

ARTOS™

DRONE DETECTION

GENERATION 6

WORLD'S MOST SUCCESSFUL DRONE DEFENSE SYSTEM
HUNDREDS OF INSTALLATIONS WORLDWIDE!



- ✓ **NEW!** Realtime ALL frequency monitoring (NO bands), detects any drone at any frequency!
- ✓ Realtime AI frequency monitoring and DF including height information
- ✓ Scalable for huge sites and borders
- ✓ Extremely high detection range of up to 50 km
- ✓ 360A/90E degree full dome coverage with high tracking accuracy
- ✓ Detects and tracks 3G, 4G and 5G drones
- ✓ Ultra wide frequency range (9KHz to 20GHz)
- ✓ All-in-one solution, multi sensor support, latest AI based software
- ✓ Locates drone swarms and drone operators

Highlights

GENERATION 6

- NEW! Unique technology: Real-time ALL frequency monitoring (NO bands)
- NEW! Real-time DF frequency monitoring for all frequencies and directions at the same time
- NEW! Up to 48THz/s sweep speed
- NEW! Detects 3G, 4G and 5G drones
- NEW! Up to 50km detection range
- NEW! Latest AI based multi-target image and RF pattern recognition
- NEW! Optical triangulation with multiple PTZ cameras
- Ultra-wide frequency range (9kHz to 20GHz)
- Multi-frequency, multi-directional swarm attack detection
- Detects even pre-programmed drones
- Can be switched to a fully automatic mode (no operator required)
- 360° azimuth and full 90° elevation gap-less full-dome coverage with high tracking accuracy
- Provides real-time measuring of the RF emissions from drones / UAVs, jammers, phones etc.
- Tracks and locates the operator(s) controlling the drone(s)
- Enables 24/7 seamless recording (tracking and/or raw data) and monitoring
- DF measurement accuracy up to ITU class A
- Scalable for huge sites (airports, cities, borders, even complete countrywide installations)
- Tested and running under the most adverse weather conditions (night, fog, rain etc.)
- Enhanced temperature range (desert installations)
- All-in-one solution (RF, radar, camera and software)
- Setup and ready to use within a minute (portable version)
- Powerful mobile APP with automatic multi level threat alerts and threat MAP display
- Hard- and software made in Germany



AARTOS DDS

Anti-UAV system to monitor, detect and defeat unwanted drones

After four years of development, we introduced drone detection system – the AARTOS DDS. The system is designed to detect the intrusion of unwanted drones by using real time directional measurements of the drone’s electromagnetic emissions (including its remote control). It warns users of the DDS of incoming drones and sends alerts.

Drones can be more than just a nuisance

The increasingly easy access to mini/micro UAVs makes them a growing potential threat to national and commercial security. Easy to produce, cheap to buy, simple to fly, and hard to detect, commercially and non-commercially available drones are among the most quickly evolving technological threats to military and civilian interests. In the US, a commercial drone reportedly alarmed the Secret Service in March 2015 when the UAV flew too close to the President’s golf resort.



New! The AARTOS DDS Container: Stand-alone for up to 3 months

Drone Detector can be used anywhere

The drone detection system can be used virtually anywhere. Typical use cases include the protection of borders, events, residential areas, governmental facilities as well as commercial/industrial sites such as nuclear plants. Available as a single-site or multiple-site solution, the system can be adjusted to the characteristics of the respective terrain/area to be monitored.

Hardware

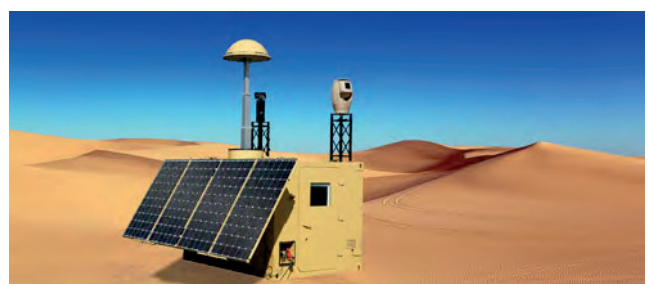
The drone detector is based on the IsoLOG 3D antenna, a real-time spectrum analyzer (XFR V5 PRO, RR or RF Command Center) and a special software plug-in for the RTSA Suite software. Combining all these elements allows for 24/7 monitoring and recording with uninterrupted data streaming. The system saves considerable measurement time, and is both compact and flexible. It can be set up at virtually any place you need to surveil/protect.

Detection range

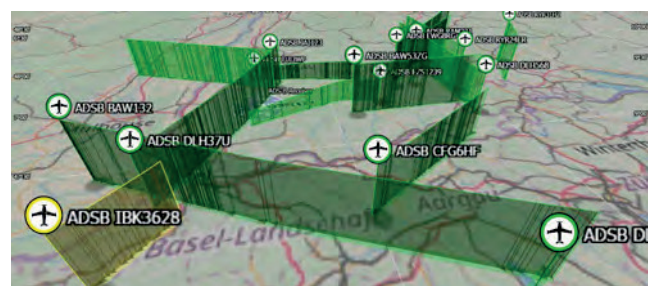
The system has no limitation with regard to its detection range. Usually, the detection range is the same (or better) as the usable distance between the operator and the drone, thus depending on the transmitter power of the drone/its operator. Taking into account the various drone types and topography, this range can be up to 50 km or more.

