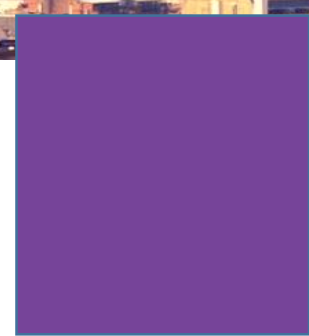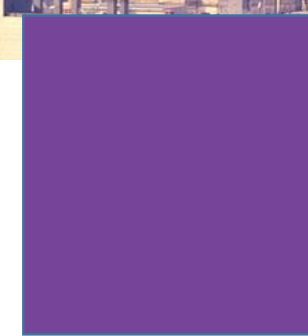# Vorpal

Monitoring drones in your airspace

Company Presentation

What we do?

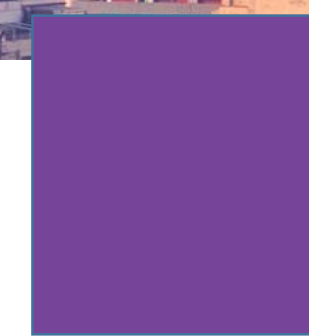Drone monitoring solution to track both the drone and drone the operator

Who are we?

military-grade signal intelligence (SIGINT) and signal processing professionals

Achievements

Working with top tier clients such as NYPD, Israel Police, Deutsche Telekom, AT&T, Microsoft, Israel Ministry of Defense

Headquarters

Founded in 2016, headquartered in Tel Aviv, Israel

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The **Problem**

This

Can
cause
this

»

No real-time, wide area and accurate

drone **monitoring systems**

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Airports

1

cnet
London's Gatwick Airport reopens after drones force 33-hour shutdown
•BY   DECEMBER 21, 2018 10:10 AM
PST

BUSINESS INSIDER
Flights headed for Newark airport had to be temporarily grounded after 2 drones were spotted flying nearby
Benjamin Zhang Jan. 22, 2019, 6:45 PM

Prisons

2

FOX 5
At least 300 drones spotted over Georgia prisons last year

Stadium

3

Washington Examiner
Super Bowl saw 54 drone incursions: Homeland Security
by Anna Giaritelli | April 10, 2019 12:46 PM

FOX NEWS 10:35 AM
Mystery drone illegally flies over Fenway during Red Sox game
Published April 12

Military Bases

4

Flying a drone near a military base could mean jail time under Texas Senate bill
BY DAVID MONTGOMERY SPECIAL TO THE STAR-TELEGRAM
APRIL 17, 2019 06:19 PM, UPDATED APRIL 18, 2019 12:35 AM

CBC
As Gatwick grapples with drones, Canadian military eyes ways to drone-proof airspace
Flying spies, some tiny as insects, 'can pose real and significant threats to military operations'
December 22, 2018

Border

5

ROTOR&WING INTERNATIONAL
U.S. DEA: Border Wall or No, Drone Drug Smuggling Likely to Increase
By Frank Wolfe | January 10, 2019
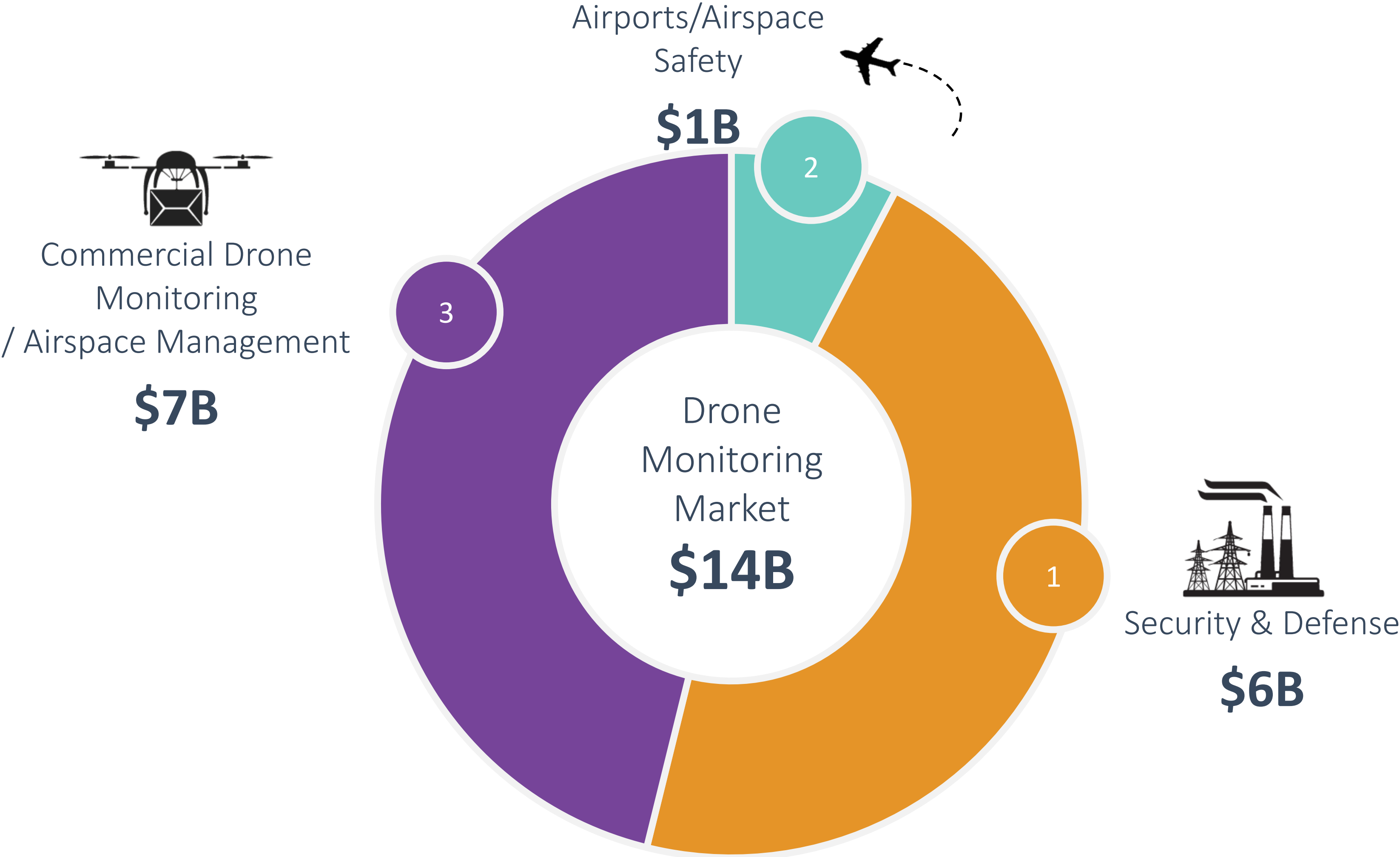
Troops

6

Forbes
28, 2019, 03:02am
### Iranian Drone Shown Monitoring U.S. Warships, As U.S. Seeks To Deter 'Threat of Iran'

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Annual US Market Opportunity by 2023

