



Detection



Defeat



C2

Anti-Drone System



Anti-drone system is one of our key product applying leading technology and our experiences in design, research, and development RF jamming system. The system combines 3 major components which are Detection system, Defeat system, and Command and control system. All works together effectively. Additionally, we provide consultant, engineering service and customer service as needed .

Key Features

- **Passive detection and wide-band jamming**
- **Support band 400, 900, 2400, 5800, 1227.60 and 1575.42 MHz**
- **3-5 km radius 360 degree for operation, depend on systems design**
- **Open full automatic defense or manual mode**
- **Find direction and location of drone**
- **Defeat either specific drone or all drone together**
- **GPS Spoofing: Evict mode / Landing mode**
- **Black list and White list plus full model library**
- **Durable and suit to operate in all weather**
- **IP66**

System Operation Process



Anti-Drone

The Drone/UAV detection and defeat integrated system adopts to solve the detection, identification, and direction finding, and orientation of drone. It also uses wideband interference and GPS spoofing interference technology to combat the drone implements a security system. The system can conduct 360-degree passive detection and defense of Drone in the protected area.

DETECTION SYSTEM

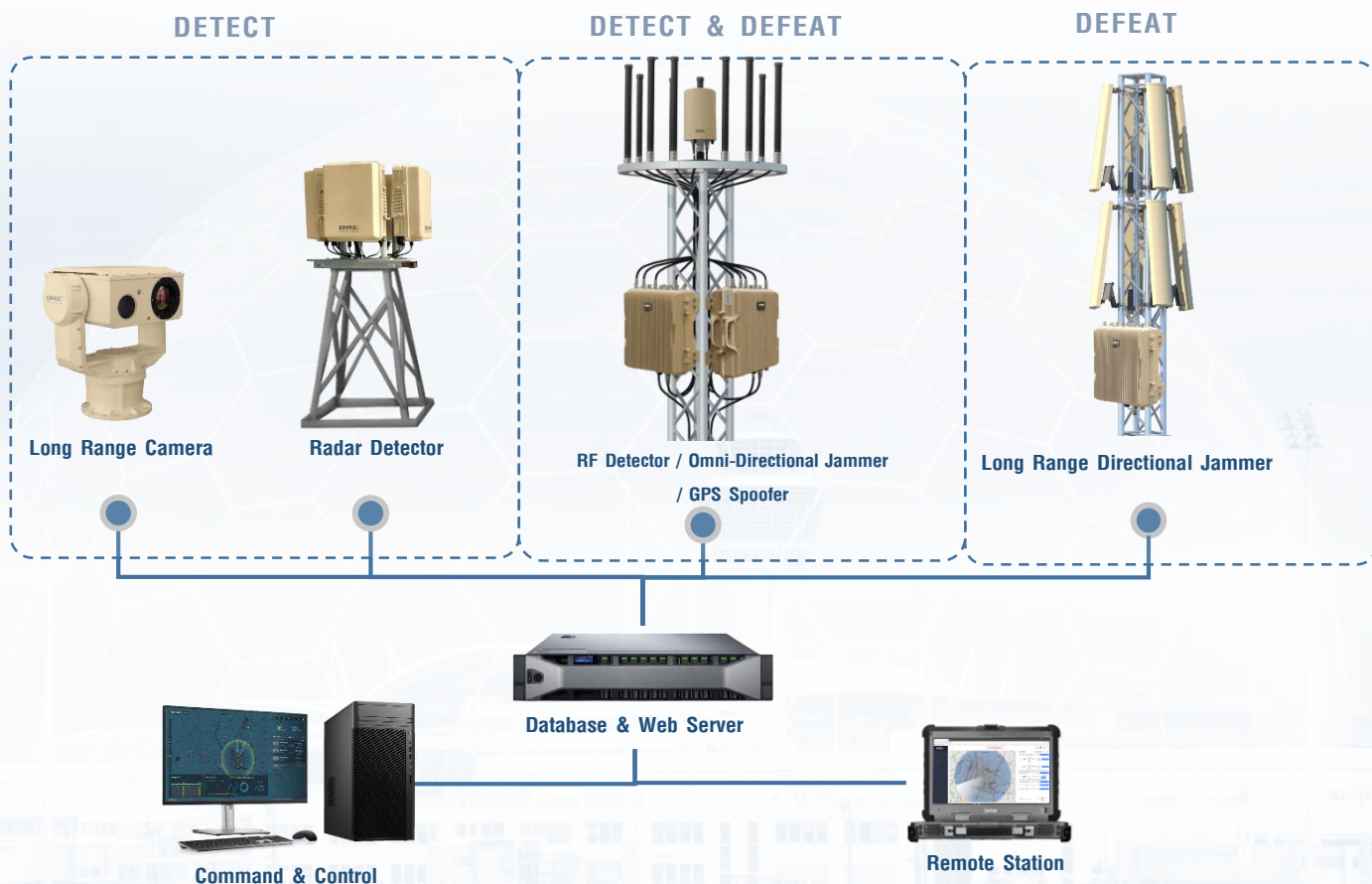
The detection system supports multiple RF sensors, RF scan sensors used to control drones. This will make it possible to measure the direction and position of the drone.