Early detection

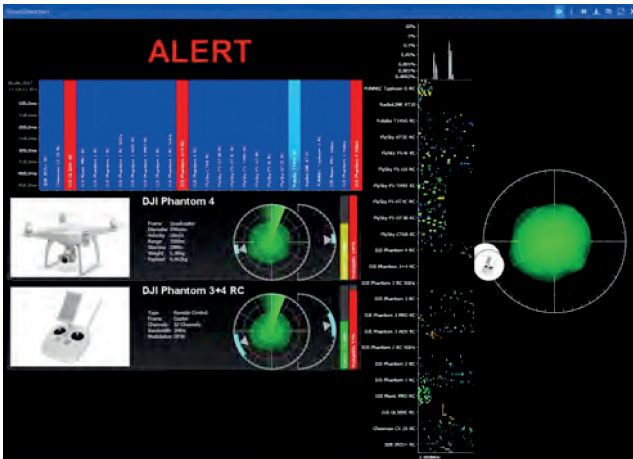
The AARTOS Drone Detector triggers an alarm as soon as a remote control sends a signal, which is even before the actual drone is airborne. Countermeasures can therefore be initiated at a much earlier stage.



New! Fully mobile AARTOS Shelter Command Center



New! Integrated 3D ADS-B, FLARM and FANET flight-tracker



Countermeasures

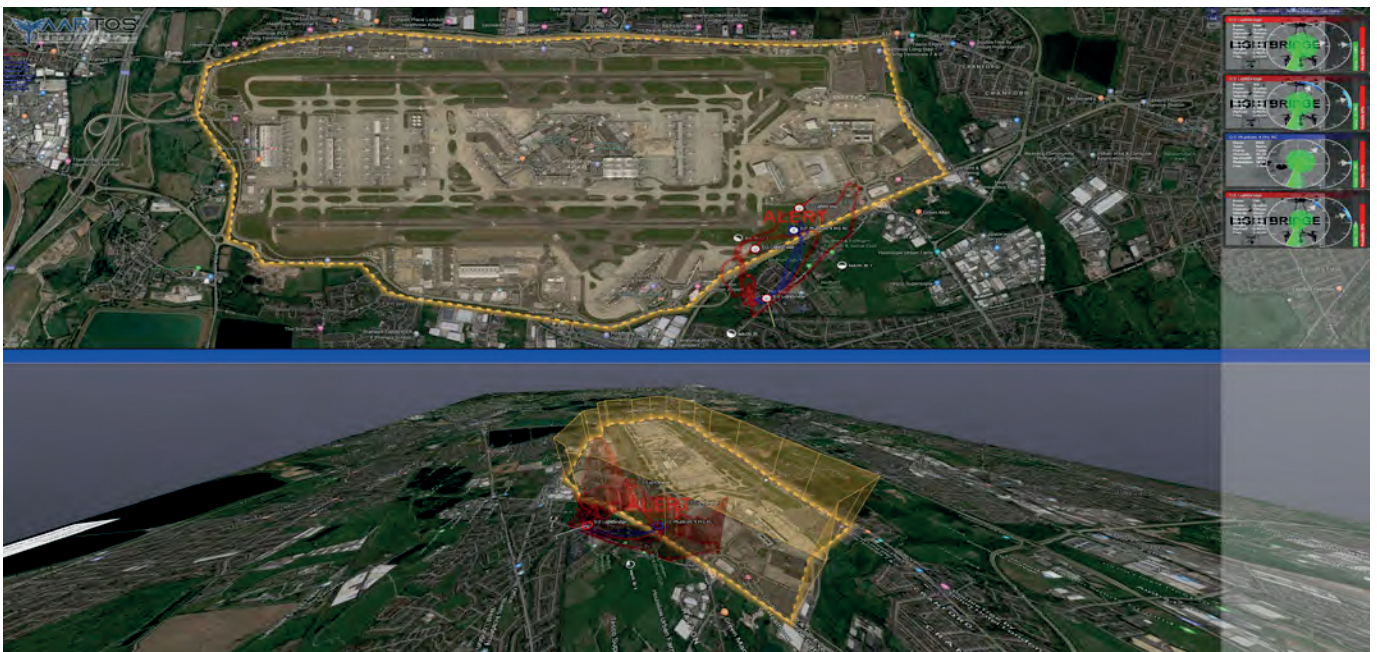
The system can be extended to include an automated, integrated jammer that can effectively prevent a drone from receiving RF contact/signals, thus forcing it into fail-safe mode, e.g. to land or to hover. The interference is extremely selective so that other RF channels are not impaired.

Besides being highly selective, the jammer is extremely directional and only jams in the direction of the incoming UAV.

Advantages of a radio communication solution

RF detection of drone signals has significant advantages compared to other methods such as radar, optical and acoustic detection:

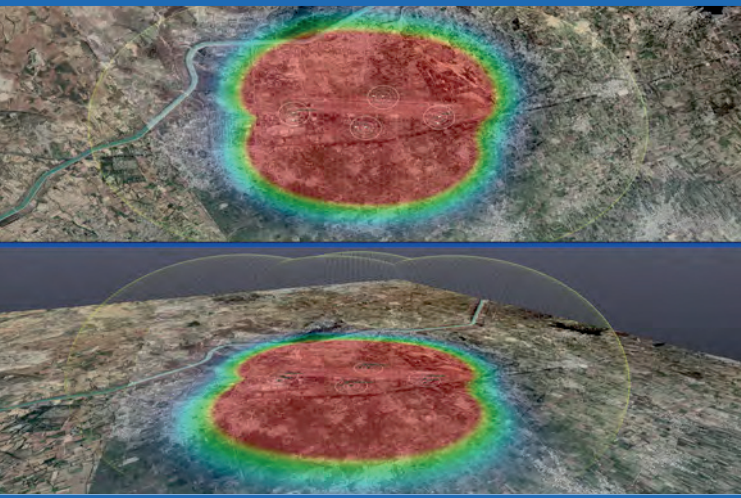
- **Safe detection without false alarms**
The system can not be confused by other flying objects such as birds, balloons or kites.
- **Early detection**
The AARTOS Drone Detector already triggers an alarm as soon as a remote control sends a signal, hence even before the actual drone is airborne. Countermeasures can therefore be initiated at an early stage.
- **Tracking the drone operator**
Since the AARTOS DDS detects both the drone (via its downlink signals) and the corresponding remote control, the direction of both can be immediately tracked. When two or more systems are used, the exact position can be determined via triangulation.



