



BEAMS INFORMATION FOR TENDER

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1 Purpose of document

2 Definitions

Abbreviation	Definition
API	Application Programming Interface
BEAMS	Booyco Electronics Asset Management System
BHU	Booyco Host Unit
BHU	Booyco Host Unit
CXS	Collision Awareness System
GPS	Global Positioning System
GSM	The Global System for Mobile Communications
IoT	Internet Of Things
MQTT	Message Queuing Telemetry Transport
MSSQL	Microsoft Structured Query Language
PDS	Pedestrian Detection System
RF	Radio Frequency
VM	Virtual Machine
WI-FI	Wireless Fidelity

Table 1: Definition Table

3 Overview

BEAMS is a web-based system that gives Booyco employees and clients a way to view, interact with and report the information collected by Booyco PDS systems. Booyco administrators use this same system to configure and check the proper functioning of your PDS system. BEAMS require a secure login which is created by the BEAMS team. BEAMS is compatible with the following browsers: Chrome, Firefox, Edge and Safari.

4 Hosting

BEAMS can be hosted on a client supplied VM (Virtual machine), physical server or on the Booyco cloud servers.

5 Server Specifications

When installing BEAMS on a client supplied server the following would be required:

Recommended requirements for BEAMS application	
-	3GHz processor or better (8 core)
-	32GB 2400MHz DDR4 memory
-	1TB SSD or more
-	Windows server 2019 or newer
-	1Gbps Network interface card

Table 2: Recommended requirements for BEAMS application

All additional software will be installed by the Booyco software installation team.

Backups of the hard drives should be part of the client's backup schedule. It is recommended to do a monthly full backup and a weekly incremental backup.

Additional requirements for a BEAMS	
For user creation and password resets	SMTP account required for user account creation
For Google maps and server updates	HTTP access is required. Port 80 and 8080
For maintenance and troubleshooting	VPN access is required
API's	Will be discussed in technical meeting if applicable
Ports to be opened	For CWS equipment 1873, 20873 and 50000 For CXS equipment 48071 and 48073
Domains to be whitelisted	www.booycobeams.com data.rifin.co.za https://www.google.com/maps

Table 3: Additional requirements for a BEAMS

6 Security

To authenticate on the interface BEAMS utilizes full SSL with 2048bit keys and SHA512 bit cyphers. The data itself is encrypted with SHA256.

7 Database

BEAMS makes use of MariaDB. The reasons for using MariaDB are:

- The costs of MSSQL and Oracle compared to MariaDB
- MariaDB is compatible with Microsoft Windows and Linux based servers
- Superior support for Clustered and distributed data handling
- Superior speed of the database specifically for the type of data BEAMS deals with
- Compatibility with Microsoft reporting services

Please Note that BEAMS can run on MSSQL or Oracle databases should a Booyco client require this, but the speed of the data handling should be considered as mentioned above.

8 Integration

BEAMS can be integrated with various other systems like time and attendance systems, fleet management systems, lamp room management systems or 3rd party dashboards.

Integration is done by means of API's and MQTT.

9 Methods of downloading data from the BHU and uploading to BEAMS

There are xx different methods of downloading data from the BHU and uploading the data to BEAMS.

9.1 Manually downloading of data with a Booyco tablet

A Booyco technician will download the data manually from the BHU with a Booyco tablet. He will then connect the tablet to an internet source and upload the data to BEAMS.

9.2 Live Data Transmission with the IOT Beacon (Wi-Fi)

A vehicle fitted with a BHU, other sensors and an IOT beacon can be configured to connect to a clients Wi-Fi network to transmit data live to either the BEAMS cloud server or a client's onsite server. The IOT Beacon supports Wi-Fi A/B/G/N/AC.

9.3 Live Data Transmission with the IOT Beacon (GSM)

A vehicle fitted with a BHU, other sensors and an IOT beacon can be configured to connect to a GSM network to transmit data live to either the BEAMS cloud server or a client's onsite server. Provision has been made for 2 sim cards to connect to 2 different service providers for redundancy.

