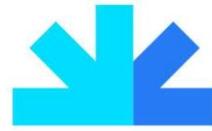# Eclipse

Product Description

August 2023

sentrycs

SENTRY CS LTD, ToHa Tower, 6 Totzeret HaAretz Street, 6744129 Tel Aviv | www.sentrycs.com
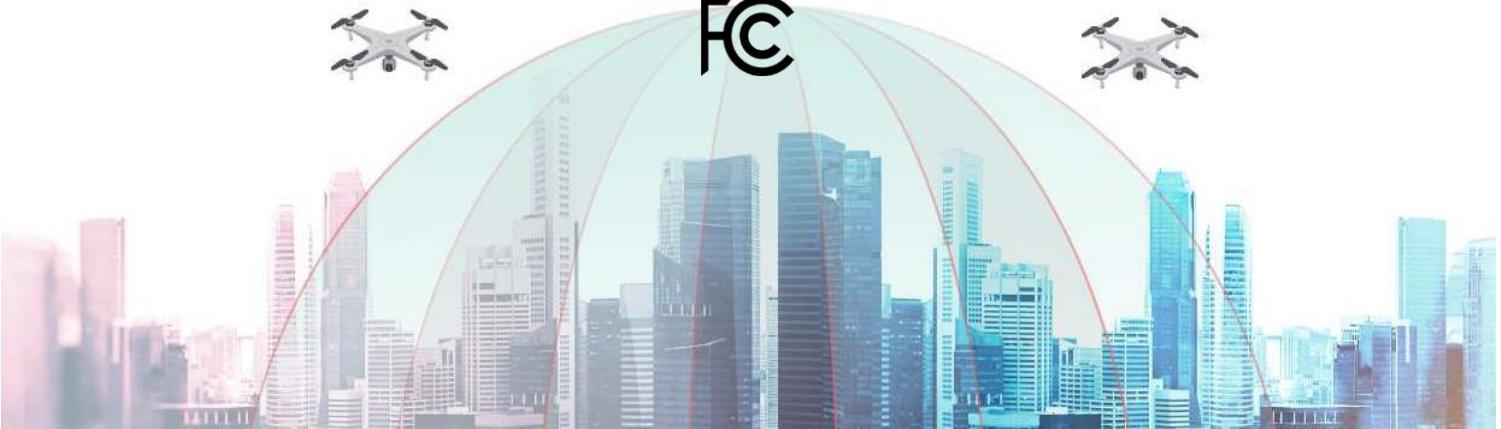
FCC ID: 2BCINEC2
IC: 31212-EC2
HVIN: BU_01

Contents

Eclipse Product Description

1   Preface

Eclipse is the premier cyber counter-drone platform designed to automatically detect, take over and safely land unauthorized commercial drones in a designated zone.

2   Functionality

Eclipse is an autonomous end-to-end cyber solution, providing 4 layers of security:

- **Detect** – Detecting and locating drones in the vicinity of the perimeter, using a 24/7 monitoring system.

- **Identify** – Extracting rich real-time data, including the operator's last known location and flight parameters.
  Friendly drones can be whitelisted according to their serial (tail) number.

- **Control** – Mitigating airborne drone intrusions by automatically and actively taking over the controls from the operator, navigating the drone to a predefined location, then landing it there safely. Intrusion is defined when a drone tries to enter a predefined geofenced area.

- **Prevent** – Denying drones from taking off from within a predefined geofenced area.

3   Technology

Eclipse uses Electronic RF receipt and transmission technologies for the purpose of protecting perimeters from drones, as follows:

- **Detect** - Uses **passive** RF scanning methods, in which the relevant spectrum bands (ISM bands) are scanned continuously for known drone communications' signatures. Once a drone is located, parsing of the telemetry channel provides information about the drone's location and altitude.

- **Control & Prevent** (deny takeoff and airborne takeover) - Uses protocol manipulation techniques – essentially to surgically redirect the control from the original drone operator into our system.
  Protocol manipulation is a series of messages sent to the drone that are received as legitimate commands which take over the controls. The controlling channel remains – at all times– without interference and continues to function normally. The level of disruption is minimal and relates only to the drone receiving unexpected command messages.

4 Operation

Eclipse uses communicating sensors that are installed in several locations around the perimeter. All sensors are connected to a central server, which syncs their operation. The server also displays a Command and Control dashboard for real-time alerts, as well as for configuring the system.

