

DEFENCE & SECURITY CONSULTANTS

Anti-Drone Systems C-UAS

GENERAL CONCEPT

Current Situation:

Drones are currently a major threat not only in combat environments whether in the open field or in urban combat, but also constitute a serious terrorist and criminal threat. The risk lies not only with armed drones but also with drones that are capable of transmitting intelligence to the enemy through observation. Drone manufacturers are increasingly raising the technological level of their systems to avoid their inhibition or interception, which makes it necessary to act proactively against them.

How to act?

The first challenge is detection, at the greatest possible distance, as well as identification, for which TEMPLEFORCE uses the radio spectrum (RF) as its main means of detection, which also guarantees the greatest invulnerability to the environment (weather conditions, sounds, etc.).

C-UAS combat by direct fire involves significant difficulties in urban environments, and is unfeasible in civilian environments, so jamming is the most versatile means.



Baghdad, July 5 2021

GENERAL CONCEPT

Detect

- Active radar
- Smart camera with video Analytic
- Own drone ID tracking
- Data fusion & Machine learning AI



Integrated

C2



Defeat

- Soft kill
- Smart Jamming
- Take control
- Projectiles (*)
- Directed energy (*)
- Drone Based SK & HK (*)

* Risk of collateral damage when the drone is downed



SOLUTIONS

Taking into account what was explained in the previous slide, SDLE can provide the alternatives that best suit the environment to be protected.

MAIN IDEAS:

- Each customer has different risks/problems.
- No two environments are the same.
- Each customer has his own legal restrictions and ROE's.
- There is no one-size-fits-all solution, each site needs its own solution.
- Each problem needs to be studied before making any proposal.
- Use of soft kill countermeasures.
- Uncontrolled drones represent a secondary projectile.
- The time from detection to jamming should be less than two minutes to ensure safety.

TYPES OF SOLUTIONS

Fixed Solutions

Designed for the protection of military or police bases, critical infrastructures, prisons, or any other site that due to its special relevance requires 24/7 protection and high detection capacity.

Existing regulations and security configuration

Existing air traffic flight profile and airport/urban use restrictions.

Mobile Solutions:

To provide constant coverage to VIPs or to have immediately deployable systems to protect eventual activities with a high degree of effectiveness, such as political or sporting events, in the civilian case, or in deployments of military units.

Portable Solutions:

That protect targets on an ad hoc basis without the need for material deployments, as they are autonomous unipersonal equipment.

Our solutions include the possibility of supplying virtual simulators and simulations for training: TRAIN TO WIN