9.4 Live Data Transmission with the IOT Beacon (RF)

A vehicle fitted with a BHU, other sensors and an IOT beacon can be configured to connect to a RF network to transmit data live to either the BEAMS cloud server or a client's onsite server. The RF network is created by means of other IOT Beacons configured as repeaters connecting to Booyco's Data Base Stations, which then transmits the data to the BEAMS server via a network connection on the same network as the BEAMS server.

10 Dashboards

The BEAMS dashboard shows a quick overview of the status of the company's BEAMS environment, recent activity and personalised warnings. The dashboard is configurable by BEAMS administrators by means of widgets. Different widgets display different data sets to get a quick overview of the Booyco data for a specific client or site. Current widgets available are:

- Area Occupation
- Counter Details
- Counter Overview
- Counter with Target
- Pedestrian Tracking
- Vehicle tracking
- Site area Occupation
- Top Pedestrian Interactions
- Top Vehicle Interactions
- Message Center
- Live Map view for vehicles

11 BEAMS Industry Standard Reports for Surface and Underground

Vehicle Interaction Reports

Vehicle Interaction summary

Vehicle Interaction Details

Device activity overview between dates
Device proximity warnings
All States (System Health Report)
Emergency override
Interaction, Warning (Single Vehicle)
Interaction, Slow (Single Vehicle)
Interaction, Stop (Single Vehicle)

Pedestrian Interaction Reports

Pedestrian Tag Interaction Summary
Pedestrian Tag Interaction Details

Pedestrian Tracking Reports

Pedestrian Walkway Movements
Pedestrian Walkway Movements by Tag ID
Number of Tags in SAFE areas
Number of Tags in Above Ground areas
Number of Tags in Underground areas
Number of Tags in Emergency areas
Tag assigned User / Personnel / Equipment
Tag Last Seen at (Service-Point)
Tag Last Seen Date-Time

Vehicle Tracking Reports

Vehicle Movements
Vehicle Movements by Vehicle ID
Vehicle Tip Counter Report

Upload (Vehicle Logs) Reports

Uploads
Last Upload Report
Uploads for Site or Device

Vehicle Check list

Vehicle Check list

Site License Checks

Site License Checks

Map Reports (Surface)

Live Map Reports (Speed, Interactions, BHU Screen, Displayed on Google Maps)
Archived Data Reports (Speed, Interactions, BHU Screen, Displayed on Google Maps)
Activity Map Report Critical (Heat map)
Activity Map Report Proximity (Heat map)
Activity Map Report Movements (Heat map)
Activity Map Report Combined (Heat map)

Activity Calendar Reports

Activity Calendar Reports

12 Report Parameters and Exports

Report parameters such as Start date, End date, Selected Device and other parameters can be changed by using the Toggle reports parameter section above any reporting section.



Figure 1: Toggle report parameters

Where applicable reports can be copied to your clipboard, exported to Excel or exported as a PDF document.



Figure 2: Copy or export reports

Reports can also be autogenerated and scheduled to be mailed to specific users at specific intervals. This is configurable according to the client’s requirements.

13 Vehicle Interactions

Vehicle Interactions offers comprehensive information on vehicle operations. The main recorded interactions include physical direction, speed and position (where fitted), proximity warnings of encroaching pedestrians, other vehicles, and activated emergency states.

The System health state is also monitored and provides insight to the health of the system during operation of the BHU.

Date	More details	Logic Stop	Ped. Stop	Ped. Slow	Veh. Warn	Veh. Stop	Veh. Slow	Veh. Warning	Bypass	Slam	Logic Slow	VDS Alert
01-09-2019	More details	1200	0	0	0	0	0	0	0	0	0	0
02-09-2019	More details	1653	0	0	0	0	0	0	0	0	0	0
03-09-2019	More details	2947	0	0	0	0	0	0	0	0	0	0
04-09-2019	More details	4180	0	0	0	0	0	0	0	0	0	0
05-09-2019	More details	2466	0	0	0	0	0	0	0	0	0	0
06-09-2019	More details	4537	0	0	0	0	0	0	0	0	0	0
07-09-2019	More details	5931	0	0	0	0	0	0	0	0	0	0
08-09-2019	More details	5072	0	0	0	0	0	0	0	0	0	0
09-09-2019	More details	2808	0	0	0	0	0	0	0	0	0	0