AARTOS GIS: Unique real time 3D topographic view

Command and control software

Drone detection is only as good as its mode(s) of display



Operators can zoom and move the map in real time

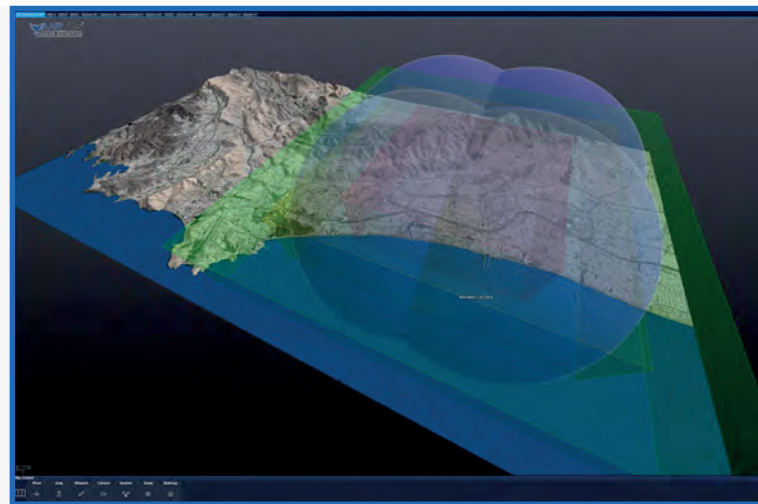
Same Time 2D Top-Down & 3D View

Our top-down 2D perspective is the most commonly used drone detection visualization. Clearly structured, it is easy to understand and navigate, thus very similar to map solutions offering satellite images.

The 3D view expands on the 2D perspective by adding a visual layer of the drone's altitude information (available when using multiple drone detection systems). In addition, the 3D space makes it easier to perceive the distances between different objects on the map.

3D Topographic View

The topographic mode displays the surrounding terrain's surface, depicting hills, mountains, peaks, and valleys. Combined with our 3D building system, the topographic view creates the most accurate representation of the surrounding area.



Users can tilt, turn and zoom the GIS in real time



Realistic view of an airport using 3D models

Advanced 3D Model View

The 3D view is able to integrate 3D models from complex areas (e.g. cities, airports etc.). This very realistic view greatly improves the usability of the AARTOS drone detection system.

Jammer integration

Mobile Manpack-Jammer



Omni- and Directional Antenna,
Covers a total of 5 bands,
120 W output
(up to 2,5 km range)

Automatic Corner-Jammer (180°)



2 sectors with 2 antennas,
Covers 7 - 8 bands,
180 W (up to 3 km range) or
650 W output (up to 6 km range)

Automatic Omni-Jammer (360°)



4 sectors with 4 antennas,
Covers 14 - 16 bands,
360 W (up to 3 km range) or
1300 W output (up to 8 km range)

Jammer disclaimer

The AARTOS CMS (Counter-Measure Solutions) can only be sold to entities with proper government approval for the deployment of jammers. Contact us for more information at info@ap-flyer.pl.



Powerful jammer setup tool: Sectors, omni and even complex beamforming shapes can be constructed or imported. This enables the user to see the coverage of every jammer and frequency on the GIS display.

Camera integration

Additional protection through visual detection (optional)

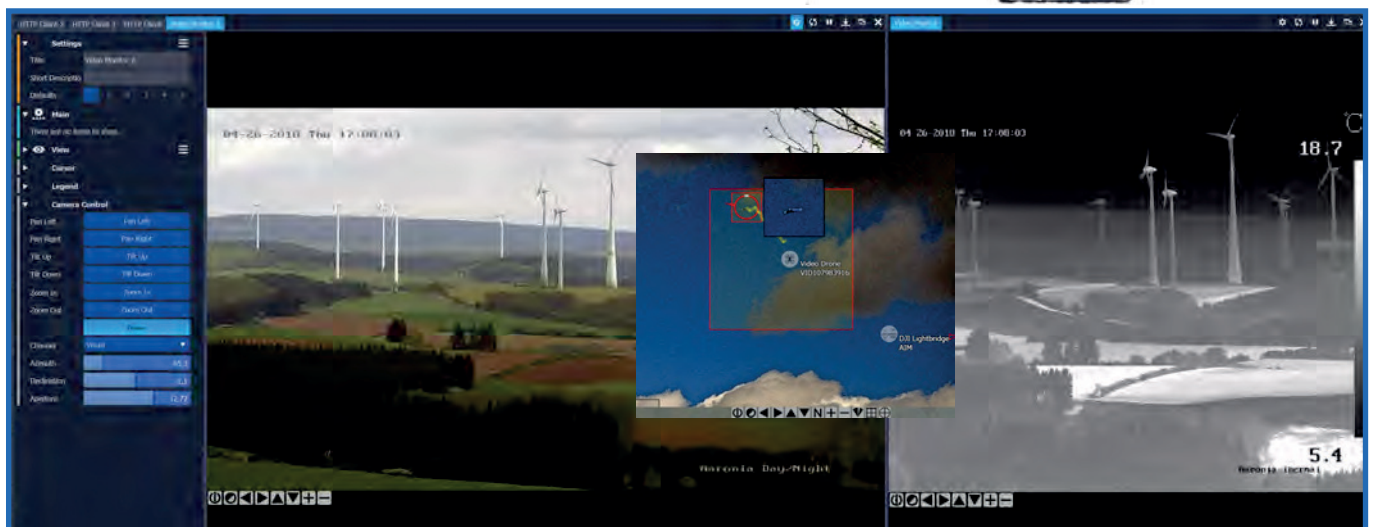


Among the latest additions to the AARTOS DDS is the optional Visual Detection System - a fully integrated optical and thermal drone detection solution, perfectly matched with the RF detection mechanisms of the AARTOS Drone Detection System.