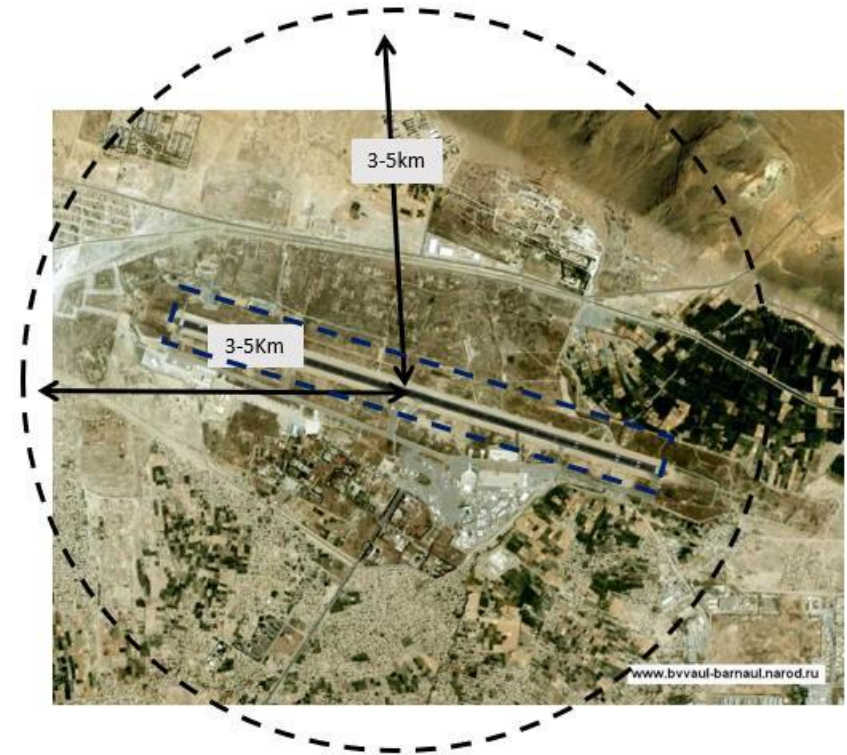
FIXED SOLUTIONS



- Fixed solutions can be land-based, containerized or naval.
- They do not require military type equipment, so they can be deployed in civilian environments.
- They can be integrated into air defense or air control systems.
- They are compatible with airport equipment.
- Can be minimized to avoid infrastructure requirements.
- Can integrate hard kill defeat, through the use of machine guns.

CONCEPT AND PLANNING

- Objective:
 - Protect any site against drone intrusion by deploying an anti-drone system 24 hours a day, 7 days a week.
- To understanding
 - Drone issues – Frequent intrusion areas and what kind of drones.
 - Current regulations and safety.
 - Existing Air traffic flight profile and restrictions for airport/urban use.
- Complete Project:
 - Anti-drone system operations center.
 - Anti-drone system deployment site .
 - Terrain and air traffic study.
 - RF spectrum usage and EMI/EMC study.
 - Infrastructure requirements: existing and necessary.



As a result of the on-site study and customer conditions, the company can decide on the best configuration.

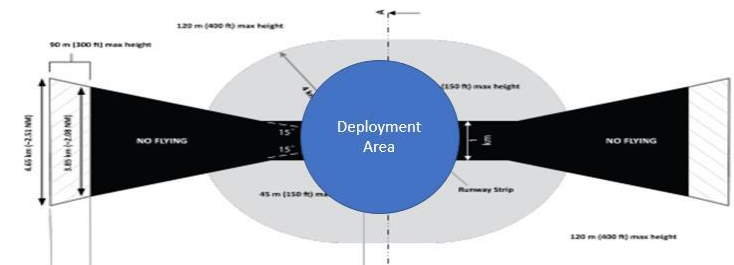
SYSTEM DEPLOYMENT, DESIGN AND CAPABILITY

Basic System

- 1x 3D Radar 3600
- 1x 3D RF Detection 360°
- 1x EOIR Camera (thermal and TV)
- 1 x 8- bands Drone Jammer
- 1 x Wide-Band Drone Jammer
- 1 x Transponder

Quantity of basic systems on agree with protected area conditions

- Against Commercial, DIY & Certain Mil-grade Drone
- Long range
- Detect & Defeat Integrated
- 24/7 Operations
- Able to operate and monitor at main control room with one operator
- Able to be integrated with Air Defense Systems



C2 System (Main) at Ops room

SYSTEM DEPLOYMENT, DESIGN AND CAPABILITY

BASIC SYSTEM

DETECTION ELEMENTS:

- 3D Doppler Radar 3600: Guarantee early detection even in case of autonomous flight.
- 3D RF Detection 360°: Passive system, with capability to triangulate drone and controller position
- EOIR Camera (thermal and TV): Passive system used to confirm risk, useful to determine the type of attack and very useful for forensic evidence.
- Transponder: To check blue forces.
- Aeroscope: To identify UAV communication links, thus identifying all DJI drones serial numbers

CONTERMEAUSURE EQUIPMENT:

- 8- band Drone Jammer
- Wide-Band Drone Jammer

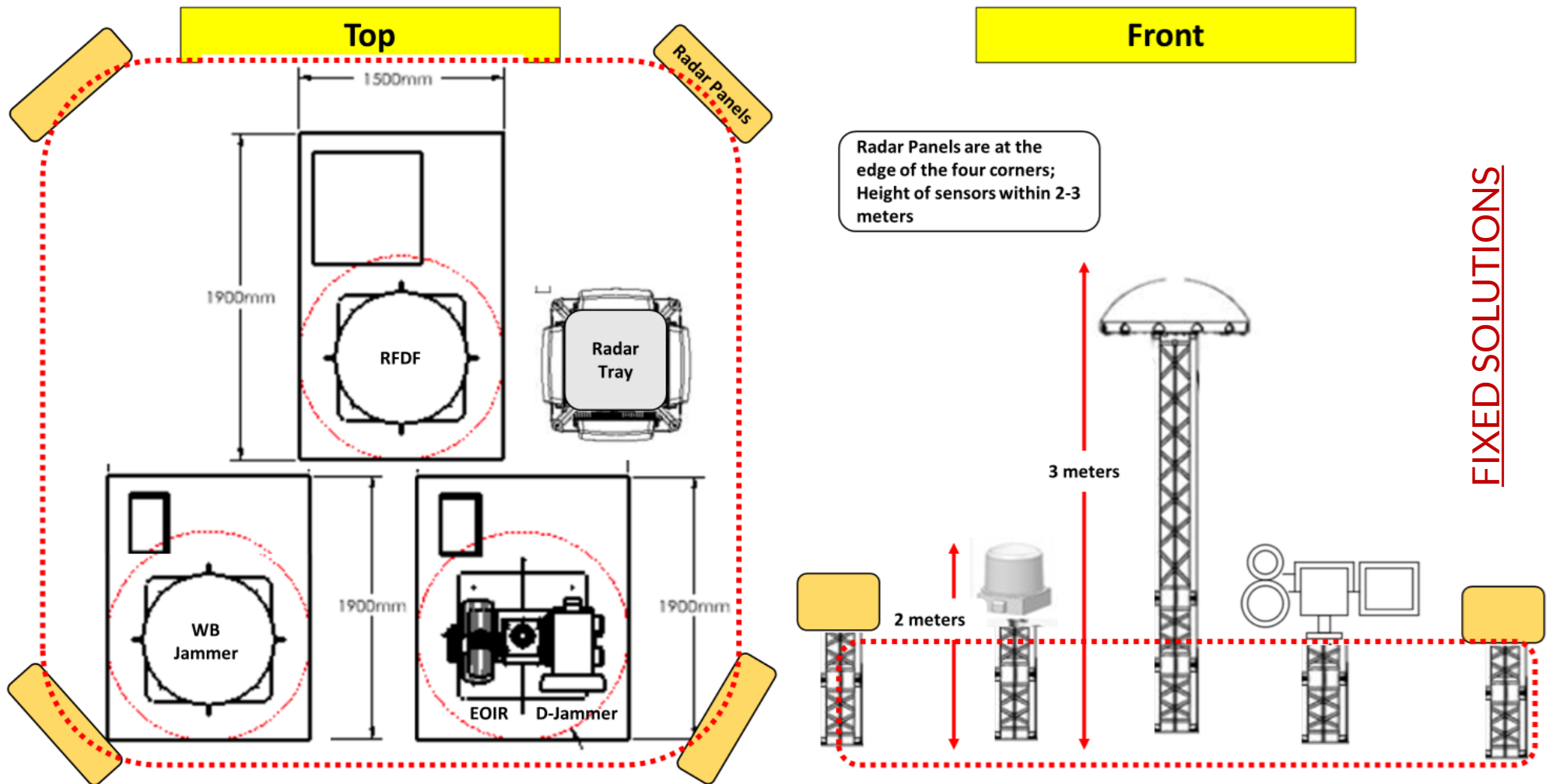
JAMMING EFFECT:

There are usually two responses from the drone jammed:

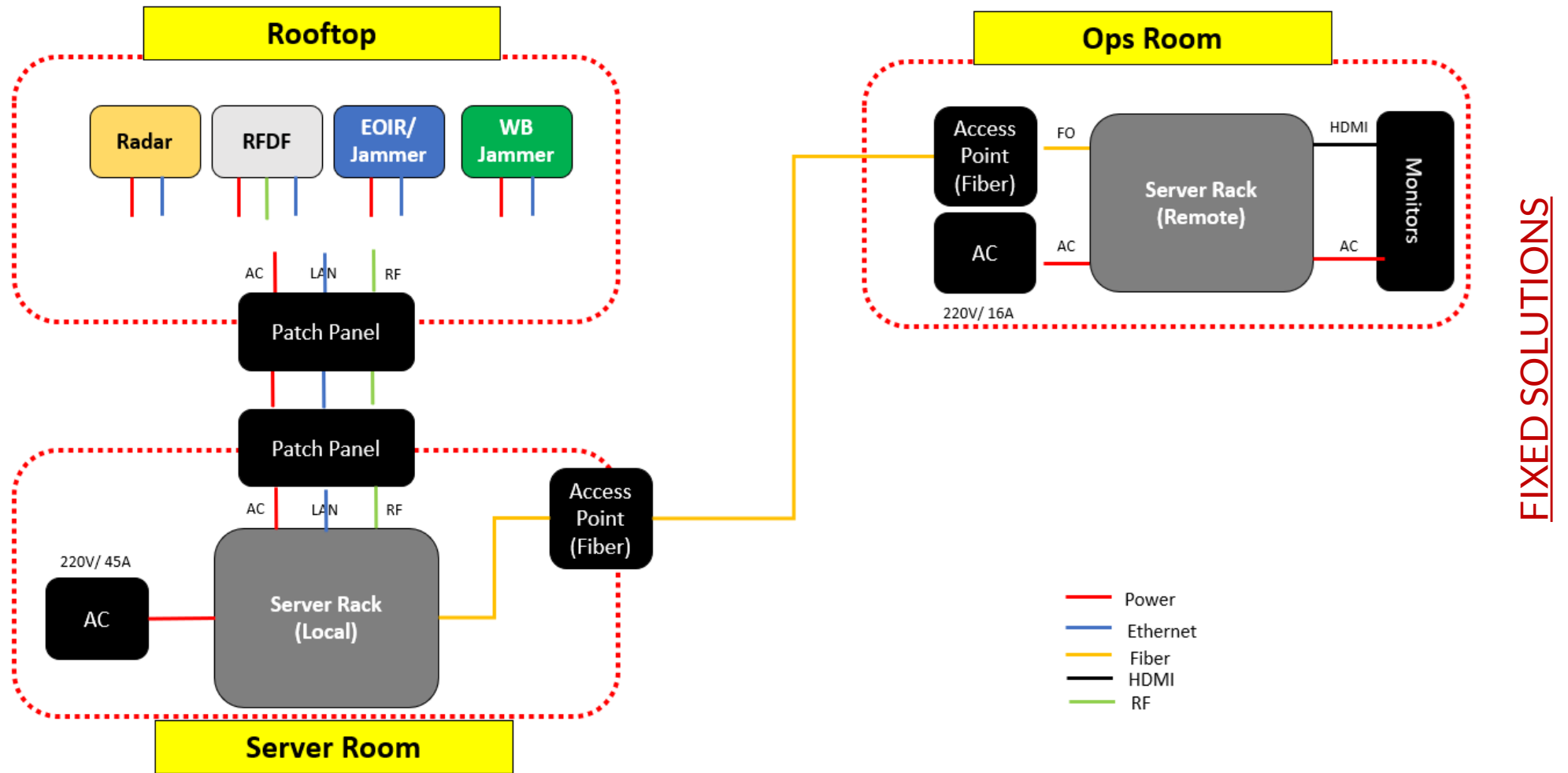
- Return home
- Remain flying in static position until shut down (gives time to clear the “kill zone”)

“Trapping“ the drone is not recommended: ‘Risk of ’booby trap”.