DEFEAT SYSTEM

Defeat direction is either in Omni Direction or Direction. The defeat mode can be in Wideband Frequency and Precision frequency with applying Frequency Follower technique.

COMMAND & CONTROL

Includes command and control computer, application software and display. displaying detected drone on a map. automatically tracking, record, analyze, process and report results.



Detection System



Long Range Camera (Option)

Long range PTZ EO/IR camera works day and night for detecting, searching, identifying object with full HD. Built-in Laser works with thermal camera providing accurate distance measurement. The camera connects to a control system via network computer and show its output on the external display.

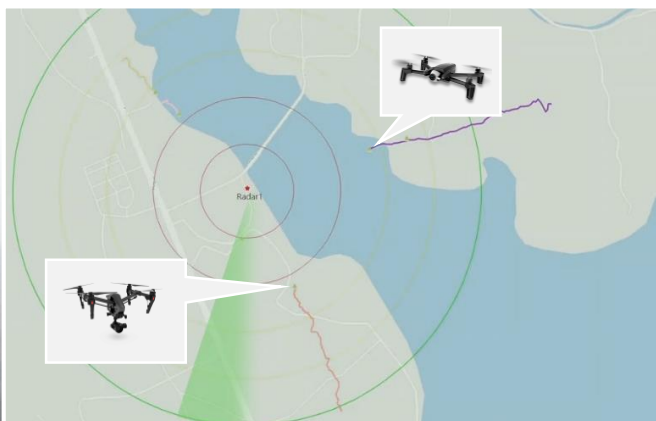
- ▶ High resolution EO/IR type camera
- ▶ Starlight CMOS image sensor
- ▶ Detect distance 2.5 km
- ▶ Track target automatically
- ▶ Daylight camera, 40X zoom
- ▶ Thermal camera, 10x zoom



Radar Detector (Option)

The Omni-Directional UAV/Drone Radar Detector can detect and report results in real-time. The working principle is that the radar will send radio waves in all directions. When the waves hit the aircraft, the radio waves are reflected, and analyze the data to determine the location, distance, direction, and speed of the target's movement..

- ▶ High data rate and high positioning accuracy
- ▶ Digital Phased Array Technology
- ▶ Operating frequency 5.5 – 5.8 GHz
- ▶ Detect distance 3 km, 360 degree omnidirectional.
- ▶ Detects small targets (RCS \approx 0.01 m²)
- ▶ Detect one or more drone all direction



Detection & Defeat System



RF Detector and Omni-Directional Jammer

Working principle: When detecting a signal that can be used to control the Drone, it will transmit interference signals covering the frequency bands to disconnect drone remote control and the satellite system (GPS)

Detect Features

- ▶ It is an RF Sensor system that detects the direction accurately
- ▶ Frequency bands: 400 MHz, 900 MHz, 2.4 GHz, 5.8 GHz
- ▶ Passive detection does not emit electromagnetic signals
- ▶ Detect distance 3 km, 360 degree omnidirectional
- ▶ Shows the position, direction and records the behavior of the target

Defeat Features

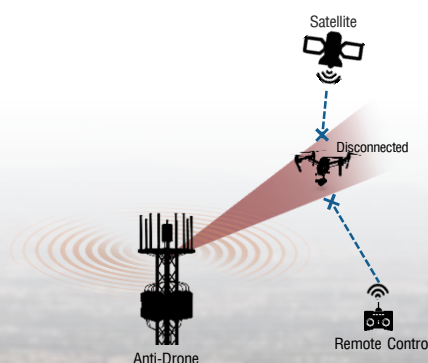
- ▶ Frequency bands: 400, 900, 2400, 5200, 5800, 1227.60, 1575.42 MHz
- ▶ DDS (Direct Digital Synthesis) Oscillator technology
- ▶ Frequency Hopping follower
- ▶ Precision Jamming / Wideband Jamming
- ▶ Defeat distance 3 km, 360 degree omnidirectional
- ▶ Automatic or manual operation mode

Supports the frequencies that are currently used for drone/UAV control. They can be installed together to enhance the frequency coverage.