This option enables the user to actually spot detected drones, even from a long distance, and identify potentially dangerous payloads attached to the drone, such as explosives.

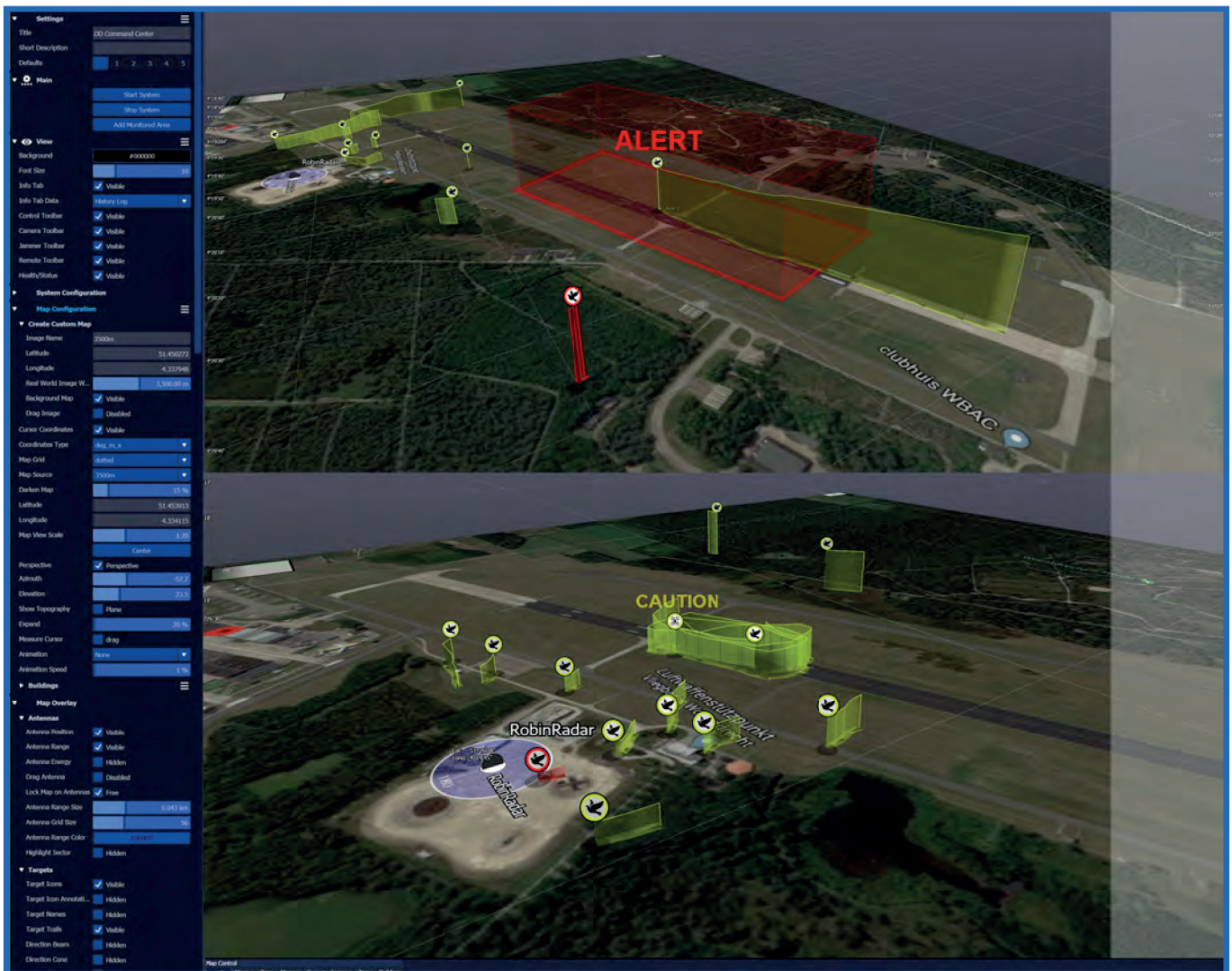
Should a drone switch to autonomous flying mode whilst being tracked by our Visual Detection System then the tracking will continue regardless.

Camera HD for Extra Long Range 3+km range	
Material	Marine grade aluminum alloy, Sealing IP67
Size (with option)	< 890 (w) x 800 (d) x 850 (h) mm; Total weight < 85 kg
Operating Temp.	Standard version: -20°C to +55°C
Control	PELCO-D protocol, ONVIF: Profile S protocol
2-Axis motorized OMNIBUS XVB 610 Pan & Tilt	
Full HD Day Camera CAMEZOOM-FHD/Z64-1030	
Progressive CMOS sensor - Approx 2.1 Mp	
Continuous zoom: Optical 64x / Digital 4x	
Max FOV: 18.7° x 10.6° / Min FOV: 0.29° x 0.16°	
HD-Cooled Thermal Camera CAMIR-HD/Z20-690	
Sensor: Cooled snapshot FPA (Made in France)	
20x continuous optical zoom - Resolution 1280 x 720 pixels	
F = 35 to 690 mm, F/4	
Field Of View from 20.7° to 1.06° (H)	
Control Command Unit	
Image Stabilization Pack for:	
- Full HD day camera	
- HD-Cooled thermal camera	
Remote control software video tracking	



Full HD camera view (left side) and the thermal camera view (right side) in the RTSA suite pro software.

Radar integration



AARTOS supports powerful 3D radar integration



Typical radar for the DDS

More than just drone detection

Using a sophisticated radar system, the AARTOS DDS can automatically determine and display the exact position, flight direction, altitude, speed and classification of an inbound drone. The trajectory of the flight can be tracked in realtime as a 3D model.