Airports/Airspace Safety
$1B

Commercial Drone Monitoring / Airspace Management
$7B

Drone Monitoring Market
$14B

Security & Defense
$6B

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Vorpal's **Solution**

- Highly accurate and wide area drone monitoring solution

- Detect & track drones

- Find the operator

- Passive

- Full regulatory compliance

- Operational in dense urban

Passive sensors
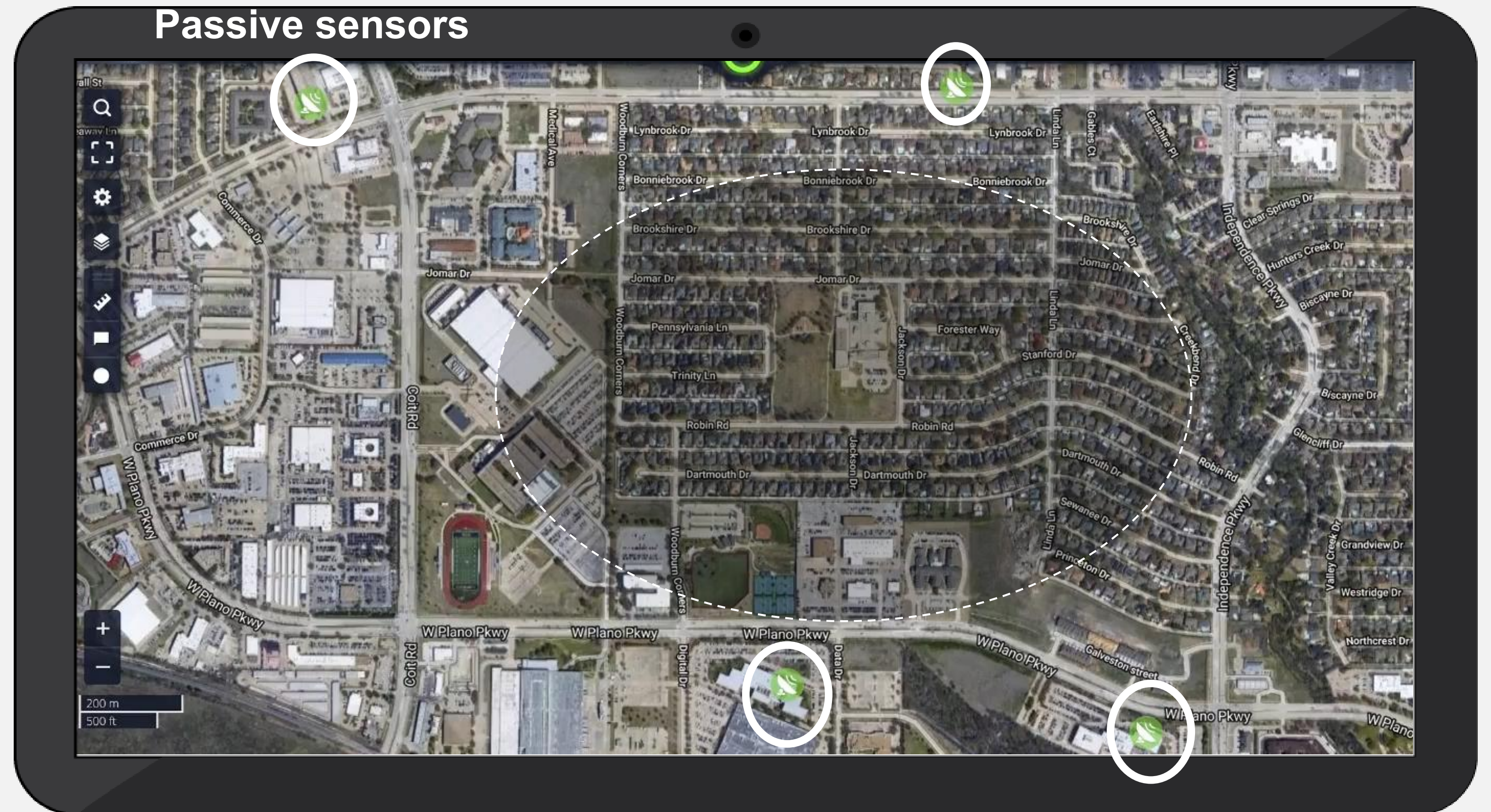
Tracking 4 simultaneous drones flying in Dallas, Texas