GPS spoofing (Option)

Spoof Features

- ▶ Frequency bands: 1575.42MHz(GPS-L1), 1561.098MHz(BDS-B1), 1602MHz(GLONASS-L1)
- ▶ GPS spoofing interference
- ▶ Distance 1 km, 360 degree omnidirectional
- ▶ Automatic or manual operation mode



Defeat System

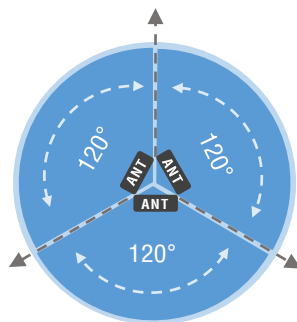
Long Range Directional Jammer

Working principle: transmit interference signals covering the frequency bands to disconnect drone remote control and the satellite system (GPS)

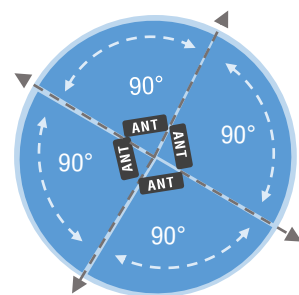


Defeat Features

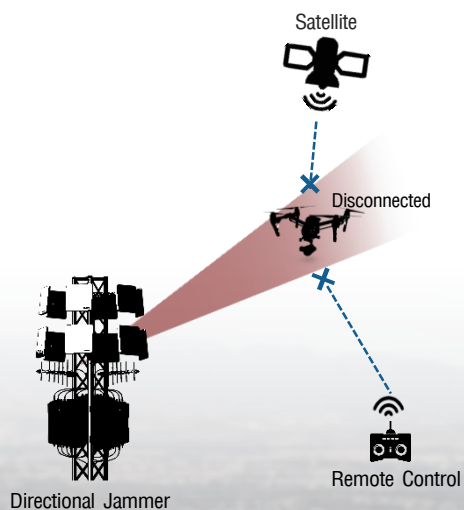
- ▶ Frequency bands: 400, 900, 2400, 5800, 1227.60, 1575.42 MHz. (Customize)
- ▶ VCO (Voltage Control Oscillator) technology
- ▶ Wideband Jamming
- ▶ Distance 3 km, 360 degree omnidirectional (90/120 degree/Sector)
- ▶ Automatic or manual operation mode
- ▶ Selective direction or all directions



Directional Jammer
120°, 3 Sector (360°)



Directional Jammer
90°, 4 Sector (360°)

