



HEXWAVE™

Walkthrough Explosives
and Weapons Detection
System



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Acknowledgements

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Acronyms & Terms

Acronym	Definition
3D	Three Dimensional
AI	Artificial Intelligence
EIRP	Effective Isotropic Radiated Power
FCC	Federal Communications Commission
LDT	Liberty Defense Technologies
RF/RFI	Radio Frequency/ Radio Frequency Interference
OCP	Operator Control Panel
TD	Threat Detection

Word	Definition
Alarm	Visual symbol for marking a detected threat location
Avatar	Computer-rendered figure
Detected Threat	Threats flagged during real-time screening
Device	FCC reference for a “Class A” digital device
Divest	Act of disclosing or handing screening staff personal belongings such as a cell phone, car keys, jacket, or wallet
Operator	Person monitoring/running the dashboard during real-time screening
Scan/Screen	Used interchangeably – the process of individuals being cleared or flagged (alarmed), in real-time, by HEXWAVE™ for concealed threats
Threat Detection	The process of screening for concealed threats as individuals walk through the HEXWAVE™

FCC Compliance

FCC Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in commercial, industrial, or business environments. 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Modifications: System modifications or component changes not expressly approved by Liberty Defense could void the user's authority to operate the equipment under FCC regulations.

Shielded Cables: To meet FCC requirements, only the cabling provided by, or approved by Liberty Defense, may be used for system interconnects.

Users were advised to maintain a 20cm separation from the transmitters.

FCC Waiver Conditions

Accordingly, pursuant to the delegated authority in Sections 0.31 and 0.241 of the Commission's rules, FCC waives the requirements of Sections 15.31(c), 15.503(d), the introductory test of 15.511(b), 15.511(b)(2), 15.511(f) and 15.521(d) of FCC rules to permit the certification and marketing of the HEXWAVE™ system. This waiver is subject to the following conditions:

1. The HEXWAVE™ system will operate as described in the FCC waiver conditions.
2. Liberty Defense shall inform purchasers that HEXWAVE™ devices may not be resold or leased to third parties for use at another installation in the United States without prior notice to Liberty and unless appropriate arrangements are made to meet all conditions of this waiver.
3. This waiver shall apply to the HEXWAVE™ system described herein and provided no changes are made to the transmitter that would increase the system's EIRP.
4. Liberty Defense shall include the following language on a label, displayed in a conspicuous location; "Operation of this device is restricted to law enforcement, fire and rescue officials, private security personnel, public utilities, and industrial entities. Operation by any other party is a violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties."

5. Liberty Defense require to avoid outdoor deployment within 20 km of the sites listed in footnote US 131:

Arecibo Observatory, PR.....	18° 20' 37" N, 66° 45' 11" W
Green Bank Telescope (GBT), WV.....	38° 25' 59" N, 79° 50' 23" W
Very Large Array (VLA), Socorro, NM....	34° 04' 44" N, 107° 37' 06" W
Very Long Baseline Array (VLBA) Stations:	
Brewster, WA.....	48° 07' 52" N, 119° 41' 00" W
Fort Davis, TX.....	30° 38' 06" N, 103° 56' 41" W
Hancock, NH.....	42° 56' 01" N, 71° 59' 12" W
Kitt Peak, AZ.....	31° 57' 23" N, 111° 36' 45" W
Los Alamos, NM.....	35° 46' 30" N, 106° 14' 44" W
Mauna Kea, HI.....	19° 48' 05" N, 155° 27' 20" W
North Liberty, IA.....	41° 46' 17" N, 91° 34' 27" W
Owens Valley, CA.....	37° 13' 54" N, 118° 16' 37" W
Pie Town, NM.....	34° 18' 04" N, 108° 07' 09" W
St. Croix, VI.....	17° 45' 24" N, 64° 35' 01" W

Please contact Liberty Defense for coordination if deployment is necessary for outdoor operations within 20 km of the above referenced sites.

6. Liberty Defense require to avoid outdoor deployment within 10 km of the sites listed in Table 1:

Table 1. Exclusion Zone Sites

Location	Latitude (dd mm ss)	Longitude (ddd mm ss)
AK, Anchorage	61 09 24 N	149 59 07 W
AK, Fairbanks	64 51 32 N	147 51 04 W
AK, U of AK	64 51 37 N	147 50 50 W
AK, North Pole	64 48 18 N	147 30 00 W
AK, North Pole West AS4	64 47 37 N	147 32 18 W
AK, North Pole West AS5	64 47 42 N	147 32 18 W
AK, Poker Flat	65 07 00 N	147 27 35 W
CA, Goldstone (DSS-14)	35 25 33 N	116 53 19 W
CA, Goldstone (DSS-24)	35 20 24 N	116 52 29 W
CA, Goldstone (DSS-25)	35 20 15 N	116 52 31 W
CA, Goldstone (DSS-26)	35 20 09 N	116 52 23 W
HI, South Point	19 00 50 N	155 39 47 W
SD, Sioux Falls	43 44 10 N	096 37 21W
VA, Wallops Island	37 55 28 N	075 28 35 W
VA Wallops Island	37 55 35 N	075 28 32 W

7. The outdoor deployment Coordination Zone Sites that should be subject to a 1.2 km coordination zone are identified in Table 2.

Table 2. Coordination Zone Sites

Location	Latitude (dd mm ss)	Longitude (ddd mm ss)
CA, La Jolla	32 52 11 N	117 15 07 W
CA, Orange	33 47 38 N	117 51 00 W
CA, Pasadena	34 12 06 N	118 10 27 W
CA, Poway	32 56 18 N	117 02 42 W
DE, Newark	39 41 01 N	075 45 18 W
FL, St. Petersburg	27 45 36 N	082 37 55 W
FL, Tallahassee	30 23 10 N	084 13 53 W
HI, Honolulu	21 17 54 N	157 48 59 W
IN, Indianapolis	39 47 42 N	086 03 43 W
IN, Lafayette	40 25 48 N	086 54 54 W
KY, Morehead	38 11 31 N	083 26 20 W
LA, Baton Rouge	30 24 43 N	091 10 44 W
MD, Greenbelt	38 59 57 N	076 51 18 W
MD, Lanham	38 57 40 N	076 50 24 W
MD, Suitland	38 51 07 N	076 56 31 W
MI, Peach Mountain	42 23 56 N	083 56 08 W
MS, Stennis Space Center	30 22 05 N	089 37 01 W
MT, Missoula	46 55 34 N	114 05 35 W
NJ, New Brunswick	40 28 48 N	074 26 13 W
NM, Albuquerque	35 05 02 N	106 37 16 W
NY, New York	40 49 12 N	073 57 00 W
OR, Corvallis	44 34 04 N	123 16 39 W
TX, Austin	30 23 42 N	097 44 06 W
TX, Irving	32 52 41 N	096 59 53 W
UT, Salt Lake City	40 46 00 N	111 53 13 W
WI, Madison	43 04 15 N	089 24 24 W

Please contact Liberty Defense for coordination if deployment is necessary for outdoor operations within the above referenced sites.