TYPICAL EQUIPMENT DEPLOYMENT CONFIGURATION



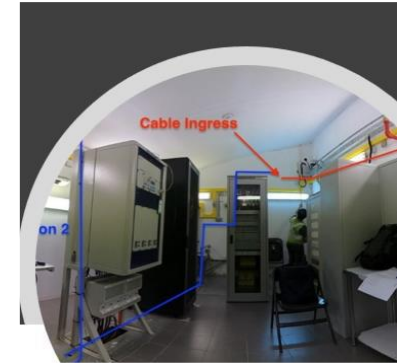
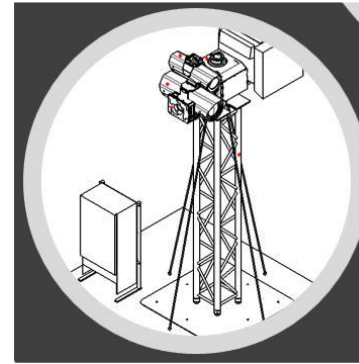
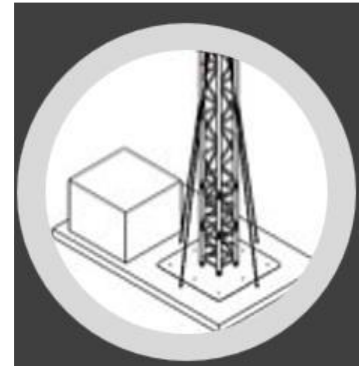
OVERALL SCHEMATIC DIAGRAM (EQUIPMENT ONLY)



The operations room can be located away from the Rooftop and the server room.

SYSTEM INFRASTRUCTURE

- Infrastructure Requirements
- Equipment structure
- Network
- Power supply & UPS, Air conditioning
- Lightening protection
- Obstruction Lighting and Signaling
- Safety Certification

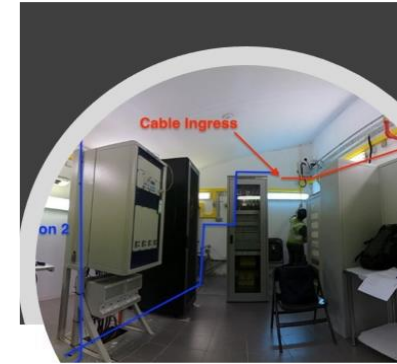
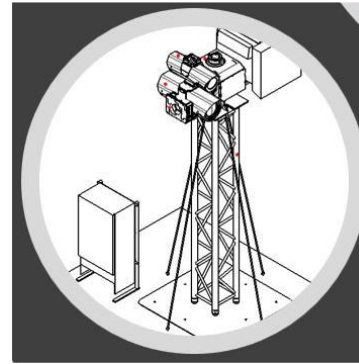
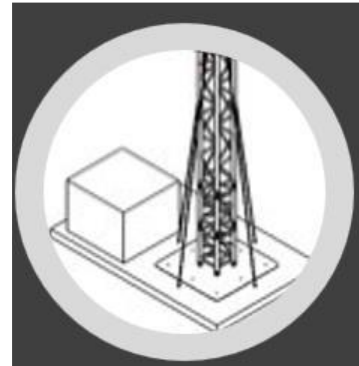


FIXED SOLUTIONS

The operations room can be located away from the Rooftop and the server room.

SYSTEM OPERATION

- One operator
- Training in two weeks
- Maintenance contract if requested
- Operation contract if requested
- Installation in 10/15 days
- Preventive maintenance limited to cleaning
- Periodic calibration



FIXED SOLUTIONS

The operations room can be located away from the Rooftop and the server room.

MOBILE SOLUTIONS

- The mobile solutions are installed on the type of vehicle selected by the customer from a wide range of possibilities, even tracked vehicles.
- A single vehicle integrates all the elements that make up the system: detection, inhibition and command and control.
- Part of the functionalities are operational on the move.
- The adaptation of the vehicles allows them to circulate on public roads.



MOBILE SOLUTIONS

- Detect, defeat, integrated on commercial or military vehicles.
- 3D radar: 3 – 5 km all around
- 3D RFDD: 3 – 10 km all around
- EOIR: 2 -8 km day & night
- 6 Band disruptor: 3 – 5 km
- Integrated C2
- Networked



MOBILE SOLUTIONS COMPARISION

- **EQUIPMENT:**

Same equipment as fixed solution

- **CAPABILITY:**

Theoretical as fixed solution, limitations about line of sight by height of sensors and Jammers.

- **POWER SUPPLY:**

The vehicle must be running to operate the system or be connected to an external power supply.

UPGRADABLE CAPABILITIES

As the threat does not stop, the system has the capacity to grow by integrating new sensors into the command-and-control system.

Jamming frequencies can be expanded if new windows of risk are detected.