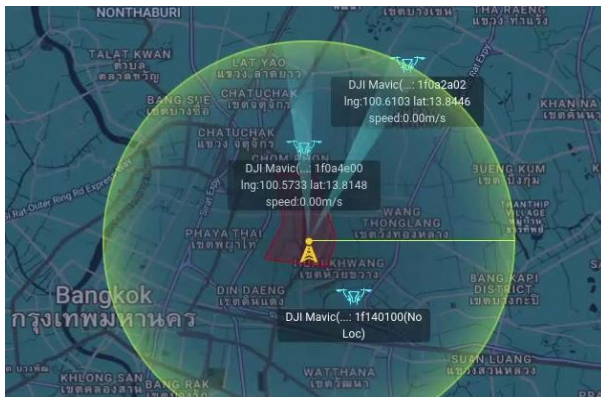


COMMAND AND CONTROL



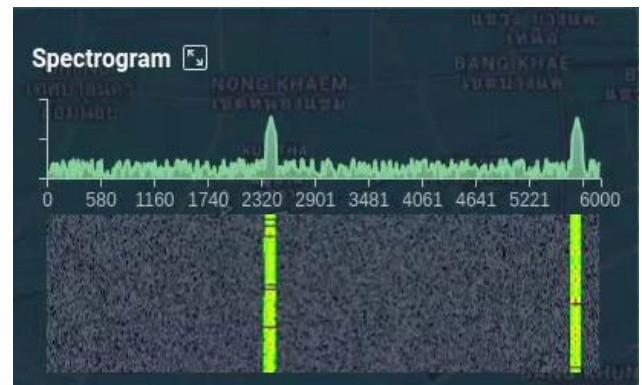
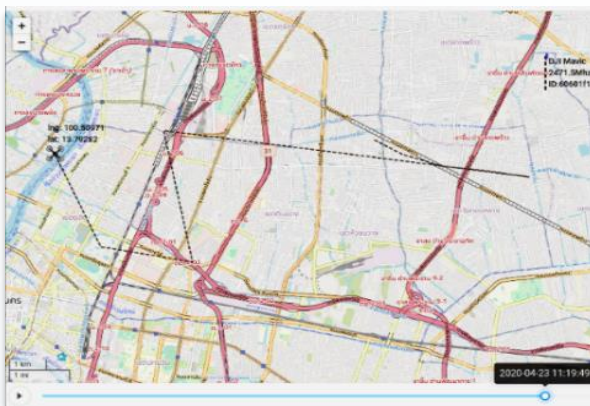
Command and Control

- ▶ Display, control and command any Anti-Drone System
- ▶ Automatically record, analyze, process and report results
- ▶ Analyze the Drone from other targets (Fault Target / Clutters)
- ▶ Distinguishing between friend and foe
- ▶ Show map (Google Map) and frequency bands (Spectrum Mode)
- ▶ Automatic notification system. (Drone Alert)
- ▶ There is a database of RF Drone List / Drone Library
- ▶ Support integration with other detectors
- ▶ Able to simulate target data to practice usage



Map Mode

Show system operating radius and direction, position, frequency information Model of the drone on the Google Map.



Spectrum Mode

Shows each target's drone control frequency channel details. that can be detected in the form of Waterfall Plot.

Auto Tracking

Detects targets entering the area The system will notify users immediately. and start recording the flight path automatically Can track both Single target tracking and Multi target tracking.

History Replay

Retrieves historically detected targets' flight behavior data over time. with a summary of the results.

COMMAND AND CONTROL

The command and control system can be selected for two purposes: Manual Jamming and Auto Jamming.



GPS Spoofing

Select the GPS spoofing effect according to the actual situation to achieve " Evict " or " Landing "

Evict Mode

The target drone returns to the starting point. to trace the flight path back to the location of the remote control

Landing Mode

The target drone immediately lands on the ground.

Frequency Interference Mode

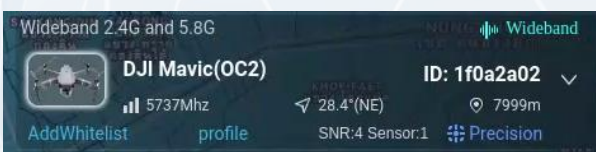
The system will follow to interfere with the signal that the target UAV/Drone can change (Frequency follower).

Wideband Jamming: It is a transmission of frequencies to interfere with the drone. From low frequencies to high frequencies throughout the frequency band (Frequency Sweep).

Precision Jamming: Select to interfere only the sub-frequency range that the target drone is in use (Fixed Frequency).

Whitelist / Blacklist

Can define names and aircraft information Which is detected as a list allowed to fly in the area (Whitelist) to prevent signal interference.