4.1 Architecture

The Eclipse architecture is shown below.
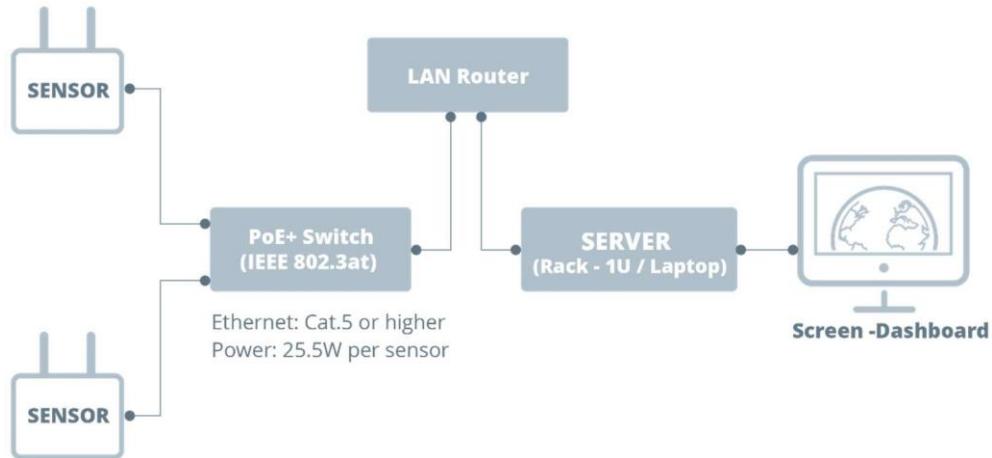
4.2 Eclipse II Accessories

Component	Description	Manufacture	P/N
Brain Unit		Sentry CS LTD, ToHa Tower, 6 Totzeret HaAretz Street, 6744129 Tel Aviv	
Dual Antenna		RF-Core C-708, Bundang Technopark, 744, Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea, 13510	RCDAFEM-2460-A1
WIFI and SDR High gain antenna		Alfa network 4F.-1, No.106, Ruiguang Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)	AOA-2458-79AF AOA-2458-79AM
SDR Low gain antenna		Mars Antennas	MA-DBO2455-3

Component	Description	Manufacture	P/N
		3 Hamanor st. Holon 5886103, P.O.Box 1852 Holon 5811801, Israel	
ETH cable		Sentry CS LTD, ToHa Tower, 6 Totzeret HaAretz Street, 6744129 Tel Aviv	
BUDA harness		Sentry CS LTD, ToHa Tower, 6 Totzeret HaAretz Street, 6744129 Tel Aviv	
Laptop		Dell Menachem Begin 121 Azrieli Sarona Tower Tel Aviv 6701203	Latitude 5420 XCTO

4.3   Operational Components

Eclipse Operational Components are set out in the following table:

Component	Description
Deployed Technology	Protocol Manipulation. Eclipse does not use Jammers or GPS spoofing.
Dashboard	Web browser-based (connected to a local server). Eclipse supports unlimited numbers of users and parallel logins by different users. User roles and access is managed by the Customer's administrator.
API	RestAPI supported for extracting alerts from the system. Further integration is possible, but requires specific definitions by the Customer.
Whitelist	Friendly drones can be whitelisted according to their serial (tail) number. Whitelisted drones can be tracked and monitored, but cannot be taken over. The Customer manages the file of whitelisted drones.

4.4   Operational Capabilities

Eclipse Operational Capabilities are set out in the following table:

Capability	Description
Drone detection	Detect drone activity up to a 2 Km (1.24 miles) radius per sensor. According to the drone's communication signature. Can be extended if CE/FCC compliance is not required.
Drone operator detection	Extract the operator's last known location, identify the drone model and its serial (tail) number.
Drone identification	Extract flight parameters such as the drone's speed and altitude
Drone flight parameter detection	Prevent take off of unauthorized drones within a geo-fenced area
Ground takeover, mid-air takeover	Actively take control of an unauthorized drone that is attempting to fly into a geo-fenced area

5   Customer Prerequisites

The following items are required:

Item	Description
Power Supply	Our product do not contains the AC/DC adapter. You need purchase the DC 24V/10A compliance the directive 2014/30/EU. The adapter shall be installed near the equipment and shall be easily accessible.
Power Consumption	20 W (typical) 25.5 W (max)
Server	1U rack location
Network	Connection between all sensors to the server. Cat. 5 Ethernet supporting 802.3at
Wireless Network Option	Possible with additional configurations (MDNS, DHCP)