The system distinguishes between birds, fixed-wing drones and propeller drones. When a flying object/UAV enters the area designated for protection, a multi-alarm can be configured.

Customer Hardware Integration

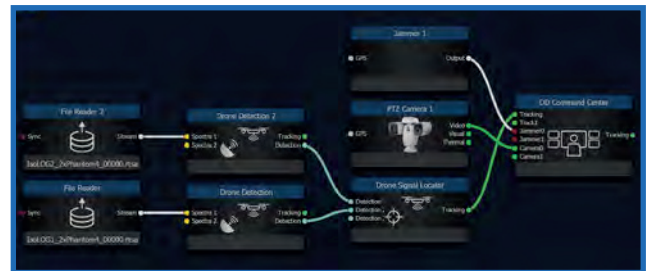
Because software is key



The AARTOS drag and drop construction setup

Complete customization

The required equipment can be configured in detail to customer requirements. The end customer receives hardware tailored to their specific needs, with all components chosen individually. This guarantees the optimal drone detection performance in any given terrain or area.



A typical setup for drone detection

System Versions

AARTOS DDS X3 (Mobile)



Portable solution, omnidirectional, range: 500 m - 2 km

Designed to be used as a concealed and portable drone and jammer detection device, the setup is lightweight and offers battery life of 1,5 hours. Equally easy to operate and carry, the system is ready to use within half a minute.

AARTOS DDS X7 (Advanced)



1 - 3° accuracy, range: ~ 3 - 7 km

The highest precision in drone detection, combined with an extremely high detection range. It consists of a 16 sector IsoLOG 3D DF antenna array and a spectrum analyzer (V6 Command Center, V6 XFR Pro or V6 Rugged Rack). Perfect for both single-system and multi-grid system setups.

AARTOS DDS X5 (Base)



4 - 6° accuracy, range: ~ 1 - 2 km

The base system consists of one analyzer (V6 Command Center, V6 XFR Pro or V6 Rugged Rack) and one IsoLOG 3D DF antenna array with 8 sectors. It is a highly cost-effective solution, and can be used to cover large areas with a drone detection grid.

AARTOS DDS X9 (Ultra-Wideband)



1 - 3° accuracy, range: ~ 5 - 14 km

The X9 combines highest precision and ultra-wideband monitoring for instant, real-time detection over multiple bands (instead of one instant or multiple via hopping). The system consists of an IsoLOG 3D antenna array with 16 sectors and the UWB unit. Perfect for ultra-high-range drone detection grids.

System versions

X3

X5

X7

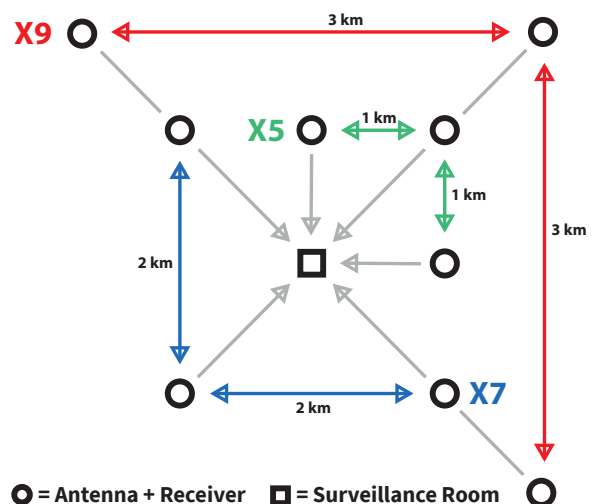
X9

Range	500 m - 2 km	1 km - 2 km	3 km - 7 km	5 km - 14 km (Airport solution 50 km)
Sectors	Omnidirectional	8	16	16
Tracking Accuracy (Line of Sight)	Omnidirectional	4 - 6°	2 - 4°	1 - 3°
Multi frequency swarm attack	No	No	Yes	Yes
ITU Class for Tracking Accuracy	-	B	A	A
Ampli	2	2	3	3
Simultaneous Band Coverage	Hopping	Hopping	Stitching/Hopping	Stitching/Hopping
Sweep/Scan Speed	500 GHz/s	1 THz/s	2 THz/s – 4 THz/s	4 THz/s – 48 THz/s
Receivers	1	1	1 (optional 2)	4 (unlimited additional receivers)
Scalable	No	Yes	Yes	Yes
Recommended Grid Distance	-	1 km	2 km	3 km
Equipment Included	V6 XFR Pro, IsoLOG 3D Mobile	V6 XFR Pro, IsoLOG 3D DF	Command Center / Remote Rack, IsoLOG 3D DF	Remote Rack, IsoLOG 3D DF
Automatic Jamming Option	No	No	Yes	Yes
Radar Option	No	No	Yes	Yes
PTZ Support	No	No	Single	Multi