Product Labels and Descriptions



Figure 1. Product ID Label

Label Locations



Figure 3. Label Locations

Safety Symbols & Notices

The HEXWAVE™ User Guide includes the following symbols:



Provides additional information on proper operations of the unit.



Provides a helpful hint for using the device more effectively.



Indicates that improper use of the system may cause harm to the user, damage to the unit hardware, or loss of data.

Safety Notices:



1. Do not attempt to open or modify a panel or use it in any way other than as described in this manual. Doing so will render the system's limited warranty null and void and may cause personal injury.
2. Do not enter a HEXWAVE™ portal wearing internal pacemakers and defibrillator medical devices.
3. Users must always maintain a 20cm separation from the front panels (transmitters).
4. Trip hazard – Any cables running between the panels should be covered or taped down to avoid a tripping hazard.
5. Conditions for HEXWAVE™ operation must be level, dry, and not exceed the maximum operating temperature of 95°F/ 35°C.
6. It is recommended that two (2) people unpack a panel.

Specifications

Physical & Environment:

Panel Height	73.3" (1.86 m)
Panel Depth	8.2" (0.2 m)
Wheelbase Width	43.8" (1.11 m)
Wheelbase Depth	26.1" (0.66 m)
Weight	Each Panel is ~140 lbs. (~63.5 kg)
Wheels	Lock for stability
Operating Temperature	42° F to 95° F/ 5° C to 35° C
Storage Temperature	32° F to 113° F/ 0° C to 45° C
Relative Humidity	20% to 80% (without condensation)
Operating Altitude	11,000 ft

Connectivity:

Ethernet	IEEE 802.3
WIFI	IEEE 802.11 a/b/g/n/ac
Supported Browsers	Chrome and Firefox
Power Supply	100 to 264 VAC, 47 to 63 Hz, 2000 VA
Power Access	Standard power outlet; dedicated 15A line

Certification & Compliance:

FCC	Compliant with applicable FCC Regulatory Standards as defined in the FCC waiver
Product Safety	Compliant with safety standard UL 62368-1:2019 Ed. 3

Overview

HEXWAVE™ is a real-time, walkthrough security system built to detect metallic and non-metallic weapons and threats concealed on people. HEXWAVE™ recognizes all of today's threats including traditional weapons, improvised weapons like 3D-printed guns, ceramic knives, and plastic, liquid, and powder explosives.

Using AI, the system does not alarm on benign objects such as keys, wallets, and cell phones, and eliminates the need to divest outerwear (jackets/coats/shoes) for screening. This creates an ideal screening environment that is fast, simple, unintrusive and easily managed for both high- and low-foot traffic venues and applications.

HEXWAVE™ captures and reports on important threat-related data, including the threat type, location, and detection time, in a variety of formats for analysis. The system does not store images or any personal information, ensuring 100% protected personal privacy.

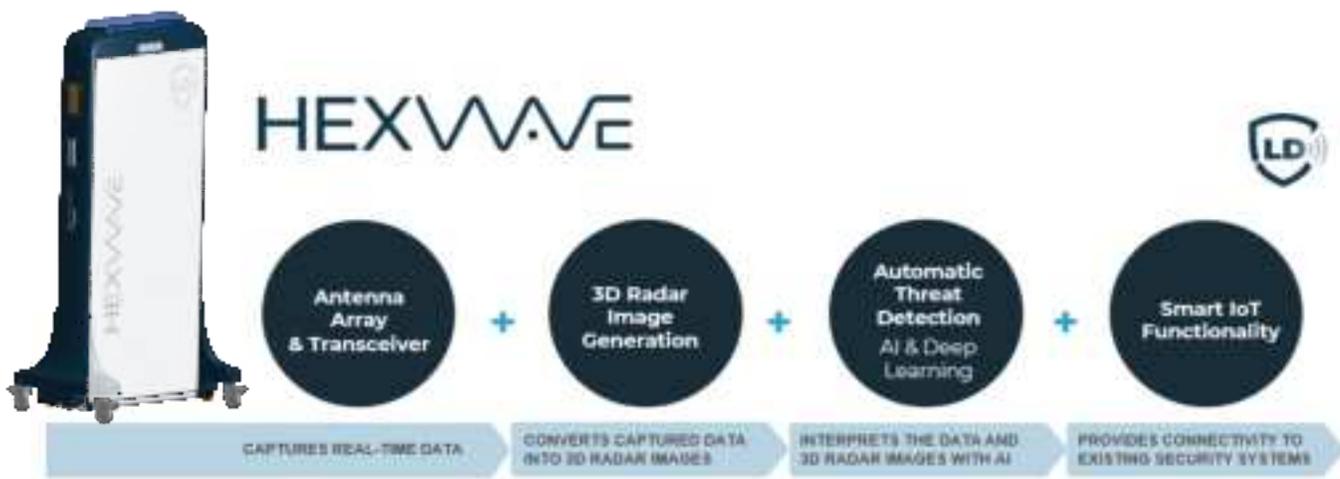


Figure 4. HEXWAVE™ Overview

The HEXWAVE™ Panel



Figure 5. HEXWAVE™ Front Panel



Figure 6. HEXWAVE™ Rear Panel

Power and Cable Connections

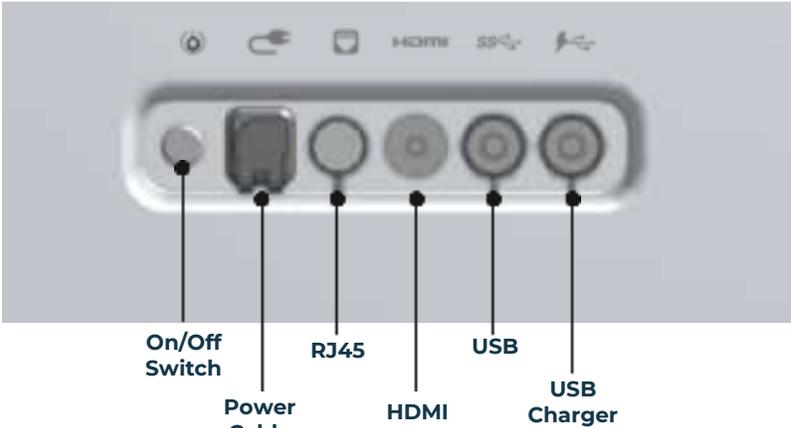


Figure 7. Rear Panel Connections

Panel Lights - Traffic Flow and Alarm

Top & Side Lights	
Color	Alert
Green	Clear - next person may enter the system
Blue	Not Clear - someone is going through the system
Red	Alarm - requires resolution before next person may enter the system
Yellow (Flashing)	Service required or System Error - requires resolution

Monitoring Software

HEXWAVE™'s software features an Operator Control Panel (OCP) where operators monitor and clear individuals for threats and direct traffic flow. It also has an advanced operations component for managing sites and user accounts and running reports.



