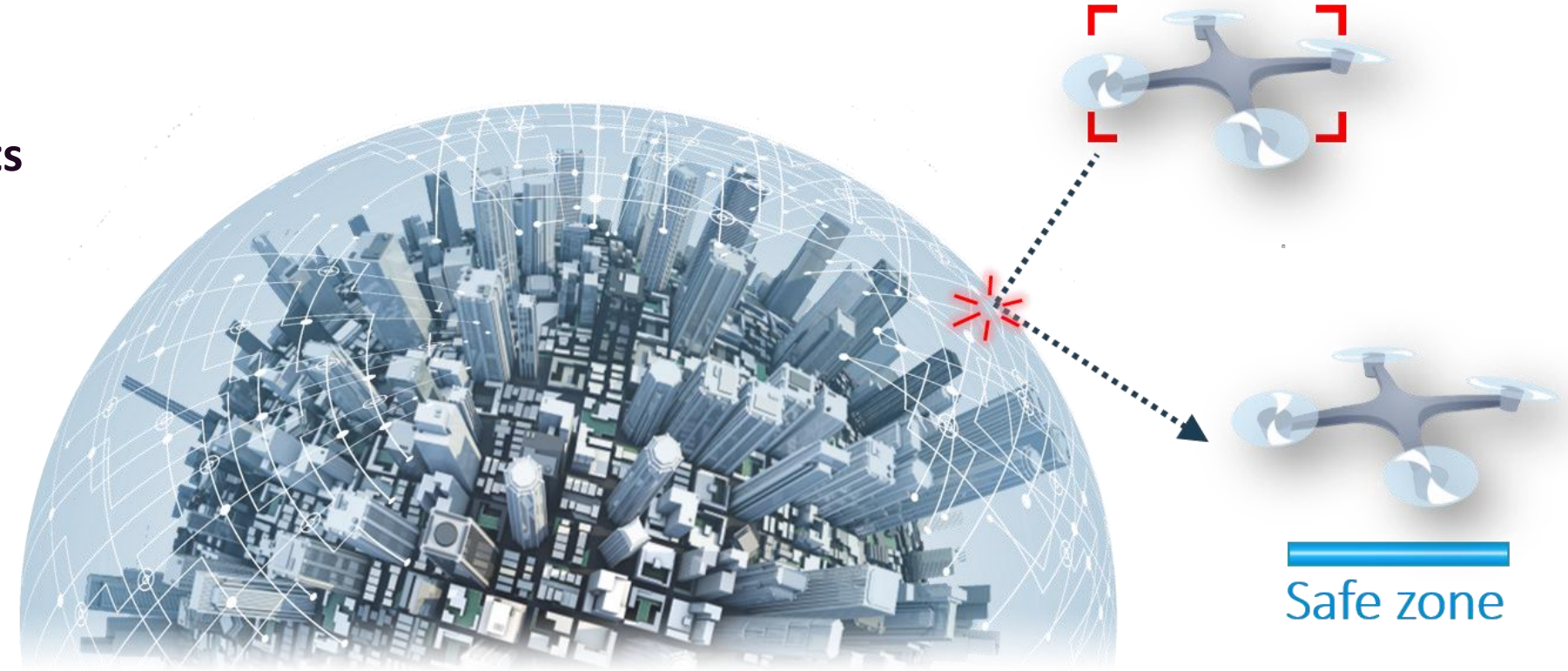
Less Populated Environments → Sensitive Environments