Therefore, detection and defeat can be improved.

Every day our technicians work to cover the entire threat spectrum and offer our customers the best options.

;;;Being proactive is the only option!!!!

TEMPLEFORCE SUPPORT

- Full training in operation and maintenance as part of the scope of supply.
- Maintenance services could be added
- Possibility to be operated by the TEMPLEFORCE team in the field
- Possibility of integration with customer's command and control systems

PORTABLE SOLUTIONS

The objective of the portable solutions is to provide protection for specific situations, such as the movement of personnel on patrol in both urban and rural areas, or the specific protection of VIPs.

The equipment is fully portable, and its autonomy is subject to the number of available batteries, being in any case rechargeable and commercially available.

The systems are divided into three groups:

- **PYXIS:** portable drone jammer with 9 or 10 directional RF bands.
- **MANPACK:** Multi-band omnidirectional jammer, which creates a protective bubble over the operating unit. It can be connected to electrical power sources, so that if the unit accesses a point with electrical supply it can dispense with batteries.
- **MANPACK DETECTOR:** Allows the detection of drones operating in the environment, in this way the inhibition with the two previous ones is performed only in case of threat detection, and also provides information about the position of the drone controller, to be able to act against it.

These systems can work independently, it is the customer's needs that determine the best combination of them.

PORTABLE SOLUTIONS



PYXIS-H10 is the world's first portable 10-band RF portable drone jammer specially designed to prevent drones from posing a threat by either shooting them down or sending them back to their launch point. The PYXIS-H10 system consists of a directional jammer covering the 433 MHz, 915 MHz, 2.4 GHz, 5.1 GHz, 5.8 GHz ISM bands and several GNSS bands (1.5 GHz L1 and 1.2 GHz L2) with a range of 1000 m or more. Coverage is effective against most widely used commercial and DJI drones and even military class drones. PYXIS-H6 disrupts remote control, telemetry, video link and GNSS transmission to drones.

Frequency Band Coverage	433MHz band (420 to 450MHz), 915MHz band (902 to 928MHz), 2.4GHz band (2400 to 2485MHz), 5.8GHz band (5725 to 5850MHz) GNSS L1 band (1559 to 1610MHz), GNSS L2 band (1208 to 1254MHz) (covering GPS L1&L2, GLONASS G1&G2, Galileo E1 & BeiDou B1)
Directional Coverage Range	>1000m depending on type of drones and range ratio
Angle of coverage	For V & H ~30-45°
Response time	Able to halt the drone immediately Able to bring down Drones or send them home
Jammer Technology	EVO
Number of Jammer Modules	6
Jammer Power	Up to 10W per module (rated power)
Number of Directional Antenna	6 bands Integrated
Mode of operation	Individual or All bands selection
Aiming Scope & Display	Unity or 4x Scope with Laser pointer
Build in Test	Yes, with OLED display
Display	Display start up and build in test Display of battery level, temperature & jammer Ops Display direction of aiming with build-in digital compass
Battery Operated	Changeable & rechargeable battery 22.2V 5000mAh Li-Po
Standby Battery Time	~ 48 hours
Operational Battery Time	~ 45min replaceable battery
Battery Charging Time	~ 3 hours (From battery low to full charge)
Weight	< 7.5Kg
Dimension	68x37x9cm
Environmental & Ruggedization	Operating temperature: -20 to 60°C Storage temperature: -20 to 70°C Ingress Protection: IP65 Overheating protection at 60°C
System Safety	Compile to Radiation hazard for human, fuel and ordnance in accordance to International standards



Man pack (MP) is a specially designed 6 RF bands Drone jammer to prevent the drones from posing any threats by either prevent the drones from entering the protected area, bring the drones down, or send them back to their launch point.

The TFDK MP system consists of both Directional and Omni-directional (All round) jammer covering the band 433MHz, 915MHz, 2.4GHz, 5.8GHz and GNSSL1 & L2 for both the directional and all-round jamming. The coverage is effective against most widely used commercial drones as well as some military class UAVs.