Figure 8. Tablet Setup with Operator Control Panel

Installation & Setup

Unpack



- **Single panel weighs approximately of 140 lbs. (63 kg)**
 - **It is recommended that two people unpack a panel**
-



- **Unpack panels near or at the installation site. No special tools are required**
 - **HEXWAVE™ is compatible with any stand, such as a desk or a podium and will work with any viewing device that has an internet connection and monitor**
-

Panels

1. Check for shipping damage and report as necessary.
2. Unstrap all strapping and remove the top lid.
3. Remove the 2 side panels and set aside.
4. Remove any accessories or packages and set aside.
5. Put the ramp in place, with the ramp posts inserted into the base to keep the ramp from moving.
6. Unscrew the wing nuts holding the hold-down bracket, and retain the hardware for future use.
7. Unlock the system's wheel locks and carefully roll the system down the ramp.

Accessories

Unpack the items for setup:

- (1) Tablet
- (1) Universal tablet floor stand
- (1) USB-C to ethernet adaptor
- (2) Power cables, 10'
- (1) Router
- (3) Ethernet cables, 10', 6', 3' black
- (1) User Manual on USB

Optional Accessories

- Laptop (Administrator Use)
- Portable Calibration Plate
- APC UPS 1500VA UPS Battery Backup & Surge Protector
- Stanchion Set

Placement Options

- **Standalone** – Single panel screening setup requires individuals to be screened at 30 in. (.76 m) from the panel front. Individuals turn twice for full screening.



Figure 9. Standalone Setup

- **Portal Setup:** Start with the panels facing each other and touching at the wheelbase for proper alignment. Lock the wheels on one panel and roll the second panel back a minimum of 64 in. (1.62 m) to a maximum of 72 in (1.82 m). Overall placement should allow for going around the portal, if necessary.



Figure 10. Portal Setup (a)

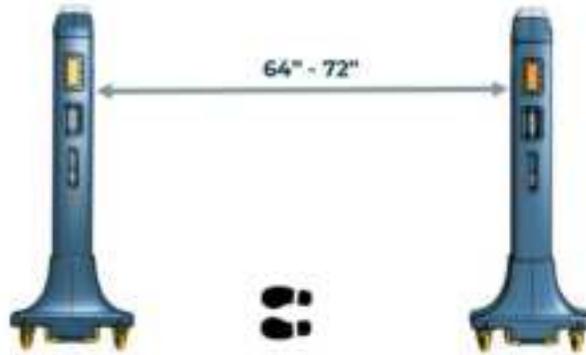


Figure 11. Portal Setup (b)

Lock Wheels

Lock all four wheels after placement by pressing down each wheel's locking lever. To unlock, pull the lever up.

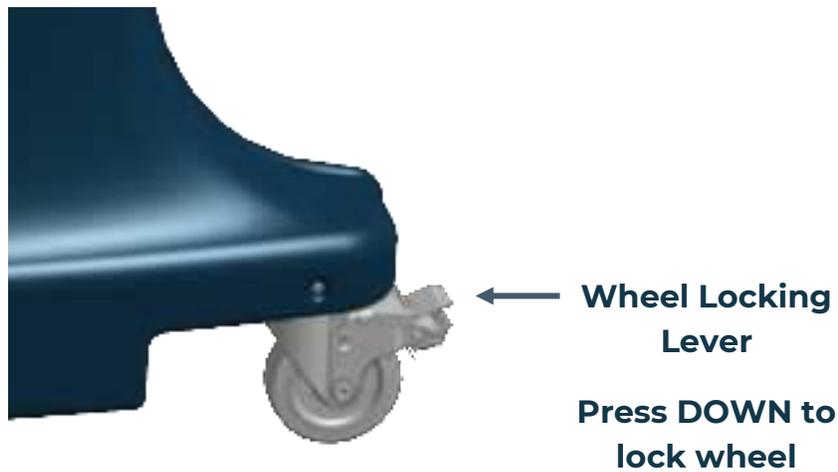


Figure 12. Lock Wheels

Tablet Stand Setup

1. Assemble the stand.
2. Secure/lock the tablet onto the stand.
3. If necessary, adjust and re-lock the stand height.

Power Up Panels

1. Attach the AC cord to the panel.
2. Plug each panel's AC plug into an AC source.
3. The equipment needs to be connected to a grounded outlet.
4. Press the Power button once on each panel to power it up.

