Anti-drone Solution

Spoofing System & Drone Dome

Bstarcom CATALOG

Bstarcom
TEST & MEASUREMENT

Bstarcom Inc.

We are offering wireless communication, IoT, and AI solutions since 2012.

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1 Spoofing System (Inducement & capture system)

Consist of Spoofing System

Detection equipment: Radar

Neutralization equipment: Spoofing controller & antenna

Neutralization equipment: RF Jammer

Functions

- It identifies accurate 3D location(latitude, longitude, & altitude) and speed of UAV/drone and tracks the target by receiving GPS and GLONASS satellite signals it uses for navigation.
- Detected drone is induced to safe zone outside of defense area and being forced to land.
- Drones can be detected and induced from 5 km away.
- Unlike usual counter-UAV solutions requiring RF jammer to block all the signals , Spoofing system only deceives satellite signals and wireless RF equipment in the vicinity are not affected while operating.
- Because it safely guides the drone to safe zone and capture it, it may avoid the risk of collateral damage.

Description

DSA504C: UAV/drone detection

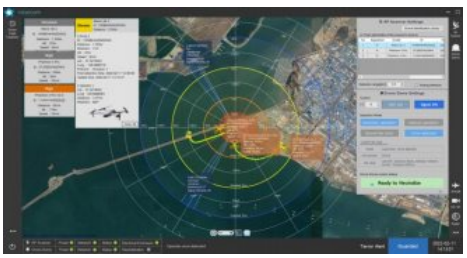
- 3D stationary Ku band radar
- Precise location and speed detection
- Drone swarm attack can be managed.
- 100% of detection rate(if calibrated)

DSA504C

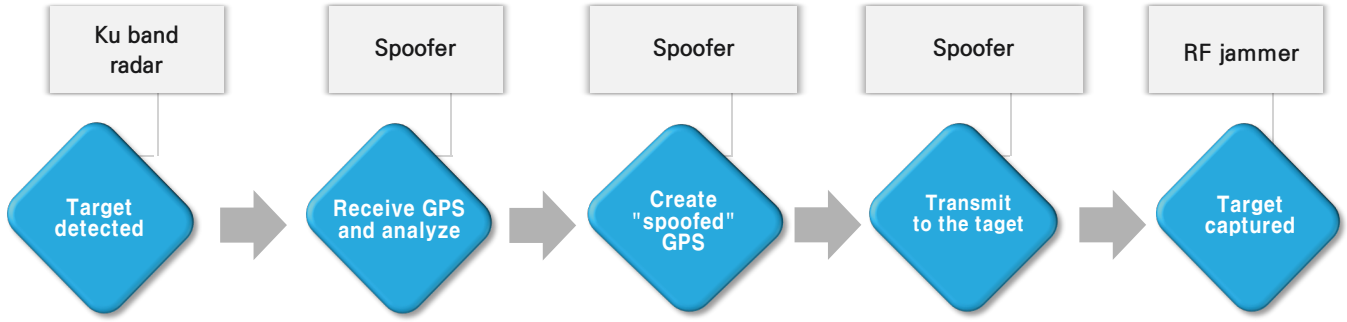
UADS-S1: UAV/drone spoofing system

- It induces UAV/drone to safe zone and able to forcefully land the target.
- Navigation that UAV/droen uses is adjusted and it will follow to new directions.
- Consist of spoofing controller(to induce), RF jammer(to force landing), and integrated software(to manage)
- Autonomous flight, Mission flight, and Manual flight can all be managed.

UADS-S1



UAV(Drone) Inducement & Capture Flowchart



Specifications

Controlling satellite signal capacity	GPS L1 & GLONASS L1
Synchronizing time to satellite signal	Less than 10 μs
Detection range capacity	Within 5 ㎞
Spoofing range capacity	Within 5 ㎞
Range of safe zone(CEP)	Within the radius of 120 m
Range of detecting band	Ku band
Operating temperature	-20 ℃ to 55 ℃