| 7 **vorpal**

Success Stories

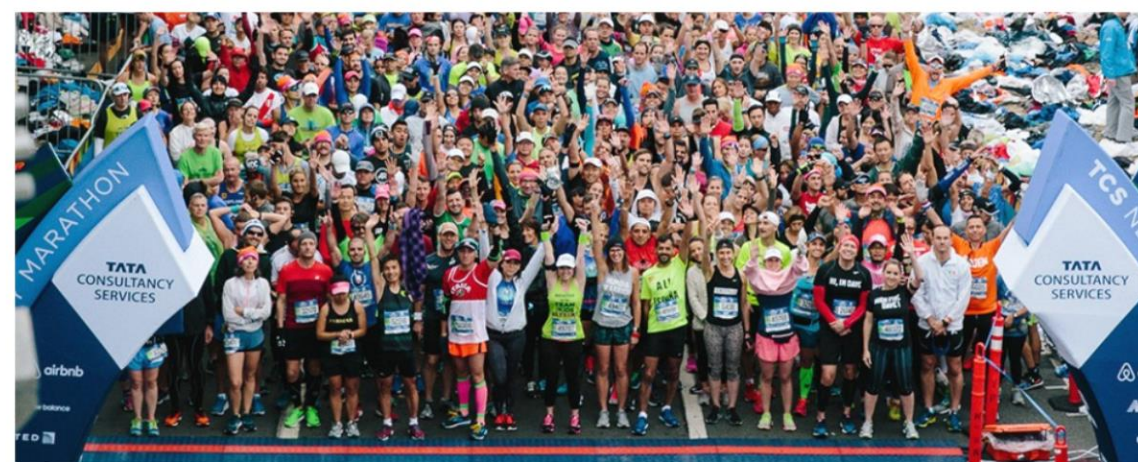**Jerusalem**

24/7 deployment

Berlin

24/7 deployment

Singapore

Deployment for a local integrator

New York

Protecting the New York Marathon
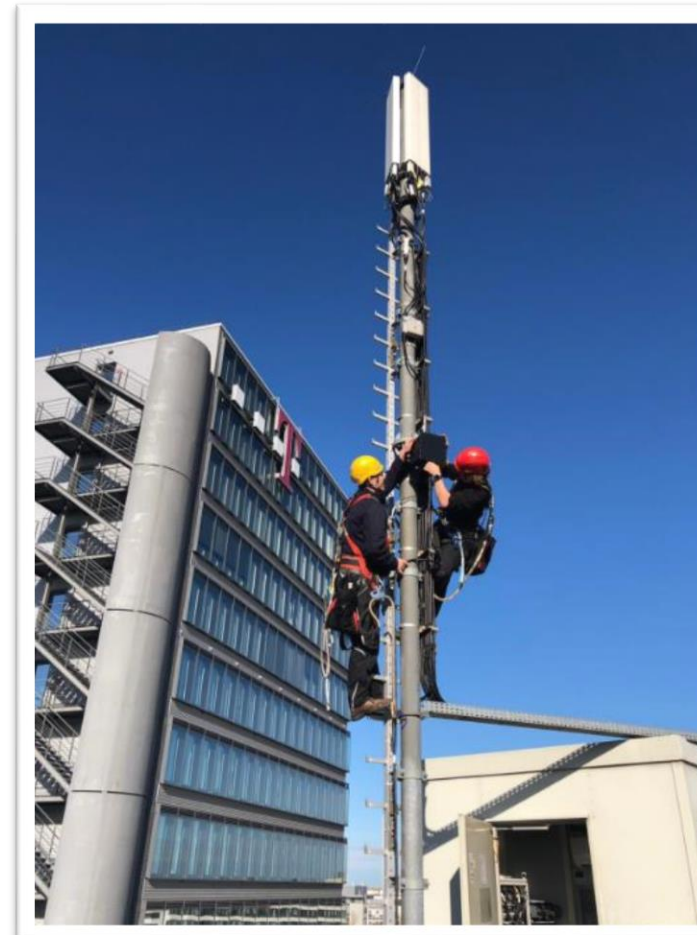
New York

Protecting the Ball Drop at Times Square

Munich

Deploying on Deutsche Telekom's infrastructure

Dallas

Demonstration with AT&T & Microsoft

Tel Aviv

Protecting the Eurovision contest

Deployments on existing infrastructure
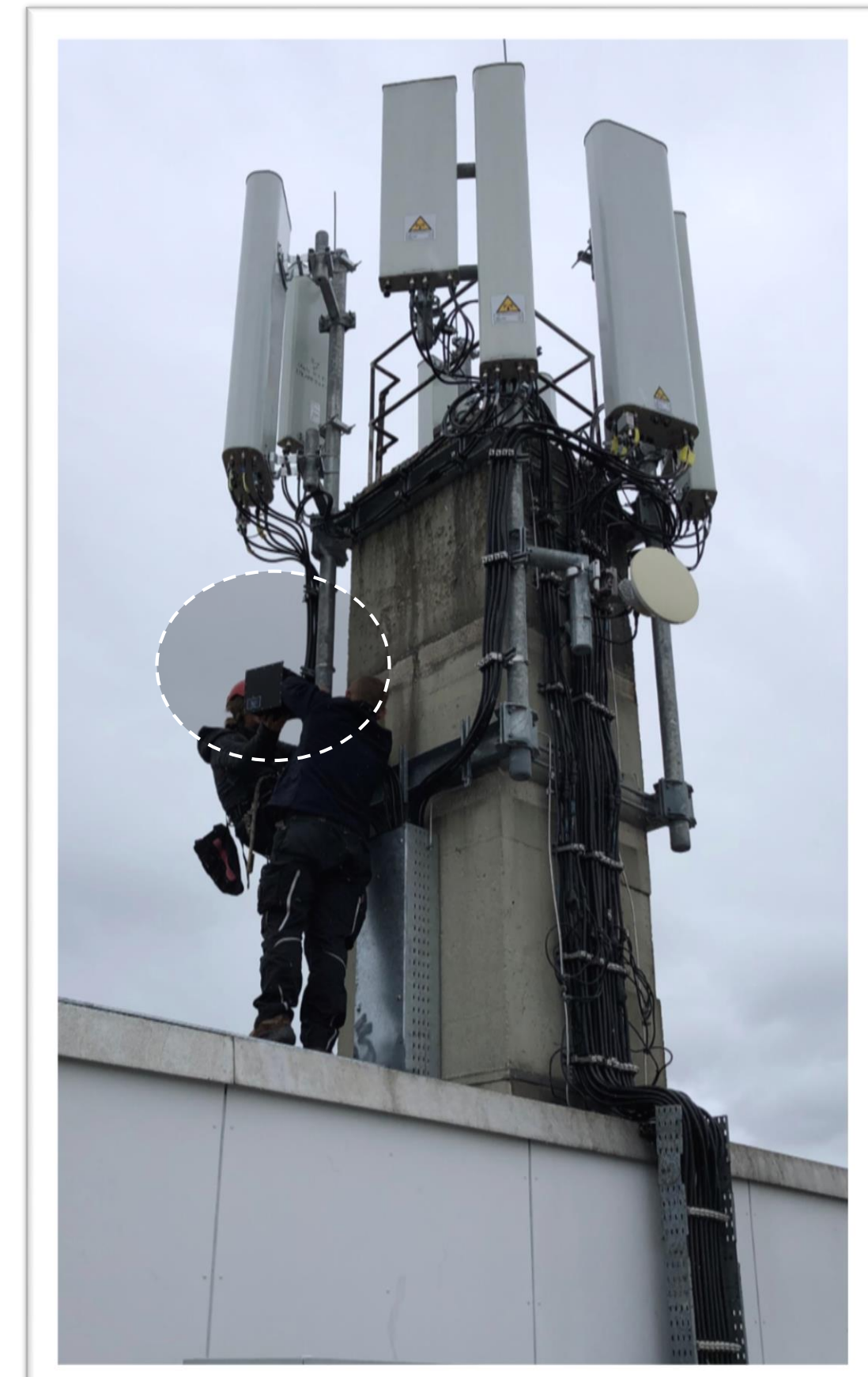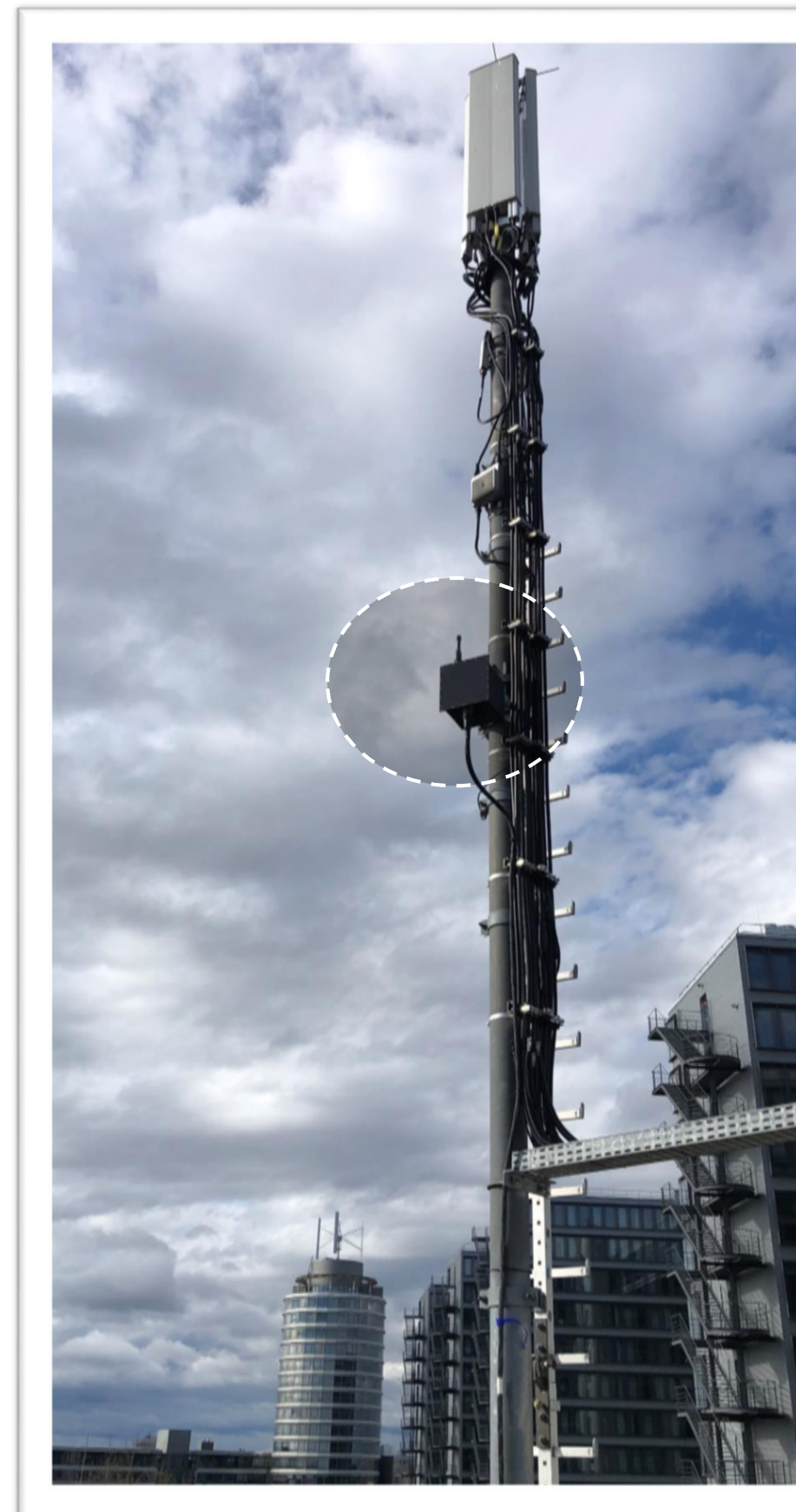
Vorpal's Path