COUNTER-DRONE BY RF CYBER-TAKEOVER

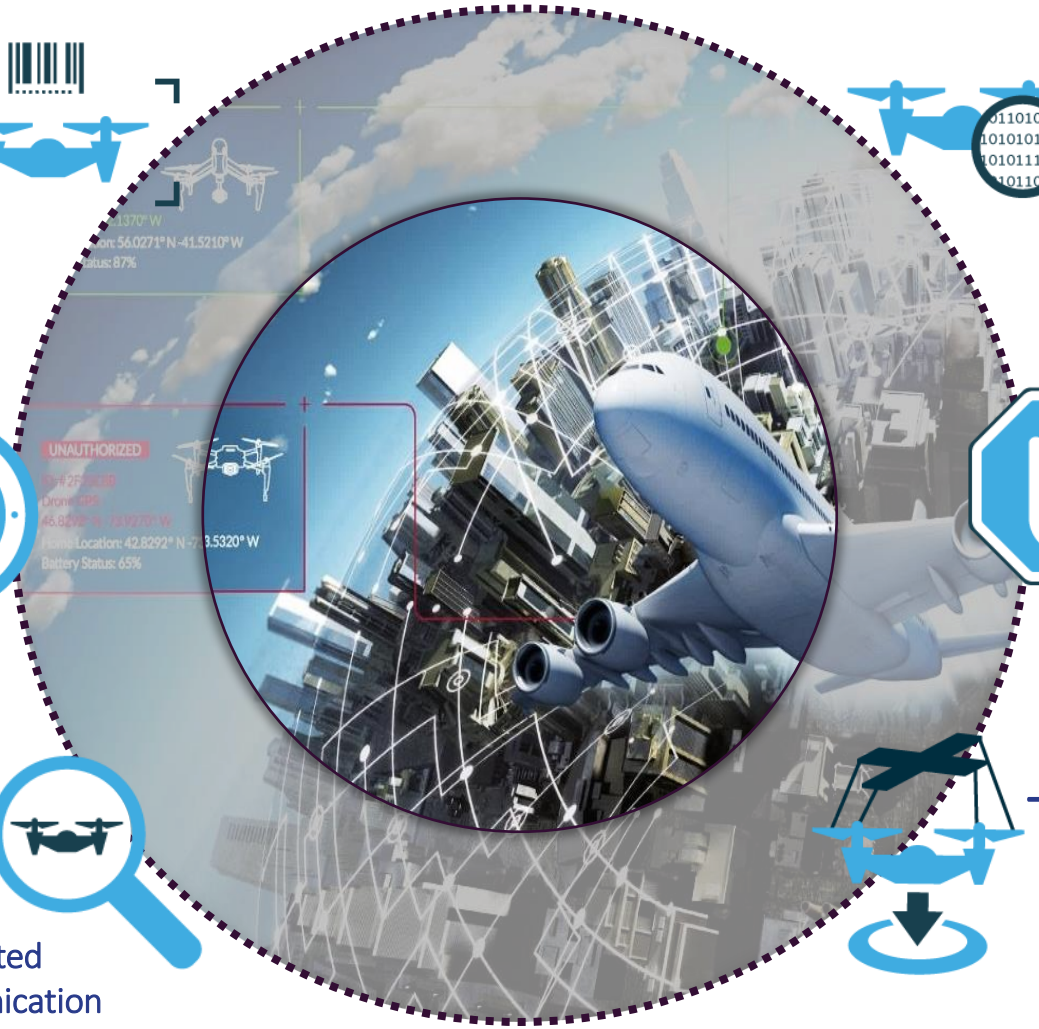
An autonomous counter-drone system
to detect & **take control** over rogue commercial drones
and land them safely in a designated zone

Designed for
Urban Environments

- Non-jamming
- Non-kinetic
- No line-of-sight



Capabilities & Options throughout the Drone Incident Lifecycle



Identify the Drone (IFF)

Passive

Extraction of the drone's unique communication identifier ("Tail Number")

Locate & Track

Passive

Real time location tracking by extracting the drone's GPS positions

Detect & Alert

Passive

Alert when a drone is detected according to its unique communication signal

Discover Pilot Location & Identification

Passive

Extraction of the drone's take-off position (home point) with GPS accuracy while in midair

Fend Off

Active-RF

Disconnecting the drone from its remote controller, causing it to fly back to its take-off position according to its original configuration.

Take Control & Land

Active-RF

Setting a new flight path for safe landing of the drone to a pre-defined position

Drone Identification - Friend or Foe?

- Authorized drones play critical role at airports.
- Surveillance & Inspection
- Must distinguish between “friend and foe” & enable continuity for authorized drones