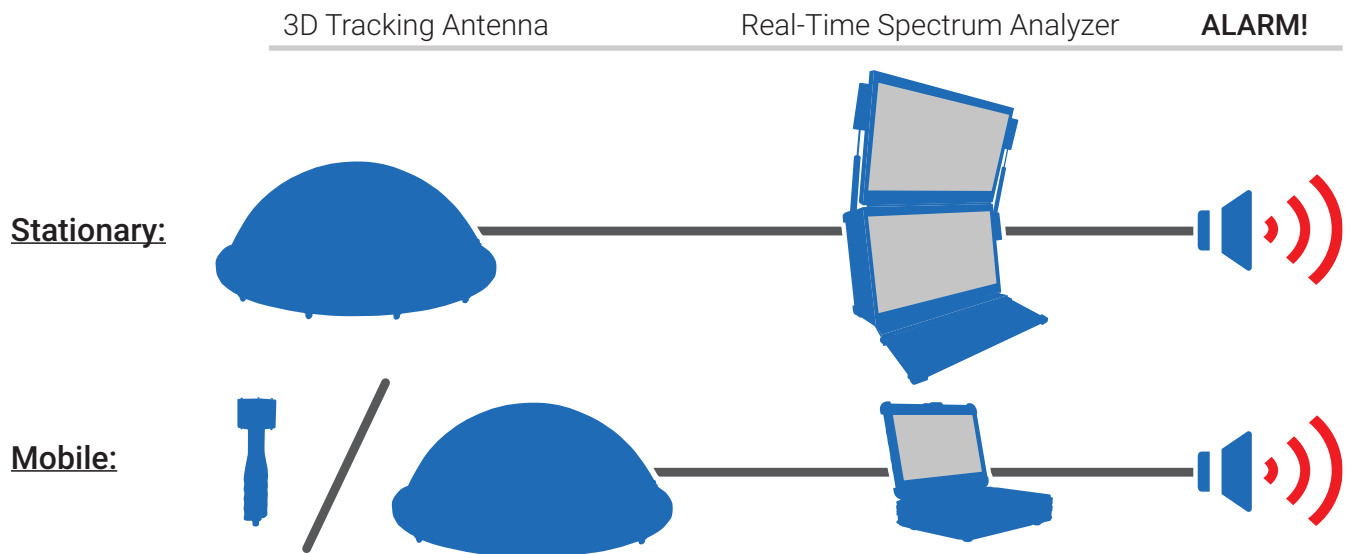
Scalable

When using the AARTOS DDS as a scalable grid solution for drone and RF detection, we recommend placing the antenna + receiver combos apart from each other at a reasonable distance, thus ensuring the best and most comprehensive coverage and detection. For the X5, we recommend a maximum distance of 1 km, for the X7 a maximum distance of 2 km, and for the X9 a maximum distance of 3 km.

The GRID system can be conveniently remote controlled from a central location.

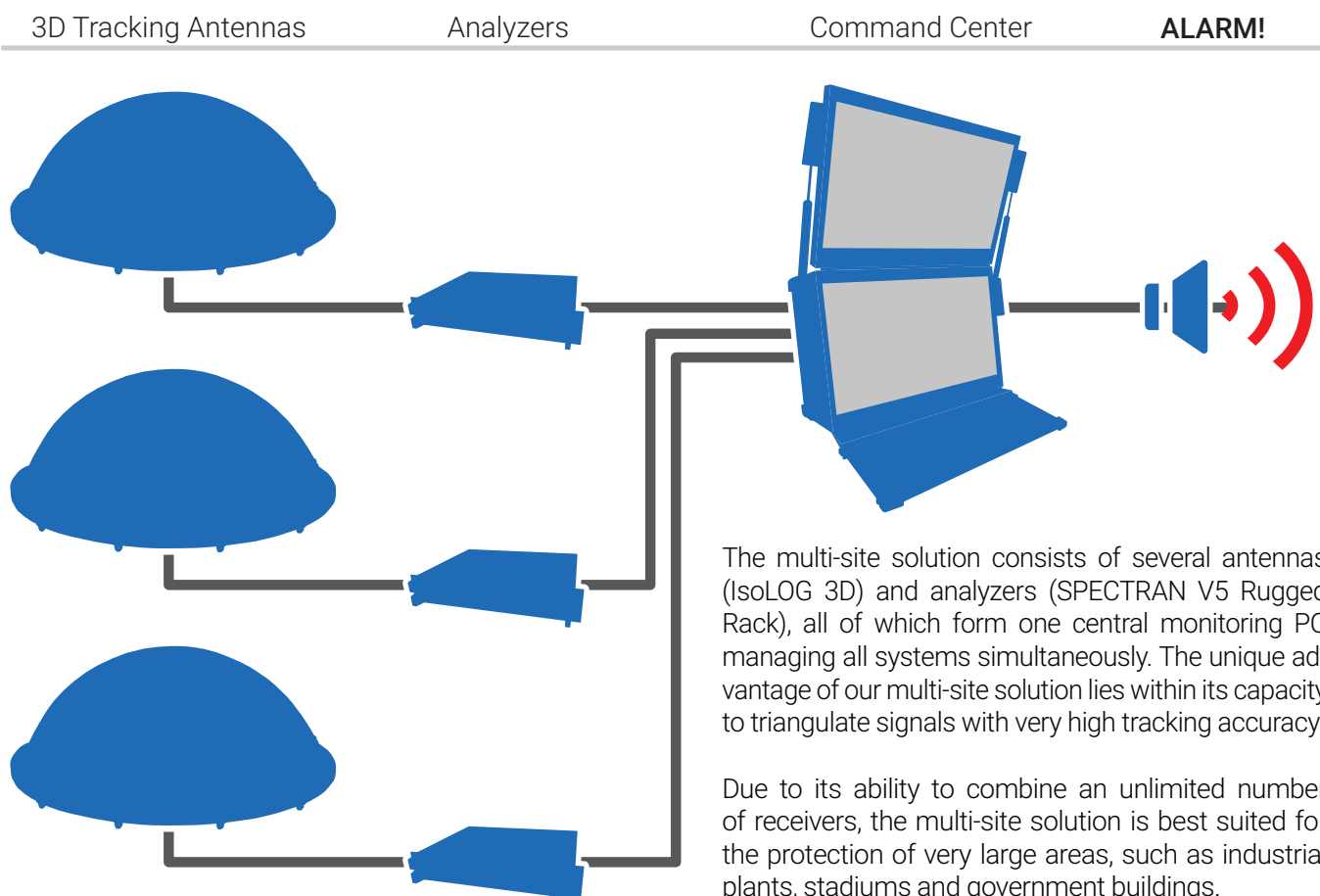


Single site solution (portable)



The single-site solution is set up and ready to use within a few minutes. Based on a stationary or mobile spectrum analyzer (e.g. the RF Command Center or the XFR V5 PRO, see also p. 12) as well as the 3D direction tracking antenna IsoLOG 3D, this system is perfectly suited for the surveillance of smaller areas, e.g. a house or a prison.