Figure 3: Vehicle Interactions Overview sample

Reports

[Edit Report](#)

[Previous page](#) [Report list](#)

Report : Device proximity warnings [Toggle report parameters](#) [Pinned](#)

[Copy](#) [Excel](#) [PDF](#)

Search:

Start Time	End Time	Duration	Severity	Type of Tag	Tag ID	Proximity Direction	Upload Log
02-06-2021 08:06:31	02-06-2021 08:06:33	00:00:04.000	Green - Warning	Versatile	3156627747		182386
02-06-2021 08:06:32	02-06-2021 08:06:37	00:00:05.000	Green - Warning	Versatile	3156629953		182386
02-06-2021 08:06:35	02-06-2021 08:06:37	00:00:02.000	Green - Warning	Haul / Transport	3259466615		182386
02-06-2021 08:06:37	02-06-2021 08:06:40	00:00:03.000	Green - Warning	Haul / Transport	3259466615		182386
02-06-2021 08:06:40	02-06-2021 08:06:44	00:00:04.000	Green - Warning	Haul / Transport	3259466615		182386
02-06-2021 08:26:15	02-06-2021 08:26:19	00:00:04.000	Green - Warning	Haul / Transport	1314812233		182386
02-06-2021 08:29:27	02-06-2021 08:29:34	00:00:07.000	Yellow - Slow	Versatile	3156643912		182386
02-06-2021 08:29:42	02-06-2021 08:30:12	00:00:31.000	Red - Stop	Versatile	3156643912		182386
02-06-2021 08:30:28	02-06-2021 08:30:28	00:00:02.000	Red - Stop	Versatile	3156643912		182386
02-06-2021 08:59:29	02-06-2021 08:59:41	00:00:12.000	Green - Warning	Surface Forming	1514812265		182386
02-06-2021 08:59:58	02-06-2021 10:00:01	00:00:05.000	Green - Warning	Surface Forming	1514812265		182386
02-06-2021 10:00:33	02-06-2021 10:00:35	00:00:02.000	Yellow - Slow	Versatile	3156627747		182386
02-06-2021 10:00:44	02-06-2021 10:01:35	00:00:51.000	Red - Stop	Surface Forming	1514812265		182386
02-06-2021 10:01:45	02-06-2021 10:01:48	00:00:03.000	Yellow - Slow	Surface Forming	1514812265		182386
02-06-2021 10:01:48	02-06-2021 10:01:50	00:00:02.000	Green - Warning	Surface Forming	1514812265		182386
02-06-2021 10:01:54	02-06-2021 10:01:57	00:00:03.000	Red - Stop	Surface Forming	1514812265		182386

Figure 4: Device Proximity Sample

Reports

[Edit Report](#)

[Previous page](#) [Report list](#)

Report : Interaction Logic (All Events, Single Vehicle) [Toggle report parameters](#) [Pinned](#)

[Copy](#) [Excel](#) [PDF](#)

Search:

Start Time	End Time	Duration	State Class	State Type	State Value	Upload Log	Show Parameters
06-01-2022 17:34:09	06-01-2022 17:34:09	00:00:00.000	Power	Power_Switched	Power_Down	340506	
06-01-2022 18:34:48	06-01-2022 18:34:48	00:00:00.000	Power	Power_Switched	Power_Up	340506	Show 1 Parameters
06-01-2022 18:35:11	06-01-2022 18:35:11	00:00:00.000	POI	Distress_Signal	None	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	POI	PDS_Coalition_Change	Dry/Wild	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Vehicle Intervention	Estop_Monitoring	Off	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Hardware Self Test	Device_Status	OK	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Hardware Self Test	Device_Status	Fail	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Hardware Self Test	Device_Status	OK	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Hardware Self Test	Device_Status	OK	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Hardware Self Test	Device_Status	OK	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Hardware Self Test	Device_Status	OK	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	System Self Test	VTS_Status	Not_Tested	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Software	Software_Download	End	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	System Self Test	Test_Firmware	Deactivated	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	System Self Test	System_Status	Fail	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	System Self Test	System_Status	OK	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	System Self Test	System_Status	OK	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	System	EscapeSequence	End	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Vehicle Intervention	Negotiation	Incomplete	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Hardware Self Test	Device_Status	OK	340506	
06-01-2022 18:35:17	06-01-2022 18:35:17	00:00:00.000	Work Zone	Operational_Work_Zone	WorkZone_End	340506	
06-01-2022 18:35:23	06-01-2022 18:35:23	00:00:00.000	Vehicle Intervention	Estop_Monitoring	On	340506	
06-01-2022 18:35:23	06-01-2022 18:35:23	00:00:00.000	Hardware Self Test	Device_Status	OK	340506	
06-01-2022 18:53:26	06-01-2022 18:53:26	00:00:00.000	Power	Power_Switched	Power_Down	340506	
06-01-2022 19:13:04	06-01-2022 19:13:04	00:00:00.000	Power	Power_Switched	Power_Up	340506	Show 1 Parameters