Setup Configuration

1. Designate Panels as Left and Right (Devices)

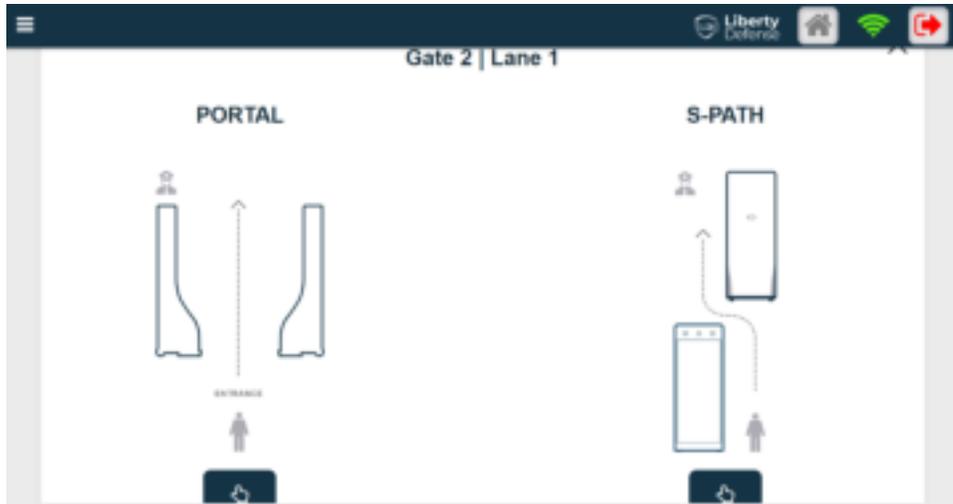


Figure 13. Panel Setup Configuration

- a. Select PORTAL or S-PATH

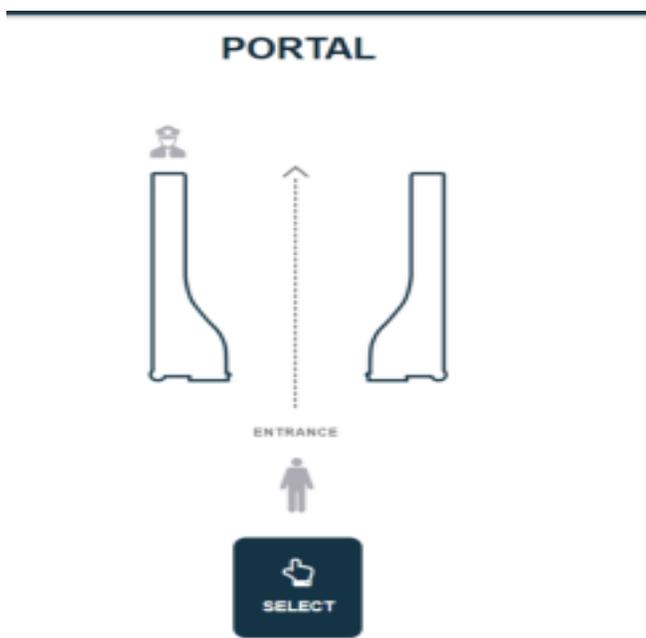


Figure 14. Portal Setup

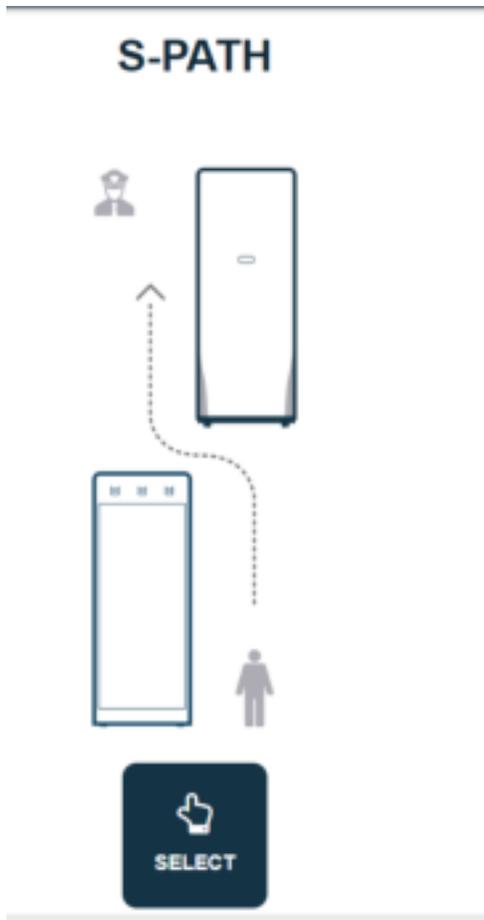


Figure 15. S-Path Setup



Figure 16. Setup Configuration (a)



Figure 17. Setup Configuration (b)

- a. Click on DETECT
- b. Click on SYNC
- c. Click on the CONFIRM button



Figure 18. Setup Configuration (c)

- d. Repeat the process to set up the right lane.

This completes Installation & Setup.

Basic User Operations

Threat Detection Monitoring



Customers using HEXWAVE™ Operator Control Panel should follow their company's protocols for escalating and managing detected threats.

In general, individuals being screened should:

- Proceed one at a time through the portal.
- *Walk—Turn—Go* for portal screening.
- Not be screened wearing internal medical devices such as pacemakers and defibrillators.
- Have enough space around the portal to bypass screening, if necessary.

Log In

Open a browser window and log in using the following credentials and the assigned password:

HEXWAVE.basic@email.com

Liberty Defense

2021/06/08 11:11:16
Scan Count : 000041

Login

USER NAME
hexwave.basic@email.com

PASSWORD

Forgot email or passcode?

Login

REGISTER

Figure 19. Basic User Login

Operator Control Panel

After logging as a level 3 user, the Operator Control Panel Screen opens (shown below) where Operators screen individuals as they pass through the portal. The avatars represent an individual's front and back as they are being screened.

- When no threat is detected, the operator clears the individual on the console, the panels show the solid green all clear light and the system resets for the next person to screen.
- When a threat is detected, a visual alert appears on the avatar showing the threat location. The system records the threat location, type, date, and time. The top light on the panel shows solid red.

Operators are required to follow their company procedures for threat resolution and escalation to management for further action.



Figure 20. Operator Control Panel (OCP)

Advanced User Operations

Advanced Operations are used by supervisory staff for managing sites and accounts, and by service technicians for customer service.

Log In

Access requires using one of the following credentials and the assigned password:

HEXWAVE™.advanced@email.com

technician.cust@email.com

technician.LDT@email.com



Figure 21. Login Page

Overview

After login, the Threat and Device Status dashboard opens where site components such as Calibration Services, threats, venues, gates, lanes, device, tablets, locations, customers, and user accounts are set up and managed. Reports are available as described in Generating Reports.

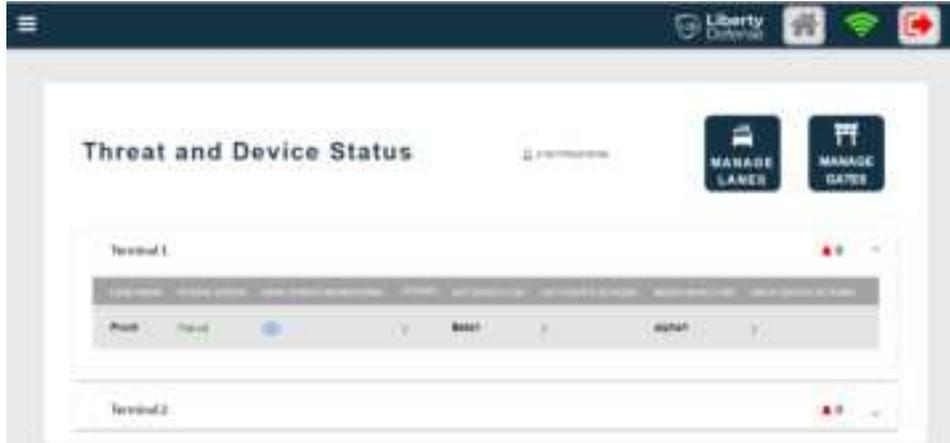


Figure 22. Threat and Device Status Screen

Calibration Services

Full Calibration

- Click full calibration under calibration service on the hamburger menu.

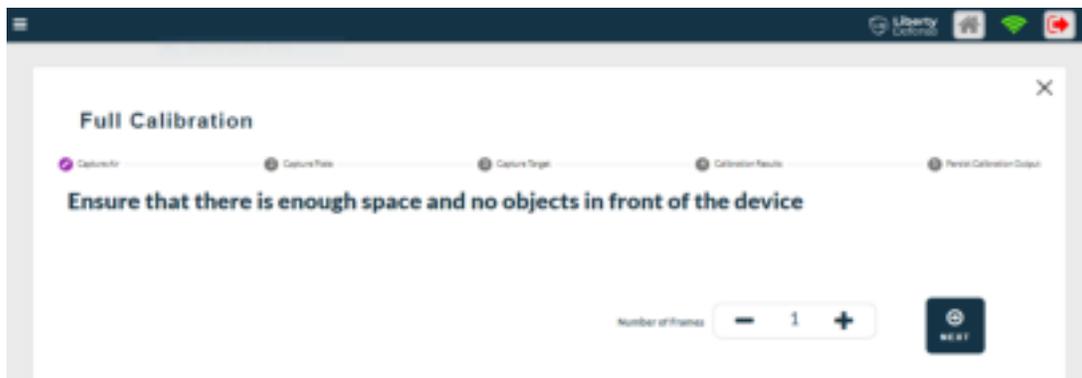


Figure 23. Full Calibration Screen

Air Calibration

- Click air calibration under calibration service on the hamburger menu.



Figure 24. Air Calibration Screen

Offset Calculation

- Click offset value under calibration service on the hamburger menu.