DRONE JAMMER MANPACK

The package consists of the following: ·One SDLE-Man-pack Anti-Drone Jammer complete system. ·One Fujinon or equivalent Binocular ·One RF Explorer Radio frequency Spectrum Analyzer

Two ruggedized transport cases

·One year warranty on parts and components against manufacturer defect. Technical support included. Additional year warranty available (optional)



DRONE JAMMER MANPACK

SPECTRUM ANALYSER

RF explorer Portable Spectrum Analyzer for jammer modules functionality test and frequency survey of operating area. Ability to test all the frequency bands used by Jammer.



Frequency Band Coverage	433MHz band (429 to 456MHz) 915MHz band (902 to 928MHz) 2.4GHz band (2400 to 2485MHz) 5.8GHz band (5725 to 5850MHz) GNSS L1 band (1559 to 1610MHz) GNSS L2 band (1208 to 1264MHz) (Covering GPS L1&L2, GLONASS G1&G2, Galileo E1 & BeiDou B1)
Directional Jamming Range	~1000-1500m depending on type of Drones
Omni-Directional - All round coverage Range	~300-500m radius depending on type of Drones
Against multiple drone swarm attack	Yes, using Omni-Directional coverage
Response time	Able to kill the drone immediately Able to bring down Drones / UAV or send them home in 5-10 seconds
Light, man pack and portable	For easy to carry, fast response operation, and high efficiency
Aiming Scope	Unity or 4x Scope with Laser pointer
Environmental and Ruggedization	IP55
Jammer Technology	DDS
Number of Jammer Modules	6
Jammer Power	15-20W per module (rated power)
Number of Directional Antenna	4 (433MHz, 915MHz+GNSS L1+GNSS L2, 2.4GHz, 5.8GHz)
Number of Omni-Directional Antenna	6 (433MHz, 915MHz, 2.4GHz, 5.8GHz, GNSS L1 & L2)
Mode of operation	Directional or Omni. Only one mode at any time. Tripod mode available.
Build in Test	Yes, with OLED display
Display	OLED display of battery level, temperature and jammer operations
Battery or AC Power	27.5V, 13Ah Li-Po. Built-in Battery. Can use direct AC for operations
Standby Battery Time	~ 50 hours
Operational Battery Time (Directional Only)	~ 1 hour (>60 trigger activations of 1 min each)
Operational Battery Time (Omni-Directional Only)	~ 1.5 hour (all 6 bands) Can use direct AC for operations
Battery Charging Time	~ 2 hours (From battery low to full charge)
Weight of Handheld Antenna	~ 3.5Kg
Weight of Man Pack	~ 15Kg
Weight of Tripod (Optional)	~ 4Kg

PORTABLE SOLUTIONS



The complementary rifle has the following features:

Directional coverage range >1000-2000m, depending on the type of drones and range ratio.

Angle of coverage for V and H: 30°-45°

Response time: Able to stop the drone immediately

EVO Jammer Technology

Number of jammer modules: 6

Jamming power: 10 W per module (nominal power)

Number of directional antennas: 9 integrated bands

Single operation mode or all bands selection

Sighting scope and display Single or 4x sighting scope with laser pointer

Integrated test, with OLED display

Integrated start-up and test display

Battery level, temperature and jamming operations display

Indication of aiming direction with integrated digital compass

Powered by rechargeable Li-Po 22.2 V, 10000 mAh rechargeable battery

Standby battery time: 48 hours

Operating battery time: 60 min replaceable battery

Battery charging time: 4 hours (from low battery to full charge)

Weight: < 7.5Kg

Dimensions: 68x37x9cm

Operating temperature: -15 to 55°C

Storage temperature: -20 to 70°C

Ingress protection: IP65

Overheating protection at: 55°C

System safety Certified with respect to radiation risk to people, fuel and appliances according to international standards

PORTABLE SOLUTIONS



COMPARATIVE:

- ❖ The rifle requires the operator to be focused on monitoring the environment to inhibit any threats, or to have a detection system.
- ❖ The rifle is lightweight and has a range of up to 1000 meters.
- ❖ In multiple attack situations more than one rifle may be required if the threat is coming from different sectors.
- ❖ The backpack does NOT require the permanent attention of the operator.
- ❖ The coverage is omnidirectional, so that the protection is bubble-shaped.
- ❖ The backpack has a range of about 500 meters, which is sufficient for drones loaded with explosives.
- ❖ The power consumption and weight of the backpack are higher.