Sensing as a service

Today

Tomorrow

Drone monitoring for Airports, Security and Military

Scale on existing infrastructure

Providing only software

Drone monitoring as a service
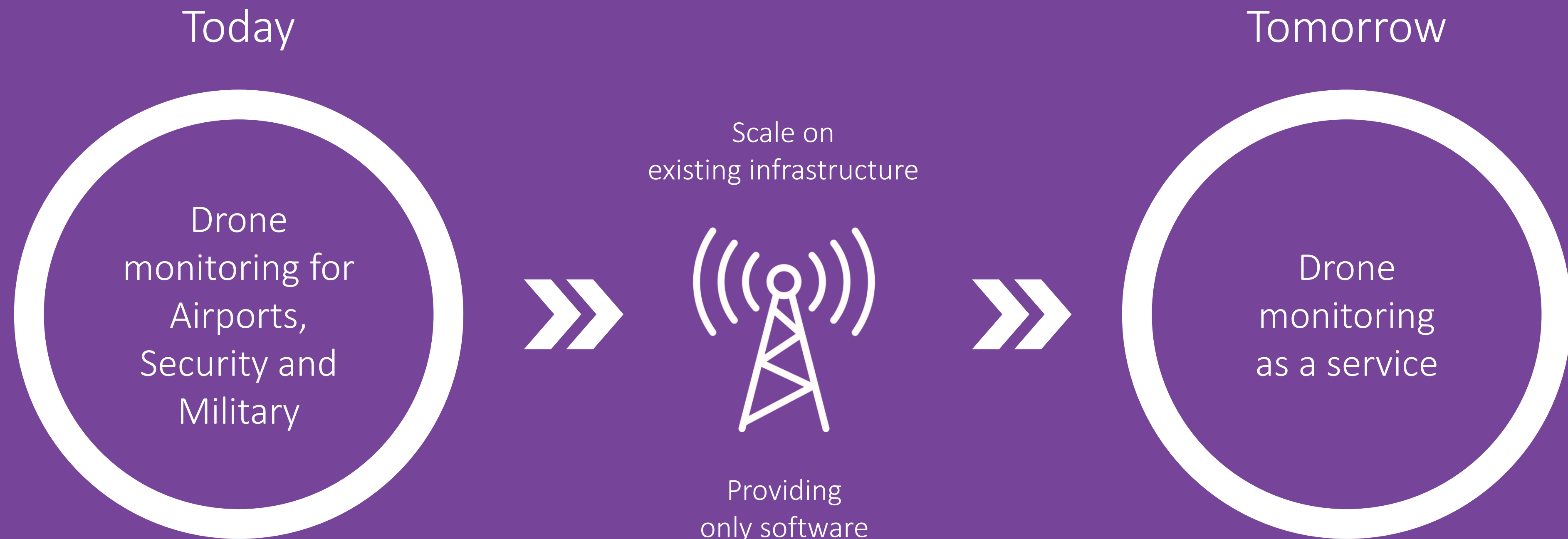
Scaling for City & State Coverage