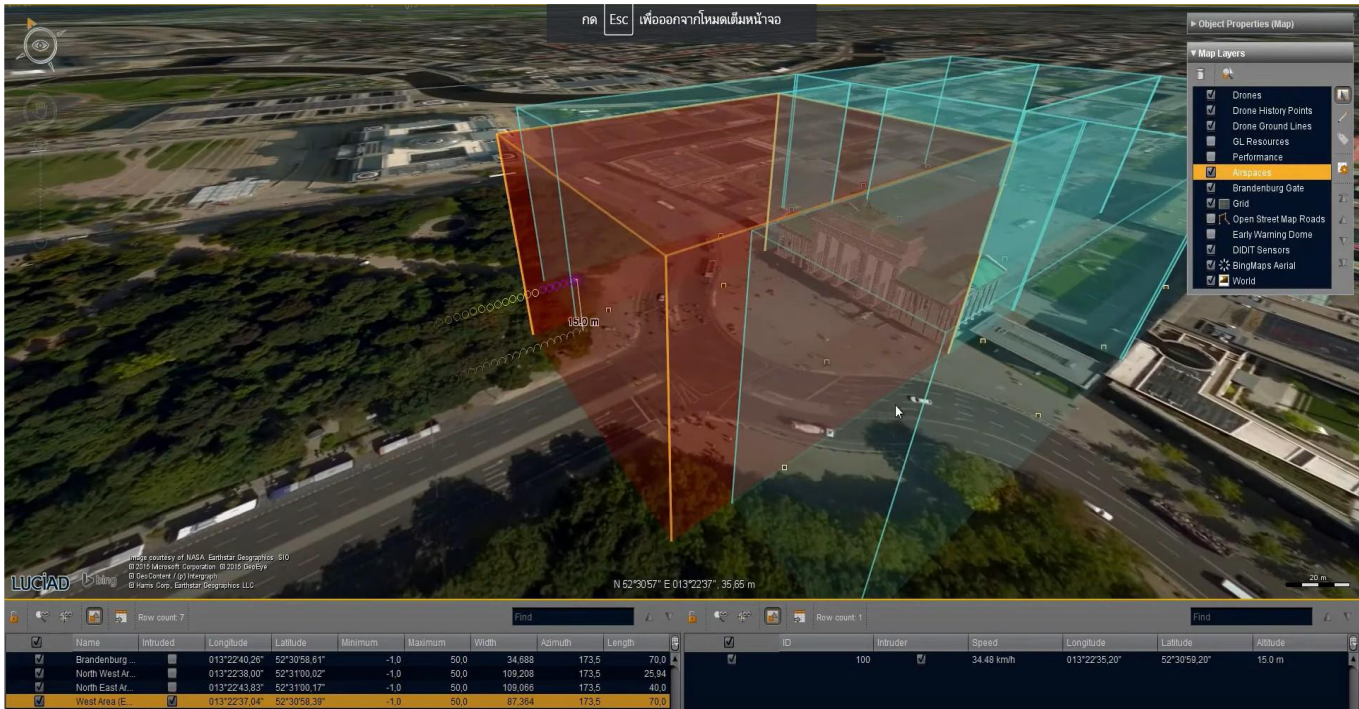
Drone Event

Browse the history of drone detection data.

Drone Type	Signature	Occur Times	Detected At	Duration(Sec)	Frequency	First Position
DJI Phantom 4 Pro	69691396094c	2	2023-01-27 12:04:12	66.68	5640.0Mhz	100.65531, 15.889141 11°, 4755m
DJI Inspire 2	69691396199c	4	2023-01-27 10:00:11	64.68	5640.0Mhz	100.65468, 15.90319 11° 0', 4567m
DJI Mavic(OC2)	696913962a02	7	2023-01-26 16:09:42	62.57	5743.0Mhz	
DAI-FUA X	576180912	5	2023-01-26 16:01:17	61.98	2432.0Mhz	
Demo	573963232	4	2023-01-26 15:41:39	62.65	2467.0Mhz	
DJI Mavic(OC2)	696911443004	8	2023-01-26 15:20:27	63.39	5750.0Mhz	100.64136, 15.90727 11°, 2663m

COMMAND AND CONTROL

Situation Awareness Geographic Management (Option)



Multi type map display

Support display data in both 2D and 3D. The geographical data type can be Vector, Raster, Bing Map, KML and OGC standard.

Various tools

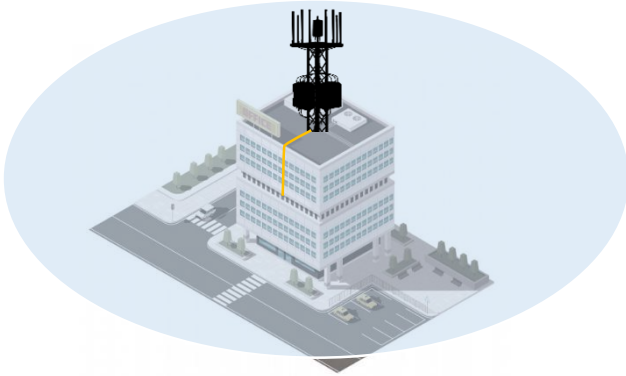
Tools can support distance measurement, path calculation, build line, rectangle, square, circle, block, cylinder, hemisphere, sphere.



Data Fusion Display

At command and control, it displays drone detection data on the map system. The data is from RF detection system, Radar system, and camera. Moreover, it support connect and combine other drone detection data and are shown on the screen.