Figure 5: System Health Check Sample

14 Activity Calendar

The activity calendar shows all vehicles that had activity during the selected calendar month. It shows the vehicles in order of most to least number of interactions. The type of activity can also be selected. The different activity types are Average movement speed, Number of logged movements, Ped/Vehicle stops and Ped/ Vehicle Slows.

Calendar Activity

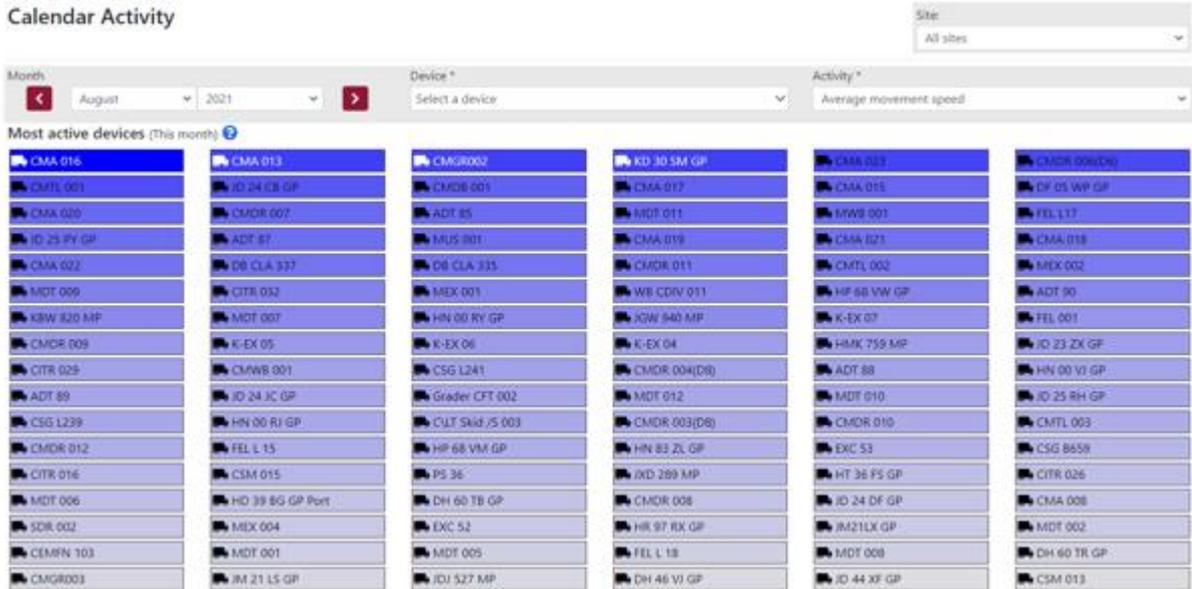


Figure 6: Activity Calendar Main screen

August 2021

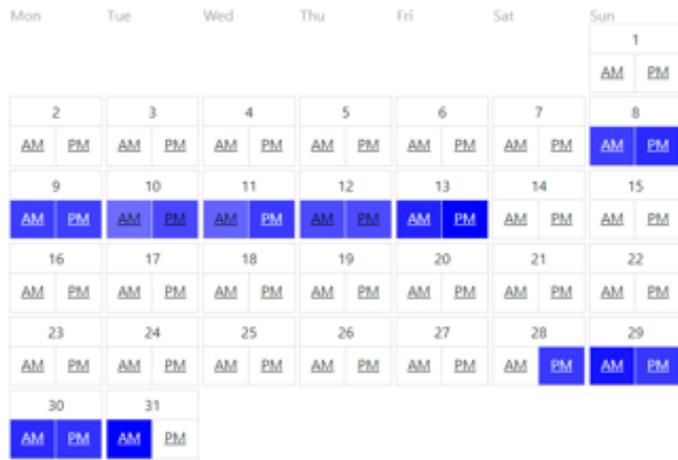


Figure 7: Activity Calendar Month view

13 August 2021, AM



Figure 8: Activity Calendar Hour view

15 Activity Map

The Activity Map displays a heat map of the selected site for areas where the Critical Zones (Stop zones), proximity interaction and movements.



Figure 9: Heat map sample

16 Pedestrian Tracking

Pedestrian Tracking offers a view to where people are located within a Site and how they moved from area to area during the day (or selectable historic period). Pedestrian tracking is made possible by personal RF identification tags worn by pedestrians as part of their kit and picked up by RF loops or readers positioned in walkways, doors, gates, turnstiles or other measurement points.

Pedestrian Tracking

Generated: 19-11-2019 18:23:23

The summary below shows the most current pedestrian area information for the last 24 hours.

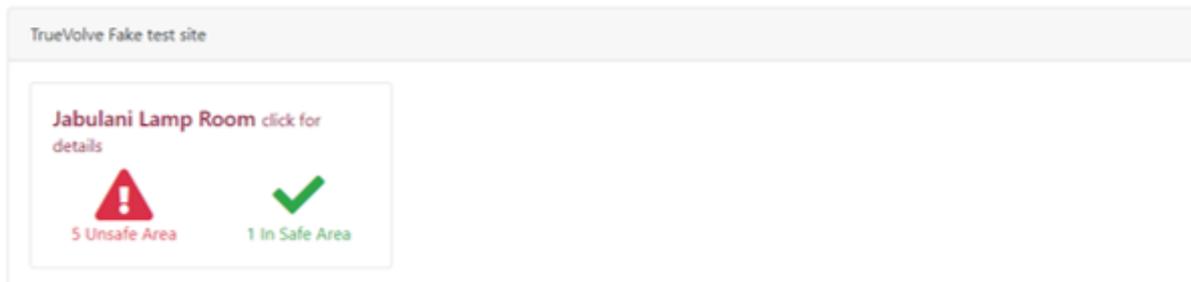


Figure 10: Pedestrian Tracking Main View (Shaft Clearance)

The area Detailed view includes specifics of the pedestrians and their whereabouts. Hovering the mouse over a person (or tapping on a mobile device) will pop up the movement progression detail indicating the person's movement as "seen" by the system.