Name	Description	Remarks
Capable of controlling signal type	GPS L1 & GLONASS L1	
Detection range capacity	Within 5 ㎞	RCS = 0.01 ㎡(measured at a point 5 ㎞)
Spoofing range capacity	Within 5 ㎞	Adjustable
Circular Error Probability	Within the radius of 120 m	
Defending angle capacity	360 °	
Detection accuracy	distance ≤ 10 m, azimuth ≤ 0.5 °	
Detection and spoofing speed capacity	3 ㎳ - 80 ㎳	
Power output of Radar	Less than 100 W	
Power output of Spoofer	Less than 1 W	Directional(measured at a point 5 km)
Dead zone of Radar	Within 200 m	Can be 0 m with Smart Jammer
Drone-detection rate	100%	If defense site is optimized , more than 100 UAV/drones can be detected simultaneously.
Power input	AC 220 V	
Power consumption	Less than 1 ㎾	
Weight	About 100 ㎏	
Operating temperature	-20 °C to + 55 °C	

2 Dome type Regional Defense System

Consist of Dome type System

Neutralization equipment:
Drone Dome

Detection equipment:
RF Scanner

- It's a cutting-edge UAV/drone defense system that keeps drone out from the facility by spoofing satellite signal it uses for navigation.
- RF Scanner detectes precise location of drone and the controller and it will alert to the User. It identifies drone's ID, serial number, type, protocol, etc.
- Bubble-shaped barrier is created within the radius of 500 m.
- Unlike usual counter-UAV solutions requiring RF jammer to block all the signals, Spoofing system only deceives satellite signals and wireless RF equipment in the vicinity are not affected while operating.
- Compared to Hard-kill Anti-drone solution striking drones with missiles and lasers, Drone Dome is specialized in dealing with drone swarm attack.

Functions

Dome type stationary Spoofing equipment

- The stationary spoofing equipment releasing low output prevents UAV/drone not to trespass to the facility.
- It operates without manpower and round-the-clock to keep the drones out within 500 m.
- GPS L1, GLONASS L1, GALILEO, and BEIDOU can be spoofed but other wireless communication signals in the vicinity are not affected.
- Specific neutralization equipment or additional RF jammers are not required.

DSA804C

Drone Dome

Capable of controlling signal type	GPS L1, GLONASS L1, GALILEO, & BEIDOU
Output of Drone Dome	Less than 30 ㎽
Spoofing range capacity	Within 500 m
Power consumption	Less than 50 W
Input power	110 V – 220 V
Operating temperature	–20℃ ~ 55℃

Smart Jammer

- It functionally operates as RF scanner and additionally has Selective Jamming skill.
- User can choose the drone to land among drone swarm attack.
- Directional RF jammer installed in the scanner can land the selected drone.
- Accurate directions of approacing UAV/drone can be identified and will be tracked.
- Communication protocol between drone and the controller is received and analyzed.
- Location of the operator will be detected even if during manual flight.

DSA604C

Name	Description	Remarks
Range of detecting frequency	400 MHz – 6 GHz	Adjustable
Detecting Communication Protocol	IEEE 802.11a,b,n,g signal, Wi-Fi, Ocusync, Lightbridge, Mavlink, frequency hopping signal	
Range of direction finding capacity	Within 3 km	If drone with 2.4 GHz & 26 dBm in opened area.
Scanning angle	360°, omnidirectional	
Direction finding accuracy	±5°	
Direction finding mode	Analog and Digital	
Simultaneous detection capacity	100	
Level of direction finding capacity	+10 dBm to –110 dBm	
Simultaneous tracking capacity	4	
Identifying type of drone	Positive(Digital direction finding)	Can be added
Enemy identification (Black & white list)	Positive(Digital direction finding)	Can be added
Identifying location of operator	Positive(Digital direction finding)	
Jamming angle	**Within 3 km**	**in opened area**
Selective jamming	**Positive**	
IP rating	IP65	
Operating temperature	–30℃ to +55℃	

Photoelectric Tracking Device Drone identification (EOIR camera)

- Drone-identification and tracking device with HD imange resolution
- Multi-spectral and all-weather monitoring are possible.
- It searches for the target in 3 km.
- Smart tracking and deep-learning tracking technologies are applied.
- It can be used with Spoofing system & Drone Dome optionally.
- Small drones within 3 km can be detected and the one within 2 km can be identified.