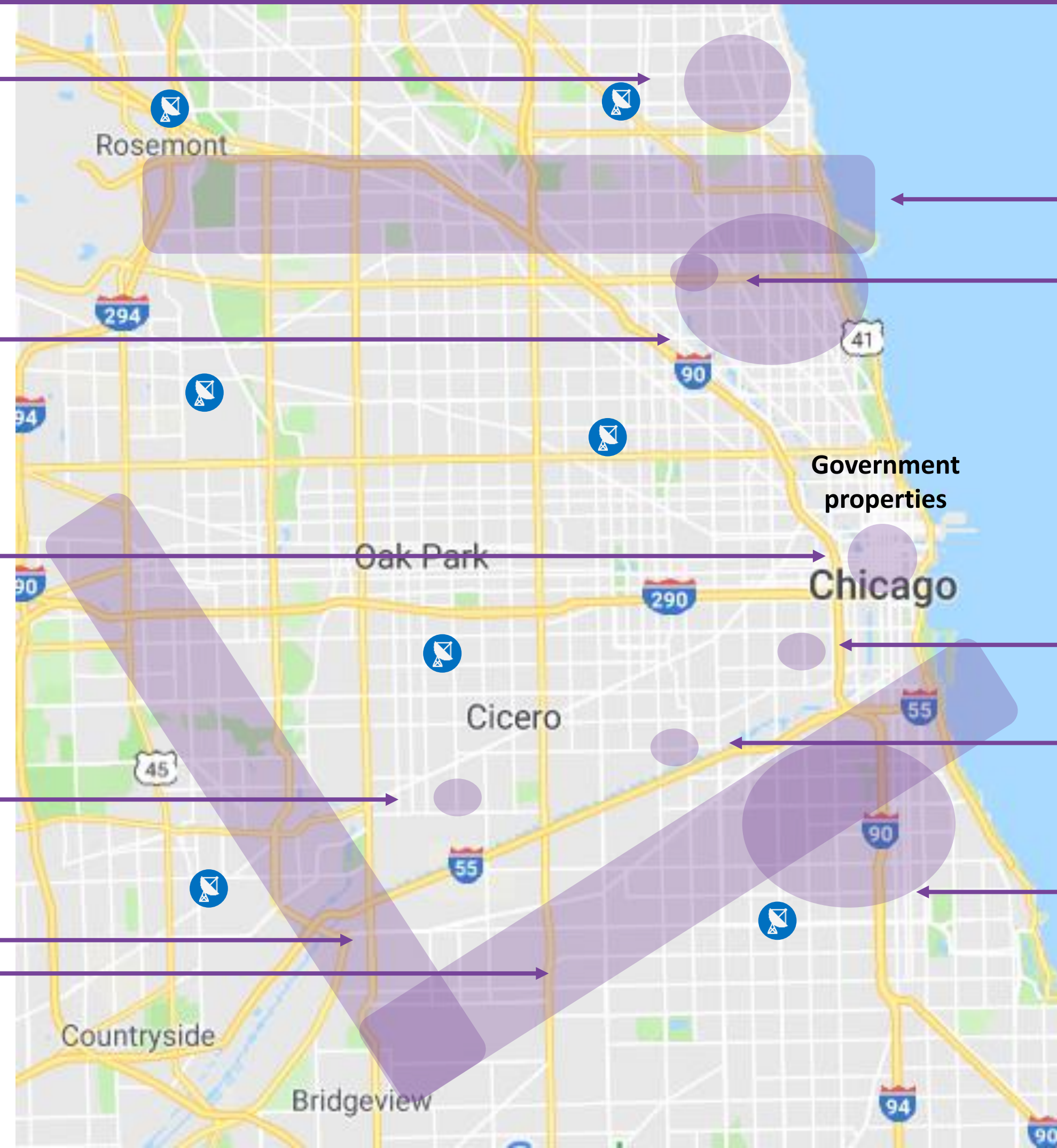Example of potential customers

Gay Pride Parade (Police)

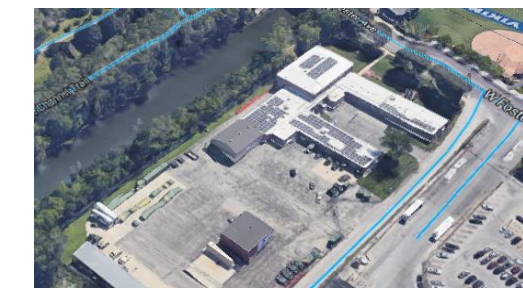Cubs Stadium

Secret service building

Power generation

Midway Intl air corridor

Government properties

O'hare air corridor

Marine Corp facility

Chinese new year parade (Police)

Cook county jail

White sox

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Future Potential Customers

Fail safe system and cyber security solution for commercial drone operations
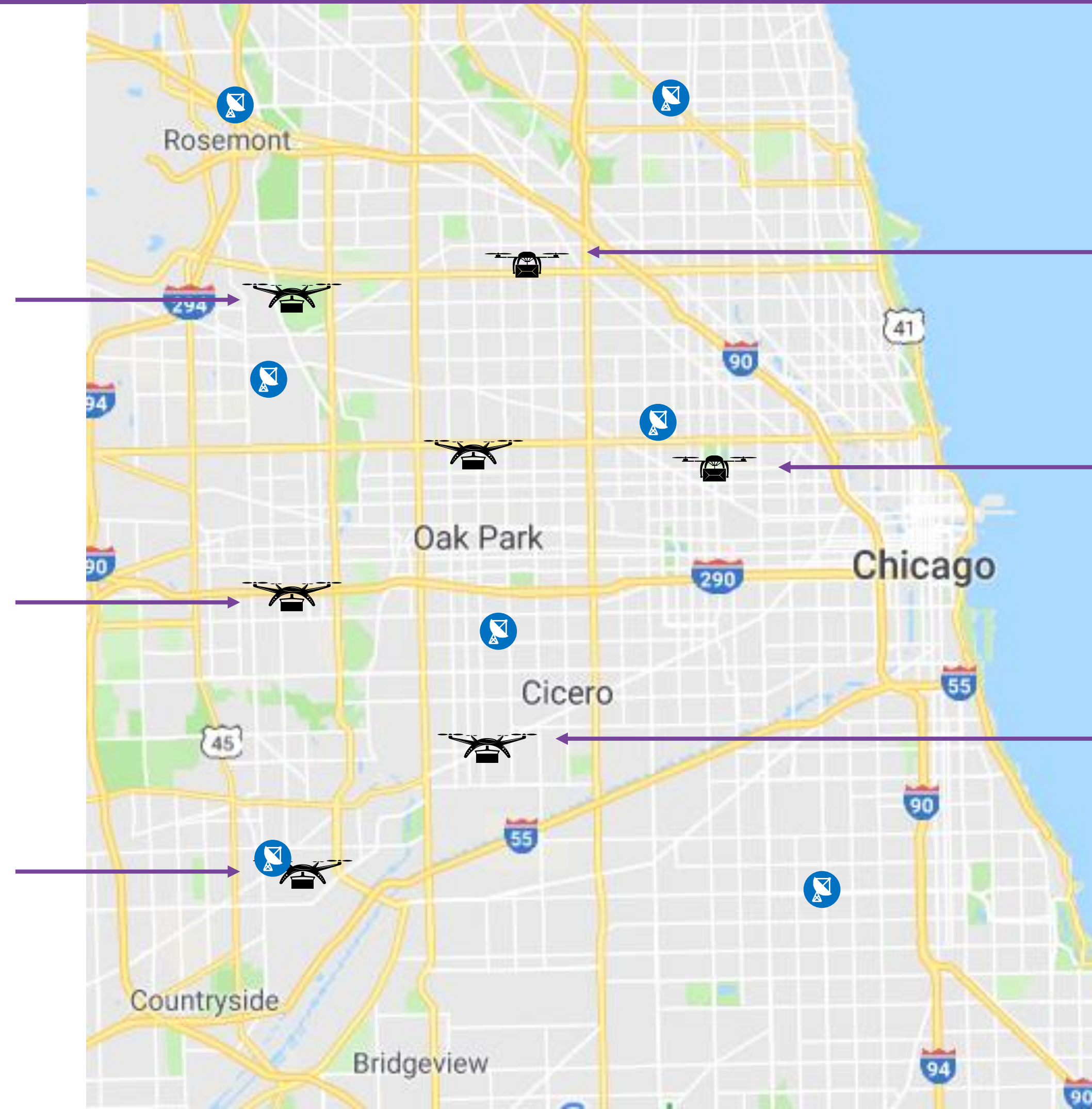
Amazon drone

DHL drone

Construction drone

Police drone

Airbus Taxi Drone

Inspection drone

AT&T, Microsoft and Vorpal **Collaboration**

Exploring drone monitoring as a service

» Enabling us to **track** thousands of drone **in real time**

AT&T   Microsoft

Vorpal provides the **solution**. Microsoft and AT&T provide the **infrastructure**