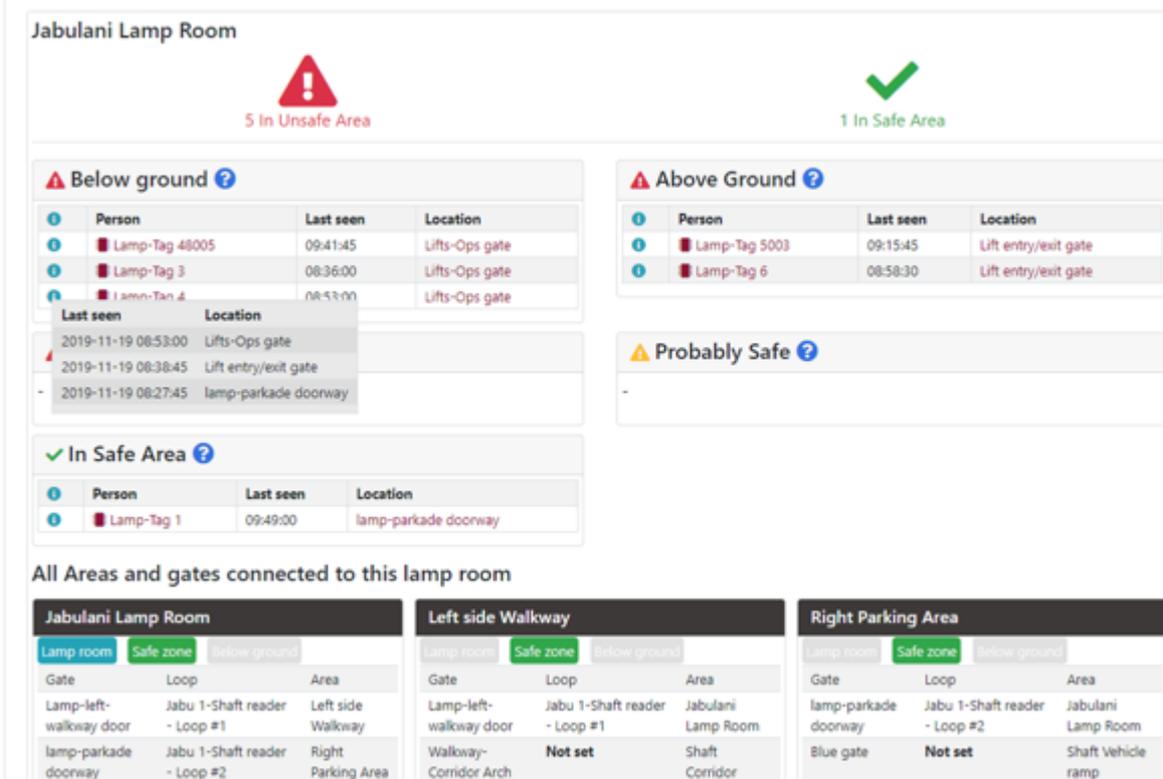


Figure 11: Detailed whereabouts of pedestrians

17 Vehicle Tracking

With Booyco's vehicle tracking, all vehicles fitted with the required hardware can be accurately tracked on its physical location list view and a vehicle list view based on where tracking panels are installed.