DSA104C

Specifications

Visible Light Camera for day	1/1.8' progressive scanning CMOS image sensor (Lens focal length: 200 to 550 mm)
Thermal Imaging Camera for night	Uncooled Vanadium Oxide focal plane detector (Thermal Imaging lens focus: 30 to 550 mm)
Scanning angle	360°(Continuously rotates)
Detection range capacity	Within 3 km
Power consumption	Less than 100 W
Operating temperature	-30℃ to +60℃

Name	Performance	
Detection range capacity	〉3Km (Day), 〉2Km (Night)	
Identification range capacity	〉2Km (Day), 〉1Km (Night)	
Visible Light Camera (Day)	Lens Focal Length	55x(200-550mm continous zoom)
	Resolution	1920 x 1080
	Image Sensor	1/1.8" Sony Exmor CMOS Sensor
	Frame rate	25/30 fps
	Image fog reduction	Optical fog reduction
	Auto zoom during tracking	Image vanadium oxide focal detector
Thermal Imaging Camera (Night)	Detector Type	Uncooled vanadium oxide focal plane detector
	Lens Focal Length	30 - 550mm continuous zoom
	Resolution	640 x 512
	Image coding	1280 x 1024
	Auto zoom during tracking	Support radar linkage automatic tracking
PTZ	Accuracy	±0.02°
	Horizontal range	360º continuous infinite rotation
	Vertical range	-45° to +70°
	Horizontal velocity	0.05° - 60°/s
	Vertical velocity	0.05° - 45°/s
Target Tracking Function	Target finding	Auto, radar or RF Scanner for azimuth guidance
	Target locking	Auto or manual
	Target tracking	Auto
	Target recognition	UAV/Drone
	Day and night tracking switch	Auto
	Radar distance overlay	Support
	Display and output of tracking status	Support
	Auto zoom	Auto zoom with preset target size
Network Function	Radar access	Support
	RF Scanner access	Support
	Control protocol	SDK
	Interfaces	UDP/RS422
General Infomation	Power supply	24VDC or 220VAC
	IP rating	IP66
	Dimension	500*600*700 mm
	Operating temperature	-20℃ to + 60℃

Drone Gun

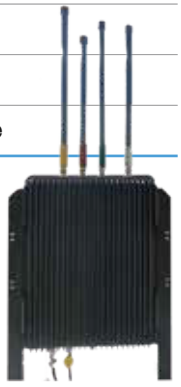
- Portable gun type RF jammer
- Valid RF jamming range capacity: within 2 km
- From 400 MHz to 6 GHz, and custom channel of band can be managed.
- Directional antenna with high gain is applied.
- User-friendly, one-key operation, and Good-Design selection by KIDP
- Alert for low-voltage battery
- 2D electronic scanning antenna and separation of air-ground target

DSA904C

Name	Description	Remarks
Range of jamming band	400 MHz to 6 GHz	Custom channel by user's preference
Function	Expelling & landing	
Jamming range capacity	2 km	
Counter angle	15°	
Pitch angle	40°	
Running time	100 mins.	
Battery	Rechargeable & exchangeable	
Dimension	900 * 300 * 65 mm	Battery included
Weight	6 kg	
Operating temperature	-20°C to +60°C	

EOD Jammer (Bomb detector)