Figure 25. Offset Calculation Screen

Threat and Device Status

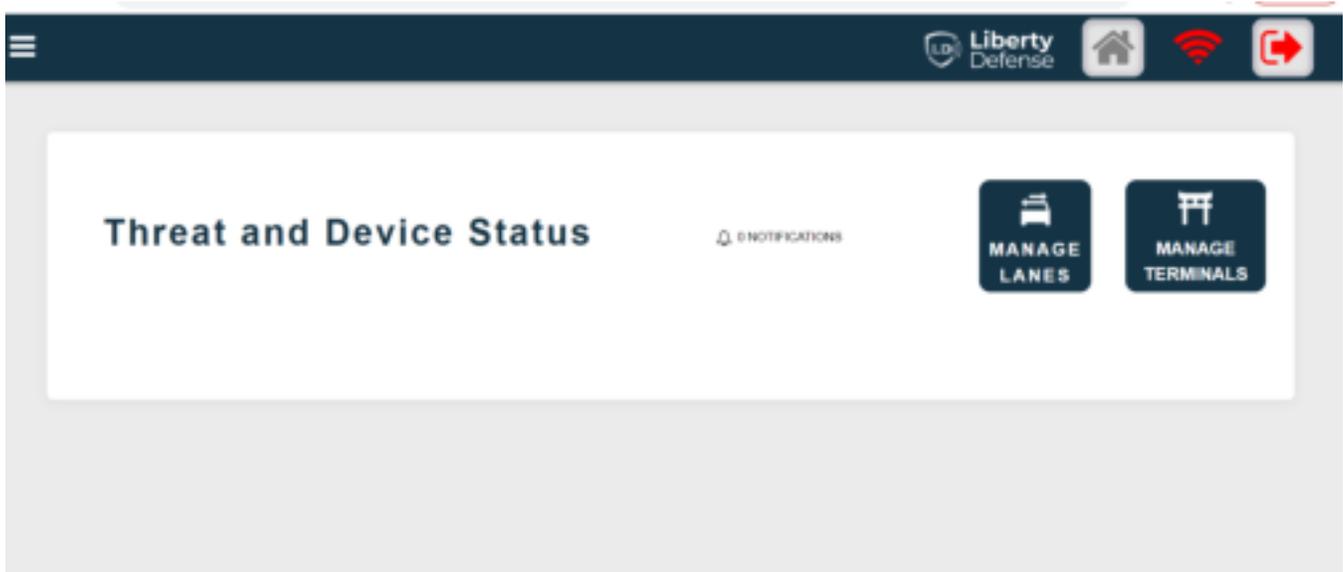


Figure 36. Threat and Device Status Screen

User Management



Account Management

- Click account management under user management on the hamburger menu to:
 - a. CREATE
 - b. EDIT
 - c. DELETE

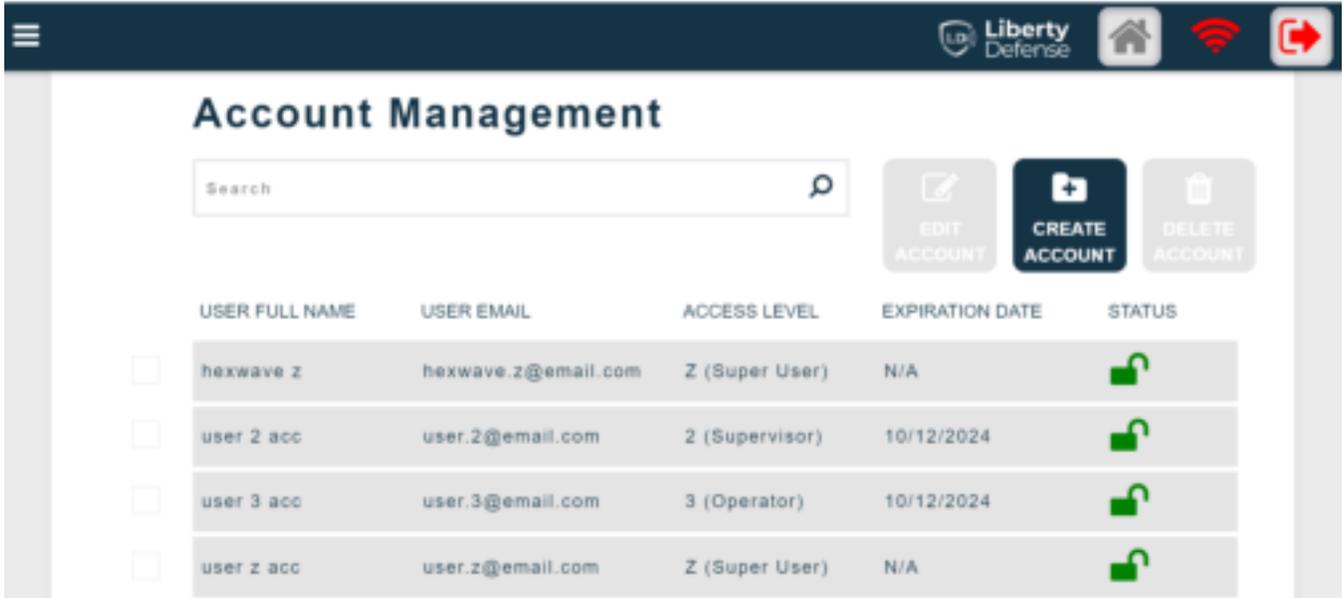


Figure 47. Account Management Screen

Access Level

- Click access level under user management on the hamburger menu to:
 - a. Assign Capability

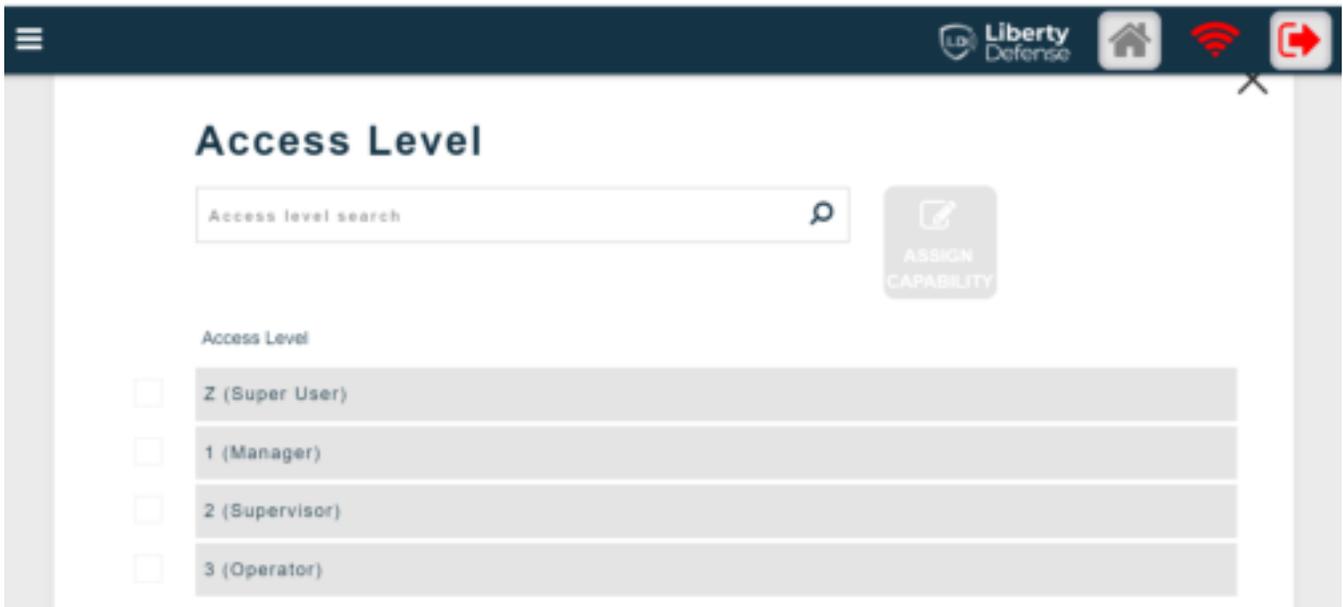


Figure 58. Access Level Screen

Generating Reports

Click Reports on the hamburger menu.