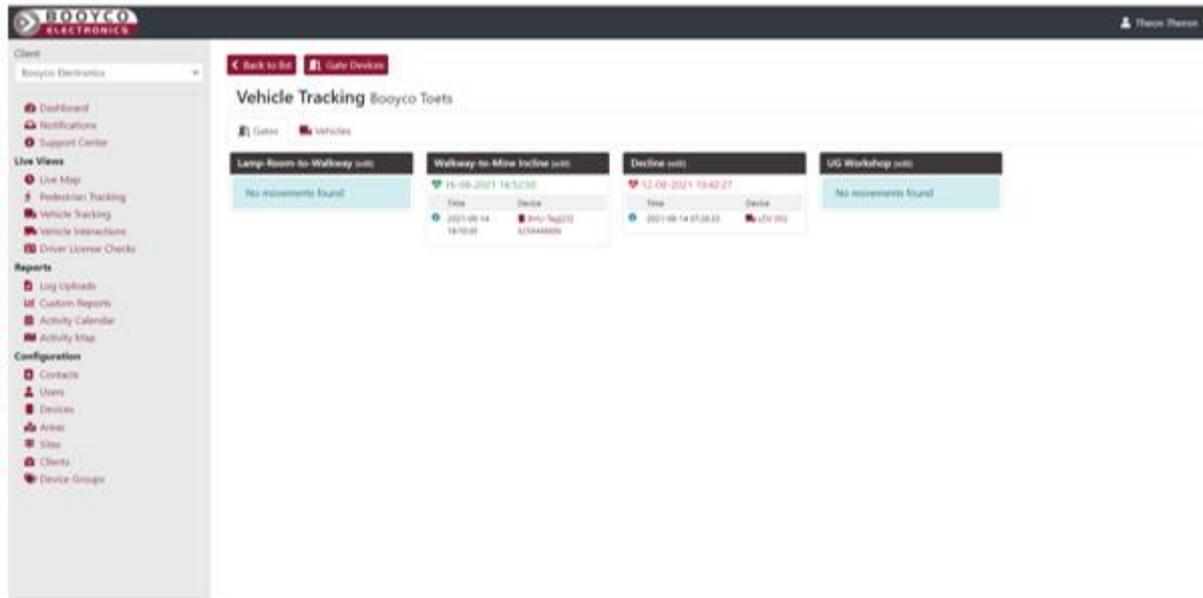


Figure 12: Vehicle tracking Gates View

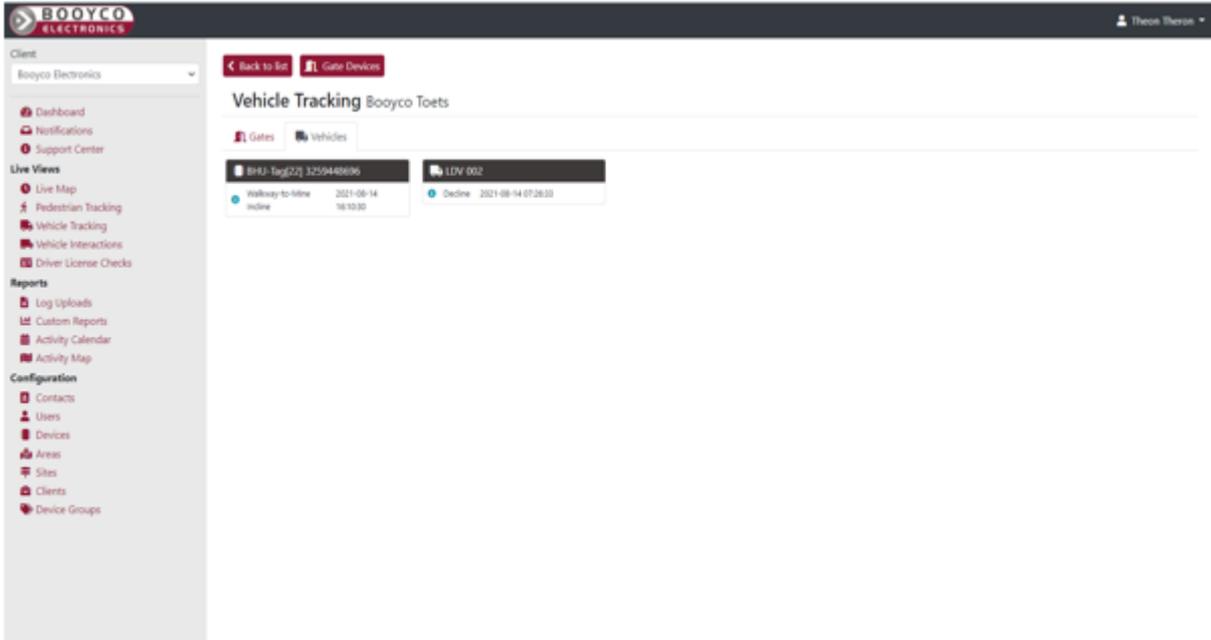


Figure 13: Vehicle tracking Vehicles View

18 Additional BEAMS features with an IOT Beacon fitted

The IoT (Internet of Things) Beacon was designed to bring IoT functionality to mining vehicles and equipment. The IoT Beacon is an integrated IoT gateway that interfaces with the Booyco CXS system to provide IoT functionality. Fitted to a vehicle it provides GRSM (On Surface) and WIFI coverage (Surface and underground), for live tracking (On Surface), live data log extraction (Surface and underground), remote configurations and remote updates. The unit is also supplied with battery back-up.

18.1 Live Map

The Timeline report displays historical or live movements and interactions of vehicles fitted with GPS systems. Map data will be transmitted live to BEAMS when the vehicle is fitted with an IoT Beacon. If the vehicle is not fitted with an IoT Beacon data can still be downloaded manually and uploaded to BEAMS for archived Map reporting.



Figure 14: dafdsa

18.2 Message Center

With the message Center and IoT beacons fitted you have the ability to send and receive messages between the BHU fitted in the cab of the vehicle and BEAMS. All messages are logged with Who sent the message, who it was sent to, when it was sent, was it received, when it was received and what response was given by the operator.