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AT&T, Microsoft and Vorpal

Microsoft Build 2019 Annual Event

"making sure that the air space with drones is safe is such a critical need"

Satya Nadella - Microsoft CEO

Use case-scaling up on Existing Infrastructure
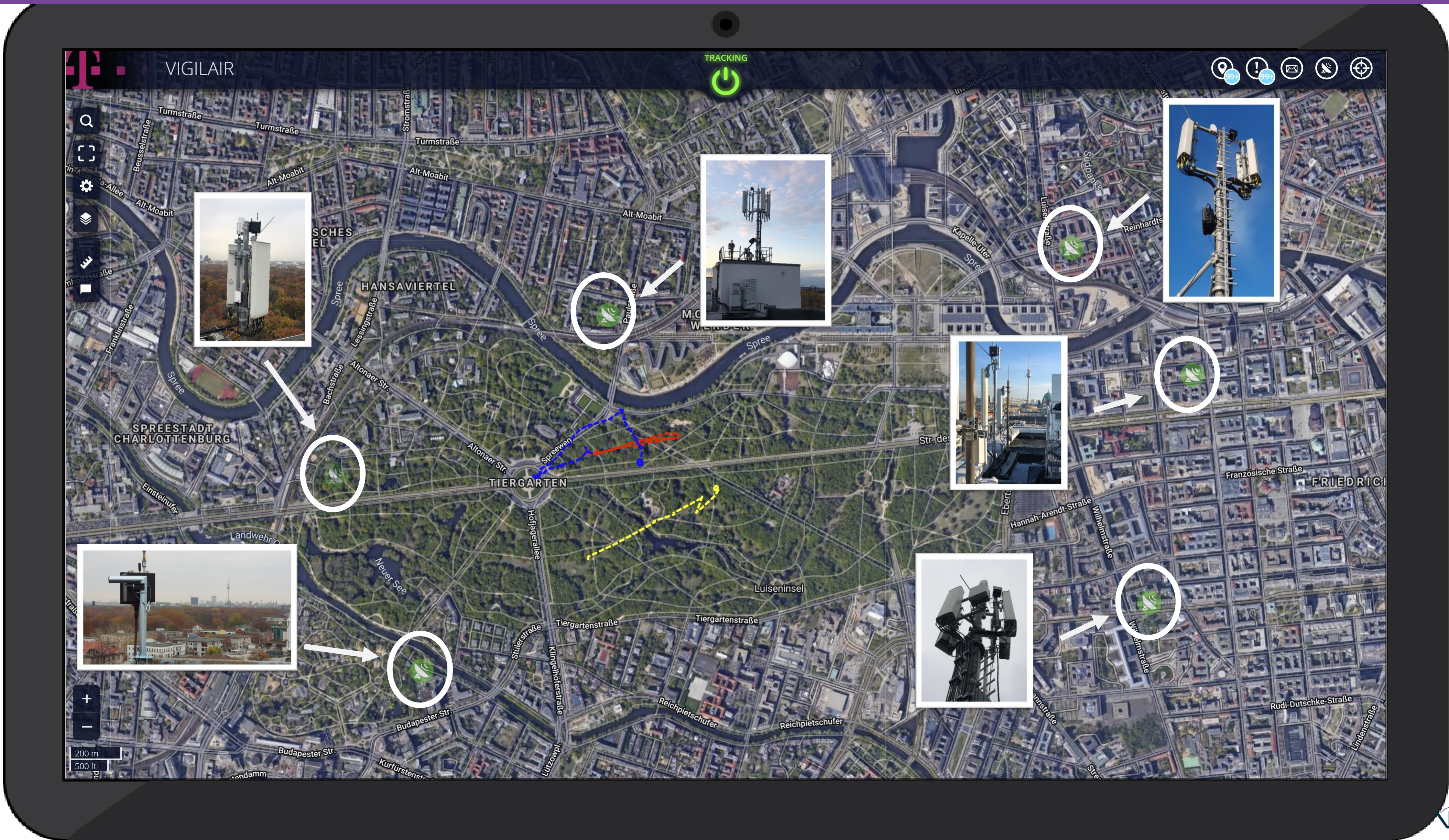

⊤··· Deutsche Telekom

After testing the leading companies in the field, Deutsche Telekom chose Vorpal to deploy a full operational drone monitoring system in Berlin

Deployments on Deutsche Telekom infrastructure in Munich
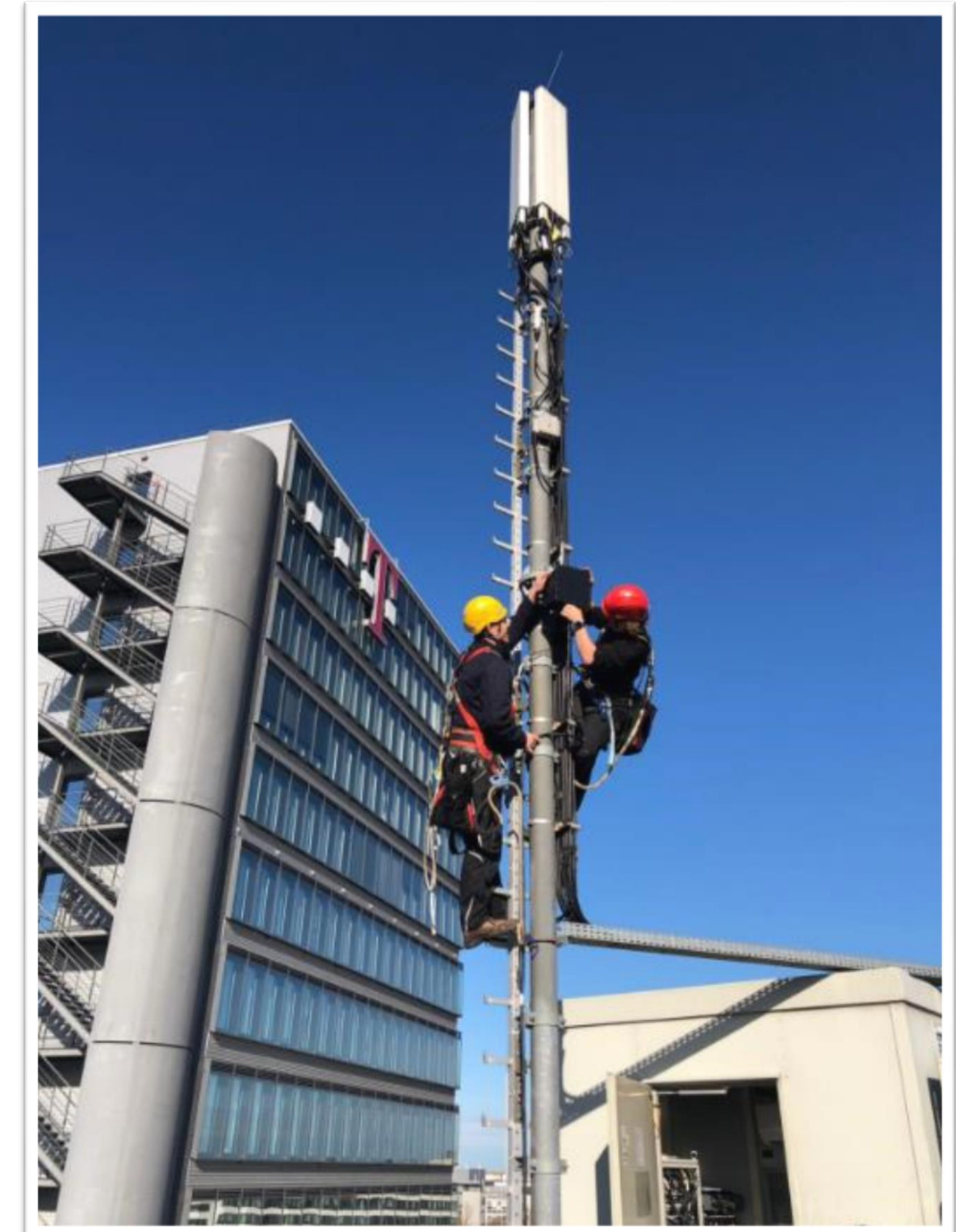
Monitoring drone activity in Berlin