- Reports** ^
- Dashboard
- Scan Count Details
- Device Information
- Operator Information
- Operator Action
- Screener Message

Dashboard

- Click dashboard under reports on the hamburger menu to view:
 - Total persons scanned during the time period.



Figure 69. Dashboard Screen

Scan Count Details

- Click scan count details under reports on the hamburger menu to view report.



Figure 30. Scan Count Details Screen

Device Information

- Click device information under reports on the hamburger menu to:
 - Show REPORT
 - Export to EXCEL
 - Export to PDF



Figure 31. Device Information Screen

Operator Information

- Click operator information under reports on the hamburger menu to to:
 - a. Show REPORT
 - b. Export to EXCEL
 - c. Export to PDF

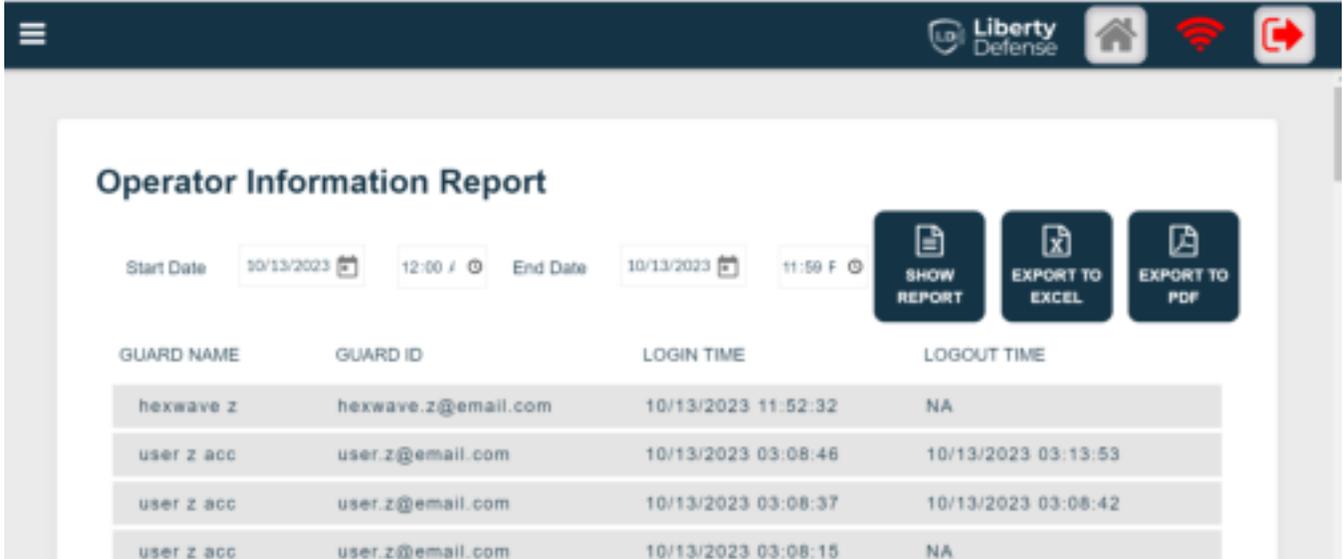


Figure 32. Operator Information Screen

Operator Action

- Click operator action under reports on the hamburger menu to to:
 - a. Show REPORT
 - b. Export to EXCEL
 - c. Export to PDF

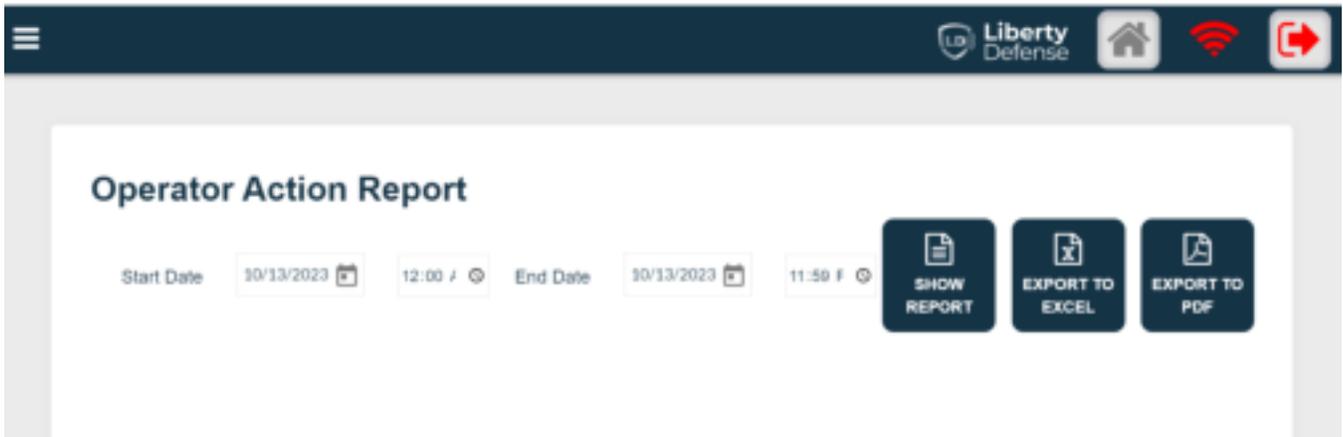


Figure 33. Operator Action Report Screen

Screener Message

- Click screener message under reports on the hamburger menu to:
 - a. Show REPORT
 - b. Export to EXCEL
 - c. Export to PDF