Message Center

Find Message: Site: Create new:

Unread Messages 1

Time	Type	Device	Site	Text	
28-10-2021 11:12:19	Received	BOOYCO DEMO	Booyco Toets	Breakdown - Mechanical	Mark Read
28-10-2021 11:10:02	Received	BOOYCO DEMO	Booyco Toets	Emergency	Mark Read
28-10-2021 11:06:44	Acknowledge	BOOYCO DEMO	Booyco Toets	Go To Tip 1	Mark Read
28-10-2021 10:14:17	Received	BOOYCO HILUX	Booyco Toets	Emergency	Mark Read
28-10-2021 10:13:42	Received	BOOYCO HILUX	Booyco Toets	Emergency	Mark Read
28-10-2021 08:58:08	Received	BOOYCO HILUX	Booyco Toets	Breakdown - Mechanical	Mark Read
28-10-2021 08:57:12	Received	BOOYCO HILUX	Booyco Toets	Breakdown - Mechanical	Mark Read
27-10-2021 19:27:22	Acknowledge	BOOYCO DEMO	Booyco Toets	Go To Workshop	Mark Read
27-10-2021 19:25:58	Received	JW26USP	Booyco Toets	Emergency	Mark Read
27-10-2021 19:16:11	Received	BOOYCO DEMO	Booyco Toets	Emergency	Mark Read

Previous 1 2 3 4 Next

Figure 15: Message center

Messages can be customized. This means from the sound that is played on the BHU, message types, alert pictures displayed on the BHU and responses given by the operator.

Site: Targeted devices: Reached devices:

Message Details

Message Type: Audio to play: Require Acknowledge: Time To Live: hours Display Seconds (0 is infinite): s

Message:

Buttons

Button Identifier	Button Text
<input type="button" value="Delete"/> Button 1	Yes
<input type="button" value="Delete"/> Button 4	No

Devices:

BOOYCO HILUX ?????????????????? HERMI SIN

Figure 16: Custom Message sent from BEAMS Sample

Device	Site	Received	Message Text
BOOYCO DEMO	Booyco Toets	2021-10-28 11:12:19	Breakdown - Mechanical
BOOYCO DEMO	Booyco Toets	2021-10-28 11:11:39	Emergency
BOOYCO DEMO	Booyco Toets	2021-10-28 11:10:26	Emergency
BOOYCO DEMO	Booyco Toets	2021-10-28 11:10:02	Emergency
JK68GZ GP	Booyco Toets	2021-10-28 10:23:17	Emergency
JW26ISGP	Booyco Toets	2021-10-28 10:19:42	Emergency
JW26ISGP	Booyco Toets	2021-10-28 10:19:18	Emergency
BOOYCO HILUX	Booyco Toets	2021-10-28 10:14:17	Emergency
BOOYCO HILUX	Booyco Toets	2021-10-28 10:13:42	Emergency
JW26ISGP	Booyco Toets	2021-10-28 09:36:40	Emergency
BOOYCO HILUX	Booyco Toets	2021-10-28 09:09:12	Breakdown - Mechanical
BOOYCO HILUX	Booyco Toets	2021-10-28 08:58:08	Breakdown - Mechanical
BOOYCO HILUX	Booyco Toets	2021-10-28 08:57:12	Breakdown - Mechanical
BOOYCO DEMO	Booyco Toets	2021-10-27 19:49:19	Emergency
JW26ISGP	Booyco Toets	2021-10-27 19:27:30	Emergency
JW26ISGP	Booyco Toets	2021-10-27 19:25:58	Emergency
BOOYCO DEMO	Booyco Toets	2021-10-27 19:16:11	Emergency
JW26ISGP	Booyco Toets	2021-10-27 16:53:11	Emergency
JW26ISGP	Booyco Toets	2021-10-27 16:52:08	Emergency
JK68GZ GP	Booyco Toets	2021-10-27 16:42:52	Breakdown - Mechanical

* Previous 1 2 3 4 Next *

Export Received Messages Export Sent Messages

Figure 17: Message Center logs



Figure 18: BHU Task list (Messages sent from the BHU to BEAMS)



Figure 19: BHU message from Message Center