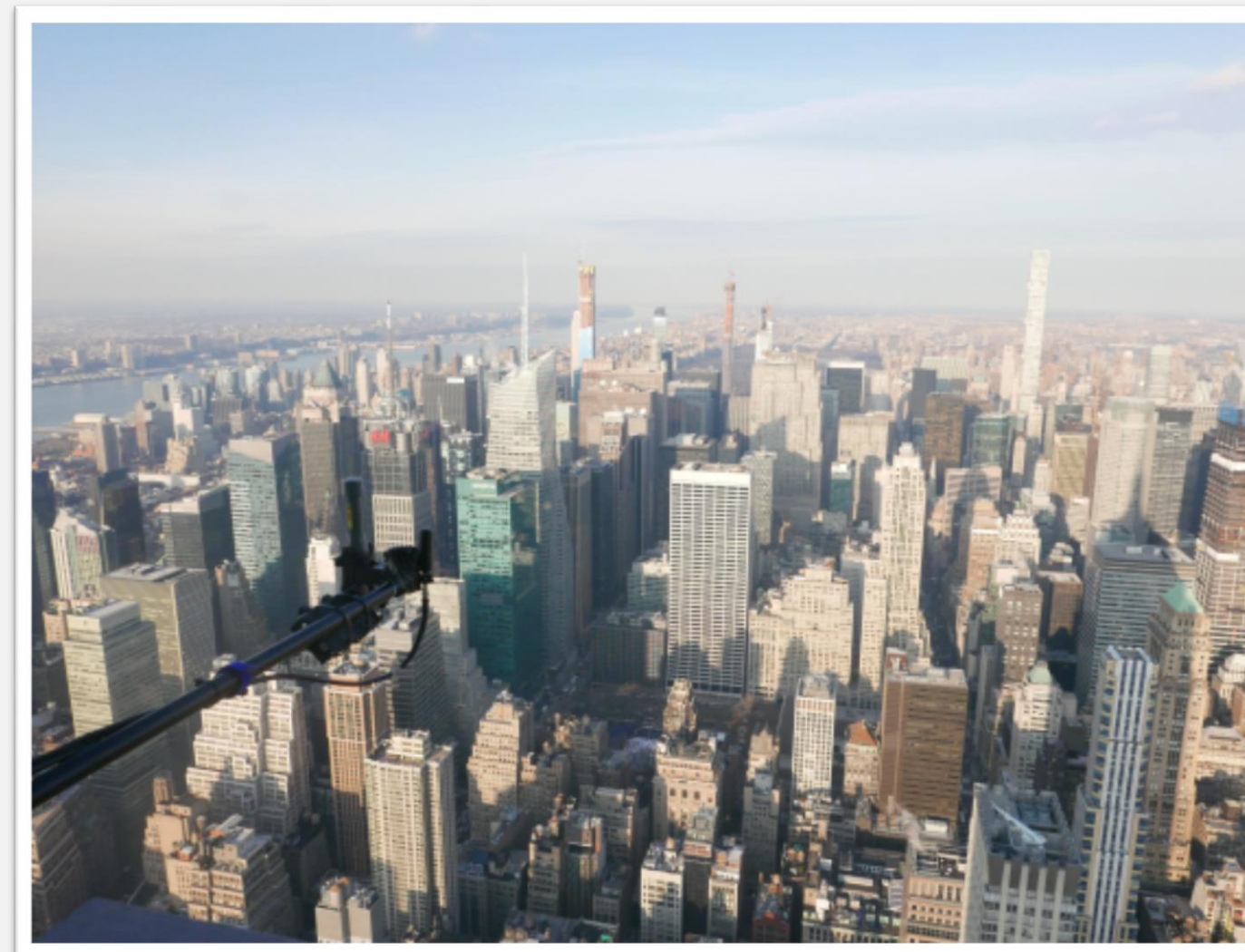# Catching drone operator for **Law Enforcement**