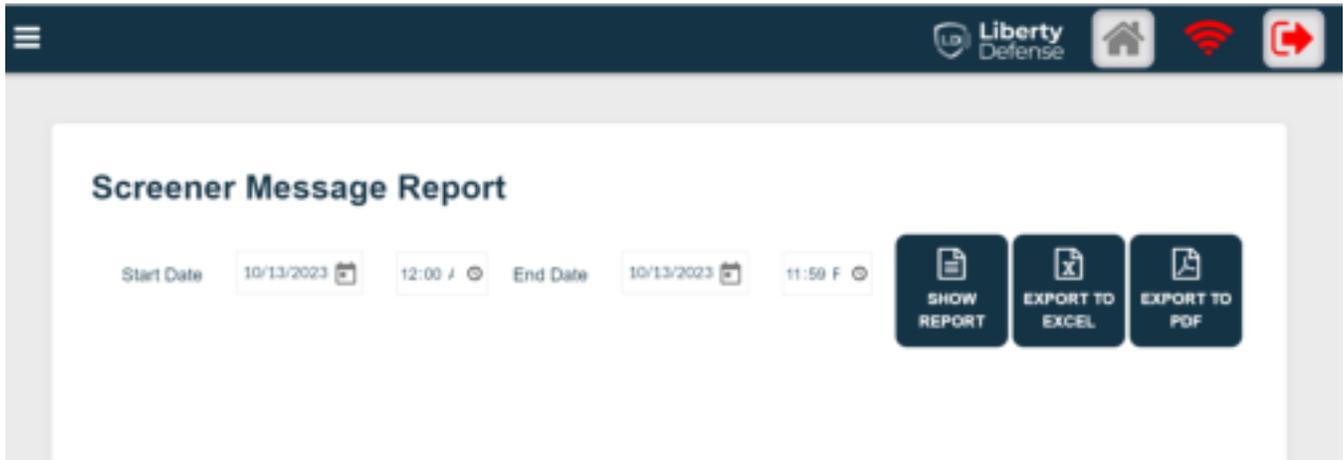
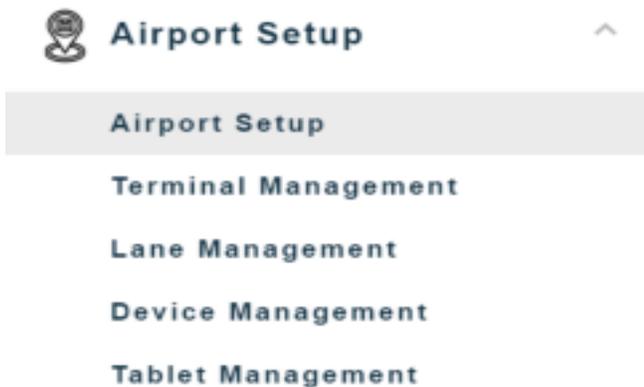


Figure 34. Screener Message Report Screen



Terminal Management

- Click terminal management under airport setup on the hamburger menu to:
 - a. Assign Terminal to Map
 - b. Add Terminal
 - c. Delete Terminal

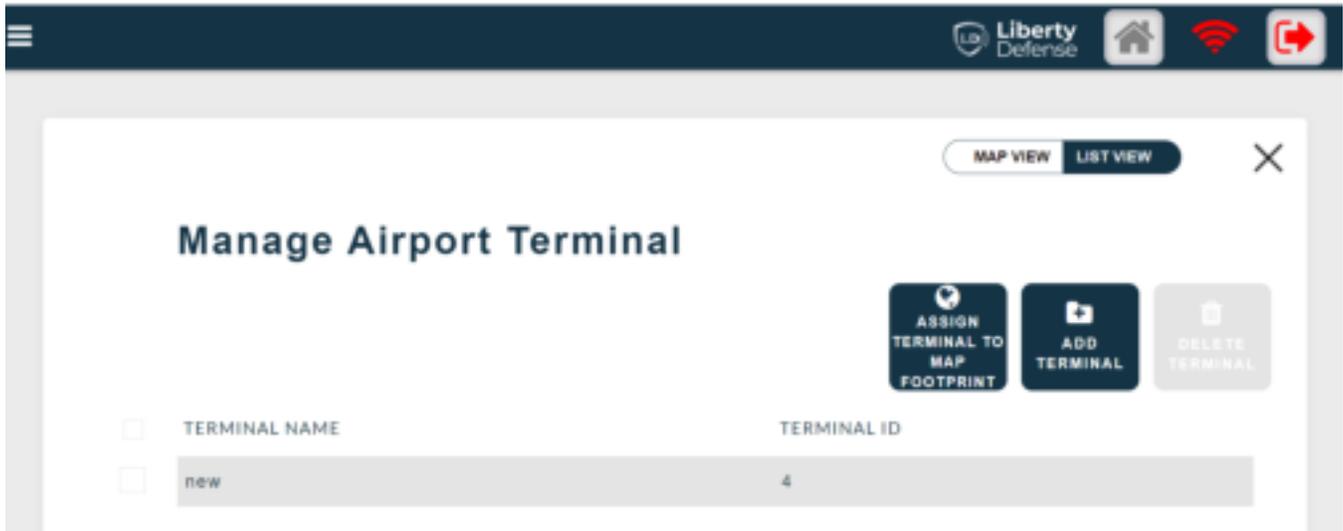


Figure 35. Manage Airport Terminal Screen

Lane Management

- Click lane management under airport setup on the hamburger menu:
 - a. Click new