6   Technical Specs and Limitations

Item	Description
Standards Compliance	CE, FCC, CE
Effective Range	Up to 2 Km (1.24 miles) radius, per sensor. Can be extended if CE/FCC compliance is not required.
Antenna Specs	360° antennas
Operating Band	LTE Band 2,17 WIFI 2.4G WIFI 5G SDR 2.4G&5.8G
Takeover	One drone per sensor at a time
Temperature Range	-20 – 60 °C -4 – 120 °F
Water/Dust Resistance	IP67
Drone Support	According to the support matrix list
Success Rates	Detection - up to 10 seconds to detect drones at the maximum range (avg. 3 sec) Mitigation - 95% takeover success rate on the first attempt for supported drones. 100% takeover success rate on the second attempt.
Weight	Sensor - 2.5 Kg (5.5 pounds) including antennas
Size	Sensor - 25x25x8 cm (10x10x8 in)

7   FAQ

What should I know about the solution's configuration?

Eclipse operates in a "Predefined policies, automatic enforcement" mode – this means the Eclipse operator will define in advance a geofenced area (GPS-defined polygon), and a landing location.

Does Eclipse require real-time decision making?

No, Eclipse enforces an automatic denial of takeoff and takeover of airborne intrusions according to the pre-configured parameters mentioned previously.

Any interference with other wireless communications?

No. Eclipse surgically communicates with a drone and does not use jamming or spoofing methods. All other communications remain intact.

How precise is Eclipse's landing location?

The landing location is a GPS coordinate, and therefore has a precision radius of about 3m (~10 ft.). The drone will land within this radius.

What safety precautions should be taken when the system is on?

In general, be aware of the landing location and its surroundings, and keep away from this location during the mitigation process.

Can specific drones be allowed to fly?

Yes, there's a whitelist for approved drones that is managed by the Customer. If an approved drone is detected, the system will not enforce a denial of takeoff and will not perform a midair takeover. Whitelisted drones are unaffected by the system.

How many drones can be detected or taken over in parallel?

Eclipse can detect a large number of drones per sensor (around 10), and can take over one drone per sensor at a time. This means the system can mitigate an equal number of drones as there are sensors.

8   Appendix A - warnings

8.1.1   Appendix A1 - Modification statements

FCC Warning (Modification statement)

Modifications not expressly approved by the manufacturer could
void the user's authority to operate the equipment under FCC Rules.

ISED Warning (Modification statement)

Sentry CS LTD n'approuve aucune modification apportée à l'appareil par l'utilisateur,
quelle qu'en soit la nature. Tout changement ou modification peuvent annuler le droit
d'utilisation de l'appareil par l'utilisateur.

8.1.2   Appendix A2 - RF Exposure Warnings

1. <u>Mobile Device RF Exposure Statement (If Applicable):</u>

    1. Mobile Device definition: Mobile: (§2.1091) (b) — A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Per §2.1091d(d)(4) In some cases (for example, modular or desktop transmitters), the potential conditions of use of a device may not allow easy classification of that device as either Mobile or Portable. In these cases, applicants are responsible for determining minimum distances for compliance for the intended use and installation of the device based on evaluation of either specific absorption rate (SAR), field strength, or power density, whichever is most appropriate.

    b. Statement in UM:
       RF Exposure -

       For FCC: This device is only authorized for use in a mobile application. At least 20 cm of separation distance between the (Product Name) device and the user's body must be maintained at all times.

       For IC: La distance entre l'utilisateur et de produits ne devrait pas être inférieure à 20cm

8.1.3 Appendix A3 - FCC/ ISED Regulatory notices

Interference statement (if it is not placed in the device)

This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Wireless notice

This device complies with FCC/ISED radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the ISED radio frequency (RF) Exposure rules. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Le présent appareil est conforme à l'exposition aux radiations FCC / ISED définies pour un environnement non contrôlé et répond aux directives d'exposition de la fréquence de la FCC radiofréquence (RF) et RSS-102 de la fréquence radio (RF) ISED règles d'exposition. L'émetteur ne doit pas être colocalisé ni fonctionner conjointement avec à autre antenne ou autre émetteur.

8.1.4 Appendix A3 - FCC Warning

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver

is connected.

—Consult the dealer or an experienced radio/TV technician for help.