Vorpal was chosen to protect high profile events

- Ball Drop event in Times Square on the New Years Eve

- The New York Marathon

- Halloween Parade on 6th Avenue

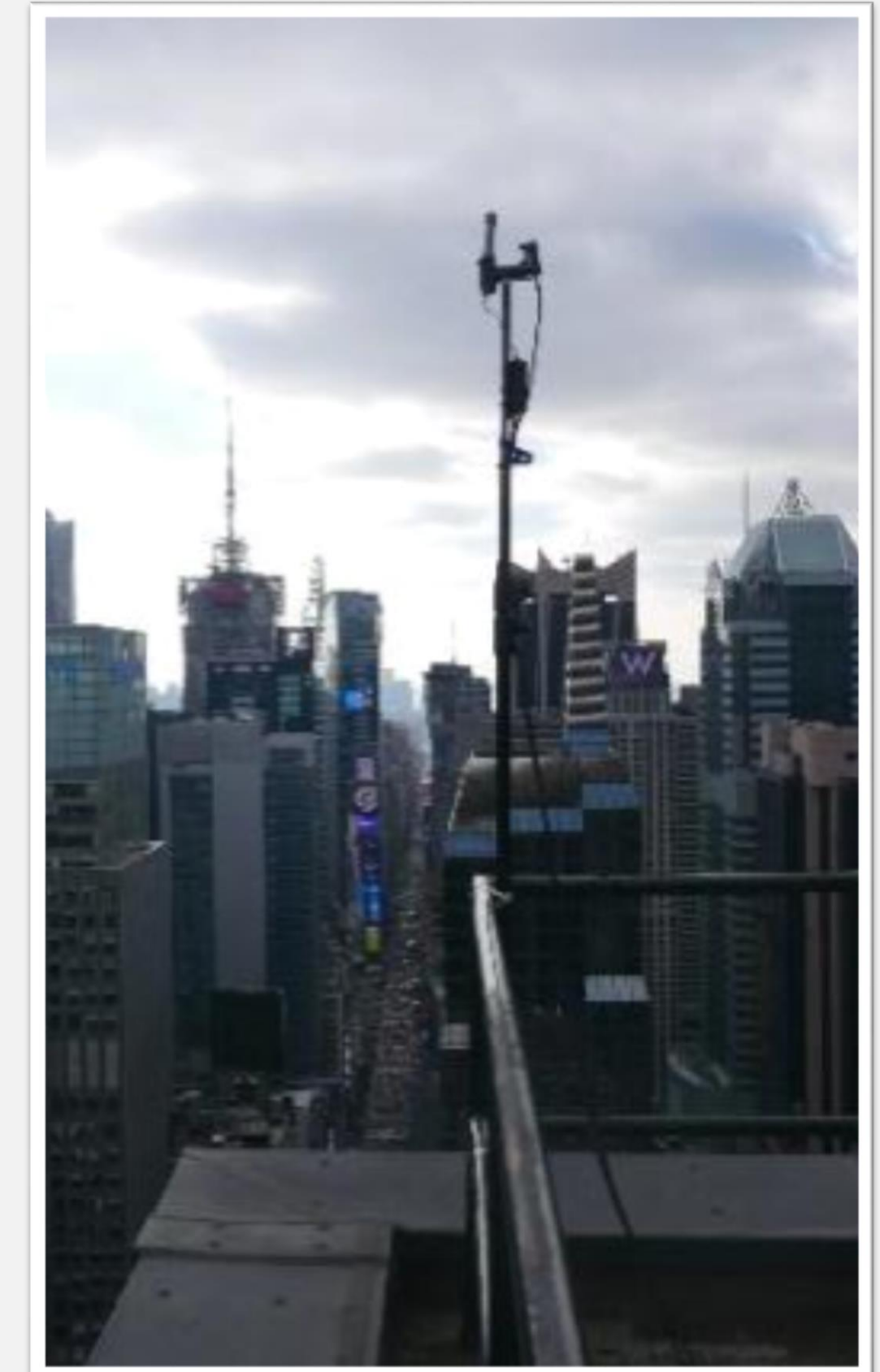**Deployment examples** »

Residential building

Times Square

Empire State Building

Apprehending a drone operator for the NYPD

Using Vorpal's solution, the NYPD identified a rogue drone in real time and was able to apprehend the operator

Protecting the Eurovision Contest

Vorpal was chosen to **protect the largest global song Contest event**. Using Vorpal's drone monitoring solution the police were able to:

- Apprehend over **30 drone operators**

- Intercept over **100 drones flying** in the no-fly-zone

- Monitor over **200 drones** flying in Tel Aviv

Confiscated drones caught using Vorpal's solution

UTM (Unmanned Traffic Management) Fallbacks

Forbes

Hundreds Of U.S. Flights Canceled As GPS-Based Aircraft Navigation System Fails

Zak Doffman Contributor ⓘ

McKinsey & Company

For UTM to function, air-mobility solutions must be equipped with critical technologies, such as detect-and-avoid systems and navigational tools for environments where GPS does not function

By Tyler Duvall, Alastair Green, Meredith Langstaff, and Kayla Miele

Avionics INTERNATIONAL

Kittyhawk CEO Jon Hegranes said "Real-time authorization without real-time visibility, enforcement or compliance leaves more problems than solutions for commercial operators."
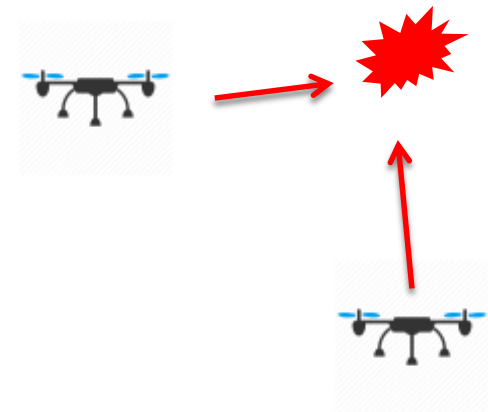
By Nick Zazulia | May 3, 2018

cnet

U.S. drone hijacked by GPS hack?

Unnamed Iranian engineer tells Christian Science Monitor that the sophisticated drone was forced to land by spoofing GPS coordinates.

BY STEVEN MUSIL ⓦ | DECEMBER 15, 2011 11:05 PM PST

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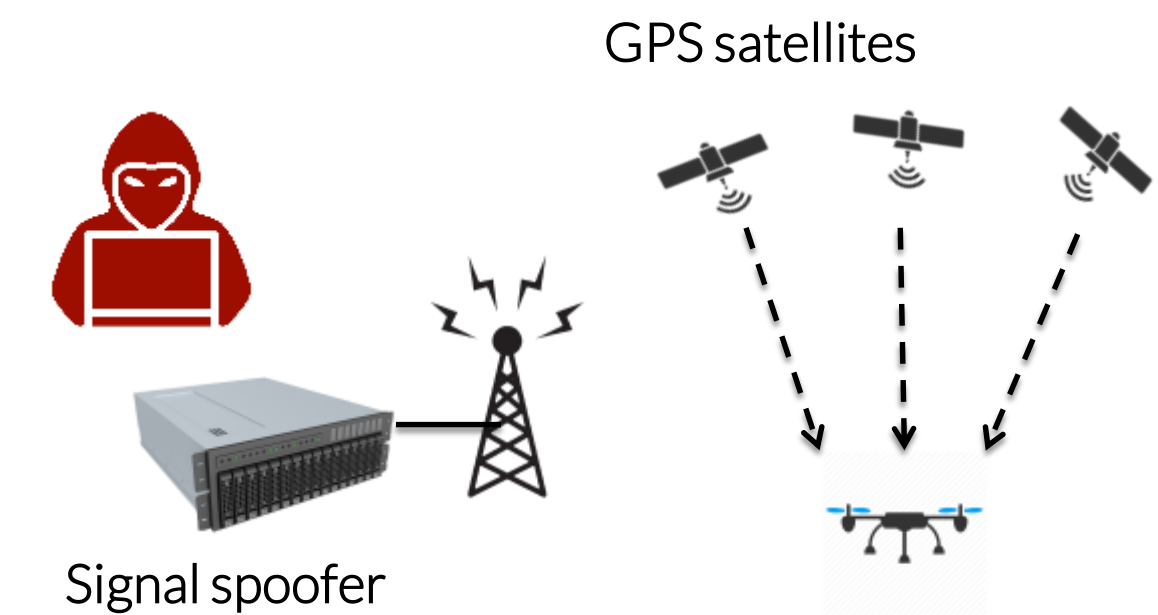# Vorpal for **Commercial Drone Operations**

Fail safe system and cyber security solution

Monitoring both cooperative and non-cooperative drones

Independent and Reliable Positioning (GPS fallback solution)

GPS satellites

Signal spoofer

Immune to GPS hacking, jamming or spoofing

Enable law enforcement to geolocate rogue drone operators

Vorpal's Path

Phase I

Wide area coverage customers

Industrial companies & Airports

Phase II

Multitenant (covering multiple customers over the same deployed hardware)

SaaS- City wide coverage

Phase III

National airspace

Assisting commercial drone operators