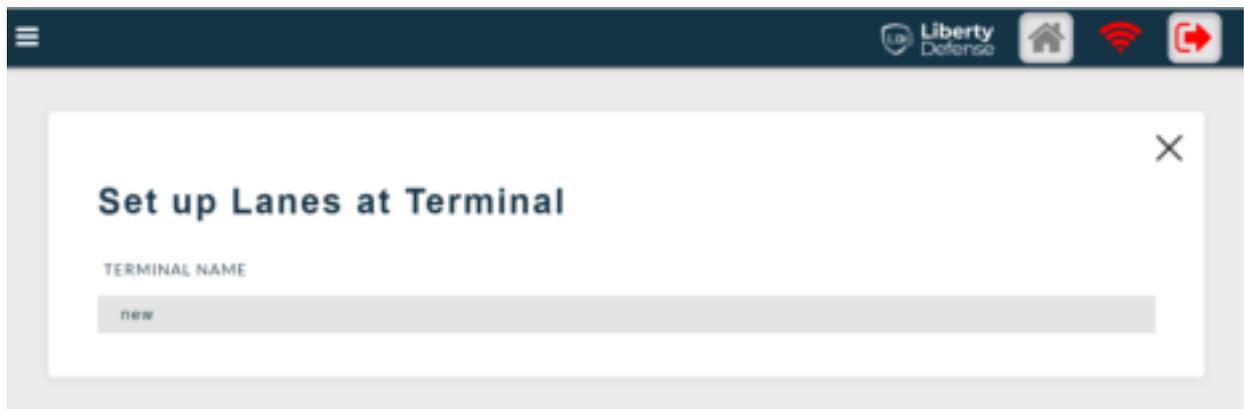


Figure 36. Lane Set Up Screen

- b. Switch terminal
- c. Setup a lane
- d. Edit lane

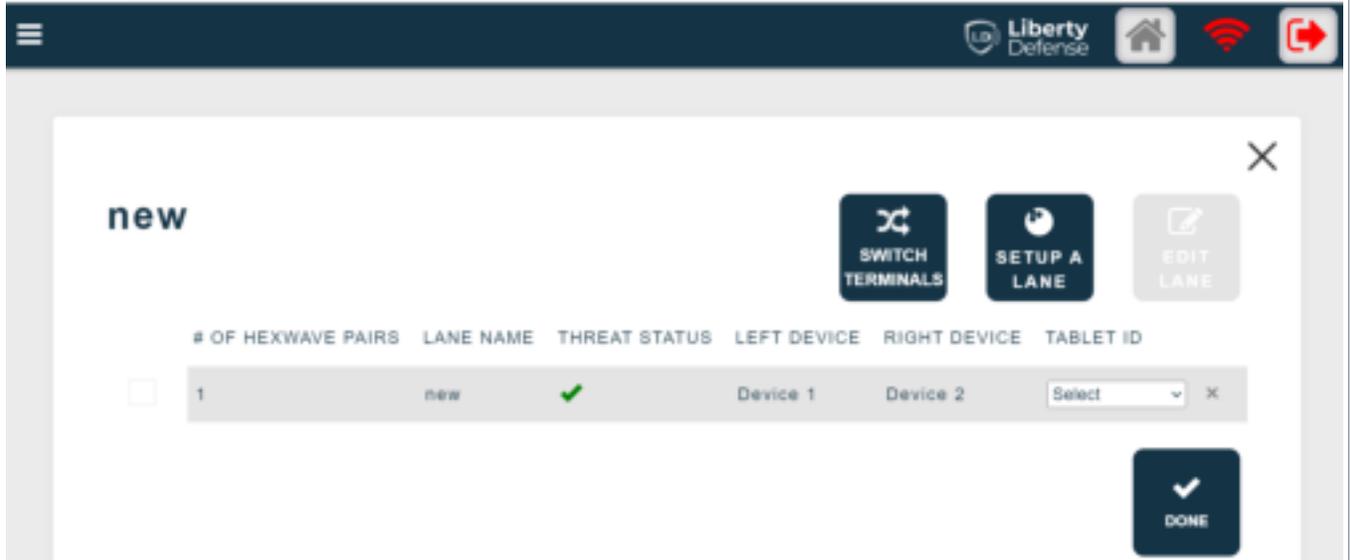


Figure 36.b. Lane Set Up Screen

Device Management

- Click device management under airport setup on the hamburger menu to:
 - a. CREATE
 - b. EDIT
 - c. DELETE



Figure 37. Device Management Screen

Tablet Management

- Click tablet management under airport setup on the hamburger menu to:
 - a. CREATE TABLET
 - b. EDIT TABLET
 - c. DELETE TABLET

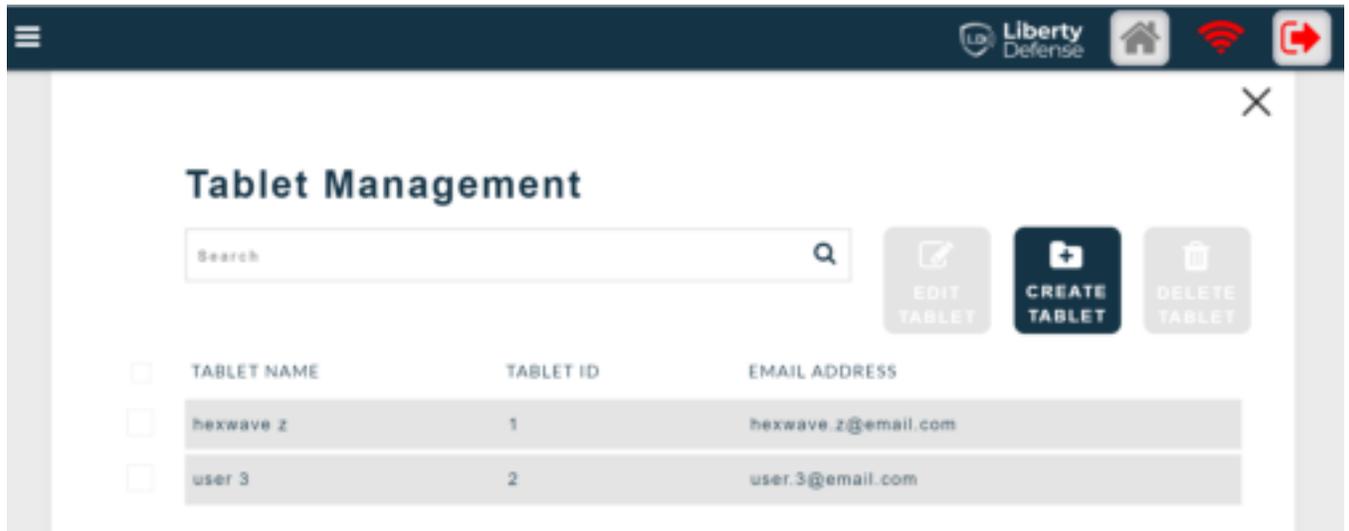


Figure 38. Tablet Management Screen

Diagnostics

- Click diagnostics under the hamburger menu to:
 - a. Start capture
 - b. Stop capture
 - c. State monitor
 - d. Reboot device
 - e. Shutdown

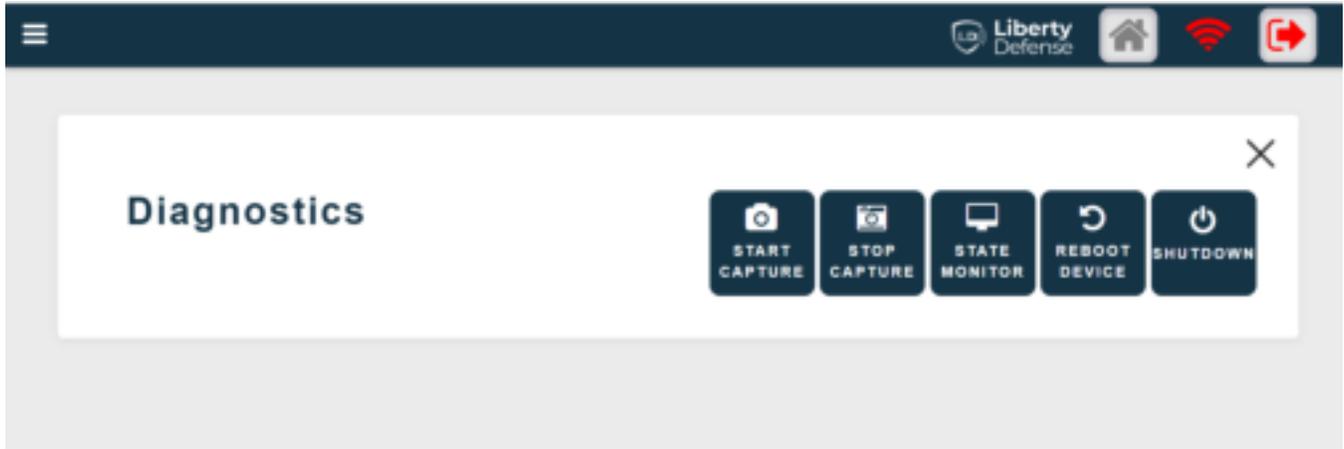


Figure 38. Diagnostics Screen

Appendix

Warranty

The HEXWAVE System comes with a 1-year standard parts and labor warranty. We will have extended warranties available for purchase.