Multi site solution



Design & Casing Options



Portable Rugged Laptop Analyzer

For portable solutions, the SPECTRAN V6 XFR Pro is the system of choice. This rugged, military-grade laptop features a powerful Intel i7 processor as well as an integrated spectrum analyzer.

This model is perfect for rapid deployment in the field - all it takes to detect drones is to set up the IsoLOG 3D DF antenna and connect it to the XFR Pro.

Portable Command Center Analyzer

The SPECTRAN V6 Command Center was designed with the latest and most powerful hardware and can also be configured to your personal requirements and requests. Two 4K displays depict all the information processed by the RTSA Suite Pro software. Both its hardware and twin 24" sunlight-readable displays make the Command Center the perfect stationary system.



Portable Rugged 19" Rack

The SPECTRAN V6 Rugged Rack is highly versatile and can be used in different ways: as an indoor or outdoor analyzer with multiple configurations for remote detection, or as part of an antenna-analyzer grid, allowing for the coverage of large areas as well as the triangulation of drones and their operators. The rack is water- and dustproof for outdoor use, remotely controllable and requires almost no maintenance.

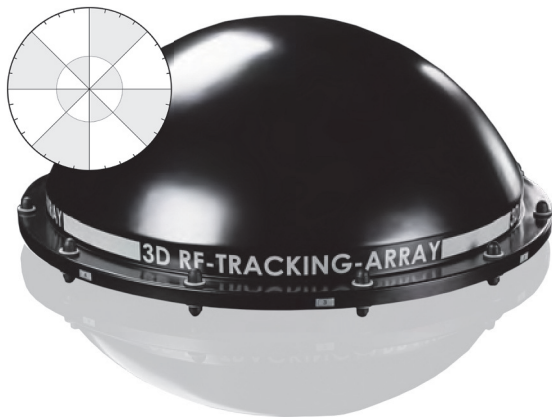
Stationary Cooled Outdoor 19" Rack

This IP65 Outdoor Rack is equipped with a double insulated housing plus efficient cooling modules to handle a temperature range from -30° to 60° Celsius. A high-end sand filter enables it to withstand sand storms. The Outdoor Rack resists all environmental conditions and is the best choice for permanent outdoor installations of the AARTOS system.



Antenna versions

IsoLOG 3D 80



8 sectors with 16 antennas

Frequency range: 400 MHz (20 MHz) to **8 GHz**

Tracking accuracy (line of sight): **4 to 6°**

IsoLOG 3D 160



16 sectors with 32 antennas

Frequency range: 400 MHz (20 MHz) to **8 GHz**

Tracking accuracy (line of sight): **1 to 3°**

Frequency range

Standard	400 MHz to 8 GHz
VLF Extender to 20 MHz	optional
SHF Extender to 20 GHz	optional

Additional options

Internal GPS receiver	Yes
Internal low-noise pr	Yes (included)
Customized color (RAL table)	Yes (standard - white)

Measurements & operating specifications

Operating temperature	-30 to +60° C (-22 to 140° F)
Storage temperature	-40 to 70° C (-40 to 158° F)
Dimensions	960 x 960 x 380 mm
Weight	approx. 22 kg
RF Output	N (50 Ohm)

Frequency range

Standard	400 MHz to 8 GHz
VLF Extender to 20 MHz	optional
SHF Extender to 20 GHz	optional

Additional options

Internal GPS receiver	Yes
Internal low-noise pr	Yes (included)
Customized color (RAL table)	Yes (standard - white)

Measurements & operating specifications

Operating temperature	-30 to +60° C (-22 to 140° F)
Storage temperature	-40 to 70° C (-40 to 158° F)
Dimensions	960 x 960 x 380 mm
Weight	approx. 25 kg
RF Output	N (50 Ohm)

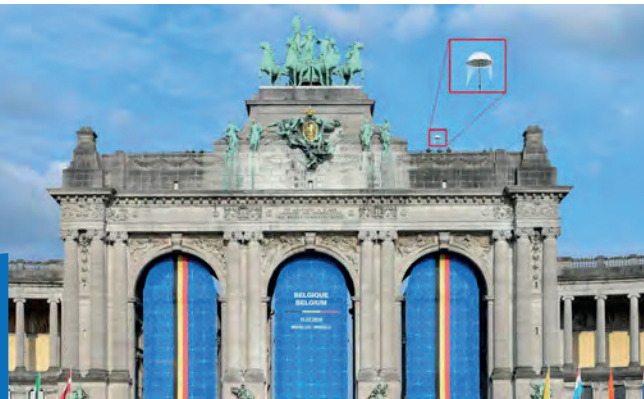
Latest references

Examples of AARTOS used in 2018



2018 NATO summit protected against drones by AARTOS system

AARTOS drone detection system was the exclusive RF-based counter-UAV solution protecting the 2018 NATO Summit in Brussels.



Multiple systems were placed on top of the NATO headquarters as well as the Triumphal Arch at the Cinquantenaire (Jubelpark), the place of the delegation dinner. Reacting to the growing threat posed by unmanned aircraft systems, AARTOS was handpicked by the Belgian Police.

This may come as no surprise, as it is the only RF-based detection system to meet all of the police requirements, with a special focus on multi-target, high-range detection in urban environments.



AARTOS DDS protected the summit meeting of Kim Jong Un and Donald Trump

We were proud to provide AI-based drone detection system AARTOS for the protection of the 2018 North Korea–United States summit in Singapore.