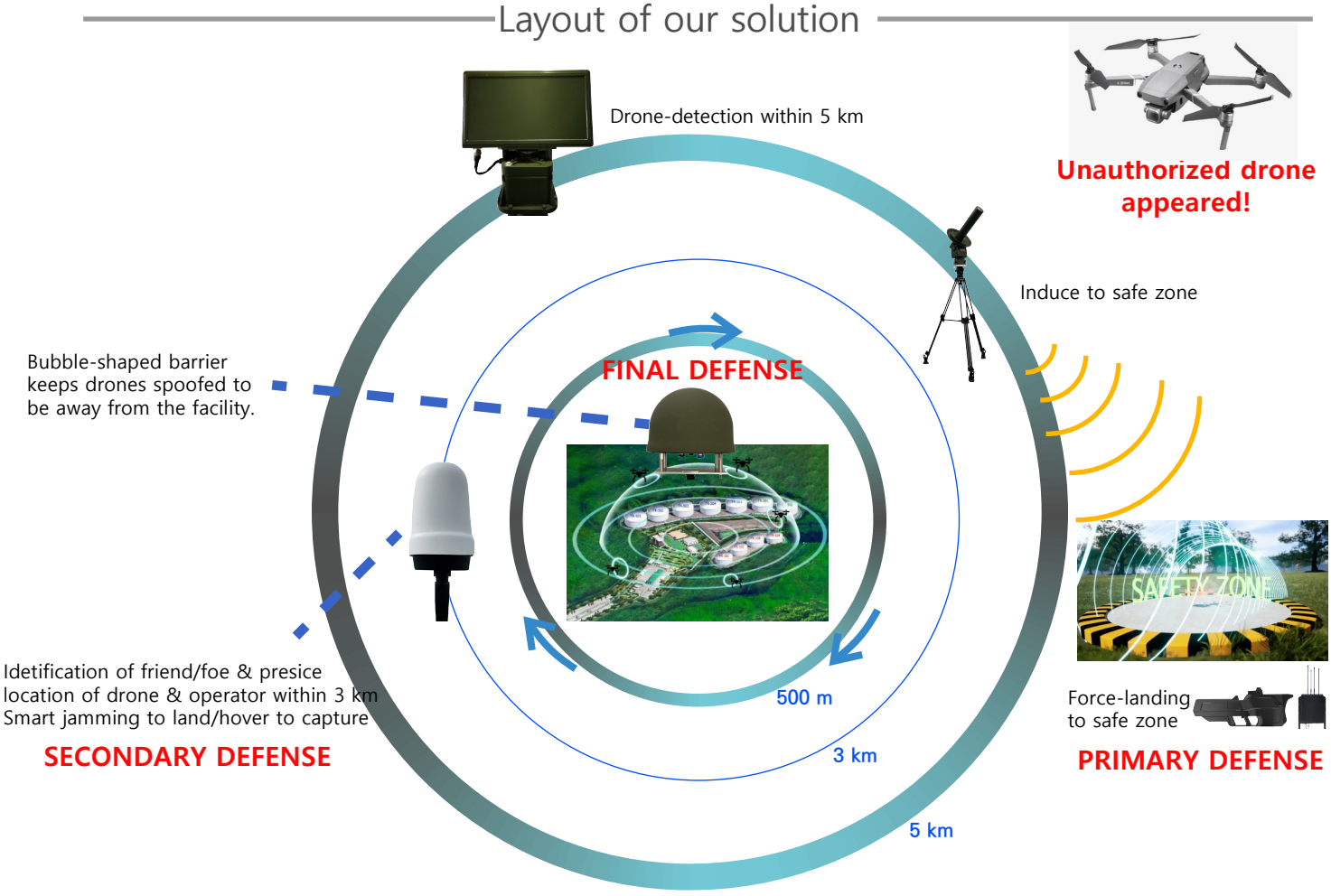
Model	DSA204C-BD1
Range of Frequency	20 MHz to 5,850 MHz
Application	RC, Poll, TRS, GPS, Wi-Fi, etc.
Remote Range	30 m - 50 m
Usage	Obstruct and Jam against remote explosive



DSA204C-BD1

3 Anti-drone Total Solution

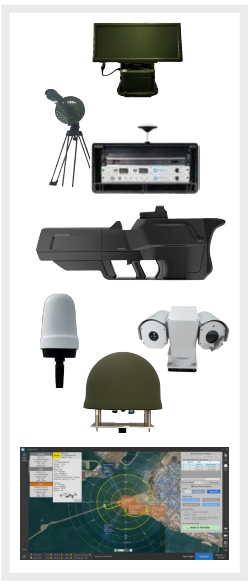
Layout of our solution



Anti-drone system for national facilities against trespassing drone

Proposal of Bstarcom

1	Drone detection: Ku band RADAR (DSA504C)
2	Neutralization(inducement): Spoofer (UADS-S1)
3	Capture by forced landing: RF Jammer (DSA904C & Smart Jammer)
4	Direction finding & identification: Smart Jammer (DSA604C) & EOIR (DSA104C)
5	Dome type sationary Spoofing system (DSA804C)
6	Integrated controlling software



Comparison of neutralization techniques beeteen Spofer and RF Jammer

Name	RF Jamming	Spoofing satellite signal	Remarks
Response of satellite signal	Blocked	Deceived/recreated	
Transmit output	20 W required	30 mW required(Dome type)	Within 500 m
	500 W required	1 W required(Spoofer)	Within 5 km
Neutralizing effect	Neutralized by blocking satellite signals	Expelled by bubble-shaped barrier	Dome type
		Induced & captured by spoofing GNSS	Spoofer
Safety	Danger (It can affect other RF equip.)	Safe	
Requirement of detection & identification equip.	Necessary	Unnecessary (Dome type)	

RF Jammer vs. Spoofer