Multiple Deployments for Operational Flexibility

Easily customize to meet your changing operational needs

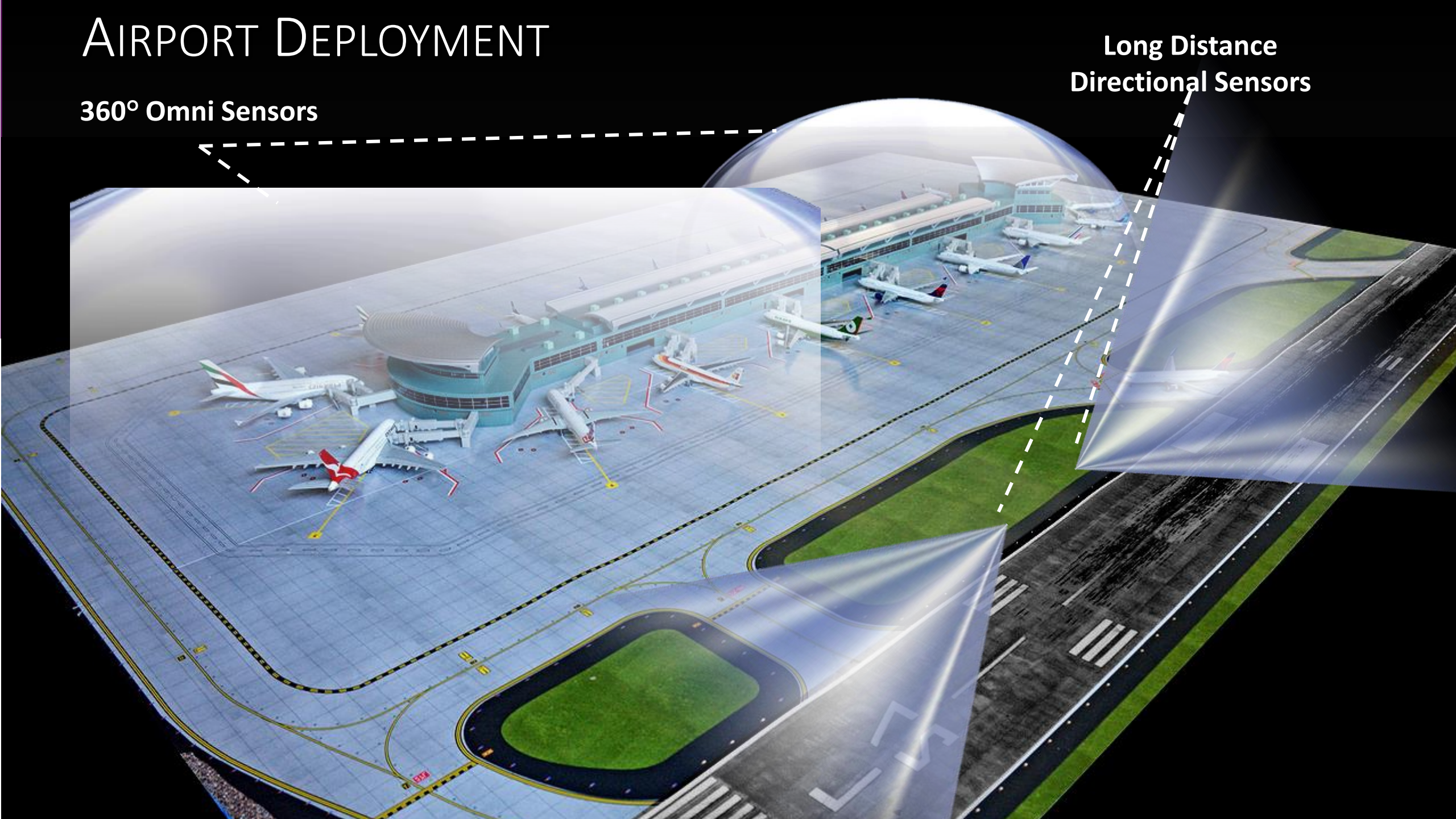
Stationary deployments

Tactical deployment

Long-Range Directional Capability

- For long-range coverage at airports.
- Enable detection & mitigation at long distances.
- Ruggedization to withstand extreme environmental conditions.

Airport Deployment



Urban Deployments

Summary: Airport Counter-Drone Core Concepts

CONTROL

The best way to **control** the drone threat and ensure **continuity** is to **take control of the drone** itself

SAFETY

A **safe landing** or fending off of the rogue drone is the best possible outcome for **safe airspace and continuity**

FOCUS

Counter-drone measures must **focus on the real risk, the most dangerous drones,** and employ drone risk analysis, assessment, and prioritization

FUTURE

The constantly changing and increasingly complex drone threat requires foreseeing the drone future and **always staying a drone threat ahead**.

Goal: Counter-Drone Capability for Continuity

Continuity is the Key:

- Communications
- Transportation
- Commerce
- Everyday life

Thank You!

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