We were delighted to be a part of this historical and unique event, protecting the summit against drones. This is great testimony to the unrivaled capabilities of our AARTOS system, and the significance it is gaining internationally. Since drone technology is becoming more and more readily accessible, the use of micro/mini UAV is beginning to pose a potential threat to national and commercial security. AARTOS, the fully automated drone detection system, detects emissions from any RF signal and analyses them in great detail



and with high precision. These signals may stem from the “hopping patterns” of drones and their remote controls, but also from other sources such as cell phones capable of detecting even the most cutting-edge 4G-based drone systems.

The AARTOS system uses a unique ultra-high range (10-15 km) 360-degree dome coverage. The detection technology is based on the patented ISOLOG 3D Tracking Array Antenna, the UWB real-time RF receiver SPECTRAN V5 as well as a complex AI-based tracking system. In addition, the system incorporates a live/real-time situation awareness display that depicts highly detailed 3D flight trajectories.

International Airport Installations

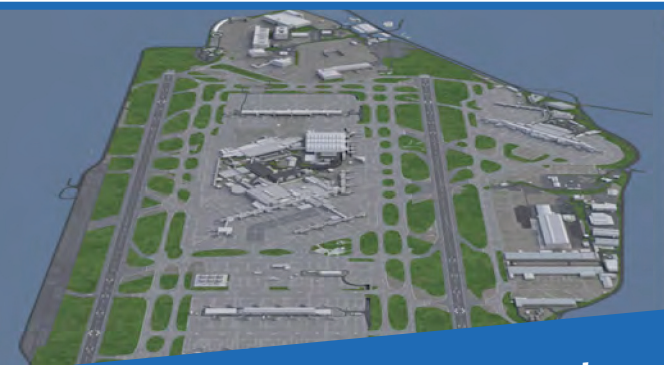
AARTOS rollout for international airports worldwide

Over 300 additional installations planned in 2019/2020!

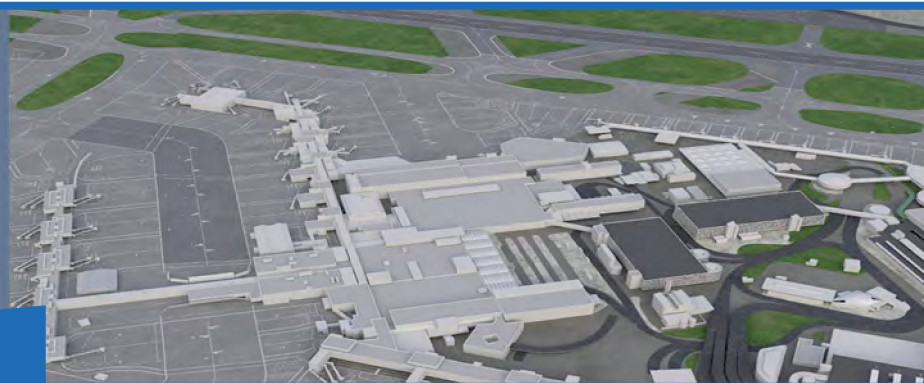


Muscat International Airport

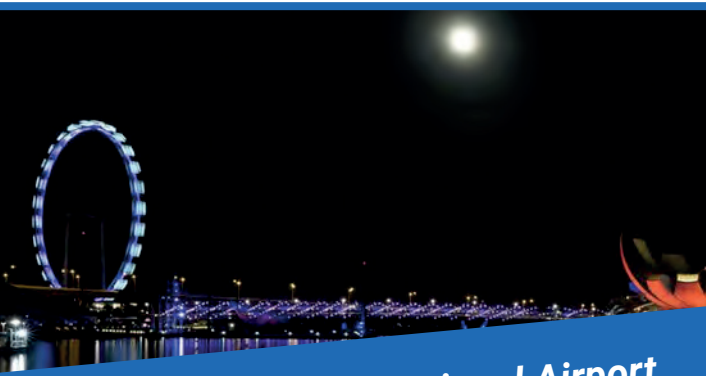
Oman Airports has approved AARTOS DDS as the appropriate solution for drone detection at Muscat International Airport.



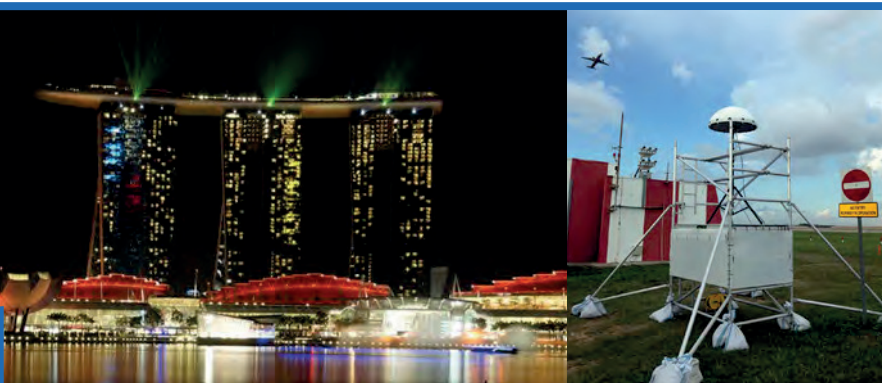
UK International Airports



International Airports in the UK use the AARTOS DDS! These installations use our latest 3D model feature for the complete airports (including buildings, bridges, towers etc.).



Singapore International Airport



Our latest installation: Singapore Changi International Airport uses the AARTOS Drone Detection System.

- MORE THAN 300 INSTALLATIONS IN 2018 -



CUSTOMER GROUPS

- Militaries & Police Forces (Ground & Air)
- Convoys
- Airports
- Power plants
- VIP security services
- Border patrols
- Government buildings (e.g. embassies, prisons)
- Events (Concert, Political, Sport,...)
- Seaports / Marinas
- Private Properties

AARTOS DDS REFERENCES