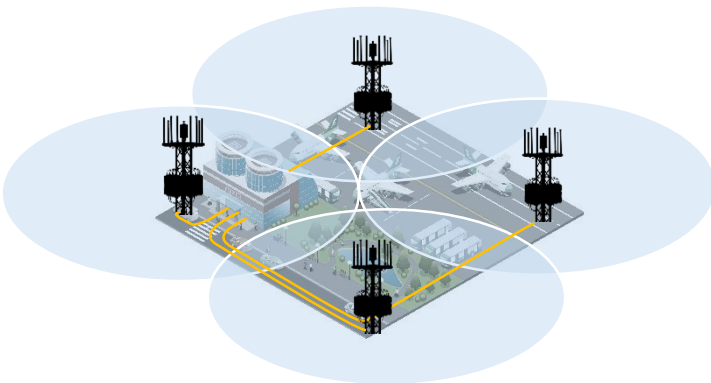
Systems Design



Single-Site Solution

Single-site installation is as simple as installing one Anti-Drone System in the center of the site and can be combined with auxiliary equipment such as radar, surveillance cameras. Connect to a central analysis and command computer set.

This type of installation is suitable for surveillance in small areas, such as small government areas, buildings, residences, places to support important people or specific areas.



Multi-Site Solution

Multi-site installation, more than one Anti-Drone System can be installed at the edge or corner of the site to spread the working area to cover a large area. Can be equipped with accessories such as radar, surveillance cameras for each sub-area. It sends the data signal to the central control and command computer, that can manage each sub-area.

This type of installation is therefore suitable for surveillance of large areas such as airports, military bases, oil refineries, industrial plant big stadium or important government areas.

Applications



Airport Protection



Military Bases protection



Critical Infrastructure Protection

**Department of Naval Communications and
 Information Technology, Royal Thai Navy**
 On November 12, 2018



Royal Thai Marine Corps Headquarters
 On January 28, 2019

**Air Defense Command,
 Royal Thai Air Force**
 On March 7, 2019



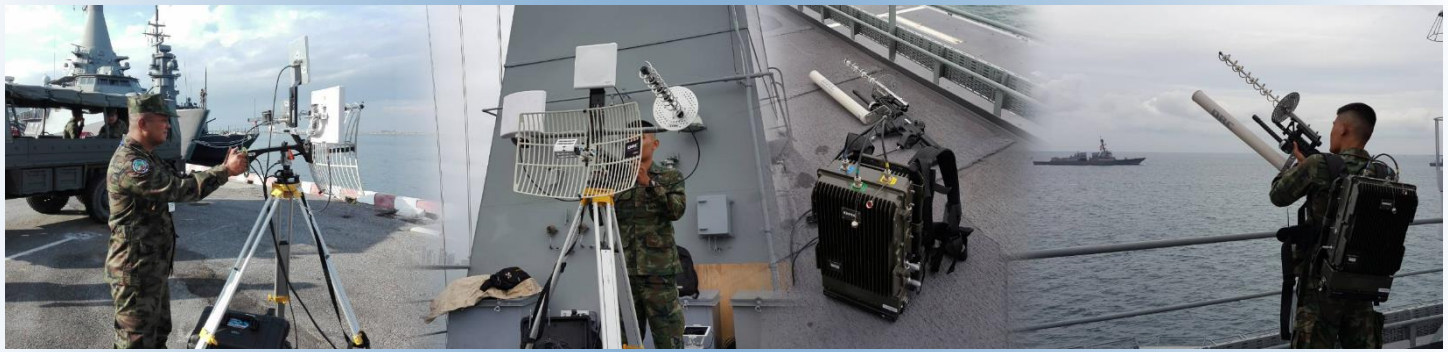
**Naval Electronics
 Department, Royal Thai Navy**
 On February 6, 2019

**Aircraft Combat Command and Coast
 Guard, Royal Thai Navy**
 On January 28, 2019





Support the performance of the sub-committee The Royal Cremation Ceremony of His Majesty King Bhumibol Adulyadej on October 25-29, 2017



Support the operations of the Thai Air Security Forces. Aircraft Combat Command and Coast Guard
at the International Maritime Fair On the occasion of the 50th anniversary of the founding of ASEAN on 12-22 November 2017



Support the operation of the Bureau of Joint and Combined Training Planning military tactics department Royal Thai Armed Forces Headquarters in
training Cobra Gold 18 (Cobra Gold 18) on February 23, 2018



Support the operations of the International Counter Terrorism Operations Center.
In the event, Un Ai Rak Bike UnAiRak On 1-2 December 2018



Support operations at the Suranaree Forces Command (East side) Royal Thai Army Anti-drone device to detect drug smuggling with Drone at the Naval Forces Command along the Mekong River on 27-30 November 2018 and 15 December 2018 to 17 January 2019



Royal Thai Marines Headquarters, Navy on the 24th of July 2020



Department of Communications and Information Technology, Royal Thai Navy Year 2020