PORTABLE SOLUTIONS

MANPACK DETECTION SYSTEM

Real-time passive detection system. The system includes a display for the operator. Range is 4000 meters in open areas to 800 meters in urban areas.

Provides position, speed, altitude and, in some cases, drone type and serial number.



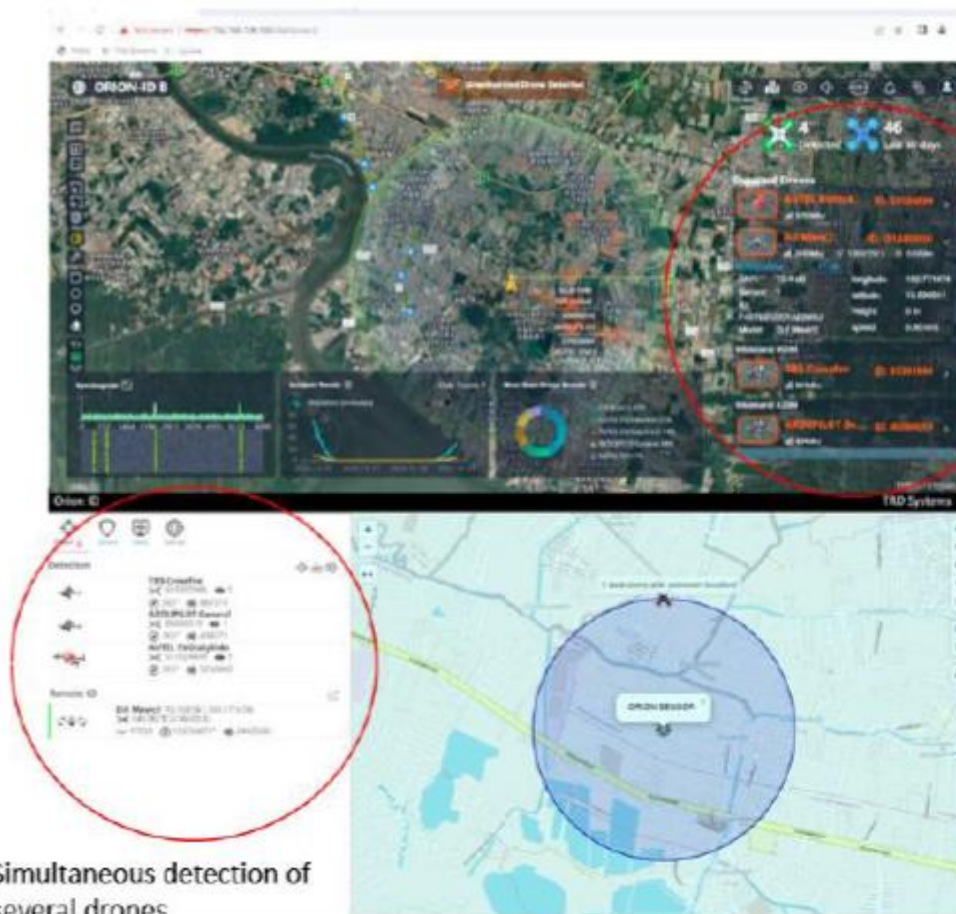
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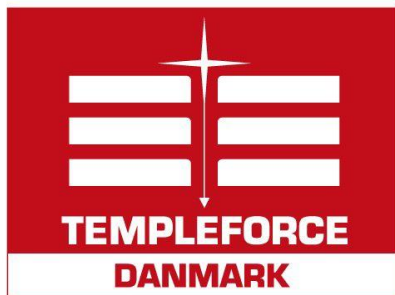
Simultaneous detection of several drones

Manpack Detection System

- Show detection zone
- Able to detect multiple targets
- Able to provide position and azimuth of the drone and also of the operator
- Logging of detections
- Display radiation spectrum on the screen

* Maps could be updated online





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